ASSESSING THE HUMANITARIAN SUPPLY CHAIN MANAGEMENT OF HEALTHCARE LOGISTICS DURING DISASTER RESPONSE OPERATION: THE CASE OF DISASTER RELIEF AND FOOD SECURITY PROGRAM COORDINATION OFFICE, NORTH SHEWA, AMHARA REGION, ETHIOPIA

By

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A THESIS SUBMITTED TO THE SCHOOL OF COMMERCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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This is to certify that the thesis prepared by Workye Molla, entitled "Assessing Humanitarian supply Chain Management of Healthcare Logistics Disaster Response Operation: The case of Disaster Relief and Food Security Program Coordination Office, North Shewa, Amhara Region, Ethiopia", which is submitted in partial fulfillment of the requirements for the Degree of Masters in Logistics and Supply Chain Management, act in accordance with the regulation of the university and meets the accepted standards with respect to originality and quality.

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Declaration

The undersigned, declare that this thesis entitled "Assessing Humanitarian supply Chain Management of Healthcare Logistics during Disaster Response Operation: The case of Disaster Relief and Food Security Program Coordination, North Shewa, Amhara Region, Ethiopia" is my original work and has not been presented for any degree in any other university in the study area, and that all the sources of constituents used for the thesis have been properly acknowledged.

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Certification

This is to certify that Workye Molla has carried out his thesis work entitled "Assessing Humanitarian Supply Chain Management of Healthcare Logistics during Disaster Response Operation: The case of Disaster Relief and Food Security Program Coordination Office, North Shewa, Amhara Region, Ethiopia" under my guidance and supervision. Accordingly, I hereby assure that the study is his own original work and suitable for submission of the award of Master of Arts in Logistics and Supply Chain Management.

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Lists of Abbreviation

CRED	Climate Related Emergency Disaster
DOM	Disaster Operations Management
EHRP	Ethiopian Humanitarian Response Plan
HL	Healthcare Logistics
HSCM HL	Humanitarian Supply Chain Management Healthcare Logistics
HSC	Healthcare Supply Chain
HSCM	Humanitarian Supply Chain Management
HO	Humanitarian Organization
IDP	Internal Displaced Person
IFRC	International Federation of Red Cross and Red Crescent Societies
OCHA	UN Office for the Coordination of Humanitarian Affairs
OM	Operation Management
SC	Supply Chain
SCOR	Supply Chain Operations Reference Model
RVE	Risk and Vulnerable in Ethiopia
UNJLC	United Nations Joint Logistics Centre
UNCTAD	United Nations Conference on Trade and Development
WFP	World Food Program
WHO	World Health Organization

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Abstract

Humanitarian Supply Chain Management of Healthcare Logistic is the process of effective and efficient plans, implementations and controls for aid flows from the point of origin to the point of consumption with the aim of meeting the aid recipients' requirements. The main objective of this study is to assess humanitarian supply chain management of healthcare logistics practices, challenges and to measure the operational performances of humanitarian relief logistics during disaster relief operations in the case of disaster relief and food security program coordination, North Shewa, Amhara region. The study employed descriptive type of research design and both qualitative and quantitative approach were implemented by using census sampling. The target populations were all employees of disaster relief and food security program coordination, North Shewa. Data was collected using questionnaire and analyzed by using statistical package for social science. The sample size for quantitative studies was 78 employees of the organization. Both primary and secondary data were applied for this study. Primary data were collected with questionnaires, semi-structured interview and secondary data were reviewed report of the organization. The finding indicates thatabout 53% of the respondents have knowledge to basic components of HSCM logistics practices are took place in their organization and about 83.6% of respondents identified the main challenges, which impacted on the humanitarian organization of operational performances and only 32% of the respondents were reflected the three performances indicators are significance to HSCM logistics performances operations of their organization.Conclusions; humanitarian supply chain management logistics practices and challenges are affected the humanitarian supply chain management operation performances by putting more pressure on a consequence, which decreased the activities of HSCM and slowed down the delivery to beneficiaries and hence decreased quality of operations. Finally the following recommendations will be demonstrated; effective coordination between all partner, establishing suppliers performance rewarding schemes in procurement by identify potential supplier, provide response rapidly to beneficiary, distribute relief aid to those whose need it, implements practices of "just in time" approach in humanitarian supply chain management factors related to reliability, responsiveness and agility and implement HSCM logistics process standardization.

Keywords: Humanitarian supply chain, Healthcare logistics, Disaster, response, Relief operation

CHAPTER ONE

1. INTRODUCTION

For the period of recent decades, compelling indications and discussions show that the number of disasters has grown at an unprecedented rate all around the world. How to improve the performance of humanitarian supply chain management of healthcare logistics during disaster response operation has attracted an increasing attention on a global scale. Under introduction notifies the background of the study, background of the study area, statement of the problem, basic research questions, objectives and hypothesis, significance and scope of the study as well as definition of key terms. In this thesis will be focusing on humanitarian supply chain management of healthcare logistics practice, challenge and performance in order to identify disaster relief challenge and determine the performance of the selected organization performance and suggest ways how to improve it.

1.1 Background of the study

The occurrence of both natural and man-made disasters is on the rise worldwide. Disaster has been defined as disruption that cripples the functionality of a community causing major human, material, economic or environmental losses which surpass the ability of the affected people to cope using existing resources (Azrul Ghazali, 2018).

From 2019 to 2020, 679 major disasters were reported in EMDAT killing 26,774 people, affecting 189,038 million others and caused direct economic losses valued at 293.156 billion US$. The two years rivaled 2016 as the world's hottest recorded year despite the absence of a strong El Nino effect. Apart from the COVID-19 pandemic, the year was dominated by climate related disasters (CRED, 2021).

In comparison to the previous two decades (2000- 2019), 2020 had a higher impact in terms of number of recorded events and economic losses (US$ 151.6 billion). There were considerably fewer deaths compared to the annual average of 61,709 and fewer people directly affected compared to the annual average of 201.3 million people. This decrease in impacts is due to the absence of mass casualty events, such as the 2004 Indian Ocean Tsunami (227,000 deaths) and

the 2010 Haiti Earthquake (222,500 deaths) or high impact events, such as the 2015/2016 drought in India (330 million people affected) (OCHA, 2021).

Droughts were most heavily experienced across the Sahel, affecting a total of 13.4 million people in Mali, Burkina Faso, and Niger. Wildfires across the west coast of the USA marked the third year in the past four years with US$10 billion in economic losses. Finally, although it was a relatively quiet year for geophysical events, an earthquake that killed 115 people in Turkey served as a reminder of the severe threat of earthquakes, the deadliest type of disaster over the previous 20 years. Overall, the most notable features of the year were significant flood events across East Africa, South Asia, and China; a record year in the number of storms in the Americas; a series of storms in quick succession to strike South-East Asia; and summer heat waves across Europe which accounted for the deadliest disaster events for the 2nd year in a row (Gerald J. Dorothy R., 2020).

Historical accounts dating from the medieval period and the better documented accounts from 16th and the 17th centuries suggest that famine in Ethiopia has been the frequent outcome of natural and socio-economic factors. Drought, famine and related disasters have been a recurring feature of Ethiopian history and indeed the history of the Horn of Africa. Pankhurst states that the natural causes of famine included drought, locusts, caterpillars and in the case of the great famine of 1889-1892. Socio-economic factors leading to famine included deforestation, soil erosion and exhaustion, fragmentation of land holdings, the subsistence economy with its primitive agricultural tools and inadequate grain storage, in-egalitarian systems of land tenure, arbitrary taxation and other dues, and civil wars (RVE,2003).

Ethiopia saw a significant increase in internal displacement in 2018 as a result of inter-communal conflict in several pockets of the country, with a near doubling of the internally displaced person (IDP) and IDP returnee population to around three million by the end of 2018. Though localized small-scale displacements have always existed in Ethiopia from clashes between communities over pasture and water rights in pastoralist and agro-pastoralist areas along regional boundaries, the scale and frequency seen in 2018 are unprecedented (OCHA, 2020).

Providing sustained and adequate assistance to affected-people in remote and hard-to-reach areas, as well as in areas where access was restricted due to insecurity remained a challenge

throughout the year. The spikes in internal displacement and the vast geographic spread of the hotspot areas stretched response capacity and resources (EHRP, 2019).

While strengthening the humanitarian response, the government and humanitarian partners are working towards a joined-up response strategy with the government, development and financing partners. This strategy will focus on enhancing resilience and durable solutions in prioritized geographic areas, and aims at achieving two to three specific and measurable collective outcomes by 2025 (EHRP, 2019).

This study, humanitarian supply chain management of healthcare logistics (HSCMHL) during Disasters relief will provide an environment for researchers and students in various disciplines, including humanitarian logistics practices such as procurement, transportation, warehouse, distribution and operation management, to conduct research in a number of areas related to service humanitarian healthcare supply chains.

When a disaster occurs, an efficient disaster relief supply chain plays a critical role in quickly distributing relief supplies to the affected area for rapid recovery. In this context, several academic research studies were conducted to investigate different aspects of disaster relief supply chain management. Lodree and Taskin, (2008), proposed an insurance risk management framework for decision-makers to quantify the risks and benefits associated with stocking decisions for disaster relief efforts or supply chain disruption. Maon, (2009), proposed a theoretical model for developing a supply chain in disaster relief operations through cross-sector socially oriented collaboration.

Based on the above, the aim of this thesis is to assess the HSCMHL disaster relief operations process in North Shewa, Amhara region national state, based on humanitarian logistics practices: such as resource, procurement, transportation, warehouse, distribution and information and their challenges.

1.2 Statements of the Problem

Every year, over 170 million people will be affected by conflict, and another 190 million disasters; yet the full impact on people's health is far greater than this. Some will be large national, regional or even global crises, from cyclones and drought to major outbreaks. The area of disaster management has become increasingly prominent in a context of frequent political,

religious change and conflict, and within it, the field of knowledge on humanitarian logistics and supply chain management (HLSCM) has attracted attention from a variety of stakeholders, such as scholars, practitioners and policy makers (WHO, 2019).

The demand and supply management is an area which requires a lot of attention from the research community. Any new method for near accurate demand predictions will be a great help to the logisticians. The supply management issue has to be given considerable attention. Operations research models are required for intelligent sourcing and storing of the aid materials and to be able to manage the available resources when it is required (Ramesh Anbanandam, 2012).

The above studies have not focused specifically on humanitarian supply chain management of healthcare logistics disaster relief operations practices and challenges. Most of the times the problems humanitarian organizations face differ from one country to another. According to researchersinvestigating different journals and articles there was no study done on the topic of HSCM or HL practices for disaster response in North Shewa. Therefore, there is a need to conduct a study to identify the humanitarian supply chain management of healthcare logistics practices, challenges and operational performances in North Shewa.Additionally this thesis will also be able to compare the situation in North Shewa with other regions and countries.

1.3. Objectives of the Research

1.3.1. General Objective

To assess HSCM of HL during disaster relief operations in terms of procurement, commodity handling, transportation management, distribution and information technology process in the case of disaster relief and food security program coordination office, North Shewa, Amhara region.

1.3.2 Specific Objectives

- To assess the HSCM practices of HL during disaster response operations in North Shewa disaster relief and food security program coordination office.
- To identify the main challenges of the HSCM of HL in North Shewa during disaster relief and food security program coordination.

- ❖ To measure the HSCM performance of Healthcare Logistics in North Shewa disaster relief and food security program coordination.

1.4. Research Questions

To assess theoretically and empirically based evidence about the humanitarian supply chain management of healthcare logistics performances, identify the main challenges. Therefore to achieve the intended objectives, the study will be answering the following questions.

1. How is HSCM of HL beingpracticed in North Shewa disaster relief and food security program coordination?
2. What are the challenges of HSCM of HL in North Shewa disaster relief and food security program coordination?
3. What is the HSCM performance of healthcare logistics during disaster relief and food security program coordination?

1.5 Scope of the study

The study would focus on humanitarian supply chain management of healthcare logistics practice and challenges in Disaster Relief and Food Security Program Coordination of North Shewa. Temporal scope: The study would conduct in-depth interviews related to humanitarian supply chain management of healthcare logistic practices with workers of the study organization during the study period. Geographical scope: the study would betoo limited on HSCM of HL response operation in Disaster Relief and Food Security Program Coordination of North Shewa. Methodological scope: study would limit on descriptive types of research design. Conceptual scope: The study would focus on HSCM of HL response from the perspective of disaster relief operations in the main drivers of humanitarian supply chain practices and challenges.

1.6 Limitations of the Study

This thesis was focused and collected data from the Government Humanitarian disaster relief organization, but not including beneficiaries and donors it showed that the study was limited to only one side.Therefore, it is difficult to generalize the findings of the study for other humanitarian organizations. There was a lack of willingness of the employees regarding filling the questionnaires or providing the required data with care and being unable to return the questionnaire on time.

1.7. Significances of Study

The study will contribute to HSCM of HL field by examining the current practice of humanitarian logistics disaster relief service. Humanitarian service providers and North Shewa humanitarian disaster relief staff will use this feedback to assess their practice against other competitive humanitarian healthcare logistics disaster relief operations. Researchers and academicians will find the outcome of this research valuable to their study and the advancement of knowledge. This research will also provide useful contributions to the policy makers who are responsible for improving humanitarian disaster relief strategy. The relevance of this study will reveal a critical and not yet researched placeto develop a theory under humanitarian supply chain management of healthcare logistics disaster relief operations.

1.8 Definition of Terms

Disaster: a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources (IFRC, 2009a).

Disaster Response: A sum of decisions and actions taken during and after disaster, including immediate relief, rehabilitation, and reconstruction (UN DHA, 1995).

Emergency relief: The immediate survival assistance to the victims of crisis and violent conflict. Most relief operations are initiated on short notice and have a short implementation period (UNHCR, 2013).

Humanitarian Operations: Operations conducted to relieve human suffering, especially in circumstances where responsible authorities in the area are unable or unwilling to provide adequate service support to civilian populations (OCHA, 2020).

Humanitarian healthcare logistics: Meeting to provide the needs of humanitarian disaster relief items for disaster relief beneficiaries (e.g. therapeutic food, sanitary materials, clothing, gloves, medical equipment; like wheelchair, stretcher, **Sanitary and safety measures in the storage facility** etc.) (Iwan Vanany, 2015).

Humanitarian logistics: the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of goods and materials for the purpose of alleviating the suffering of vulnerable people (Thomas and Kopczak, 2005).

Logistics: The holistic planning, regulation, accomplishment, and control of all intern and cross-company flow of goods and information (Frank St, 2021).

