ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PHARMACY

Assessment of Factors Affecting Vaccines Cold Chain Management Practices in Public Health Centers Found in Sebeta Town and the Surrounding Woreda of Oromia Regional State

By Fikadu Getachew

A Thesis Submitted to

The Department of Pharmaceutics and Social Pharmacy

Presented in Partial Fulfillment of the Requirements for the Degree of Masters of Science in "Health Supply Chain Management"

Principal Advisor: Dr. Busha Temesgen (PhD)

Co-Advisor:- Mr. Dawit Teshome (M.Sc, MA, Lecturere, Department of Pharmaceutics and Social Pharmacy, AAU)

Addis Ababa, Ethiopia

Oct, 2023 G.C.

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES
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Graduate Program in Health Supply Chain Management

Letter of Confirmation

This is to certify that Fikadu Getachew has carried out this research on the topic entitled "**Assessment of Factors Affecting Vaccines Cold Chain Management Practices in Public Health Centers Found in Sebeta Town and the Surrounding Woreda of Oromia Regional State, Ethiopia"**. It has been submitted to School of Pharmacy Board with my approval as advisor.

Advisor

Dr. Busha Temesgen, PhD (Head, Logistics and Supply Chain Management PU, Assistant Professor of the Adis Abeba University)

Signature_____

Date_____

Addis Ababa, Ethiopia

Oct, 2023 G.C

ACKNOWLEDGEMENT

First of all, I would like to thank the almighty God who is the reason for my existence and has given me his help to accomplish this work successfully. Then I have a deepest gratitude to my advisors Dr. Busha Temesgen and Mr. Dawit Teshome for their valuable comments and unreserved guidance during this proposal work. Additionally, my gratitude also goes to my classmates, especially to those who have been helping me morally and professionally for completing this proposal.

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ABBREVIATIONS

BCG	Bacilli Calmitte Gururi
CCM	Cold Chain Monitor
CDC	Center for Disease Control Prevention
DTP	Diphtheria, Tetanus and Pertussis
EPI	Expanded Program for Immunization
EPSA	Ethiopian Pharmaceutical Supply Agency
EVM	Effective Vaccine Management
FDA	Food and Drug Administration
FMOH	Federal Ministry Of Health
LIAT	Logistics Indicators Assessment Tool
OPV	Oral Polio Vaccine
SCM	Supply Chain Management
SOPs	Standard Operating Procedures
SPSS	Statistical Packages for Social Sciences
TT	Tetanus Toxoid Vaccine
UNICEF	United Nations Children's Fund
VCCM	Vaccine Cold Chain Mangement
VVM	Vaccines Vial Monitoring
WHO	World Health Organization

ABSTRACT

Introduction: Curing and prevention of diseases are challenging circumstances for health-care professionals. Immunization has been identified as one of the most cost-effective health interventions in preventing diseases. Too high or too low temperature makes vaccines loss their effectiveness and potency irreversibly and permanently. So, good management and handling of vaccines is necessary. Storage area, storage equipment, transportation protocols, transportation systems, the working staff, etc. are some of the factors that may affect the cold chain and logistics of vaccines at different settings.

Objectives: The objective of this study is to assess the factors affecting the vaccines cold chain management practices.

Methods: A mixed method was implemented to identify the factors affecting the vaccines cold chain management practices at Sebeta town and Sebeta Hawas Woreda from Aug 2022 to Oct 2022 G.C. and Census method and Purposive sampling techniques were used.

Result: Age of the respondents fall in the range of 24 to 48 years with a mean age and standard deviation (SD) of 25.95±3.81. All the respondents know that freezing and heat affect the potency of vaccines. 95.8% of the respondents know that OPV is the most heat sensitive vaccine whereas 97.9% of the respondents know that a contingency plan for power supply is important. Labeling vaccines with time and date of reconstitution is known by 95.8% of the vaccines handlers. 10.5% of the vaccinators and the vaccine handlers do not know that keeping foods and other items with vaccines affect quality of vaccines. Information management system, man power availability and storage facilities are highly significant factors that affect the vaccines cold chain management practice indicating the R square from the regression is 0.586.

Conclusion: Despite high percentage of good knowledge and positive attitude, poor availability and adherence to cold chain guideline, insufficient number of man power, insufficient storage space in some health centers and low coverage of EPI trainings are determinant factors that directly or indirectly affect the vaccines cold chain management practice in the study area.

Key Words: Vaccines, Cold Chain, Health facilities, Immunization Programs

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

When it comes to the treatment and prevention of diseases, health care professionals are in a challenging position. In order to cure and prevent these medical problems, maintaining immunity among members of a population is essential for biosafety (Arsalan et al., 2014).According to Nelson et al. (2004), one of the most cost-effective health solutions for addressing contemporary health problems is immunization.Consequently, vaccination is regarded as one of the most successful initiatives in history, having prevented millions of deaths around the globe (Ashok et al., 2017).It is thought to save about 2.5 million lives annually and have the potential to save many more (Ojo et al., 2019).

The term "vaccines" is defined by Sanobar et al. (2021) as "inactivated or attenuated microorganisms or parts of microorganisms (nucleic acid, protein) that, once administered to the host, stimulate a protective response of cells within the body systems."As a result, vaccinations are arguably the biological innovation that has been most successful in preventing disease (Malonis et al.,2019).

The use of vaccines in the treatment and prevention of disease has become a popular biosafety strategy, as was mentioned in the paragraph above.The fact that vaccines are delicate biological products, however, is their main drawback.According to Arsalan et al. (2014), improper handling and maintenance of these pharmaceutical commodities could lead to their total and irreversible loss.

When exposed to extreme heat or cold, vaccines may lose some of their effectiveness. They can also be deadly for the groups who most need protection (Comes et al., 2018).This indicates that maintaining the cold chain, or a particular temperature range, during the transport of vaccines from manufacturers to users is crucial to maintaining their efficacy.Without comprehensive, regular monitoring, it can be difficult to ascertain whether vaccination failure is due to breaks in the cold chain (Haworth et al., 1993).

In order to solve such pervasive concerns with vaccine cold chain management, vaccine handlers must be aware of and practice the management as per the standard already established for these particular

pharmaceutical goods.Good vaccine cold chain management procedures maintain optimal vaccine storage and handling to guarantee the full advantages of immunization (Feyisa, 2021).

Good cold chain management practices (GCCMP) are built on ensuring the items' quality and patients' safety. Utilizing temperature profiles that are expected to be typical for the type of cargo is dependent on a variety of factors, including:

- Temperature conditions at origin and destination
- Seasonal temperature (winter versus summer)
- Load configurations
- Transport routes and modes (overnight air, ground, international and so on)
- Total time of transit
- Duration and location of handling and stop-over places
- Product management

Examining these factors in different combinations can allow a company to build a level of certainty regarding how its packaging, techniques, and actions of its contracted service providers will work together with the shared goal of maintaining a product during storage and delivery.