1.9 Organizations of the study

This thesis is organized in five chapters. The first chapter comprises background of the study, statement of the problem, research objective and questions, scope of the study, delimitation and limitation of the study, and significance of the study which can be applied to humanitarian logistics in the study area, as well as the specific research questions and objectives. The second chapter presents literature review, under subtopics of theoretical literature review which existing theory based study, empirical literature review in which findings of related studies conducted having consistent and contradictory findings, conceptual framework of the study which the process of developing it and finally identify the literature gap of the study. Chapter three describes the methodology implemented; it determines data collection, research design, research approach, sampling technique, data source and type, data collection procedure, method of data analysis and presentation, validity and reliability test and ethical considerations. Chapter four presents the analysis of the data and presents the findings and discussion of findings of the study. Finally, a summary of the study conclusion, recommendation and consideration for future research in this area would be proposed.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

In this chapter try to increase an understanding of the existing research and debates relevant to HSCM of HL operation related topics, and to present that knowledge in the form of a written report. Conducting this related literature review will help to build the knowledge towards this particular study topic. The main reason of this chapter is document critical knowledge, important concepts, research methods, and experimental techniques that will be used in the performance of HSCM of HL in disaster relief operations. This literature review helps to get a better understanding of how research findings are presented and discussed in particular HSCM of HL in disaster relief operations in general to have the overall overview of the concepts and with a special focus of the particular study area of North Shewa Disaster Response Office.

2.1 Theoretical Literature Review

2.1.1 Logistics

Logistics (management): that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements (CSCMP, 2009).

Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements (CLM, 1986). In humanitarian aid and disaster relief operations mainly concentrates on strategic and operative planning issues, such as facility location planning, inventory planning, vehicle routing, and delivery planning (Mingli Liu, 2013).

2.1.2 Supply Chain Management

Supply chain management is defined as all activities associated with the flow and transformation of goods from raw materials stage through the end user, as the associated information flows.Supply chain is a system of suppliers, manufactures, distributors, retailers and customers where material typically flows downstream from suppliers to customers (except for reverse logistics) and information flow in both directions. SCM involves managing a connected series of

activities including planning, coordinating and controlling movement of goods from supplier to customer (R.B. Handfield, 1999).

Another definition of supply chain management emerges from the transportation and logistics literature of the wholesaling and retailing industry, emphasizing the importance of physical distribution and integrated logistics. There is no doubt that logistics is an important function of business and is evolving into strategic supply chain management. Its primary focus is the efficient physical distribution of final products from the manufacturers to the end users in an attempt to replace inventories with information and reduce transportation costs (Abbas M. Afshar, 2009).

2.1.3 Definition and Concepts of Humanitarian Supply Chain Management

In order to lessen the impact on those who are affected by the disaster, the HSCM involves managing the many systemic elements.Preparation, planning, purchasing, transit, warehousing, tracking, following, and tracing, as well as customs clearance, are all included in the HSCM logistics function. The functions of humanitarian logistics and supply chain management (HL-SCM) operations include the processes of acquiring resources and goods, caring for and safeguarding these goods, and providing these goods and services in a proper, efficient, effective, and timely manner as and when necessary (Thomas and Kopczak, 2005).).

HSCM of HL is the procedure of efficient and effective plans, implementations, and controls for aid flows from the point of origin to the point of consumption (i.e. therapeutic food, sanitary materials, clothing, gloves, medical equipment, such as wheelchair, stretcher, gowns, goods, services, financial resources, information, etc.), with the goal of satisfying the needs of the aid recipients (Iwan Vanany, 2015).

The involvement of healthcare SC in crisis management activities is crucial for ensuring beneficiary safety as well as service quality. Rescue efforts are the primary goal at the time of the crisis. Health services can be given to victims who have health issues as a result of disasters in order to aid in rescue attempts.

It is anticipated that the impact of increasing losses, particularly for victims, will be lessened by the efficiency and efficacy of operational processes in the healthcare supply chain. According to Byman (2000), humanitarian relief groups engage in two main categories of activities:

(1) Relief efforts: assistance for those affected by major emergencies. In order to reduce immediate hazards to human health and survival, these short-term actions concentrate on delivering products and services.

(2) Developmental activities: Longer-term assistance with an emphasis on sustainability and local self-sufficiency. Creating stable and dependable means of transportation, healthcare, housing, and food is one of these things. Indeed, humanitarian logistics play a major role in disaster relief; according to all estimates, at least 80% of the cost of disaster assistance is made up of logistics operations.

Four arguments are provided by Thomas and Kopczak (2005) as evidence for the importance of humanitarian logistics in disaster relief and in the success of present and future operations:

1. For significant humanitarian programs to be efficient and quick to respond, logistics are essential.

2. Logistics can be one of the most expensive components of a relief effort since it includes transportation and procurement.

3. As it will handle the tracking of items along the supply chain, the logistics department is frequently the source of data that may be examined to give post-event learning.

4. Logistics data reflects all implementation-related factors, including the efficiency of suppliers and transportation companies, influenced by how the healthcare system can run in a disaster supply chain process. It is anticipated that the efficiency and efficacy of operational procedures in healthcare logistics will lessen the impact of larger losses, particularly victims. Rescue healthcare logistical operations were the primary goal at the time of the disaster. Health services can be given to victims who have health issues as a result of disasters in order to aid in rescue attempts. The majority of the time, medical services are provided in the disaster's epicenter at facilities like hospitals, clinics, health centers, etc (Suparno, 2015).

Health emergency kits, temporary medical facilities, stockpiling, warehousing, prepositioning of supplies, transportation, telecommunications, security of operations, donation guidelines/emergency, importation of medications, equipment, and devices (safety, security,

etc.), as well as cold chain for vaccines, specimen transport, and essential supplies (glove, gauze, plaster, gown, and bandages)

2.1.4 HSCM logistics Practices

Costa, (2012) identified the following actions that need to be developed for better performance in humanitarian operations: Sourcing, procurement, transport, storage and handling, distribution, information technology and performance evaluation.

A. Sourcing Practices

Sourcing is the purchasing of products or components that go into a product from the supply chain. The Sourcing process involves a host of essential tasks, such as managing supplier relationships, identifying suppliers for a request for quote, managing cost negotiations, and evaluating supplier performance after product shipment.

Benefits of Effective Sourcing Decisions are; better economies of scale can be achieved if orders are aggregated, more efficient procurement transactions can significantly reduce the overall cost of purchasing, design collaboration can result in products that are easier to manufacture and distribute, resulting in lower overall costs and firms can achieve a lower purchase price by increasing competition through the use of auctions.

The sourcing process has seven steps (C. Scott., 2011).

1. Humanitarian relief requirement analysis

The first step when developing a sourcing strategy is to fully understand the purchase requirement relative to the business unit objectives. Also involved in this step is a thorough supplier spend analysis to determine past expenditures for each commodity and supplier, as well as the total expenditures for the commodity as a percentage of the total.

2. Discovering potential Suppliers

Several pieces of information are required in order to make an informed choice on sourcing: information on the volume of all annual purchases. External market research is used to uncover details about important suppliers, capacity that is available, technological trends, price and cost data and trends, technical requirements, environmental and regulatory difficulties, and any other

data that is available. Cost structure, financial standing, customer satisfaction levels, support capabilities, relative strengths and weaknesses, how the buying company fits in their business, how the company is viewed, core capabilities, strategy/future direction, and culture are some of the important factors that should be documented and included in a thorough supplier analysis study (Manuel Furlotti, 2014).

3. Selecting Suppliers

Once one or more potential suppliers have successfully completed the evaluation step, the selection process must begin. The supply manager or sourcing team will now ask potential vendors to submit bids or proposals. Whether to choose suppliers through haggling, open bidding, or a combination of the two must be decided. Initial supplier qualification, agreement on the measurement criteria, acquiring relevant data, and selection are the four fundamental steps in the selection of strategic suppliers (Manuel Furlotti, 2014).

4. Developing Suppliers source strategy

Not all suppliers need development, but to reach the lofty status of a world-class collaborative relationship, development is needed. Even suppliers recognized as the best of the best requirement investment on the part of the buying firm to realize the full benefit of the collaborative relationship (Manuel Furlotti, 2014).

5. Negotiation

A negotiation is an interaction communication process that may take place whenever we want something from someone else or another person wants something from us. Negotiation is the process of communicating back and forth for the purpose of reaching a joint agreement about differing needs or ideas. Negotiation is a decision-making process by which two or more people agree how to allocate scarce resources (Manuel Furlotti, 2014).

6. Contracting with the Suppliers

Although there are significant differences in the specific wording and details of contracts employed by supply managers for sourcing products, processes, and services, the structures of contracts used in purchasing products and services are fairly standard and have a number of

common attributes. In general, these attributes are established by a firm's legal counsel and then are modified for different types of suppliers, products, and services (Manuel Furlotti, 2014).

7. Buyer-Supplier Relationships Management

The transition from mechanical and reactive purchasing to proactive procurement is analogous to how relationships between buyers and suppliers have changed. For a variety of reasons, collaborative and alliance ties for the purchase of non-commodity goods and services tend to have lower overall costs than transactional connections. High levels of demand certainty and continuity are necessary for process improvements and the implementation of technical advancements (Manuel Furlotti, 2014).

B. Procurement practices

The purpose of the procurement process is to make sure that the organizations involved in relief practices have the resources needed to meet identified needs. This in turn requires identifying the sources of those goods and services and the way in which they will be acquired (PAHO, 2001).

Goods can be acquired differently; like in bulk or vendor stored, until needed and procurement can consider just local or also global suppliers and vice-versa. After a disaster struck, speed at any costs is of utmost importance, as the first 72 hours are crucial for providing relief. Goods are brought into the affected area as quickly as possible. After the first 90 to 100 days, disaster response is delivered more effectively at reasonable cost and speed (Balcik, 2008).

Humanitarian organizations often purchase relief items from global suppliers through competitive bidding processes in order to provide equal opportunities to all firms in. However, in cases of huge disasters, when providing goods quickly in large amounts is crucial, tendering techniques are not applied. In the bidding process, humanitarian organizations first identify potential suppliers, which are able to meet the item and delivery requirements (PAHO, 2001).

Next, these qualified suppliers are invited to bid. As a final step, humanitarian organizations evaluate the purchasing offers and finally make contracts with the winning supplier. Then the delivery of supplies to the affected areas begins. To increase responsiveness, humanitarian organizations started to establish pre-purchasing agreements with suppliers, which specify in advance quality and delivery requirements for emergency items (Humanitarian M., 2015.

C. Transport Practices

The next step in the supply chain is transportation, which involves moving people, equipment, and essential supplies. Before being delivered to the disaster-affected areas, the goods are first conveyed to central distribution centers, distribution intermediary locations, or local distribution centers. A transport strategy must consider not just the mode of transportation but also the practical options for moving goods from one location to another and the options for the quick and secure delivery of aid. Allocating relief supplies, scheduling vehicle delivery, and planning vehicle routing are the main operational transportation considerations (Balcik., 2008).

To reduce operational costs and increase the chance that impacted individuals will survive, effective delivery of relief supplies and personnel is required. Naturally, the majority of research on transportation in disaster relief supply chain management and humanitarian aid concentrates on how to transfer scarce relief supplies to a catastrophe location. Any strategy for providing humanitarian help must include transportation. It aims to distribute goods and other necessities to those who may benefit from emergency disasters. Trucks, airplanes, ships, and other vehicles that can be deemed appropriate for the circumstances can all be used for transportation (Oloruntoba, 2005).

D. Storage and Handling Practices

The purpose of storage is to protect the emergency supplies in an organized, systematic fashion until they can be delivered to their ultimate recipients. It must also take into account reserve supplies, or stockpiles, for future or unforeseen or unexpected needs. Organizing a warehouse, so that it functions correctly means complying with current standards for protecting the quality and security of the products shipped. Some warehouses have been specially designed to facilitate storage, having the necessary space and characteristics for the safe loading, offloading, and handling of the merchandise Inventory management is the process of monitoring and controlling inventory level and ensuring adequate replenishment in order to meet customer demand. Inventory management helps companies identify which and how much stock to order at what time. The practice identifies and responds to trends to ensure there's always enough stock to fulfill customer orders and proper warning of a shortage (PAHO, 2001).

In the case of HSCM, the organizations have low visibility in the case of the inventory and many times, the control of the inventory is being given to the country officials which may lead to improper planning like scarcity in some areas and surplus in others (Ergun, 2010).

E. Distribution Practices

The objective of the distribution logistics chain in relief operations is to provide aid to the victims of a disaster, or at the very least to the agencies in charge of handling emergency supplies, in a way that is reasonable, fair, and well-managed to prevent abuses or waste. Any link in the chain's failure or ineffective operation will have an impact on performance as a whole. For example, if a shipment of supplies is transported properly, but it is discovered upon arrival that no accommodations were made for storage, the effectiveness of the transport effort will have been in vain. Or, if there are sufficient resources to meet the demands of a disaster location but no means of transportation to get them there,

F. Information Technology Practices

Information technology plays an important role in the humanitarian aid and disaster relief environment. The use of information systems to track and trace relief items helps improve the effectiveness of aid delivery and waste minimization. Use of information technology to speed up humanitarian work was also found to be a major practice among humanitarian organizations; the reason for this is to enable the organizations to speed up humanitarian activities in disaster relief operations (Pettit and Beresford, 2009)

2.1.5 HSCM of Healthcare Logistics Performance in Disaster response

The process of calculating an action's efficacy and efficiency is known as performance measurement. While efficiency relates to how economically a firm uses its resources when providing a certain degree of customer satisfaction, effectiveness assesses the extent to which client requests are met (MJG, 2018).

Humanitarian supply chain efficiency will be evaluated in terms of time of delivery, quality of delivered materials, decrease in fatalities, and decrease in stock-outs of essential supplies including equipment and medications, and optimal utilization of donated goods. More efficient, more effective, and more transparent relief operations are necessary because to the growing frequency and size of catastrophes, a lack of resources, financial competition, and the demand

for responsibility. Measuring the effectiveness of relief chains has become crucial for all organizations involved in disaster management because logistics are at the core of all relief operations and are also the most expensive aspect of any relief effort (Sivadass Thiruchelvam, 2018).

Client satisfaction, which may be attained through solid connections with the customer and all other parties involved, can be used in the business setting to gauge performance. The idea of a customer in the context of business refers to a person whose requirements are supplied by suppliers, vendors, or sellers in return for payment of some kind. By applying the aforementioned idea to HLSCM, we can see that there are two separate types of customers: the donor and the recipient. However, the HO's effectiveness is crucially dependent on the satisfaction of both the donor and recipient, and this is accomplished by providing beneficiaries with timely access to high-quality products and services in an open and responsible manner (Shafiq M., Soratana K., 2019).

There are six justifications for performance evaluation. These include determining success, determining whether customer requirements are met, helping organizations better understand their processes, locating bottlenecks and areas in need of improvement, ensuring decisions are made based on facts, and demonstrating whether planned improvements actually take place (Shafiq M., Soratana K., 2019).