The cold chain distribution process is regularly certified using quality principles, but it's crucial to understand that even a qualified method might alter over time.Because of this, consistent and sufficient monitoring is suggested (Bishara, 2005).

Specific guidelines for the handling and storage of vaccinations are recommended by the Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO).They must also be protected from heat and light, stored in accordance with government vaccination guidelines, and kept in accordance with manufacturer instructions (Arsalan et al., 2014). The vaccinations that will be used must be handled and preserved properly for immunization programs to be systematic and effective. The Immunization Program's supply chain system is thoroughly examined in the (EVM) assessment, which identifies the system's strengths and weaknesses at all levels and aids in the development of a workable roadmap for change.The EVM assessment offers suggestions for the strict supervision of the cold chain, which is necessary for vaccines that are very vulnerable to freezing and overheating (Diamenu et al., 2015).

In addition to the direct temperature effect, logistics issues including modes of transport, warehousing, handling, and packaging should be reevaluated in order to create even more rapid and efficient ways for maintaining the potency of vaccines (Mutangili, 2021).

The management of vaccines is generally affected by a range of factors via the cold chain from the manufacturing sites to the end users. They might be affected, for example, at the manufacturing site, during transportation, in storage areas, at hospitals, or in fields where they are distributed to a community during a campaign. The focus of this essay will be on identifying and summarizing the factors that affect the vaccine cold chain management practices used in healthcare institutions.The study's findings will support public and commercial sector partners in their efforts to effectively and consistently manage the cold chain for vaccinations.

1.2. Statement of the Problem

Vaccines must be maintained in a cold chain system at certain temperatures since they are biological products that may lose their efficacy when exposed to heat and freezing (E. Osei, 2019). As this could jeopardize their performance and safety, they must be transported and stored in a way that prevents exposure to temperatures that are either greater or lower than those recommended for storage (Brzozowska et al., 2016).

Maintaining the quality of the vaccinations is one of the largest issues with immunization programs (Bogale et al., 2019). National immunization programs still have to overcome delivery challenges in order to deploy new vaccines, close the vaccination coverage gap sustainably, and secure sustainable funding. Solutions for the vaccine cold chain and logistics are crucial to resolving some of these problems (Ashok et al., 2017).

The majority of cold chain handlers showed inadequate knowledge, and a large percentage revealed poor practice of cold chain preservation techniques. In terms of public health, cold chain maintenance was insufficient and required special attention to detail in order to offer proper management of vaccine cold chains at vaccination distribution locations (Feyisa, 2021).

The known fact is that more innovative vaccines have been developed and have been adopted in underdeveloped nations, but the practice regarding vaccines cold management is full of challenges (Ashok et al., 2017). Transportation and storage of vaccines are the issues where weaknesses observed in vaccines cold chain management practices. Some additional factors that contribute to weaknesses of the cold chain management are delays during transportation, quality of refrigerators,

a method of storage, too long storage at the health unit, improper use of refrigerators, power interruption, equipment breakage, and lack of trained personnel capable of managing the cold chain (Bogale et al., 2019).

The World Health Organization (WHO) estimates that vaccines can prevent 29% of under-five mortality globally, and that this level of child mortality persists in large part due to weaknesses in the management of the vaccine cold chain system in developing countries (Ojo et al., 2019). High loss rates and insufficient vaccination coverage are brought on by inconsistent cold storage and poor practice of cold chain management (Comes and others, 2018).

It is important to adopt safety measures to protect vaccinations from excessively cold and high temperatures and to ensure that they are used within a specific amount of time. Studies of the cold chain in these countries provide vital information on the efficiency of managerial practice and the functioning of the cold chain (Lugosi et al., 1990). In most countries, the understanding and use of cold chain management practice in relation to the expanded program on immunization are not at the level required to support effective cold chain management. The training, supervision, and knowledge required for health professionals at different organizations to properly use the resources available to them at work are lacking. The cold chain, as its name suggests, is not anticipated to fail at any time, and in most cases, there are no backup plans in place to deal with the problem if it does (Moila, M.P. 2013). In order to keep track of the conditions when vaccines are being transported and stored from the manufacturer to immunization facilities, WHO established an approach in 1979e.c known as the cold chain monitor (CCM) (Lugosi et al., 1990) to enhance the practices of vaccine cold chain management through frequent technical help and on-the-job training in vaccine cold chain management practices (Mohammed et al., 2021).

Therefore, by strengthening cold chain management practices, it is possible to increase effective vaccines management and decreasing the number of vaccine-preventable disease-related mortality (Ashok et al., 2017).

1.3. Objective and Questions of the study

1.3.1. General Objective

- To identify the factors affecting vaccines cold chain management practices at health centers found in Sebeta and the surrounding woreda

1.3.2. Specific objectives

- To identify which factors majorly affect VCCM system at the selected area of the study
- To assess how the available man power, their attitude and level of knowledge affect vaccine cold chain maintenance
- To know what the vaccines cold chain management practices (like temperature monitoring, quality check, implementing SOP or EPI guidelines) look at the health centers and health offices

1.3.3. Research Questions

1. What are the factors that affect the vaccines cold chain management practice at the study sites?
2. How do temperature and information management system affect the performance of the immunization program?
3. In what ways the vaccines cold chain management practices be affected by man power, their attitudes and level of knowledge?

1.4. Significance of the Study

The ultimate goal of every public health supply chain system is to improve the outcome of the activities of the public health facilities. Supply chain management also determines the success or failure of any public health program. This study will focus on identifying the factors that affect the cold chain management at health centers in Sebeta town and Sebeta Hawas woreda. The result of the study will be useful for UNICEF, FMOH, EPSA and other stakeholders to

- ✓ know the factors that affect the cold chain system at health facilities
- ✓ understand the existing practices and put the possible future direction on the cold chain activities
- ✓ identify focus areas within the system and to make collaboration with each other in the cold chain management system.

1.5. Scope of the Study

The study is limited to Sebeta town and Sebeta Awas Wereda. The study does not include private health sectors. Some issues such as transport, storage, and handling of vaccines are issues frequently overlooked and they should be assessed. The patterns and trends need to be investigated in order for us to be sure with the facts and the study aims to reveal these factors especially in the selected areas of the study. All vaccines managed in these sectors will be seen.

CHAPTER TWO

RELATED LITERATURE REVIEW

This part focuses on reviewing previous studies and evaluates the available literature to give a wider understanding on factors affecting the cold chain management of vaccines, how to manage the vaccine supply chain and how the cold chain for vaccines is maintained from the time of receiving until the time of distribution.

2.1. Vaccines Cold Chain Management

Academics and practitioners in business management are interested in the fast developing field of supply chain management (SCM) (Charu and Swatantra, 2004). The phrase "cold chain" relates to two different elements, with "cold" denoting the necessity of controlling temperature to prevent the growth of microbes while preserving the wholesomeness of a product during processing. The phrase "chain" refers to the process of keeping track of the "chain of custody," in which each stage of the processing process is connected to the ones that come before and after it through adequate paperwork and records (Yuen, 2017).

A system called the "Cold Chain" is used to transport and keep vaccines in their optimal condition from the time they are created until they are administered to patients, typically between the temperatures of 2 and 8^{o}C (Azira et al., 2013). Frozen processing, frozen storage, refrigerated transport and distribution, and frozen sales make up the four components of the cold chain. The complete cold chain's storage system is crucial. Critical and significant issues with storage occur more frequently than issues with transportation, but if accurate findings are to be acquired, cold chains should always be viewed as a whole (Xu et al., 2014).

The majority of developing nations have vaccine supply chains that are planned and put into place to satisfy the needs of certain program logistics. The various health programs all have multiple parallel SCM running in the background, but they all essentially carry out identical functional tasks, chiefly attending to the supply requirements of their clients or consumers. However, as the health programs become more established and donor financing decreases, there are growing interests in and initiatives for integration (Jill & Hobbs, 1996).

2.2. Vaccines Cold Chain Management Practices

When handled improperly, cold chain goods, which are delicate biological compounds, may become ineffective or lose their efficacy. Therefore, it is crucial that the appropriate temperature is

maintained throughout the whole distribution chain, from the time the product is shipped from the manufacturing facility until it reaches the patient (Bhatnagar et al., 2018).

It is believed that the cold chain system is most at risk, especially in tropical nations where the power supply is unstable and where maintenance facilities are underdeveloped. 30–50% of the refrigerators and freezers are frequently found to be broken in these areas (Bogale et al., 2019). Due to severe contextual variables that have restricted their capacity to meet vaccination program needs, vaccine delivery methods have also remained substantially unchanged in many low-income nations. For instance, access to main power and roads is difficult for more than 70% of Ugandan health institutions, and the country's poor road infrastructure makes it more difficult to obtain "off-grid" solutions like gas (Ashok et al., 2017).

Management should concentrate on tracking and analyzing supply chain risks and available mitigation strategies in order to establish an effective supply chain. What we term vaccine cold chain management approach is essential for this outcome. By vaccine cold chain management methods, we mean preserving vaccines in pristine condition from their manufacture through delivery by guaranteeing an adequate cold chain infrastructure, compliance with standards, and their efficient management (Bankole, et al., 2010).

To meet the objectives of immunization programs, adequate vaccine management and safety practices must be used at all times and at all points in the supply chain. This criterion aims to guarantee that all recommended policies for vaccine management are effectively adopted and executed at all levels, including the use of vaccine vial monitors (VVMs), the "shake-test," the multi-dose vial policy (MDVP), and the monitoring of vaccine wastages (Osei, E., 2019).

The ability to effectively coordinate activities between a company, its clients, and its suppliers through upstream and downstream linkages is one of the supply chain's key characteristics. This attribute would indicate if vaccine cold chain management in a business or nation is being done correctly or incorrectly.

The absence of the essential infrastructure for maintaining cold chains is a major barrier to the spread of cold chains in many developing nations. Some industrialized nations are also affected by this issue. For instance, a study conducted in England found a number of cold chain management-specific issues that are present in ports all over the world. Inadequate or inaccurate temperature monitoring, a breakdown or malfunction of equipment, an unreliable or incomplete power supply, a lack of proper documentation, untrained personnel who are unable to report any irregularities

they see, and others are some of the challenges facing the cold chain management practice (Goedhals, 2017).

Along with these variables, other elements including humidity, equipment, people, vehicles, and refrigeration technologies might affect cold chain logistics and its management procedures (Xu et al., 2014).

We, the subject matter experts, must recognize the root causes of subpar cold chain management practices and take precautions to prevent them in order to make vaccines cold chain management practices well structured. Simply having good procedures for managing the cold chain of vaccinations is the driving force behind this. We can examine the practice from a variety of perspectives, and the scope of the analysis of the cold chain practice is undoubtedly broad. However, generally speaking, the bad behaviors observed in various organizations must be minimized to the extent of our facilities' capacity. It follows that we must avoid avoidable causes and modify modifiable factors. For instance, it is necessary to avoid using outdated equipment and to switch to newer models. Trainings must be provided to untrained staff members to update their knowledge. Wherever community services like EPI are offered, this must be implemented.

2.3. Measures of VCCM Practices Effectiveness

According to Arsalan et al. (2014), the effectiveness of the vaccine cold chain has been dependent on trained staff, suitable transportation, storage equipment, effective management practices, etc.
Technical agreements should explicitly designate who is responsible for alerting distributors about environmental excursions during the storage, distribution, and transit processes. All relevant staff members should have access to the product characteristics database, which should include a clear description of the storage instructions and safety precautions that are prominently shown on the packaging.

An operational checklist should comprise the manufacturing facility's qualification status, paying particular attention to environmental controls, transport media, handling equipment, storage warehouses, and distribution centers. Every crucial stage of production and distribution should have its own **Standard Operating Procedure (SOP)**. All operation executives should receive **Adequate training** (in the form of individualized, awareness, or document reading).

A systematic inquiry should be conducted, **a risk analysis for product quality** should be done, and **records pertaining to temperature excursions** and duration should be reviewed and authorized on a regular basis (Kumar, N. and Jha, 2017).

Additionally, **stability data** must be accessible from the manufacturer in order to assess and demonstrate that the influencing factors have no impact on the product's quality (Kumar, N., and Jha, 2017). Making ensuring immunization managers and healthcare professionals have access to and are able to use this information comes next after the stability of the vaccine has been confirmed and it has been relicensed with a new product insert. Some of this information is provided by the WHO in monographs, such as the one titled "Temperature Sensitivity of Vaccines" and other vaccine use guidelines (Kartoglu, U., and Milstien, J., 2014).

If there are recurring conditions affecting the management of vaccines, appropriate corrective actions should be taken to prevent the observed problem, if any, and modified storage and transportation conditions should be put in place on the basis of quality risk management (Kumar, N. and Jha, 2017).

2.4. Factors Affecting VCCM Practices

Globally, and particularly in underdeveloped countries like Ethiopia, the management of the cold chain system in varied circumstances can vary substantially. Numerous elements, including funding for vaccines, administration, the availability and expertise of the medical profession, transportation, temperature, equipment accessibility and upkeep, and knowledge of vaccine cold chain management, can all have an effect.