Appropriate performance measurements are necessary to assist the supply chain develop into an efficient and effective chain and display a true understanding of supply chain management. Performance measurement is the process of assessing the efficacy and efficiency of actions, and it entails the discovery, monitoring, and communication of performance outcomes using performance indicators (Chan and Qi, 2003).

2.1.5.1 Performance indicators

Appeal coverage

This indicator includes two measures. The first is the percent of appeal coverage, which is the proportion of goods donated by contributors to the total number of items needed for the operation at a particular time. It is expressed as the proportion between the total number of products requested and the number of items promised.This indicator serves to inform the

organization of how successfully and promptly pledges are being received for the sought items (Larrea, O., 2013).

The second statistic is the proportion of things that have been delivered on-site out of all the items that have been requested for the operation as of a particular time. The ratio between the number of items supplied and the total number of items requested represents this indicator in fractional form. Together, these two measures show how well an organization is able to a) discover contributors and b) transport items to the disaster area at a particular period (Davidson, A. L., 2006).

Donation-to-delivery time

The second performance indicator tracks how long it takes to deliver a donation once it has been promised by a contributor. The discrepancy between the pledge delivery time and the actual delivery time is used to describe it. Another crucial performance indicator in the HSCM is response time. Relief organization evaluation, procurement and delivery methods, supplier location, transportation preference, topology, safety, infrastructure, and politics are the elements influencing the HSCM's responsiveness (Beamon and Balcik, 2008).

Financial Efficiency

The financial efficiency indicator is made up of three metrics. The first two measures compare the budgeted prices to the actual prices paid for the goods provided in the operation using two approaches (one relative and one absolute). The cost of transporting the commodities to the beneficiaries is included in the third financial efficiency metric.This statistic is defined as the ratio of the overall transportation expenses to the total delivery expenses at a given moment in time. As more things are delivered onsite and as less expensive transport methods are employed beyond the initial delivery phase, the value of this ratio should decline with time (Larrea, O., 2013).

Assessment Accuracy

Assessment accuracy indicates how much theoperation’s final budget changed over time from the original budget. This metric contextualizesthe values of the other metrics on the scorecard. For example, if it appears on the scorecard thatthe delivery lead time of a specific type of item was longer than average in an operation, theassessment accuracy metric will indicate if the long

lead time of that item was caused by aninitially low estimation of the quantity needed (Larrea, O., 2013).

Flexibility

The flexibility metric is also an indicator of the performance of the HSCM. The flexibility metric consists of three types of flexibility. The time flexibility can be defined as the minimum response time, which is the elapsed time between the onset of the disaster and the arrival of the organization's first supplies to the disaster site. Volume flexibility for the relief chain measures an organization's ability to respond to different magnitudes (or severity) of disasters. Mix flexibility for the relief chain measures the number of different types of items that the relief chain can provide during a particular time period (Beamon and Balcik, 2008; Slack, 1991).

According to the Supply Chain Operations Reference Model (SCOR) model, five performance attributes should be considered in assessing the performance of supply chain management. The metrics are categorized in five performance attributes: reliability, responsiveness, agility, costs and asset management efficiency. The first three attributes are considered customer-focused which makes them apply to humanitarian supply chain management functions; which are reliability, responsiveness, and agility. The latter two are internally focused (Matiwos Ensermu., 2017).

Reliability

The ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability or consistency attribute includes: On-time, the right quantity, the right quality.

Responsiveness:

Responsiveness is the capabilities of the supply chain to efficiently and effectively respond to the dynamics that affect the customers of an organization by reacting swiftly or quickly to the humanitarian requirements that keep on changing.

Agility

The capacity to act swiftly in response to short-term changes, outside influences, and market shifts in order to establish or preserve a competitive edge. Flexibility and adaptability are among the SCOR agility metrics. A humanitarian organization's capacity to swiftly modify its tactics,

notably in purchasing, inventory control, and delivery to meet constantly shifting supply chain needs is known as supply chain agility. It's crucial to understand the distinction between flexibility and agility. Flexibility is an inwardly focused competency, whereas agility is an outwardly focused one. How quickly the supply chain can react is measured by its agility (Matiwos Ensermu., 2017).

In order to transfer relief supplies efficiently and effectively to disaster-affected areas, humanitarian supply chain networks must be made more agile. If humanitarian supply chains are to successfully provide the necessary humanitarian relief, including food, water, shelter, non-food products, and other infrastructural needs to the disaster-affected victims, they must be quick and adaptable (Oloruntoba and Gray, 2006).

2.2 Empirical Literature Reviews

This section of the literature review will present the findings of other empirical studies that are related to the subject matter. The aim of this part is to review what other researchers have contributed in respect of humanitarian logistics in disaster response operations from an empirical perspective. Humanitarian logistics is popular and many researchers are interested in investigating this area in the previous years (Meiller, S. Bureau, W. Zhou, 2011). Studies that consider the integration between the area of healthcare logistics and supply chain management will become an important and interesting issue for academicians and researchers in the healthcare logistics area on the field of humanitarian supply chain management are still relevant (Dobrzykowski, (2015).

During the disaster, there will be a substantial increase in demand for the basic necessities that disaster victims require, such as food, clothing, medicine, and medical supplies. Nearly 60–80% of the expenditures connected with supply chain activities in the operational logistics of humanitarian aid are incurred in the management of the humanitarian supply chain for disaster relief. In order to lessen the impact of higher losses as a result of catastrophes, the implementation of healthcare logistic response should be carried out effectively and efficiently (Van Wassenhove, 2006).

2.2.1 HSCM of HL practices in disaster response operation

A. Sourcing

Sourcing is the purchasing of products or components that go into a product from the supply chain. The Sourcing process involves a host of essential tasks, such as managing supplier relationships, identifying suppliers for a request for quote (RFQ), managing cost negotiations, and evaluating supplier performance after product shipment (Manuel Furlotti,2014).

Sourcing is the entire set of business processes required to purchase goods and services. For any supply chain function, the most significant decision is whether to outsource the function or perform it in-house. Every business has to determine whether they should perform a service themselves in-house or outsource that particular service to an outside vendor.Sourcing is one of the components of the supply chain operations reference model, and it is the interface between suppliers and the buying company (C. Scott, 2011).

B. Procurement Practices

The first phase is related to the operations of procurement of the relief products, which originate from suppliers or donors, according to study on humanitarian supply chain management methods done by Balcik, B. and Beamon (2010). Products are obtained from suppliers through a variety of procurement strategies (direct purchase, e-procurement, tenders), and the majority of procurement choices are made quickly since demand cannot be assessed until a needs analysis has been completed in the region in question.

Determine the following elements of the decision-making process for humanitarian supply chain management of healthcare logistics practices in Haiti in 2010 based on experiences and interviews during the earthquake: resource allocation policies, needs assessment, uncertainty of demand and supply, location for storage and shipment of goods, type of vehicle fleet and technology, and uncertainty about routes and vehicles. Following procedures are outlined in the domain of immediate response phase: coordination of receiving, unpredictable demand, and last-mile delivery of relief to victims (Smilowitz and Dolinskaya, 2010).

Irwan Syahrir, (2015), conducted a research on the disaster relief operations; an availability of goods to meet disaster victim needs is an important issue that should be getting greater attention. Distribution timeliness and availability of goods must be fulfilled by anyone that is involved in

the rescue operations of humanitarian disaster. However, only a few papers are known about the current issues of both humanitarian healthcare and disaster supply chain in disaster cases (Irwan Syahrir, Suparno, Iwan Vanany, (2015).

C. Transportation Practices

Eliyas Wako, (2018), identified the following concerning transportation in humanitarian logistics practices: Road deterioration and was damaged due to the fact of overweight and oversized were using overland bridges, flooding was also a deterrent for transportation in the case of the Tsunami, in Medan to Banda Aceh (Indonesia).

The mechanism of transport of goods and services, procurement of goods and supplies are essential elements to handle disaster relief effectively. Supply chain flow of the materials needed for disaster victims will usually experience a disruption in the distribution and transportation (Kumar and Heavy T., 2013).

As described by the United Nations Joint Logistics Center, humanitarian logistics during emergencies requires: delivery of the appropriate supplies in good condition, when and where they are needed, a wide range of transport, often improvised at the local level, limited, rapid, and specific deliveries from outside the area affected, a system of prioritizing various relief inputs, storing, staging, and moving bulk commodities, moving people, coordination and prioritization of the use of limited and shared transport assets, possible military involvement in logistics support (UNJLC, 2015).

D. Storage and Handling Practices

According to Whybark, (2007) mentioned some difficulties presented on the delivery of items. First, it is difficult to measure the inventory values, since most of them have been donated. Secondly and very important concern becomes when political issues intervene in the purpose ofproviding relief to people in suffering.

Yi and Ozdamar (2007) proposed a model that integrated the supply delivery with evacuation of wounded people in disaster response activities. They considered the establishment of temporary emergency facilities in the disaster area to serve the medical needs of victims immediately after the disaster. They used the capacity of vehicles to move wounded people as well as relief

commodities. Their model considered vehicle routing problems in conjunction with facility location problems.

E. Distribution Practices

Irwan, (2015), discussed with regard to the procurement and distribution of medical needs for disaster victims, and an inventory model that can solve problems of supply chain in logistics operations on the hospital at the time of the disaster would be an interesting issue to be focused on. These researches focused on disaster management typically on the management of relief operations which include the planning and distribution of relief material needs of disaster victims, evacuation, coordination and collaboration among the parties involved in humanitarian operations. But still few have focused on the role of HSC in natural disasters.

Studies that consider the integration between the area of healthcare supply chain and supply chain disaster, particularly natural disasters, will become an important and interesting issue for academicians and researchers. Several studies that take into consideration humanitarian supply chain of healthcare logistics that focus on the development of the role of management and logistic operations to control epidemic attack (Dassaklis, C. P, 2012).

F. Information Technology Practices

Elias Wako identified communication infrastructure as one of the barriers to effective delivery of aid in humanitarian logistics in Goal Ethiopia, Borena Zone. Moreover, the response of the humanitarian organizations in Ethiopia to disasters is fraught with challenging constraints making humanitarian logistics response ineffective. It is against the above backdrop that this proposal is being conducted to provide an in-depth exposition of the challenges to humanitarian rapid response in disaster relief operations in Ethiopia (Elias, W. 2018).

These researches focused on disaster management typically on the management of relief operations which include the planning and distribution of relief material needs of disaster victims, evacuation, coordination, collaboration and communication among the parties involved in humanitarian operations (Irwan S., 2015).

Generally disaster Risk Management includes sum total of all operations, programs and measures which can be taken up before, during and after a disaster with the aim to avoid a disaster, reduce its impact or recover from its losses focuses on the organization and

management of resources and responsibilities to address all aspects of emergencies and disasters, including preparedness, response and initial recovery steps. As can be seen, the disaster relief supply chain structure differs following the disaster type and actors engaged, but they all have common flows, actors and blocks, composed of procurement, inventory and transportation management (Khan. P.H, 2008).

2.2.2 The main challenges of HSCM of HL

A number of challenges were identified in literature for HSCM of HL processes. Some of the challenges only relate to specific products, whereas most apply generally for healthcare logistics processes. Challenges mainly relate to quality, costs, inventory management, complexity, process efficiency, process and SC integration, and human resources and skills and process immaturity (processes that are manual, paper based, lack standardization, are characterized by tacit knowledge, inconsistency, low utilization and lacking process data, traceability and visibility).

A. Sourcing Challenges

According to Gomez, (2015), the main challenges of HSCM of HL are unavailability of medicine from suppliers, expired and product waste, special handling of items, e.g. temperature, product safety and security, potential stock-outs (patient safety issue). Elleuch, (2014), identified in the reviewed literature organizational aspect of the healthcare logistics supplier system is the least integrated with humanitarian supply chain systems.

Smilowitz and Dolinskaya, (2015), identified the main challenges of humanitarian supply chain management is to establish a flow of donations from different sources (national and international) which are not always useful, timely, or appropriate, with minimal waste of resources.

According to a research conducted by Blecken (2010), high uncertainty (uncertain demand, uncertain deliveries of supplies and uncertain pools of resources are due to operating in highly volatile environments), difficulties relating to the earmarking of funds, damaged infrastructure and lack of human resources constitute the most important challenges. Nevertheless, the challenge uncertainties pose decreases significantly when the transition process into the rehabilitation phase begins (Humanitarian module, 2015).

According to the research conducted by Eliyas Wako (2018) about the humanitarian logistics in disaster response operation: the case of the goal Ethiopia, Borena zone, to assess the humanitarian logistics practices. The study adopted a descriptive and explanatory type of research design where the target populations were employees of goal Ethiopia Borena zone. The findings of the study indicated that humanitarian logistics practices such as procurement, transportation, warehouse and distribution were poorly practiced in the organization, such as delay in humanitarian operations due to internal barriers, demand uncertainty, challenges in accessing affected population due to inadequate transport modes, high costs inhibiting accessibility of the affected areas and inability to anticipate disaster. However, the study did not investigate humanitarian supply chain management in the context of healthcare logistics.

B. Procurement Challenges

Irwan Syahrir, and Suparno (2015) conducted literature review on healthcare and disaster supply chain management in Muhammadiyah University of Surabaya, Indonesia. The study pointed out the main challenges of humanitarian organizations in healthcare logistics. The amounts of demand for medical and health care needs are uncertain, in the disaster mitigation efforts, rapid response meeting the medical needs of disaster victims are emphasized to the rescue and recovery uncertain.

According to Wolde W. (2019), there are practical challenges specific to the humanitarian logistics response in the Borena Zone of Ethiopia when it comes to the procurement process, where procedures are difficult to enforce due to a lack of integrity, top management commitment, employee skill and motivation, resource or supply availability, coordination and information flow, internal processes, and procedures.

In Pakistan 2010, during observation from the disasters study concerning procurement the following challenges were identified: Rapid decision-making processes have not given for purchase, the immediate need to perform simultaneously different aid activities, such as supplying medical aid and products of first aid, procurement of necessary goods and the difficulty of reaching remote locations were the set of constraining factors to the humanitarian operation and tracking and tracing of shipments is typically done manually using spreadsheets

and, furthermore, in most cases there are no central databases of history on prices paid, transit times, or quantities purchased and received (EWGT, 2012)..

Melkamu Beyene (2018) conducted research on the external factors that influence the performance of humanitarian logistics in order to compare the performance of humanitarian aid organizations and examine external predictive factors that influence it in Amhara National Regional State humanitarian aid organizations. The study identified donor funding and governmental situational factors as external factors that significantly influence how well humanitarian logistics performs, but it did not provide an in-depth analysis of potential solutions to the supply chain problems faced by humanitarian organizations, particularly in healthcare logistics (IJAA, 2018).