2.4.1. Transportation

According to prior studies, one of the most important factors that have a significant impact on an organization's performance is supply chain risk (Sugathadasa et al., 2021). The need to address supply chain issues is becoming more critical as the number, volume, and cost of vaccinations and temperature-sensitive medications continue to rise internationally. Because of erratic and unpredictable shipping and transportation circumstances, for instance, many nations continue to have chronic vaccination distribution failures. In many nations, transportation access is unreliable and poorly thought out. It is challenging to deliver the vaccines in the necessary quantity and quality if transportation is scarce and the method is not suited for carrying vaccines. As a result, a

program connected to vaccine provision is not satisfied due to the poor availability and potency of vaccinations (Lloyd et al., 2015).

2.4.2. Information Management

Risks have the potential to significantly hurt information transmission and outbound supply chain activities (Sugathadasa et al., 2021). A supply chain must be planned to support and coordinate material and informational flows. Physical infrastructure, storage space, and resources like vehicles are all necessary for the transfer of stuff. The information flows are intended to assist in the coordination of the physical flows and decision-making throughout the supply chain (Comes et al., 2018). Poor notification of information will be evident if well-organized information management is not implemented. This ultimately results in inadequate cold chain management techniques for vaccines (Sugathadasa et al., 2021). High waste rates and insufficient vaccination coverage are caused by unreliable cold storage and ineffective cold chain management (Comes et al., 2018).

2.4.3. Cold Storage Area

One distinct subcategory of warehousing is solutions for cold chain storage. Pharmaceuticals that are temperature sensitive have a longer shelf life in cold storages and are kept uninterrupted within specified temperature ranges. A lot of risks are involved in the warehousing operation. Product quality is directly impacted by uncontrolled storage temperature. One key aspect in determining the efficacy and safety of vaccines is temperature. Therefore, it is crucial to regulate and keep an eye on the temperature of vaccines at every stage in the cold chain (Sugathadasa, R., 2021). High waste rates and inadequate vaccination coverage are the result of unreliable cold storage and ineffective cold chain management (Comes et al., 2018). Vaccine storage conditions aren't always controlled in many nations, especially developing nations (Lloyd et al., 2015). In order to manage the difficulties posed by pharmaceuticals, especially vaccines that are temperature sensitive, temperature-controlled warehouse sector plays a crucial strategic role in supply chains. Standardization is required for the cold storage facility where vaccines are stored in order to maintain their potency. Every installation inside the cold room needs to be correctly adjusted with a standard temperature range suited for storing vaccines (Sugathadasa et al., 2021).

2.4.4. Man Power and Their Knowledge

All professions agree that sustaining and growing professional knowledge requires ongoing professional development. However, efforts put towards professional development don't always provide the anticipated results. Although there is generally agreement among educational researchers that successful professional development is practice-related, many professional learning interventions still rely on the delivery of didactic information and keep participants from participating in real-world work experiences. Because of this, the effect of professional development on actual alterations in attitudes, behaviors, and practice frequently stays low. Some scholars highlight the root of the issue by emphasizing that knowledge is useless if it cannot be put into practice and applied to pertinent circumstances (Teräs, H. and Kartolu, Ü., 2018).

Therefore, the personnel involved in the cold chain management of vaccines must possess the training, experience, and understanding necessary to effectively manage the cold chain. If not, managing the vaccines will not follow the necessary protocol, which will result in the vaccines' lackluster potency (Xu et al., 2014).

As new vaccines are added to immunization schedules and responsible staff is required to receive training on various handling standards, the vaccine cold chain is no longer straightforward. Training is also required for the use of cool water packs and new technologies for recording temperature, such as electronic temperature recording monitors and VVMs. The health staff investigated in some countries has generally insufficient knowledge of temperature control, which leads to poor temperature control practices. Examples include the application of the Vaccine Vial Monitor, the shaking test, and the multi-dose vial policy. One cannot overstate how critical it is to address the knowledge gaps in temperature control if the vaccine supply chain is to operate at the requisite level and vaccine safety and potency are not jeopardized. Poor temperature control procedures were discovered during EVM review in some countries, along with a lack of training, continuous temperature monitoring devices, inadequate knowledge of vaccine management, and other contributing issues (Osei, E., 2019).

2.4.5. Temperature

In order to preserve the pharmaceutical product's efficacy, the cold chain must be constantly monitored and maintained. The regulation of storage and transportation temperature is one of the key elements in maintaining the quality and integrity of vaccines. It is the most major environmental factor with a substantial potential to affect the quality of vaccines. The conditions of

the vaccination products' storage and distribution should be regularly monitored to assure their quality and integrity. Using a thermometer is the standard procedure for checking the temperature in vaccination refrigerators. However, a thermometer cannot be regarded as a "appropriate" monitoring instrument because it just gives a snapshot of the temperature at the moment it is checked. Since this snapshot reading only offers a value when it is checked and does not include the rest of the day/night period, health professionals may mistakenly infer that the vaccines are safe if a temperature value between +2°C and +8°C is discovered while checking. The majority of temperature breaches go undiscovered unless a temperature excursion is observed when the temperature is examined using a standard thermometer (Kartoglu, U., and Milstien, J., 2014).

Therefore, it is essential to regulate and keep an eye on temperature at each step in the cold chain because it is one of the key criteria to gauge the quality and safety of vaccines (Sugathadasa, R., 2021).

2.4.6. Equipment

The infrastructure and machinery used for vaccine cold storage present the biggest obstacles to vaccination campaigns. Storage facilities and transportation systems have electrical and non-electric cold chain equipment that is kept at the proper temperature (Pambudi, N.A., 2022). Equipment used in storing and dispensing vaccines while preserving their efficacy includes ice-lined refrigerators, deep freezers, cold boxes, vaccine carriers, and solar refrigerators. A thermometer, an electronic data logger, a freeze indication, and a real-time temperature monitoring device are a few examples of temperature monitoring tools that may be used.

The Expanded Program on Immunization proposed solar refrigerators as a technological cure to cold chain issues in the early 1980s, and they have since gained acceptance as a potential alternative. In order to help safeguard hundreds of thousands of children from fatal and disabling diseases that can be averted through vaccinations, solar refrigerators are projected to have a significant impact. They help ensure continuous immunization services by serving as a power supply for equipment utilized in the cold chain for vaccinations (Comes, 2018).

2.5. Relationship between each Factor and Measures of VCCM Practice Effectiveness

In order to manage the complexity of vaccine supply chains, the temperature-controlled warehouse sector is strategically significant. This action could resolve problems with the current warehouse, especially with regard to monitoring and regulating the temperature (Sugathadasa et al., 2021). For instance, regular cleaning and defrosting of refrigerator/fridge ice and prompt cold chain

equipment maintenance during breakage as per WHO recommendations are key measures vaccine handlers should do (Feyisa D., 2021).

In addition to these facts, keeping effective vaccine cold chain management requires having and using Standard Operating Procedures, facilitating adequate training for working personnel and program managers, and developing systematic inquiry of overall operations. The understanding of managing vaccinations increases with training for the working crew, making vaccines safer and more efficient.