C. Transportation Challenges

In order to create a comprehensive model that describes the integrated supply chain operations in response to natural disasters in Mid-Atlantic Universities Transportation Center and Department of Civil and Environmental Engineering University of Maryland, Ali Haghani and Abbas M. Afshar (2009) conducted research on supply chain management in disaster response. The Federal Emergency Management Agency in the USA is evaluating the proposed formulation's features using numerical tests. The study's conclusions showed that the main difficulties in organizing and running during emergencies are the transportation of large quantities of numerous different relief items, such as food, clothing, medicine, medical supplies, machinery, and personnel, from various points of origin to various locations in the disaster areas.

The following difficulties were evident in transportation, according to EHRP's (2019) report: It is challenging to sustainably and adequately aid affected people in rural locations as well as in areas where access was prohibited due to insecurity. Response capability and resources were stretched due to spikes in internal migration and the hotspot areas' wide geographic dispersion. The main difficulties have been with vehicle routing, location, and allocation of different logistics issues.The transportation-related problems are common in every phase of the disaster cycle and capture the inherent complexity of the disaster environment (H.Lamos Diaz. 2019).

D. Distribution Challenges

Distribution costs, relief organizations often need to transport massive amount of materials in a very short amount of time. However, the nature of the demand in humanitarian relief chains makes relationships with transportation companies more difficult to develop.Logistics is one of the main expenditures of manufacturing firms, therefore high logistics costs severely impact a firm's logistics distribution (Christina Wierderer, 2019).

E. Storage and Handling Challenges

As explained by Blecken (2010), there are no central databases of history on prices paid, transit times, or quantities purchased and received, high uncertainty, difficulties relating to the earmarking of funds, damaged infrastructure and lack of human resources constitute the most important challenges.

According to Frezewd Tefera (2020), gathering data on storage utilization and status is difficult when evaluating the situation of disaster relief activities in the Somali region due to the significant number of inbound humanitarian cargo in response to the drought. It did, however providing sustained and adequate aid to affected-people in remote places is challenging, as not all the supply chain issues experienced by humanitarian organizations, notably in healthcare logistics, were demonstrated, according to EHRP's (2019) study with respect to transportation.

F. Information Technology Challenges

Additionally, Yenehun Chekol noted certain obstacles to the IRC's ability to properly reach its beneficiaries in Jigjiga, Somali Region. The organization's effectiveness in humanitarian logistical operations is hampered by unclear procurement rules, reluctance to review and enhance internal business processes, corruption, weak governance, and ineffective control systems (Yenehun C., 2018). However, the study leaves questions unanswered on, among other pertinent issues influencing disaster relief operations in IRC Somali Region, Ethiopia, collaboration, coordination, rapid response, human resource, information technology, storage condition, and standards challenges.

According Thomas K. Nyamu, (2012, majority of the humanitarian organizations have invested very little capital in the development and implementation of modern management information systems, information technology or logistics systems and he also explained;communicational

challenges that relate to communication and information exchange among the stakeholders involved in the process of intermodal transport.

2.3. Conceptual framework of the study

HSCM of HL during disaster response operation challenges are affected by different practices which have an impact on the humanitarian supply chain management performance. In the conceptual framework below, HSCM of HL challenges, practices and performances of the level of humanitarian organizations. Therefore the conceptual framework represents the specific direction by which the thesis has to be undertaken.

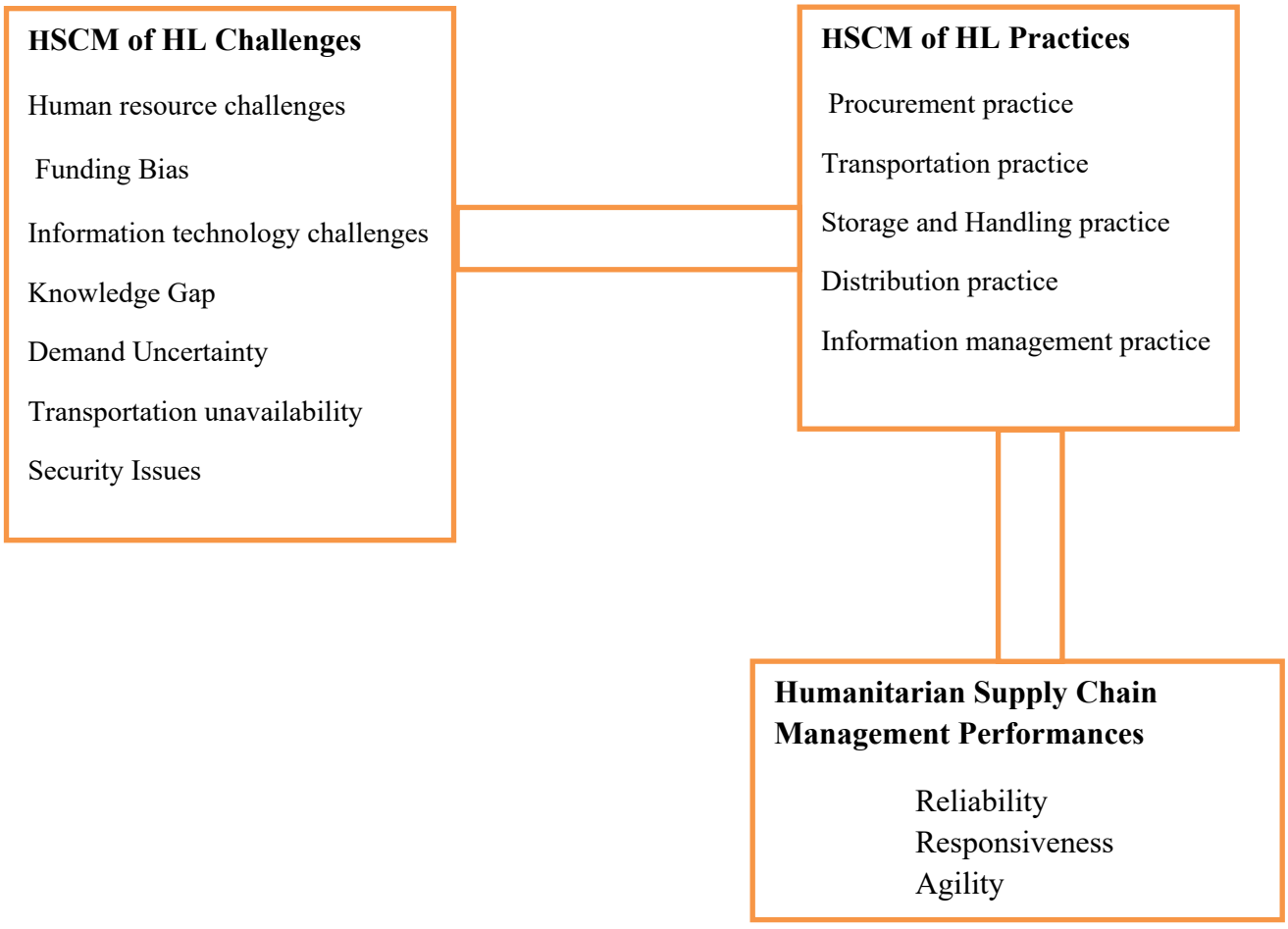

Fig. 2.1 Conceptual framework of humanitarian supply chain management operation performance (source: Adapted and modified from Frezewd Tefera, 2020).

2.4 Identified Literature gaps

According to a thorough review of the existing literature, there has been various theoretical and empirical researches on humanitarian supply chain management techniques and problems all around the world. However, there has been very little research on humanitarian supply chain crisis management in Ethiopia. According to the findings, little effort has been done in the HSC's inventory management methods, effective logistics coordination, transparency, and investigations into healthcare logistics and disaster supply chain management procedures. Aside from researcher investigations into various journals and papers, no study on the topic of HSCM of HL practices and problems for disaster response in North Shewa has been conducted. As a result, the study attempted to close as much of the gap in humanitarian supply chain management of healthcare logistical practices as possible.

UNIT THREE

3. RESEARCH METHODOLOGIES

The chapter outlines the research methodologies used for this study, with specific attention paid to the following subtopics: a description of the study area, research approach, research design, total population and sample design, data sources and types, data collection techniques, method of data analysis and presentation, validity and reliability, ethical consideration, and appropriate justification.

3.1 Description of the study area

The major city of the zone is Debre-Birhan, and there are 23 district administrative woreda in the North Shewa zone. Different disaster-related histories have occurred. Droughts have become more frequent and more severe over time. the areas afflicted by disasters including hunger, epidemic disease, violence, and outbreaks of livestock diseases (Napier, A. and Desta, S., 2011). Coordination of the food security and disaster relief programs in the North Shewa Zone is in charge of preventing and resolving this type of disaster. The study area, North Shewa, disaster relief and food security program coordination is a Governmental organization located in the North Province, about 120 km north east of capital city, Addis Ababa on the paved highway to Dessie, the town has a latitude and longitude of 9°41′N 39°32′E and an elevation of 2,840 meters at the town Debre Birhan, located in the Semien Shewa Zone of the Amhara Region. Today, it is the administrative center of the North Shewa Zone of the Amhara Region. Debre Birhan town has nine kebele with a total population of 103,450 whom 46, 553 are men and 56,897 women (Abebaw Hailu, 2021).

The North Shewa zone has 23 district administrative woreda and the capital city of the zone town Debre-Birhan. There are different disaster related histories that take place. The frequency and magnitude of droughts has been increasing over time. The zones affected by disaster like: drought, conflict, cattle disease outbreak, and famine and disease epidemics (Napier, A. and Desta, S., 2011). North Shewa Zone, disaster relief and food security program coordination is responsible for preventing and relieving this kind of disaster occur.

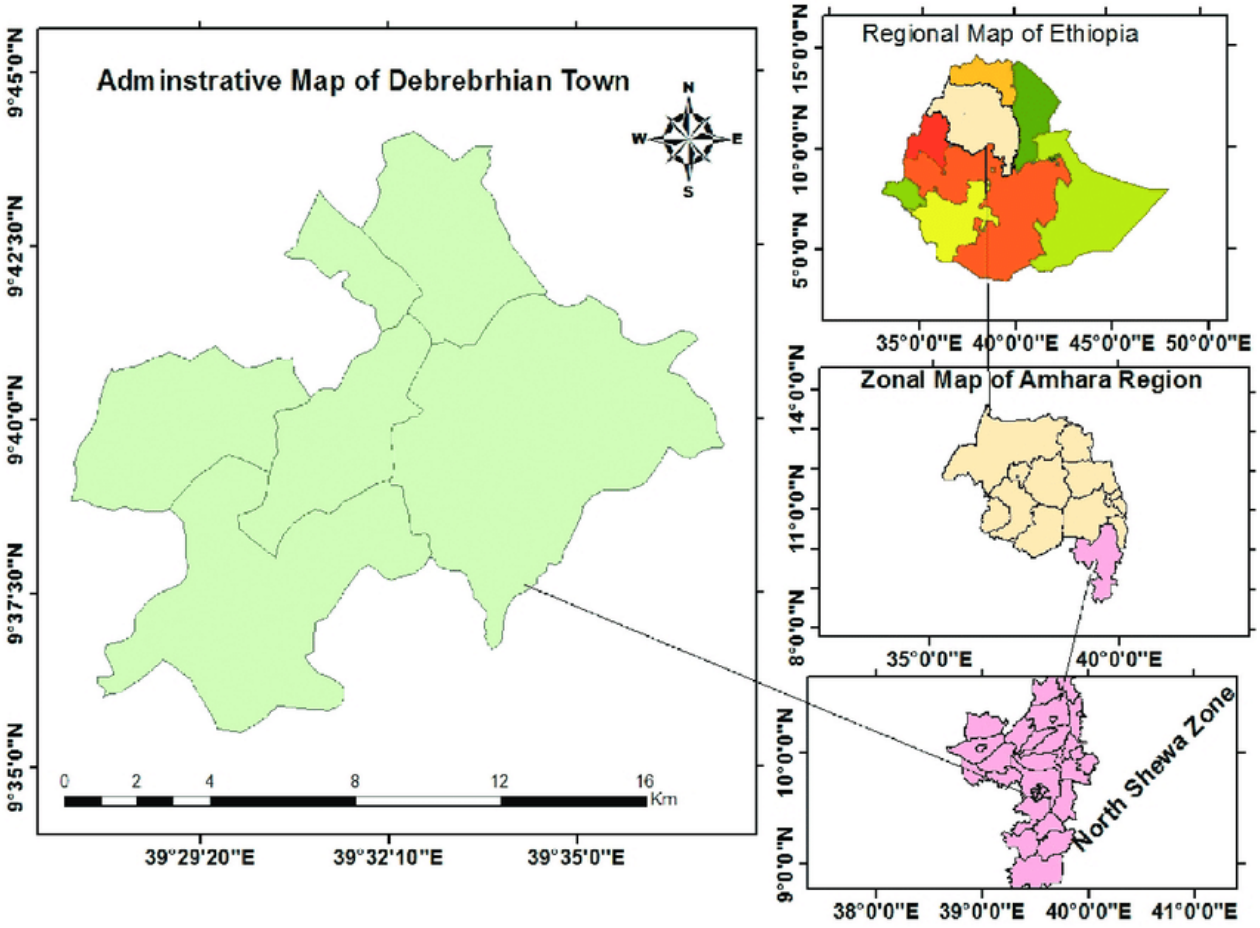

Figure 3.1 Geographical location of Debre Birhan Town of North Shewa. (source; google map).

3.2 Research Design

There are three different forms of research design, according to (Yin, 2003). Exploratory, descriptive, and explanatory are these. The descriptive study design was the one that the researcher preferred. In order to analyze the impact of the actions of humanitarian assistance groups, descriptive research design describes the facts and characteristics about the population being examined in terms of mean, standard deviation, and frequency. In order to present a clear (descriptive) picture of the disaster relief response in disaster relief operations in North Shewa, disaster relief and food security program coordination, descriptive research aims to provide an accurate and valid representation of the factors or variables that are relevant to the research questions.

3.3 Research Approach

This study is to be carried out using simultaneous qualitative and quantitative approaches to identify, define and assign weight of importance to the metrics which quantify efficiency and effectiveness of relief operations during disasters. The study implemented both qualitative and quantitative research methods. The decisions to combine quantitative and qualitative methods in this study were also justified on the grounds that it made it possible for the researcher to explore the research questions from different perspectives. Both qualitative and quantitative approaches by using survey research techniques, based on the type of data. In a qualitative approach; the questionnaire and interview were employed from the selected respondents of the head of North Shewa, disaster relief and food security program coordination officer. In a quantitative approach; questionnaire was used for collecting data and analysis using statistical procedures.

3.3.1 The qualitative method

When the complexity of the task or a lack of knowledge hindered a thorough numerical appraisal of the risk, the qualitative technique was applied. The problem of assessing the intangible impacts brought on by the deterioration in an organization's standing is cited, gathered, and researched verbally or through the use of narrative techniques in order to offer evidence.

3.3.2 Quantitative approach

When using quantitative methodologies, real data are used to leverage mathematical relations that treat risk as an estimable variable. Tables, percentages, frequencies, and other numerical representations of quantitative data are used in the analysis. Additionally, it measures a number of traits that are inherently numerical (such as years of education, age, income, etc.)

3.4 Population and Sampling design

A group of individuals chosen from the larger population who share a characteristic makes up the study's population. The study's target population was the number of employees at the North Shewa disaster relief and food security program coordination office. The researcher conducted census questionnaires to all staff members of the disaster relief and food security program coordination due to the small size of the study population. The North Shewa disaster relief and food security program coordination office includes all of the staff members who work there. sampling frame. The sample size was determined by several factors, including the type of study (qualitative or quantitative) and the predicted degree of generalization. The sample size for

qualitative studies was chosen from six department heads within the organization, while the sample size for quantitative studies was chosen from 78 employees of the organization.

3.5 Sources and types of Data

Data comes from primary and secondary sources, respectively. Through questionnaires and interviews with reports, both primary and secondary sources of data were used in this thesis. Data collection for the current study began on April 16, 2022, and ended on May 16, 2022.

3. 5.1 Primary data

Primary data refer to the data that were collected by survey technique with questionnaires and interviews directly from the study participants. Therefore primary data were conducted in the form of questionnaires from employees of disaster relief and food security program coordination office, North Shewa. Interviews were conducted from logistics and supply chain management coordinator of North Shewa.

3.5.2 Secondary Data

Secondary data is information that has previously been gathered and is contained in existing documents. It could be acquired via earlier studies, journals, and other study materials, which could be useful for one's research project. Prior to moving on to the primary data, the researcher also used secondary data to build the fundamental framework of the study. As secondary data sources, we looked over humanitarian logistics and supply chain books, journals, relief logistics publications and articles, as well as internationally published studies, documents, and reports. Data from the respondents was gathered using closed-ended surveys on a Likert scale of 5 points. Five evaluation scales, ranging from 1-Strongly disagree to 5-Strongly Agree, are present on the questionnaire. Questionnaire data are easy to understand and understandable.

3.6 Data collection procedure

The data were collected with questionnaires; first the respondents were communicated to get their consent. After getting their consent, the prepared questionnaires were distributed to each participant. The questionnaire has two parts. The first part contains general information of the respondents and the organization. The second part contains three sections. The first dealt with humanitarian supply chain management practices. The second section focused on humanitarian supply chain management challenges and the third section dealt on humanitarian supply chain

management performances. The questionnaires were collected by checking the completeness of the data and by appreciating the participation for the research. The participants were targeted among key decision-makers and workers in the organizations. The questionnaire and interview were developed and distributed to respondents, ask interviews and collect the distributed questionnaires from the respondents.

3.7 Method of data Analysis and presentation

There are two different kinds of data analysis methodologies, qualitative and quantitative, and the researcher was typically choosing one over the other depending on the sort of data they have gathered. Descriptive statistics can be used to characterize the data if the majority of the information gathered involves numerical data, which requires quantitative tools for analysis. As a result, the analysis inwords, which refers to information gained through individual interviews with open-ended questions (Nunnery this study requires the use of quantitative techniques, and descriptive statistics can be employed to describe the data as the majority of the information gathered is numerical. Mean, percent, and standard deviation are examples of descriptive statistics.

3.7.1 Validity test

Whether the research truly measures that which it approaches was intended to measure or how truthful the research results. Regarding the validity the questionnaires are accepted by other researchers and academicians for their contributions and checked. The questions are formulated in simple language for clarity and ease of understanding. Clear instructions were given to the subjects for respondents. The participants were among selected subject matter experts in the domain of disaster management in North Shewa disaster relief and food security program coordination office. To maintain the validity of the constructs and scale used in this research, most of the questionnaires were adopted from previous research with modifications. Some of the questionnaires developed were based on careful review of literature, statement of problem, literature review, conceptual framework and the research questions.

3.7.2 Reliability test

Reliability is the extent to which data collection methods or analytical processes yield repeatable outcomes. The analytical results must be consistent over time and the ability to replicate the results must be shown in order to establish dependability (Patton, Q. M. 2002). The

dependability of the data collection tools was evaluated using an internal consistency method based on Cronbach's alpha. An objective evaluation of data generalization is provided by Cronbach's alpha, a reliability coefficient (Zinbarg, 2005). Because of the acceptance threshold, the researcher's reliability was evaluated using Cronbach's alpha. A reliability test was carried out to evaluate the consistency of HSCM practices and performance, as indicated in the table.

Table 3.1. **Reliability Statistics**

Reliability Statistics			
Items	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
Reliability test ofHSCM Practices	.986	.995	45
Reliability test for HSCM Performances	.988	.989	14

3.8 Ethical Considerations

The study was involved in humanitarian logistics and disaster response operation issues. The permission was obtained from North Shewa Zone disaster relief and food security program coordination office when the letter from Addis Ababa University, school of commerce would be given. To induce an interest in the study, all coordinators and employees working under their supervision were informed about the purpose and objectives of the study. The information obtained from the questionnaire has been kept confidential and will not be used for any other purposes and the researcher was explained that it is not necessary to write the name of the respondents on the questionnaire.

CHAPTER FOUR

4. RESULTS, DISCUSSION AND INTERPRETATION

This chapter presents the results, discussion of findings, and interpretations of each result by supporting previous findings of scholars in the area. The data were collected from disaster relief and food security program coordination in North Shewa, Debrebirhan city, and analyzed and presented in the form of tables and charts based on the objectives of the study. The questionnaires were distributed to 84 supply chain employees who were sampled to participate in the study of which 78 respondents were successfully filled and collected by the researcher. Descriptive statistics were then used to analyze the demographic factors and HSCM Practices, challenges and operational performances.

4.1. Response Rate

A total of 84 questionnaires were distributed to the respondents. From these 80 questionnaires were returned, 78 were completed, two of them were not fully completed, so discard it, but four questionnaires were not collected from the respondents. This indicated that the response rate of the respondents is 92.8%. This is a very good response rate implying that the findings can be used for generalization.

4.2 Demographic Characteristics of Respondents

The purpose of this section is to compile a general history of the respondents and the organization. According to the graph below, 61.5 percent of respondents are men and 38.5 percent are women, making up the majority of the respondents.

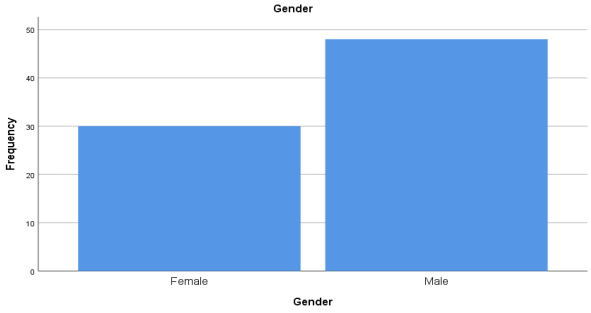

Figure 4.1 Genders of Respondents

Regarding their ages, all the respondents were above 25 years. As seen on the following table 1, more than 78.2% of the respondents are above 31 years old.

Regarding questions raised to respondents about their Educational Qualification, as indicated in table. 70% of respondents have first degree and 8.9 % of respondents have second degree and above. The result indicates that most of the respondents were qualified professionals so that they can easily understand and provide their opinion on research questionnaires.

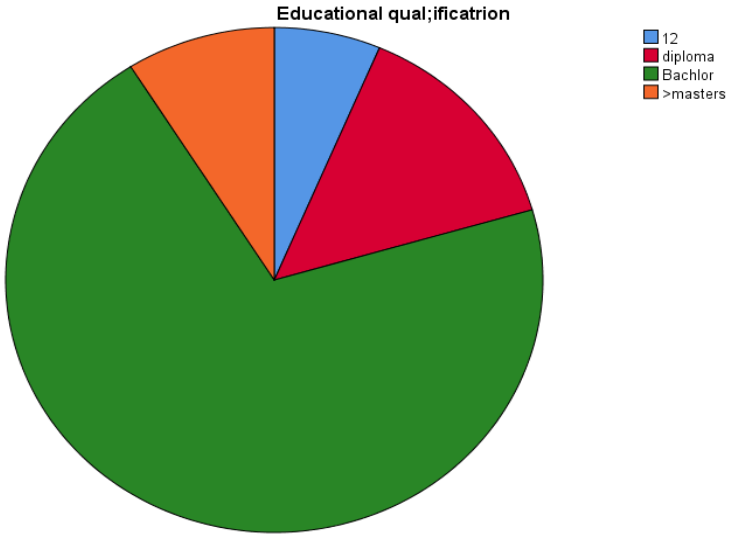

Figure 4.2 Educational qualifications of the respondents

The survey claims that the respondents are a part of various organizational units at various levels that work together to provide humanitarian logistics support in the impacted area. Distribution employees make up 29.48 percent of the respondents, while transport workers make up 24.3%. Workers in information technology and procurement make up 26.9% of the workforce. 17.8% of the respondents who participated in this study's other warehouse and senior management category

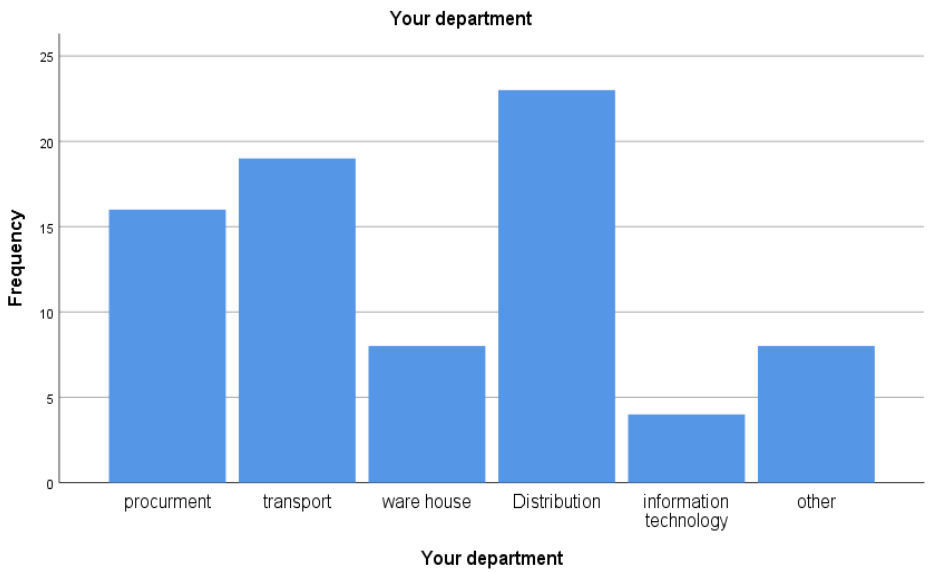

Figure 4.3 Working Department of Respondents

In addition, respondents were asked to provide information on their employment history with the current organization. As shown in the table below, 29.48 percent of respondents have less than five years' worth of experience, while 25.6% have between 16 and 20 years' worth. Almost all of the respondents, according to the results, had knowledge of and experience with HSCM within their respective organizations. Therefore the respondents have given enough and reliable information to the research question.

Figure 4.4 Work Experiences of Respondents

Table 4.1 Summary of Demographic Characteristics of Respondents

S.N	Characteristics of respondents	Category of respondents	Frequency	Percentage
	\	Female	30	38.5%
1	**Gender**	Male	48	61.5%
		18-25 years	3	3.8%
2	**Age**	26-30 years	14	18%
		31-40 years	27	34.6%
		Above 40 years	34	43.6%
		Below grade 12	0	0
		Grade 12 completed	5	6.4%
3	**EducationalQualification**:	College Diploma	11	14%
		First Degree	55	70%
		Second Degree and above	7	8.9%
		Procurement	16	20.5%
	Department/work unit	Transport	19	24.3%
4	**(Position of the organization)**	Warehouse	8	10.2%
		Distribution	23	29.48%
		Information Technology	5	6.4%
		Other	7	8.9%
		0- 5 Years	23	29.48%
5	Years worked at the organization	6-10 Years	10	12.8%
		11-15 Years	11	14.1%
		16- 20 Years	20	25.6%
		Over 20 Years	14	17.9%
		Less than 2 Years	10	12.8%
6	How long have you been working in humanitarian supply chain related tasks?	3-5 years	26	33.3%
		6-10 Years	23	29.48%
		Above 10 years	19	24.35%

Source; Research data, 2022

4.3.HSCM of HL Practices, Challenges and Performances of North Shewa Zone, disaster relief and food security program coordination

In this section, the researcher summarized from the respondents the extent to which they agreed with various measurements concerning the humanitarian supply chain management practices in the North Shewa zone using five Likert scales. (Note: SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree, Std Dev = Standard Deviation).

Table 4.2: Likert scale interpretation and value interval allocation summary

Likert Scale	Value Interval Allocation	Interpretation
1	1.0-1.8	Strongly Disagree (SD)
2	1.81-2.6	Disagree
3	2.61-3.4	Neutral (N)
4	3.41-4.2	Agree (A)
5	4.21-5.0	Strongly Agree (SA)

Source: *Dawes J, 2008*

4.3.1 Humanitarian Supply Chain Management Logistics Practices response results

From the table below there were conducted on 45 supply chain management practice indicators in order to identify the practices more known by the respondents the results of mean and standard deviation are presented and explained in the following table 4.3.