The main metrics for managing vaccines are records relating to temperature excursion and duration. This is particularly important for information notifications, which are the fundamental element influencing the techniques used in the cold chain management of vaccines. In order to regulate and influence those aspects that affect the cold chain management of vaccines generally, it is crucial to take the proper corrective actions for any errors that may occur and are related to it.

2.6. Empirical Review

(Abebe et al., 2019) In 1974, the WHO launched the Expanded Program on Immunization (EPI).This organization established a procedure for employing the cold chain monitor (CCM) in 1979 to keep track of the circumstances throughout vaccine storage and transit from the manufacturer to child immunization facilities (Lugosi et al., 1990). Around 107 million newborns (83%) had received at least three doses of the DTP vaccine globally; however, nearly 22.4 million miscarried before receiving three doses, leaving a sizable proportion of kids vulnerable to diseases and fatalities that can be prevented by vaccination (Abebe et al., 2019).

Millions of children in low- and middle-income nations do not receive the full sequence of immunizations recommended by their national routine vaccination schedule every year, despite this being an established, cost-effective public health strategy for increasing child survival. For instance, pneumonia, diarrhea, or meningitis in post-neonatal children are responsible for nearly 50% of mortality in Pakistan; these conditions can be avoided with immunization (Shaikh et al., 2018).4.4 million children in sub-Saharan Africa lost their lives per year as a result of communicable diseases that could have been prevented by vaccination. Poor vaccination rates and a lack of adequate infrastructure in sub-Saharan African nations are linked to the development of diseases that are preventable by vaccination (Bishara, 2006).

Even a study conducted in the United States found that there were few refrigerator temperatures that fell within the permitted range, with 63% falling below the minimum, 59% exceeding the maximum, and 93% either above or below or both (Bogale et al., 2019).

The market for biopharmaceuticals expanded at an average annual compound growth rate of 21% from 1999 to 2003, which was significantly higher than the traditional pharmaceutical sector's growth rate of about 11%. About 10%, or $41 billion, of the more than $400 billion in pharmaceutical items marketed globally in 2003 were biopharmaceuticals. The cold chain has grown in significance as a part of the broader pharmaceutical supply chain since biopharmaceuticals frequently have temperature sensitivity issues (Bishara, 2006).

2.7. Conceptual Framework

According to Phillips et al. (2017), a conceptual framework is a general paradigm for thinking about how determinants interact. It shows how the independent and dependent variables are related. In contrast to the dependent variable, which pertains to the subsequent phenomena, the independent variable refers to the antecedent phenomenon.

Most of the time, the criteria listed in the model's left box have an impact on how vaccination cold chain management activities are conducted. The potency of the vaccinations could be harmed if the mode of transportation chosen does not meet the requirements for vaccine distribution. Similar requirements apply to the cold room and the equipment used to store the vaccines. The vaccines might not work and could be harmful to the people receiving them if this happens. It is essential to have their expertise and manpower..

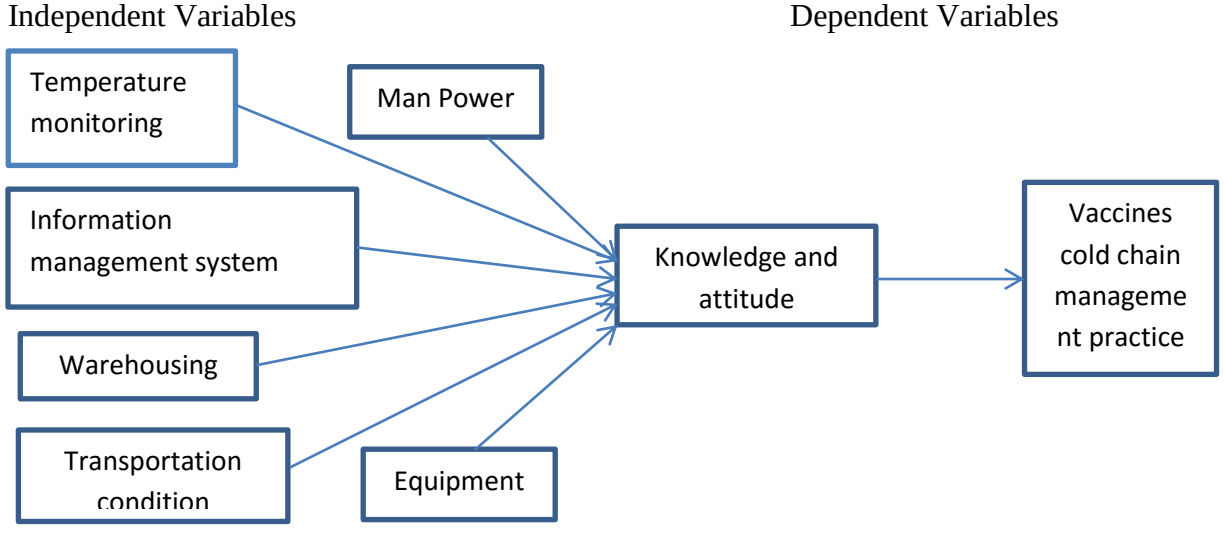

Fig.1.A conceptual framework based on theory of planned behavior model (Ajzen, 1991)

CHAPTER THREE

METHODS AND MATERIALS

3.1. Description of the Study Area

Sebeta city administration and Sebeta Hawas woreda are located to south west Addis Ababa in Oromia regional state. 10 town kebeles and 41 farmer kebeles are found in the two study sites. The total population size of the two areas from the projected population size of the town from the last Ethiopian census is 642,592 (143,695 in Sebeta Hawas woreda and 498,897 in Sebeta town). 10 government health centers and 50 health posts are found in these two sites. Since these two sites are located near the capital of the country, the access they have for any issues related to vaccines and their cold chain management is thought better if compared with those that are found in remote areas.

3.2. Research Approach

Both quantitative and qualitative study approaches were employed to make a mixed type of study method. Quantitative research method, by definition, deals with quantities and relationships between attributes; it involves the collection and analysis of highly structured data by using standardized data collection methods such as questionnaire survey.

The use of conversation and observation to gather and analyze data, primarily non-numeric data, is referred to as using "qualitative methods" in the fields of health and social sciences. We can learn a lot about people's actions, thoughts, and feelings regarding a research subject by observation and communication of people's actions (Moila, M.P., 2013). We can also learn what influences people's actions and why.

3.3. Research Design

A cross-sectional survey and explanatory study designs were applied for conducting the research study under both qualitative and quantitative approaches to identify the factors affecting the vaccines cold chain management practices at the study areas from Aug 2022 to Oct 2022 G.C. Studies that take a cross-section of the population to determine the prevalence of a phenomenon, situation, problem, attitude, or issue are best suited for cross-sectional study designs. It helps in getting a broad sense of the situation as it stands at the time of the study (Kumar, R., 2018).