Table 4.3 HSCM logistics practices Likert scale results

	Mean	Std. Deviation	N
We have the practice of discovering humanitarian relief requirement analysis to achieve HSCM goals.	2.9359	1.15477	78
We have the practice of discovering supply market analysis to achieve HSCM goals.	3.2564	.99917	78
We have the practice of collect supplier information	3.5256	.90775	78
We have the practice of developing sourcing strategy to achieve HSCM goals.	3.6282	.91324	78
We have the practice of implement sourcing strategy.	3.3846	.99650	78
We have the practice of negotiate with supplier and selection of winner to achieve HSCM goals	3.5000	.80178	78
We have the practice of contract implementation of contractual HSCM improvement.	3.6667	.86290	78
We have the practice of predict future demand based on statistical data.	3.5513	.89221	78
We have the practices of preliminary need assessment in a disaster-prone area before procurement is made	3.4744	.78499	78
We have the practices of Quantification of the need assessment is made before procurement	3.7051	.80758	78

We have the practices of Selection of Suppliers and Contract provisions is in practice	3.4615	.93548	78
We have the practices of Analysis of proposals	3.5897	.71051	78
We have the Supplier relationship management practices	3.3974	.82713	78
We have the practices of Issuance of purchase orders and Administration of purchase contracts and resolution of related problems	3.3077	.91606	78
We have the practices of Maintenance of a variety of purchase record	3.3718	.89890	78
We practice identification of the availability of transport services by type of transport	3.4103	.91787	78
We practice mobilization of transport services with in shortest possible time to respond to disasters	4.0897	3.40811	78
We undertake a survey of available transport service providers,	3.4615	1.00249	78
We practice identification of type of vehicle by means of its capacity	3.3462	.92339	78
We practice use of all modes of transport to efficiently support disaster relief operation	3.5897	.85942	78
We practice transport capacity planning	3.7949	.74483	78
We have a practice of transport scheduling	3.6667	.76730	78
We collaboration with commercial transport companies to improve response capability	3.5385	.78446	78
We have a proper storage practice to efficiently utilize storage space, (free from damage, deterioration, breakage, leakage, etc.)	3.0256	.72029	78
We practice identification of potential points of storage to enable efficient disaster relief operation, (supported by technology)	3.4359	.86174	78
We practice identification of the required warehouse management equipment for stores, (storage guideline or SOP available)	3.3333	1.01504	78
We have a proper storage practice to efficiently utilize storage space, (free from damage, deterioration, breakage, leakage, etc.)	3.3077	.93013	78
We have a proper practice of handing supplies stored (eg. cold chain for vaccines…).	3.3718	.88434	78
We practice screening of supplies to identify unwanted materials,	3.3077	.84219	78
We practice definition of supplies by supply kits for shipment,	3.5385	.81690	78
We have a practice of discharging supplies as per the need identified,(Items distribution to targeted beneficiaries performed according to the time planned for distribution during disaster response).	3.2051	.94469	78
We practice inventory audit to avoid supply scarcity or surplus,	3.8974	.87668	78
We design the flow of materials for distribution keeping in mind the people who require it.	3.7308	.78415	78
We practice distribution of supplies from central distribution centers,	3.6538	.77000	78
We practice the use of different distribution spots to deliver supplies to the people	3.6410	.97999	78
We practice timely distribution of relief supplies,	3.6410	.80541	78
We practice push strategy of distribution where we do not have accurate demand information,	3.5641	.92005	78
We practice pull strategy of distribution where we do have accurate demand information	3.4872	.89361	78
We practice adequacy of information sharing with different actors,	3.8205	.57533	78
We employ information for proper supply chain planning,	3.8590	.63908	78
We employ information as a tool for decision making during crisis,	3.9872	.82955	78
We practice the use of information technology for controlling the efficient cost-effective flow of supplies	3.6667	.86290	78

We employ information management to integrate activities of the humanitarian supply chain,	3.5769	.79804	78
We practice the use of information technology to coordinate with different supply chain actors,	3.6282	.88434	78
We practice the use of information technology to distribute aid materials,	3.3718	.83912	78

4.3.2 Response results of HSCM of HL Challenges

From the table 4.4 below as summarized, there are nine indicators of humanitarian supply chain management logistics challenges assessed in North Shewa, disaster relief and food security program coordination. The first indicator is human resources related challenges, which are focusing to assesslack of professionals to deploy for relief operation, unavailability of organized disaster response team and unavailability of human resource with adequate knowledge of disaster relief operation are affect the organization.

Table 4.4 HSCM logistics challenges response results table

S.N	HSCM Challenges (N=78)	No, of Question	N x No,Q	SD=1	D=2	N=3	A=4	SA=5
1	Knowledge Gap	3	234	0	6	14	150	64
2	Transportation Unavailability	4	312	0	8	19	181	104
3	Degraded infrastructure	3	234	0	2	11	168	53
4	Funding Bias	5	390	0	17	57	187	129
5	Security Issues	5	390	0	19	43	230	98
6	Information Technology unavailability	4	312	0	18	53	151	90
7	Supply Chain Coordination Management	4	312	0	36	43	156	77
8	Demand Uncertainty	4	312	0	21	40	187	64
9	Human resource related challenges	4	312	6	2	44	215	45

Source; from research, (2022)

4.3.3 Response results of HSCM of HL operational performances

The researcher used five Likert scales in this part to synthesize the respondents' responses to several measurements of the humanitarian supply chain management performances in the North Shewa zone, disaster assistance, and food security program coordination.

Table 4.5 Humanitarian Supply Chain Management performance response results (N=78)

	Mean	Std. Deviation	N
1. Reliability of Humanitarian Supply Chain Management			
My organization provides the right quantity of relief items to beneficiary	2.8462	1.09399	78
My organization exhibited strong ability to perform tasks as expected	2.9359	1.06099	78
My organization provides right packaging for relief item and deliver with right condition with reducing inventory	3.1026	.94786	78
My organization provides relief item of high quality to beneficiaries	2.9487	.97897	78
My organization conducts need assessment accurately in disaster prone areas	2.9359	1.17705	78
Grand mean of Reliability of Humanitarian Supply Chain Management	**2.953**	**1.051**	
2. Responsiveness			
My organization provides relief item as per their schedule	2.7179	.95206	78
My organization has standard time, speed at which humanitarian supply chain tasks should be performed	2.6538	.93735	78
My organization provides relief item on time after their requisition	2.7821	.89221	78
My organization provides relief within 72 hours of disaster strike	2.8462	.94081	78
My organization exhibits responsiveness to donation-to-delivery time to provide humanitarian logistics	2.7179	.93832	78
My organization exhibits minimum order fulfillment cycle time to provide humanitarian logistics	2.8974	1.14631	78
Grand mean of Responsiveness of Humanitarian Supply Chain Management	**2.786**	**0.967**	
3. Agility statements			
My organization adapt quickly to a system of stock manage when there is stock out	2.8333	.98583	78
My organization adapt quickly to a system of stock managing when additional demand is required	2.8846	.82148	78
My organization monitors the overall relief supply chain and responds immediately to minimize supply chain risk	3.3462	.95110	78
Grand mean of Agility of Humanitarian Supply Chain Management	**3.051**	**0.919**	
Grand mean value of HSCM performance	**2.97**	**0.979**	

The outcomes of the 14 humanitarian supply chain management measurement indicators from the table 4.5, which were used to gauge the organization's operational performance, are shown and discussed.

4.4. Discussions and interpretations of HSCM of HL response results

Three HSCM organizational performance indicators, nine HSCM problems, and the conclusions of the six HSCM logistical practices are all covered in this part. The respondents were asked to describe their organization's HSCM practice, any difficulties they had, and organizational

performance. The mean values from table 4.3 were analyzed and interpreted based on the data's conclusions and the Likert scale's value interpretation. Considering this, the calculated mean value result is between 1 to 1.80 indicates strong disagreement (SD), a mean value from 1.81 to 2.6 indicates disagreement (D), from a mean value result between 2.61 to 3.4 indicates neutral (N), the mean value between 3.41 to 4.2 indicates agreement (A) and finally the mean value result of the respondents lie between 4.21 to 5.00 indicates strongly agree (SA). The values of standard deviation of the results indicate that small variance data are close to the mean whereas a large variance indicates that the points are distant from the Mean value. Standard deviation is a measure of how well the mean represents the data. In other words Standard deviation shows that the different responses of respondents are for a given idea. High Standard deviation means that the data havewidespread, which means that respondents give a variety of opinions while low standard deviation means that respondents have almost similar judgment (Kalkidan F., 2020).

4.4.1 Discussion on results of HSCM practices

There are six identified practices of humanitarian supply chain logistics assessed in North Shewa, disaster relief and food security program coordination. The first indicator is sourcing practices, which is the discovery of humanitarian relief requirement analysis and developing sourcing strategy assessment. As seen from the table below, the total mean value for this indicator is revealed as 3.41. This implies that some of the respondents agreed that the organization practiced situations well before providing any humanitarian assistance to the affected area. Similar findings were reported by Hajar Raillani, (2020) conducted on the topic “Risk identification allows decision-makers to be aware of events likely to create uncertainty”. The study tried to find humanitarian supply chain management practices in North Shewa, disaster relief and food security program coordination and the result showed in the table below.

A. Sourcing and procurement practices

Table 4.6 HSCM of sourcing and procurement practices likert scale results

	Humanitarian Organizations Supply Chain Practices	**Mean**	**Std.dev**
Sourcing practice	We have the practice of discovering humanitarian relief requirement analysis to achieve HSCM goals.	2.9359	1.15477
	We have the practice of discovering supply market analysis to achieve HSCM goals.	3.2564	.99917
	We have the practice of collect supplier information	3.5256	.90775
	We have the practice of developing sourcing strategies to achieve HSCM goals.	3.6282	.91324
	We have the practice of implementing sourcing strategies.	3.3846	.99650
	We have the practice of negotiating with suppliers and selecting a winner to achieve HSCM goals.	3.5000	.80178
	We have the practice of contract implementation of contractual HSCM improvement.	3.6667	.86290
	Grand mean of Sourcing practices	3.41	0.948
Procurement practices	We apply competitive bidding for procurement of relief supplies in disaster relief operations.	3.5513	.89221
	We have the practice of predicting future demand based on statistical data.	3.4744	.78499
	We have the practices of preliminary need assessment in a disaster-prone area before procurement is made	3.7051	.80758
	We have the practices of Quantification of the need assessment is made before procurement	3.4615	.93548
	We have the practices of Selection of Suppliers and Contract provisions is in practice	3.5897	.71051
	We have the practices of Analysis of proposals	3.3974	.82713
	We have the Supplier relationship management practices	3.3077	.91606
	We have the practices of Issuance of purchase orders and Administration of purchase contracts and resolution of related problems	3.3718	.89890
	We have the practices of Maintenance of a variety of purchase record	3.4103	.91787
	Grand total mean value of procurement	3.487	0.854

The third indicator is transportation (table 4.7) practice which focuses on the identification of the availability of transport services by type of transport and mobilization of transport services within the shortest possible time to respond to disasterareas. The total mean value of the respondents for transportation practices is found to be 3.5. This result indicated that most of the respondents agree with transport management practiced in the organization.

Storage and handling techniques, the fourth indicator (table 4.7) are used to evaluate the procedures for identifying appropriate storage locations to enable effective disaster relief operations (supported by technology), as well as the necessary warehouse management equipment for stores (storage guideline or SOP available). The overall mean rating for warehouse management is 3.48, which shows that the majority of respondents agree on the handling and storing procedures. That indicates some details regarding the storage and handling procedures that are backed by technology and followed in accordance with rules, etc. Eliyas Wako (2018) reported on research he did on the subject of humanitarian logistics techniques in disaster response operations, specifically in the example of goal Ethiopia's Borena zone.

B. Transportation and storage and handling practices response results

Table 4.7 HSCM of transportation and storage and handling practices likert scale results

		Mean	St.dev.
Transportation practice		4.0897	3.40811
	We practice mobilization of transport services with in shortest possible time to respond to disasters	3.4615	1.00249
	We undertake a survey of available transport service providers,	3.3462	.92339
	We practice identification of type of vehicle by means of its capacity,	3.5897	.85942
	We practice use of all modes of transport to efficiently support disaster relief operation	3.7949	.74483
	We practice transport capacity planning	3.6667	.76730
	We have a practice of transport scheduling	3.5385	.78446
	We collaboration with commercial transport companies to improve response capability,	3.0256	.72029
		3.56	**1.175**

Storage and handling	We practice identification of potential points of storage to enable efficient disaster relief operation, (supported by technology)	3.4359	.86174
	We practice identification of the required warehouse management equipment for stores, (storage guideline or SOP available)	3.3333	1.01504
	We have a proper storage practice to efficiently utilize storage space, (free from damage, deterioration, breakage, leakage, etc.)	3.3077	.93013
	We have a proper practice of handing supplies stored (eg. cold chain for vaccines…).	3.3718	.88434
	We practice screening of supplies to identify unwanted materials,	3.3077	.84219
	We practice definition of supplies by supply kits for shipment,	3.5385	.81690
	We have a practice of discharging supplies as per the need identified,(Items distribution to targeted beneficiaries performed according to the time planned for distribution during disaster).	3.2051	.94469
	We practice inventory audit to avoid supply scarcity or surplus,	3.8974	.87668
	Grand mean value of storage and handling	**3.496**	**0.876**

The fifth indicator is distribution procedures (table 4.8) which refer to how supplies are distributed and how the flows of goods through central distribution hubs are synchronized. The distribution management practices mean score as a whole is 3.7. This showed that the responders who were operating effectively in the organization were well aware of the distribution procedures. According to Irwan S. (2015), the planning and distribution of disaster victims' demands for relief supplies, evacuation, and coordination, cooperation, and communication among the parties participating in humanitarian operations all had the same findings.

The last indicator is information management practices (table 4.8), which emphasize effective information information sharing with various players, use information for proper supply chain planning, and use as a tool for crisis decision-making. The respondents agreed with information management procedures in the organization, as evidenced by the total mean value of 3.5 for information technology management methods. Similar findings that new and evolving technology has been argued in literature to contribute to an agile capabilities were explained by Erikisson Maria (2017)

C. Distribution and information management practices likert scale results

.Table 4.8 HSCM of distribution and information management practices likert scale results

		Mean	St.dev
	We design the flow of materials for distribution keeping in mind the people who require it.	3.7308	.78415
Distribution practice	We practice distribution of supplies from central distribution centers,	3.6538	.77000
	We practice the use of different distribution spots to deliver supplies to the people.	3.6410	.97999
	We practice timely distribution of relief supplies,	3.6410	.80541
	We practice push strategy of distribution where we do not have accurate demand information,	3.5641	.92005
	We practice pull strategy of distribution where we do have accurate demand information	3.4872	.89361
	Grand mean of Distribution practices	**3.66**	**0.858**
Information technology practice	We practice adequacy of information sharing with different actors,	3.8205	.57533
	We employ information for proper supply chain planning,	3.8590	.63908
	We employ information as a tool for decision making during crisis,	3.9872	.82955
	We practice the use of information technology for controlling the efficient cost-effective flow of supplies	3.6667	.86290
	We employ information management to integrate activities of the humanitarian supply chain,	3.5769	.79804
	We practice the use of information technology to coordinate with different supply chain actors,	3.6282	.88434
	We practice the use of information technology to distribute aid materials,	3.3718	.83912
	Grand mean of Information management practices	3.70	0.775

Table 4.9 HSCM practices likert scale respondent frequency results

S,N	HSCM Variables	No,	No, of question	Total response	SD=1	D=2	N=3	A=4	SA=5
1	Sourcing practices	78	7	546	8	103	155	212	68
2	Procurement practices	78	9	702	5	73	294	235	95
3	Transport practices	78	8	624	0	88	207	265	64
4	Storage and handling practices	78	8	624	0	101	206	223	94
5	Distribution practices	78	6	468	0	51	131	209	77
6	Information management practices	78	7	546	0	101	139	243	63
	Total	**468**	**45**	**3510**	**13**	**517**	**1132**	**1387**	**461**
	Percentage (%)			100	0.37	14.72	32.25	39.51	13.13

In general, respondents believed that the logistic techniques used in the humanitarian supply chain management performed better than the other approaches in terms of distribution, transport

management, and information technology. According to the study's findings indicated in (table 4.9), about 53 percent of the respondents were aware of the logistics procedures used in the organization's supply chain for humanitarian aid.

4.4.2 Discussion on results of HSCM Challenges

From the table 4.10, below as summarized, there are nine indicators of humanitarian supply chain management logistics challenges assessed in North Shewa, disaster relief and food security program coordination. The first indicator is human resources related challenges, which are

Focusing on how the organization is impacted by the lack of specialists available for deployment in relief efforts, the absence of established disaster response teams, and the absence of human resources with sufficient expertise of disaster relief operations The respondents agreed that difficulties relating to human resources had an impact on the organization, as seen by the total mean value of 3.9 for these challenges. Similar research by Kalkidan Fekadu (2020) shown that educating experts or human resources during disaster relief preparation improved the operational effectiveness of the organization.

Table 4.10 HSCM logistics challenges response frequency table

S.N	HSCM Challenges (N=78)	No, of Indic	N x No,in	SD=1	D=2	N=3	A=4	SA=5
1	Knowledge Gap	3	234	0	6	14	150	64
2	Transportation Unavailability	4	312	0	8	19	181	104
3	Degraded infrastructure	3	234	0	2	11	168	53
4	Funding Bias	5	390	0	17	57	187	129
5	Security Issues	5	390	0	19	43	230	98
6	Information Technology unavailability	4	312	0	18	53	151	90
7	Supply Chain Coordination and Management	4	312	0	36	43	156	77
8	Demand Uncertainty	4	312	0	21	40	187	64
9	Human resource related challenges	4	312	6	2	44	215	45
	Total Response frequency	36	2808	6	129	324	1625	724
	Percentage of frequency		100%	0.21%	4.6%	11.53%	57.83%	25.6%

The indicator to identify the challenges is funding unavailability. The mean value of this indicator is 4.1, which indicated that respondents agree funding unavailability determines the humanitarian supply chain management performance of the organization. Similar findings were reported by Getnet Mamo, (2020), that unavailability of funds for necessary information technology adoption, limited investment in information technology and unavailability of information technology expects affects the humanitarian supply chain management performance.

The Lack of Supply chain coordination and management challenges and Knowledge Gap are indicators which determine in the coordination aspects affects humanitarian supply chain management and lack of debriefings for supply chain experts affects humanitarian supply chain management performance of the organization. The total mean values of these indicators are 3.9 and 4.15 respectively. Demand Uncertainty is one of the indicators in this section which determine the uncertainty of disasters in humanitarian situations. The total mean value is 3.94. Poor infrastructure for relief supplies is another indicator to assess the infrastructure (road infrastructure) and unavailability of communication infrastructure with disaster prone areas. The total mean value of degraded infrastructure is 4.18. Transportation unavailability is another indicator for identifying humanitarian logistics challenges. The total mean value of transport unavailability is 4.22. The other indicator for this section is security issues, which determine lack of regular security and special regulation imposed by the government to access some routes and airfields for transportation of relief supplies affects the humanitarian supply chain management performance. The mean value of the security issue is 4.04.

Similar findings were reported by different researchers in different places and times. Girma Dadi, (2020) "Determinants of humanitarian logistics performance: the case of Africa humanitarian aid and development agency at Dollo Ado". Ehsan Moeiny & Javad., M. 2016), were conducted on t (2020) conducted on a topic of "Management of Relief Supply Chain and Humanitarian Aids Logistics through Supply Chain Resilience," that uncertainty about disaster timing and location, victim's needs, donors supply, infrastructure, and even relief group membership is governing the conditions. Due to, when information about the specific location of needs began surfacing, the compromised infrastructure significantly increased the difficulty of getting the right supplies to where they were needed.

Another finding conducted in Kenya by Thomas Kiura, (2015), showed the same results that lack of proper information affects the delivery of the right product; uncertainty in demand inhibits delivery of the right quantity; poor storage facilities affects the right condition of products as well as inaccessible locations affects delivery of services at the right time among the humanitarian organizations.

The findings are in line with the observations made by McLachlin, Larson and Khan (2013) that humanitarian supply chains tend to be unstable and inefficient due to lack of joint planning and inter-organizational collaboration. They deal with inadequate logistics infrastructure, along with shifting origins of and/or destinations for relief supplies without warning. The findings also agree with the assertion made by Cuervo.d, (2016) that in a disaster, arrivals, transportation, storage, and delivery of necessary goods is a difficult task that requires the mobilization of a great amount of resources.

The findings also approved by Smilowitz and Dolinskaya (2016)), the main challenge of humanitarian supply chain management is to establish a flow of donations from different sources (national and international) which are not always useful, timely, or appropriate, with minimal waste of resources.

The findings that uncertainty in demand inhibits delivery of the right quantity, poor storage facilities affects the right condition of products and inaccessible locations affects the delivery of services at the right time among humanitarian organizations in Kenya agrees with Ozlem (2015). WHO also confirms that in disaster operations there is a high uncertainty of the quantity and mix of the supplies to be received implying therefore that supplies may arrive too early and cannot be stored for a long time.

From empirical findings within this study human resource is the main challenges, it is evident that when there are many different organizations involved and when expertise is lacking it leads to challenges in coordination and strains operations, which are similar findings conducted by Karisson Ellen, (2017) in Jonkoping university international business school.

When it came to storage and warehousing which created further needs to execute solutions for this issue and thus more staff was highly demanded. Moreover, the lack of storage and warehousing affected the operations by putting more pressure on transportation and hence the

issue of congestion became a consequence, which slowed down the delivery to beneficiaries and hence decreased quality of operations (Eriksson Maria, 2017).

In general the total response mean value of all supply chain management challenge indicators are around 4, which indicates that the majority of the respondents agree with all indicators conducted to identify the effects of challenges on the operational performances of the organization. These are on knowledge gap, human resource related challenges, supply chain coordination and management, information technology unavailability, funding bias, transportation unavailability, demand uncertainty, security issues and degraded infrastructure all these indicators are impacting on performances. Therefore from the frequency table 4.9showed that about 83.6% of respondents believed that there are challenges that are affecting the humanitarian organization practices such as lack of sourcing strategies, demand uncertainty, lack of humanitarian relief items and identification of number and types of beneficiaries of North Shewa zone, disaster relief and food security program coordination.

4.4.3 Discussions on HSCM operational performances

Agility has a total mean value of 3.05 and a standard deviation of 2.68 based on the data that was gathered and examined, while the second parameter, responsiveness, has a total mean value of 2.81 and a standard deviation of 2.45. Reliability is the third indication, and the table below shows that it has a total mean of 2.36 and a standard deviation of 2.32.

The respondents' agreement with a mean result of 3.05, based on the data that was reviewed, showed that they were flexible or agile enough to respond to any changes and quick to provide the necessary humanitarian relief when changes did occur. Beamon (2016) asserts that supply chain management for humanitarian aid and disaster relief must be flexible in order to gauge how well a system can adapt to changes in demand and schedule.

The aim of reliability is to reduce errors and biases (Yin, 2016), by increasing the ability of organizations to consistently supply an acceptable product at the required time. From the findings that the first indicator, agility statement indicated a total mean value of 3.08, which representing that respondents gave their neutrality or they may have not full information to the following statements, the organization adapt quickly to a system of stock manage when there is

stock out, adapt quickly to a system of stock managing when additional demand is required and monitors the overall relief supply chain and responds immediately to minimize supply chain risk.

The previous study on agility indicated that organizational expertise and rapid response capabilities to the external environment have become a prerequisite for differentiating effective firms, weakening the integration of market forces where effective business practices are available globally. These ongoing changes require immediate response and adaptability. However, the natural need for growth and competitiveness in organization hinders the ability of the organization employee to adapt information (Ezcon., 2020).

According to Ashish Yadav, (2021), research conducted on agility that "many researchers agree that various types of benefits like reduction in the production cost, improvement in product quality, quick and timely delivery of goods and flexibility in supply chain which are very much expected in any supply chain network, are only possible with the help of various lean principles, practices as well as techniques for implementing in the entire supply chain.

The immediate response phase is defined as lasting one month since it might be challenging to define it and because agencies often define it differently as they assess various elements. (Maria Eriksson, 2017) Respondents do not believe that their humanitarian organizations deliver aid supplies in accordance with their timetable, standard time, and a minimum order fulfillment cycle time, as indicated by the responsiveness statement performance indicator's overall mean rating of 2.78 in this study. Frezewd Tefera (2020), who studied disaster relief initiatives in the Somali Region, came to same conclusions.

Table 4.11 Humanitarian supply chain management performance response frequency and mean.

S,N	**HSCM Variables**	**No,**	**No, of question**	**Total response**	**SD=1**	**D=2**	**N=3**	**A=4**	**SA=5**	**Mean**	**St,dev.**
1	Reliability	78	5	390	10	130	110	93	47	2.953	2.762
2	Responsiveness	78	6	468	51	120	181	110	6	2.786	2.431
3	Agility	78	3	234	12	58	75	84	5	3.051	2.674
		Total	14	1092	73	308	366	287	58	8.932	7.86
		Percentage (%) of response			`1q	28.205	33.516	26.282	5.311		
					Total mean value of HSCM performance					2.97	2.62

In general from the table 4.11 above, indicated that the study in terms of the three operational performance indicators (reliability, responsiveness and agility) the respondents have 30% neutral and 31% disagreement. This showed that the organization has low performances in the practices of humanitarian supply chain management response operation.

4.5Qualitative interview analysis

Interviews for heads of HSCM departments of North Shewa, disaster relief and food security program coordination. In this study in addition to the survey conducted with respondents from different employees, the researcher also interviewed the heads of HSCM departments of North Shewa, disaster relief and food security program coordination on some important issues. The following are the summary of the study findings obtained through key informant's interviews with heads of HSCM departments.

4.5.1 HSCM of HC logistics Practices

Humanitarian aid distribution procedures primarily rely on humanitarian transportation service c ompanies, with some bringing in their own trucks to bolster delivery in disaster relief locations. Information management is practiced in the zone, with different messages being shared with diff erent actors, but information is not used for proper supply chain planning or as a tool for crisis de cision-making.

This demonstrated that the North Shewa disaster relief and food security program coordinated pr acticed identifying and prepositioning disaster areas, arranging warehousing at the disaster area, and community-level monitoring to research quickly to a system of stock managing when additional demand is required

4.5.2 The major challenges HSCM Performances

According to the respondents the major factors affecting the performances of the organization are lack of identifying the type and the number of beneficiaries, lack of team coordination, unavailable of warehouse at the disaster area, low availability of information technology, no skilled man power, low coordination of NGO`s, no schedule for disaster, limited transportation management, uncertainty of the relief supplies and , poor collaboration and an inability to respond to disaster affected areas in a timely manner.

Due to these challenges, North Shewa, disaster relief and food security program coordination, supply chain management and logistics systems have many challenges to provide the relief humanitarian supplies to the beneficiaries.

4.5.3 HSCM performance of HL in terms of reliability, responsiveness and agility.

The respondents claim that it is difficult for HSCM to perform in terms of responsiveness, or the capacity to offer timely help to catastrophe victims. On-time delivery of goods is challenging due to a lack of infrastructure development, such as bad road conditions.

However, the organization attempted to mitigate the previously stated challenges by providing su pply chain operation training to implementing partners and government corresponding persons, a nd investing in building transport contractor's capacity through various trainings to strengthen th eir capacity and, in turn, provide better service delivery, and building temporary storage units to alleviate storage problems in locations where storage capacity is a problem.

The ability of HL's HSCM performance to recognize changes in the external environment and internal organizational dynamics defines its agility or flexibility. It involves being flexible and quick to adjust an organization to any environmental changes (Blome, 2013). The company should be adjusting its management services in response to environmental changes because of the demand's fluctuation. Participatory management approaches are essential agility enablers because they promote cooperation, commitment, and trust among many actors. The organization promptly responds to a stock management system when there is a stock out and additional demand for relief products from the various partners.

In general, it is clear that the strategic planning, implementation, and management of agile, flexible, and responsive supply chain practices can contribute to the success of logistical operations supporting humanitarian supply chain management operations. However, the results of these qualitative interviews showed that these practices performed poorly in terms of dependability, responsiveness, and flexibility.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this chapter the researcher was focusing by summarizing the major findings of the study collected using questionnaire and interview followed by summarized conclusions and recommendations based on the study findings.

5.1 Summary of Major Findings

The goal of this thesis is to evaluate HL's HSCM during disaster relief operations in terms of key supply chain drivers of practices, obstacles, and operational results in the context of humanitarian disaster relief and food security program coordination in North Shewa, Amhara regional state. The approach is descriptive study design, which is based on the goal of understanding and the subject's relatively limited research, which implies the possibility of gaining new insights. After a thorough analysis and discussion of the humanitarian supply chain logistics literature, a quantitative and qualitative method was used to gain a better grasp of the existing theory with the features of humanitarian supply chain management logistics.

From a total of 84 distributed questionnaires 78 respondents were completed and returned to the researcher. It showed the response rate was 92.8%. About 61.5% of the respondents are males, while females constitute the remaining 38.5% of the total respondents. About 43% of the respondents have served more than 40 years, and more than five years in their current position implying that the major portion of the response is obtained from respondents who had relatively better information regarding the humanitarian supply chain management practices of their respective organizations of the supply chain management performance.

From the findings of the study indicated that the humanitarian supply chain management logistics practices of disaster relief and food security program coordination of North Shewa zone, in terms of providing the required relief items practices have known by the respondents. Because the findings from the assessment showed that above 52% of the respondents were answered above agreements about the humanitarian supply chain management practices are undergo their humanitarian organization.

Regarding challenges of humanitarian supply chain management within the responders from North Shewa zone, disaster relief and food security program coordination as there are around 83.6% of respondents have believed that knowledge gap, transportation unavailability, degraded infrastructure, funding bias and security related issues are the main challenges that are affecting the organization.

5.2 Conclusions

Today increasing in the number of disasters places of interest that the need for better preparation and operation of supply chain management performance. During disaster humanitarian supply aid organizations often face significant problems with elements of humanitarian supply chain management and different humanitarian relief items such as therapeutic food, clothing, medical supplies (like, glove, gauze, bandages, plaster,..), sanitary material and others are distributed from central store to different destinations in the disaster occurred.

The findings within this thesis were pointed toward answering the questions about the HSCM practices, challenges, and operational performance of healthcare logistics during disaster relief and food security program coordination in North Shewa. The findings have shown that the organization has practiced the humanitarian supply chain relief response, identifying the main challenges that negatively affect the performances and measured HSCM logistics performances of disaster relief and food security program coordination, in North Shewa.

The findings of the study indicated that different challenges were faced to implementing humanitarian supply chain management and logistics practices. The 83.6% of respondents believed that there are challenges that are affecting the humanitarian organization practices such as lack of sourcing strategies, demand uncertainty, lack of humanitarian relief items and identification of number and types of beneficiaries.