3.4. Data Collection Tools and Procedures

The questionnaire was adapted and modified based on LIAT and from other previous study questionnaires. The research aimed at collecting both quantitative and qualitative data. For the cross-sectional survey, self-administered questionnaires were given to the sampled units. The questionnaires contained relevant questions which were designed in line with the objectives of the study. Cold chain system monitoring charts and checklists were employed to elicit information about the cold chain infrastructure and management in the organizations. An in-depth interview was employed for collecting qualitative data. The schedule contains open-ended questions that describes and explains the factors affecting the vaccines cold chain management in the settings. The interviews were documented appropriately by participant words. Finally, the participant words were translated into English. Data collection were carried out from May 21, 2022–May 30, 2022 G.C.

3.5. Population and Study Sample

A population is made up of all potential instances (people, things, and events) that fit a certain description and are relevant to a particular researcher. The complete set of factors that the researcher would like to generalize about is known as the "target population" (Moila, 2013).

The study population for this research work were the health centers found in Sebeta town and the surrounding woreda. The total number of health centers was 10. Accordingly, census method was used for deciding the study units. Census method as we know is the sampling method in which all the concerned bodies are taken as a whole. So we don’t need to calculate the sample size. All workers who have direct responsibility with and actively working on vaccine management were included in the study. In this study, the sample consisted of facility EPI coordinators, vaccinators, pharmacists which were 60 in number and health center directors whose opinions and preferences are used in providing information as to how vaccine cold chain management is practiced in the town and the surrounding woreda. Therefore, 48 out of 60 respondents from the health centers and from the health offices were participating in quantitative data collection. That means 48 workers have responded and the rest 12 were non respondents. For qualitative data five (5) directors of the health centers were interviewed till the gathered data were saturated. So the total number of the respondents was 53.

3.6. Inclusion and Exclusion Criteria

While setting inclusion and exclusion criteria, the researcher was considering those workers who were actively participating in vaccines management incorporating directors purposively at the time the research was being carried out. Even though it was possible to consider all products managed under cold chain system, only vaccines were considered to be specific to the topic of this particular research work.

3.6.1. Inclusion Criteria

- ✓ All types of vaccines managed within the health centers were seen

3.6.2. Exclusion Criteria

- ✓ Non pharmaceutical products and pharmaceuticals other than vaccines were not included in the study
- ✓ Workers outside pharmacy, EPI and directors were not included in the study

3.7. Data Source and Type

Primary and secondary data sources were used to assess/identify the factors affecting the vaccines cold chain management practices. The primary sources of data were obtained from interview, observation and questionnaire.

The secondary sources of data were

- ✓ Temperature monitoring chart
- ✓ Receiving and issuing models
- ✓ Monthly, quarterly and annual reports
- ✓ Vaccine administering tracking charts, etc.

3.8. Data Quality and Control Measure

Validity Test

Validity is the degree to which a test measures what it purports to measure (Creswell, 2009:190-92).Before the actual data collection days, the data collection tools were pretested for completeness and appropriateness and some of the questions were modified based on the findings to ensure the validity of the tools. The pretest was performed in two health centers found in Ilu woreda which is located near Sebeta Hawas woreda. The questions included in the questionnaire are all valid to test

the knowledge of members towards the role of labor union in maintaining employment conditions. This can be ensured that the questions are highly linked to address the roles of the labor union.

Reliability

The questionnaire was prepared in English language and was translated into Amharic language and retranslated to English to increase its quality and ensure that the translated version does not alter the meaning of the questionnaire.

The researcher was taken the pilot-test before distributing the final questioner to assure the reliability the result was 0.9.The results from analysis indicated that the Cronbach‘s Alpha value is 0.9. This suggested that the internal reliability in this study was acceptable and signified to be good.

Cronbach's Alpha	No of item
0.9	58 item

3.9. Data processing, Analysis and Interpretation

The collected data were checked manually for completeness and consistencies before entering them into computer. The quantitative data were coded, entered, and analyzed using latest SPSS version 26. Summary descriptive statistics such as percentages, frequency, and linear regression (which is ordinal in type) were used.

Qualitative data were collected by means of interview through open ended questions and observational checklists. These data were analyzed based on thematic analysis. Recorded or paper documented files from the qualitative data were transcribed into Microsoft word 2010. Transcripts were read and made understood. Similar topics were grouped together, and those with common features were clustered together until the final themes and subthemes emerge. Themes and subthemes were arranged based on their commonality.

Generally

- ✓ the data were sorted into different groups
- ✓ the quality of the data were checked. This quality check involved checking for completeness and excluding incomplete questions.
- ✓ The data were manipulated manually and organized to facilitate for computer processing.
- ✓ the results were interpreted using tables and comparison with previous similar studies

3.10. Ethical Considerations

This research has followed all ethical standards. Ethical clearance was obtained from the department of Pharmaceutics and Social Pharmacy, School of Pharmacy, Addis Ababa University. An official letter was written by the department to the health offices of Sebeta town and Sebeta Hawas woreda to get permission and support. After a brief explanation of the objectives and purpose of the study, verbal informed consent was obtained from each study participant. Participants were also informed that participation is on a voluntary basis and they have the right to stop their participation at any time if they want to stop. Study participants were also informed that all data obtained from them will be kept confidential by using codes instead of any personal identifiers.

CHAPTER FOUR

DATA ANALYSIS, RESULT AND INTERPRETATION

4.1. Qualitative Data Analysis

Theme 1: Common challenges faced by cold chain managers

Even though the cold chain management practice looks better, there were routinely existing common factors that affect the vaccines cold management. Among the factors, insufficient man power and lack of consistent electric power and transportation were the major ones.

Theme 2: Why challenges continue to exist

Lack of timely feedback from the officers of the health offices to the reports and requests of the health centers was seen. No timely maintenance of nonfunctioning equipment was practiced because of different problems like budget constraints.

Theme 3: Storage of vaccines when refrigerators are out of space

When shortage of storage space encounters the vaccine handlers use cold boxes with ice packs and temperature monitoring thermometers. Shifting the vaccines to health office storage is the other means of storing extra vaccine. The other is using sand containing water buried under ground

Theme 4: Ways to minimize vaccine damage

I have been told that the vaccine handlers were using some means for minimizing damages of vaccines. Some of the ways utilized were using ice packs, using other sources of power in case of electricity outage and regularly checking/monitoring temperature.

Theme 5: Partners in support of vaccines management

EPSA, OHB and sometimes UNICEF and MOH are partners that provide support to the health centers in different concerns like supportive supervision and product availability.

4.2. Quantitative Data Analysis Result

Only 48 of the total 60 questionnaires were correctly completed and returned, yielding 80% response rate

Table 4.2.1. Socio-demographic characteristics of respondents in the health centers, (n = 48).

S.No	Socio demographic data		Frequency	%age
1	Sex	Male	23	47.9
		Female	25	52.1
2	Age	24-28	13	27.1
		29-33	19	39.6
		34-38	11	22.9
		39-43	3	6.3
		44-48	2	4.2
3	Position	Dispenser	12	25.0
		EPI focal person	9	18.8
		Pharmacy head	4	8.3
		Store man	9	18.8
		Supply Chain and Logistics Managers	2	4.2
		Vaccinators	12	25.0
4	Educational Attainment	Diploma	25	52.1
		Degree	23	47.9
5	Profession	Druggist	13	27.1
		Health Extension Worker	1	2.1
		Health Officer	1	2.1
		Nurse	19	39.6
		Pharmacist	14	29.2
5	Work Experience	<11	32	66.7

		≥ 11	16	33.3
6	EPI Training	Yes	25	52.1
		No	23	47.9

All 10 health facilities and 2 health offices have participated (overall coverage was 100%**).** 48 vaccinators and vaccine handlers responded to the quantitative questionnaire. There were 25 (52.1%) female respondents, 19 (39.6%) were nurses, 13 (27.1%) were druggists, 14 (29.2%) were pharmacists, 1 (2.1%) was health officer and 1 (2.1%) was health extension worker. The respondents consisted of 24 to 48 years of age with a mean age and standard deviation (SD) of 25.95±3.81. Among the vaccinator and vaccine handlers included in the study, 25 (52.1%) were diploma holders concerning the level of education, with work experience ranging from 2 years to 20 years with mean work experience and SD of 9.48±4.825. Out of the total respondents, 25 (52.1%) had received EPI training.

Table 4.2.2. Knowledge of health care workers on vaccine cold chain management

SNo	Characteristics of Knowledge	Frequency	Percent
1	Freezing and heat affects vaccines potency		
	Yes	48	100
	No	0	0.0
2	OPV is the most heat sensitive vaccine		
	Yes	46	95.8
	No	2	4.2
3	Vaccines can be kept between 2 and 8 ^{o}C for a month		
	Yes	45	93.8
	No	3	6.3
4	Aware of contingency plan in case of power failure		
	Yes	47	97.9
	No	1	2.1
5	Lable date and time of reconstitution		
	Yes	46	95.8

	No	2	4.2
6	Keeping foods with vaccines affects them		
	Yes	43	89.6
	No	5	10.5
7	Low grade fever person can receive vaccine		
	Yes	30	62.5
	No	18	37.6
9	Vaccine handlers know how to read and interpret VVM		
	Yes	45	93.75
	No	3	6.25
10	The workers know how and when to perform vaccine shake test		
	Yes	46	95.83
	No	2	4.17
11	Multi dose vaccine policy known by all vaccine handlers		
	Yes	48	100
	No	0	0

All the respondents (100.0%) know that freezing and heat affects the potency of vaccines. 46 (95.8%) of the respondents know that OPV is the most heat sensitive vaccine while 45 of the respondents know that vaccines can be kept between 2 to 8^{o}C for a month. The recommended temperature range for vaccine storage was known by 93.8% of the respondents and 97.9% of the respondents know that a contingency plan for power supply is important. After opening vaccine vials, they should be labeled with time and date of reconstitution and this is known by 95.8% of the vaccines handlers. 10.5% of the vaccinators and the vaccine handlers do not know that keeping foods and items other than vaccines in vaccines refrigerators affect quality of vaccines. There was knowledge gap regarding whether children with low grade fever can be vaccinated or not. 62.5% of the respondents have said it is possible to vaccinate. All vaccinators and vaccine handlers know about multi dose vaccine policy. 45 (93.75%) of the vaccine handlers know how to read and interpret VVM. The rest do not know it well. The shake test process is known by 95.83% of the respondents.

Table 4.2.3. Observational Checklist

SNo	Items		Frequency	Percent
1	Expired and frozen vaccines exist	Yes	2	16.67
		No	10	83.33
2	The health center has sufficient storage capacity	Yes	9	75
		No	3	25
3	Requisition forms are used for reporting and ordering	Yes	11	91.67
		No	1	8.33
4	Damaged vaccines are recorded	Yes	1	8.33
		No	11	91.67
5	Items other than vaccines are found in refrigerators	Yes	2	16.67
		No	10	83.33
6	To is recorded twice daily and the record sheet is attached on the refrigerator	Yes	11	91.67
		No	1	8.33
7	Alternative power source is available	Yes	9	75
		No	3	25
8	Functional thermometer is available	Yes	12	100
		No	0	0
9	EPI and vaccine storage rooms are clean	Yes	12	100
		No	0	0
10	Ice packs and vaccine carriers are available	Yes	12	100
		No	0	0
11	SOP and EPI guideline are available and well implemented	Yes	6	50
		No	6	50

According to the finding of direct observation at the health centers, damaged vaccines were found at 2 health centers found in the wereda. Damaged vaccines were not recorded well in most of the health center. The vaccines storage capacity of the health centers is insufficient in the wereda's health centers as compared to that found in the town administration. VRF is used in all health centers for reporting the vaccines consumption and refilling the required amount. In two health

centers found in Sebeta town, items other than vaccines were found in vaccine refrigerators. Twice a day temperature record was practiced by all health centers and the record sheet/chart was attached on the refrigerators. Alternative power sources were found in 75% of the facilities. Functional thermometers were found in all areas where vaccines are handled and distributed. EPI and vaccine storage areas were clean, ice packs and vaccine carriers were available in all health centers. In half of the facilities no SOP and EPI guidelines were available.

46 (95.8%), 44 (91.7%) and 45 (93.8%) with mean and SD of 4.71 $\pm$ 0.849, 4.6 $\pm$ 0.869 and 4.46 $\pm$ 1.01 of the vaccinators and vaccine handlers believe that using vaccine carriers and ice packs, maintaining T^o condition and care for vaccines by health professionals during transportation is mandatory respectively. Only 38 (79.2%) of the respondents with mean value and SD of 4.31 $\pm$ 1.114 agree with the importance of storing vaccines in a separate refrigerator. All the respondents have a positive attitude in that T^o must always be observed and recorded regularly twice a day.

Only 27 (56.3%) of the respondents with mean value 3.52 $\pm$ 1.353 have agreed that the number of available workers in vaccines cold chain management is sufficient. 34 (70.8%) of the respondents disagree and 7 (14.6%) were neutral in the existence of computerized cold chain data management with mean value and SD of 1.96 $\pm$ 1.166.

Table 4.2.4. Attitude of respondents on cold chain management in the health centers, 2023 (n = 48).