From the empirical findings of this study, it is evident that reliability, responsiveness, and agility were an issue that affected operation performances, and the lack of storage and warehousing, lack of information and communication, limited or no access to transportation, an insufficient amount of humanitarian logistics and supplies, and shortage of human resource, limited presences of partner due to lack of financial resources and demand uncertainty are affected the humanitarian supply chain management operation performances by putting more pressure on a

consequence, which decreased the activities of HSCM and slowed down the delivery to beneficiaries and hence decreased quality of operations. Therefore they are more sensitive issues that during the relief activities more focus on operations were needed to reach beneficiaries as quickly as possible.

5.3 Recommendations

This thesis examines significant humanitarian supply chain management methods, identifiesmajor problems, and assesses the operational success of North Shewa's disaster relief and food security program coordination. Even if the research findings in general demonstrated that humanitarian supply chain management strategies were used in particular places during disasters, there are still issues that need to be considered and addressed in order to improve performance.

Among the humanitarian supply chain management practices, transportation, storage and handling, distribution and information management practices response results showed that there are agreements on practices in North Shewa's disaster relief and food security program coordination. But the implementations of all humanitarian supply chain management practices still have gaps and many challenges bottle neck to help beneficiaries. Therefore the following recommendations will be demonstrated:

- ✔ Prior to distributing humanitarian relief commodities, the organization implements sourcing/procurement procedures or strategies..
- ✔ The organization performs practices to have clear documentation and contingency plansabout the number of beneficiaries, the types of relief items required by beneficiaries and inventory planning and the inventory management strategies in order to reduce demand uncertainty challenges.
- ✔ The main problem related to the organization’s performance is security issues; therefore by regular assessment together with local and federal administration eliminate any conflicts that challenge the disaster area.
- ✔ The organization implements practices of “just in time” approach in humanitarian supply chain management factors related to reliability, responsiveness and agility.The process of quantifying efficiency and effectiveness of actions is performance measurement and

involves the identification, tracking and communication of performance results using performance indicators

5.4 Limitations and Future Research Recommendations

There are limitations in this thesis that are missing for future research. The study was focused on six drivers of humanitarian supply chain management practices, HSCM challenges and performances in terms of the logistic index of reliability, responsiveness and agilityas per the WHO humanitarian supply chain management healthcare logistics guideline by adapting the indicators to North Shewa's disaster relief and food security program coordination. But this study was limited to North Shewa zone capital city, Debrebirhan, and the study did not include Woreda humanitarian disaster relief office that was found under North Shewa zone,disaster relief and food security program coordination. Therefore it recommends conducting further studies considering all Woreda which found in the Zone. Another study will be conducted on the needs for humanitarian supply chain performance logistics in the areas of community and beneficiary involvement, and another recommendation of study area on humanitarian healthcare supply chain management related to disasters in-depth and comprehensive studies still need to be done further.

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Annex I: Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Questionnaire to be filled by: North Shewa Zone, disaster relief and food security program coordination office Staffs.

Dear Participant,

I'm Workye Molla, and I'm currently working on a project for the Addis Ababa University School of Commerce's Master of Arts in Logistics and Supply Chain Management that examines the humanitarian supply chain management of healthcare logistics in the context of the "Amhara region, North Shewa Zone, disaster relief and food security program coordination office."

As a result, this survey is intended to gather information to evaluate the humanitarian supply chain management of healthcare logistics disaster response: The data gathered through this questionnaire will be kept private and won't be put to any other use. You are cordially asked to answer the questions in an open manner since there is no requirement that you sign your name.

Thank you for your cooperation.

Workye Molla

Cell Phone: +251-963134989/911113260

E-mail: workyemolla6@gmail.com

General Instructions

- It is not necessary to write your name
- Try to address the entire questions given below
- Where answer options are available, please tick (√) in the appropriate space provided.

PART-I: General Information

This section intends to gather general information on the background of the respondent and the organization (Demographic Charactertics of respondents).

1. **Gender**: A. Female ☐ B. Male ☐

2. **Age**: A. 18-25 years☐ B. 26-30 years ☐ C. 31-40 years☐ D. above 40 years ☐

3. **EducationalQualification**:

A. Below grade 12 ☐ B. Grade 12 completed ☐ C. College Diploma ☐

D. First Degree ☐ E. Second Degree and above ☐

4. **Your department/work unit**:

A. Procurement ☐ B. Transport ☐ C. Warehouse ☐ D. Information Technology ☐

E. Other _____

5. **Years worked at the organization:**

A. 1- 5 Years ☐ B. 6-10 Years ☐ C. 11-15 Years ☐ D. 16- 20 Years

E. Over 20 Years ☐

6. **How long have you been working in humanitarian supply chain related task?**

A. Less than 2 Years ☐ B.3-5 years☐ C. 6-10 Years ☐ D. above 10 years☐

7. **Type of Organization**:

A. Governmental Organization ☐ B. International NGO ☐

Part Two: Humanitarian Supply Chain Practices, Challenge and Performance

The issues below pertain to the disaster relief and food security program coordination office's humanitarian supply chain management of healthcare logistics in disaster relief activities in the North Shewa Zone.

Please check the boxes next to the items with which you agree or disagree the most. Answers to the following questions are given on a scale of 1 to 5.

Section One: Supply Chain Management Procedures for Humanitarian Organizations:

Please check the boxes next to the items with which you agree or disagree the most.

The questions are answered on a scale of 1 to 5, where 5 is Strongly Agree, 4 is Agree, 3 is Neutral, 2 is Disagree, and 1 is Strongly Disagree.

S/N	**HSCM Practice variable**	**Humanitarian Organizations Supply Chain Practices**	**1**	**2**	**3**	**4**	**5**
1	**Sourcing**	We have the practice of discovering humanitarian relief requirement analysis to achieve HSCM goals.					
		We have the practice of discovering supply market analysis to achieve HSCM goals.					
		We have the practice of collect supplier information					
		We have the practice of developing sourcing strategy to achieve HSCM goals.					
		We have the practice of implement sourcing strategy.					
		We have the practice of negotiate with supplier and selection of winner to achieve HSCM goals.					
		We have the practice of contract implementation of contractual HSCM improvement.					

2	**Procurement practices**	We apply competitive bidding for procurement of relief supplies in disaster relief operation.					
		We have the practice of predict future demand based on statistical data.					
		We have the practices of preliminary need assessment in a disaster-prone area before procurement is made					
		We have the practices of Quantification of the need assessment is made before procurement					
		We have the practices of Selection of Suppliers and Contract provisions is in practice					
		We have the practices of Analysis of proposals					
		We have the Supplier relationship management practices					
		We have the practices of Issuance of purchase orders and Administration of purchase contracts and resolution of related problems					
		We have the practices of Maintenance of a variety of purchase record					
3	**Transport practices**	We practice identification of the availability of transport services by type of transport					
		We practice mobilization of transport services with in shortest possible time to respond to disasters					
		We undertake a survey of available transport service providers,					
		We practice identification of type of vehicle by means of its capacity,					
		We practice use of all modes of transport to efficiently support disaster relief operation					
		We practice transport capacity planning					
		We have a practice of transport scheduling					
		We collaboration with commercial transport companies					

		to improve response capability,					
4	**Storage and Handling practices**	We practice identification of potential points of storage to enable efficient disaster relief operation, (supported by technology)					
		We practice identification of the required warehouse management equipment for stores, (storage guideline or SOP available)					
		We have a proper storage practice to efficiently utilize storage space, (free from damage, deterioration, breakage, leakage, etc.)					
		We have a proper practice of handing supplies stored (eg. cold chain for vaccines…).					
		We practice screening of supplies to identify unwanted materials,					
		We practice definition of supplies by supply kits for shipment,					
		We have a practice of discharging supplies as per the need identified,(Items distribution to targeted beneficiaries performed according to the time planned for distribution during disaster response).					
		We practice inventory audit to avoid supply scarcity or surplus,					
5	**Distribution practices**	We design the flow of materials for distribution keeping in mind the people who require it.					
		We practice distribution of supplies from central distribution centers,					
		We practice the use of different distribution spots to deliver supplies to the people.					
		We practice timely distribution of relief supplies,					

		We practice push strategy of distribution where we do not have accurate demand information,					
		We practice pull strategy of distribution where we do have accurate demand information					
6	**Information management practices**	We practice adequacy of information sharing with different actors,					
		We employ information for proper supply chain planning,					
		We employ information as a tool for decision making during crisis,					
		We practice the use of information technology for controlling the efficient cost-effective flow of supplies					
		We employ information management to integrate activities of the humanitarian supply chain,					
		We practice the use of information technology to coordinate with different supply chain actors,					
		We practice the use of information technology to distribute aid materials,					

Section 2: Logistics Challenges in the Humanitarian Supply Chain for Healthcare: Please check the boxes next to the items with which you agree or disagree the most. Answers to the following questions are given on a scale of 1 to 5. 1 = Strongly Agree, 2 = Neutral, 3 = Agree, 4 = Agree, and 5 = Strongly Agree.

S.N	**HSCM challenge variable**	**Humanitarian Organizations Supply Chain management challenges**	**1**	**2**	**3**	**4**	**5**
1	Human resources	Humanitarian supply chain management performance is significantly impacted by a lack of experts with the necessary training and readiness to deploy for relief operations.					
		Unavailability of organized disaster response team in					

	Related challenges	place negatively affects the humanitarian supply chain management performance.					
		Unavailability of human resource with adequate knowledge of disaster relief operation negatively affects humanitarian supply chain management performance.					
		Unavailability of professional with the required skill negatively affects humanitarian supply chain management performance.					
2	Funding unavailability challenges	Inadequate funds availability for disaster relief negatively affects humanitarian supply chain management performance					
		There is tight donor scrutiny that negatively affects the humanitarian supply chain management performance.					
		Funding partner unavailability negatively affects the humanitarian supply chain management performance.					
		Delayed funding negatively affects the humanitarian supply chain management performance.					
		Donors being highly valued customers in the eye of the organization as compared to beneficiaries negatively affects humanitarian supply chain performance					
3	Information Technology Related challenges	The performance of the humanitarian supply chain management is significantly impacted by the lack of funding for the deployment of critical information technology.					
		Limited investment in information technology negatively affects the humanitarian supply chain management performance.					
		Unavailability of information technology expects negatively affects the humanitarian supply chain management performance.					`

		Lack of advanced information technology tools during disaster response negatively affects the humanitarian supply chain management performance.					
4	Lack of Supply chain coordination and management challenges	Lack of coordination among humanitarian supply chain actors negatively affects the humanitarian supply chain management performance.					
		Unavailability of people specialized in the coordination aspects affects humanitarian supply chain management performance					
		Presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization					
		Unavailability of virtual integration system to build supply chain integration negatively affects the humanitarian supply chain management performance.					
5	Knowledge Gap	The performance of humanitarian supply chain management is significantly impacted by the absence of debriefings for supply chain professionals after the deployment of relief operations. The performance of the humanitarian supply chain management is significantly impacted by the absence of lessons learned reports from past disaster management events.					
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		events.					
		The performance of the humanitarian supply chain management is significantly impacted by a high turnover rate along with the absence of career advancement among field supply chain professionals.					
6	Demand Uncertainty	Demand uncertainty negatively affects the humanitarian supply chain management performance					
		Uncertainty on the number of beneficiaries negatively affects humanitarian supply chain management performance					
		Uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance.					
		Uncertainty on inventory planning and the inventory management strategies negatively affects the HSCM.					
7	Degraded Infrastructure	Poor infrastructure for relief supplies negatively affects the humanitarian supply chain management performance.					
		Degraded transport infrastructure (road infrastructure) negatively affects the humanitarian supply chain management performance.					
		Unavailability of communication infrastructure with disaster prone area negatively affects the humanitarian supply chain management performance.					
8	Transportation unavailability	Post disaster transportation unavailability negatively affects the humanitarian supply chain management performance.					
		After a disaster, the performance of the humanitarian supply chain management is significantly impacted by the lack of transportation options.					

		After a disaster, the absence of transportation choices has a substantial negative impact on the efficiency of the administration of the humanitarian supply chain.					
		The performance of the humanitarian supply chain management is adversely impacted by rising transportation costs in disaster-prone areas					
9	Security Issues	Lack of regular security assessments negatively affects humanitarian supply chain management performance.					
		A special regulation imposed by government to access some routes and airfields for transportation of relief supplies negatively affects the humanitarian supply chain management performance.					
		Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance.					
		A regulation on clearance and work permits for humanitarian supply chain experts negatively affects the humanitarian supply chain management performance.					
		Lack of strong operational security for humanitarian workers operating in insecure environments negatively affects the humanitarian supply chain management performance.					

Third Section: Humanitarian Supply Chain Management Performance: Please check the boxes next to the items with which you agree or disagree the most. On a scale of 1 to 5, where 5 is for strongly agreeing, 4 is for agreeing, 3 is for neutrality, 2 is for disagreeing, and 1 is for severely disagreeing, responses are accepted.

S.N	Humanitarian Supply Chain Management performance dimensions	1	2	3	4	5
A	**Reliability** (the ability of organization to consistently supply an acceptable product at the required time)					
1	My organization provides the right quantity of relief items to beneficiary					

2	My organization exhibited strong ability to perform tasks as expected					
3	My organization provides right packaging for relief item and deliver with right condition with reducing inventory					
4	My organization provides relief item of high quality to beneficiaries					
5	My organization conducts need assessment accurately in disaster prone areas					
B	**Responsiveness** (ability to satisfy disaster affected victims in a timely manner)	**1**	**2**	**3**	**4**	
1	According to their schedule, my group offers relief items.					
2	My organization has established standards for the efficiency of the humanitarian supply chain jobs.					
3	Following their request, my company promptly offers relief items. Within 72					
4	my business demonstrates responsiveness to the donation-to-delivery time.					
5	my organization offers assistance.In order to provide humanitarian logistics hours of a disaster,,					
6	My organization exhibits minimum order fulfillment cycle time to provide humanitarian logistics					
C	Agility (flexibility to respond to any changes and speed with the necessary humanitarian aid)	**1**	**2**	**3**	**4**	**5**
1	When there is a stock shortagm 8bi,e, my company immediately adapts to a system of stock management.					
2	My company keeps an eye on the entire relief supply chain and reacts quickly to reduce supply chain risk.					
3	My company keeps an eye on the entire relief supply chain and reacts quickly to reduce supply chain risk. the overall relief supply chain and responds immediately to minimize supply chain risk					

Interview questions for heads of supply chain divisions of the selected organizations

interview questions for the selected firms' supply chain division heads

1. What do you think of your organization's disaster relief efforts in the North Shewa Zone in terms of the humanitarian supply chain?_____

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2. What major factors have been affecting your organization's supply chain management performance in the North Shewa Zone disaster relief operation?

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3. How was your organization's supply chain management performance in North Shewa Zone disaster response efforts in terms of reliability, responsiveness and flexibility?

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