SNo	Description	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean ± SD
1	While transporting vaccines, carriers, boxes and ice packs should be used whether vehicles are available or not	2 (4.2%)	0	0	6(12.5%)	40 (83.3%)	4.71± 0.849
2	The T^o condition for vaccines must be maintained during any transport system	0	4 (8.3%)	0	7 (14.6%)	37 (77.1%)	4.6 ± 0.869
3	Health care professionals should take care of the vaccines during transportation	3 (6.3%)	0	0	14 (29.2%)	31 (64.6%)	4.46 ± 1.01
4	Fully functional storage equipment are available at the HC	0	3 (6.3%)	5 (10.4%)	23 (47.9%)	17 (35.4%)	4.13 ± 0.841
5	Storage equipment should be regularly checked for compliance	2 (4.2%)	0	2 (4.2%)	12 (25.0%)	32 (66.7%)	4.5 ± 0.923
6	Vaccines should be kept in separate refrigerator	2(4.2%)	2(4.2%)	6(12.5%)	7(14.6%)	31(64.6%)	4.31 ± 1.114
7	The equipment must be sufficient for accommodating all available vaccines	0(%)	3(6.3%)	3(6.3%)	18(37.5%)	24(50.0%)	4.31 ± 0.854
8	Special storage area must be available for storage	0(0.0%)	5(10.4%)	8(16.7%)	11(22.9%)	24 (50%)	4.13± 1.044
9	Storage area should be built in the compound of HC	5(10.45%)	0(0.0%)	8(16.7%)	10(20.8%)	25(52.1%)	4.04±1.288
10	The T^o must always be	0(0.0%)	0(0.0%	0(0.0%	17(35	31(64.6	4.65±0.4

	observed and recorded regularly twice a day		)	)	.4%)	%)	83
11	The number of available workers in vaccine management is sufficient	5(10.4%)	7 (14.6%)	9(18.8%)	12(25.0%)	15(31.3%)	3.52 ± 1.353
12	All vaccine managers and vaccinators must be health professionals	0 (0.0%)	0(0.0%)	4(8.3%)	6(12.5%)	38(79.2%)	4.71 ± 0.617
13	Bin card must be available and updated for each vaccine	7 (14.6%)	0 (0.0%)	10(20.8%)	13(27.1%)	18(37.5%)	3.73 ± 1.364
14	Computerized data management must exist	24(50.0%)	10(20.8%)	7(14.6%)	6(12.5%)	1(2.1%)	1.96 ± 1.166
15	IFRR and RRF must exist for reporting and refilling vaccines	6(12.5%)	0(0.0%)	3(6.3%)	16(33.3%)	23(47.9%)	4.04 ± 1.304
16	SOP/EPI guidelines are implemented to ensure proper vaccine handling	3(6.3%)	0(0.0%)	3(6.3%)	16(33.3%)	26(54.2%)	4.29 ± 1.051
17	The information related to data management is prepared, reported and well communicated between supervisors and data handlers	0(0.0%)	2(4.2%)	0(0.0%)	21(43.8%)	25(52.1%)	4.4 ± 0.712

As it can be seen in the above Table 4.2.4., 46 respondents agreed that while transporting vaccines, carriers, boxes and ice packs should be used whether vehicles are available or not, that is 88.3%, whereas, 2 respondents disagree on the idea. Transporting vaccines, carriers, boxes and ice packs should be used has high mean value of 4.71. From this we can see that there is a good practice of vaccines, carriers, boxes and ice packs usage.

Regarding the T^o condition for vaccines must be maintained during any transport system has a high mean value of 4.6, where 91.7% respondents agrees and 8.3% disagree. When we look at this data we can see good temperature control during transportation. Similarly when we Health care

professionals should take care of the vaccines during transportation has a high mean value of 4.46, where majority 93.7% respondents agrees and 6.3% disagree .From this we can see that there is a good practice in giving care vaccines during transportation by Health care professionals.

Regarding Fully functional storage equipment are available at the HC, Storage equipment should be regularly checked for compliance and Vaccines should be kept in separate refrigerator system have a high mean value 4.13, 4.5 and 4.31 respectively. Where most of respondent 83.3% and 91.6 %agree availability of fully functional storage equipment and regular checkup of Storage equipment respectively. While 78.6% agree, 8.4% disagree and 12.5% neutral on Vaccines should be kept in separate refrigerator system. When we look at this data we can see presence of functional storage with good practice of regular checkup and storage of vaccine in different refrigerator system.

From the table items which say the equipment must be sufficient for accommodating all available vaccines, Special storage area must be available for storage and Storage area should be built in the compound of HC have a high mean value 4.31, 4.13 and 4.04 respectively. Whereas 87.5 agree, 6.3% disagree on availibity of sufficient equipment for accommodating all available vaccines and 72.9% agree, 10.4% disagree on availibity of Special storage as well 72.9 agree, 10.45% disagree on building storage area in HC.

From the above table other items which say The T^o must always be observed and recorded regularly twice a day, The number of available workers in vaccine management is sufficient and All vaccine managers and vaccinators must be health professionals have mean value 4.65, 3.52and 4.71 respectively. The first item and third item has high mean value than middle item. Whereas almost all of respondent agree on observing and recording T^o must always regularly Twice a day.91.7% agree while 8.3% neutral on All vaccine managers and vaccinators must be health professionals where as 56.3% agree,25% disagree and 18.7% neutral on sufficiency of available workers in vaccine management. From this we see still no sufficient health care workers in in vaccine management.

Regarding Bin card must be available and updated for each vaccine, IFRR and RRF must exist for reporting and refilling vaccines, SOP/EPI guidelines are implemented to ensure proper vaccine handling and The information related to data management is prepared, reported and well communicated between supervisors and data handlers have mean value 3.73, 4.04, 4.29 and 4.4 respectively. Whereas item which say computerized data management must exist has low mean

value 1.96 where 50% strongly disagree and 20.5 disagree. When we look at this data the health care is very poor in the implementation of computerized data management which could put a shadow to its role of Vaccines Cold Chain Management.

4.3. Ordinal Logistics Regression

Before using this model, there must be assumptions taken into consideration. The assumptions are:

1. The dependent variable should be measured at ordinal level
2. One or more independent variables that are continuous, ordinal or categorical can be used
3. No multi co-linearity

Table 4.3.1. Logistic Regression on the factors affecting cold chain management practice

SNo.	Independent Variables	Coefficient	Sig (P value)>	R Square	AR Square
1	IMS	-0.164	0.009	0.586 (58.6%)	0.526
2	MPTK	0.276	0.000		
4	SF	0.167	0.002		
5	AE	-.086	0.029		

NB: Variables with a p-value <0.05 were taken as statistically significant at 95% level of confidence

IMS- Information Management System, MPTK- Man Power and Their Knowledge
TMP- Temperature, SF- Storage Facility, AE- Adequate Knowledge
TC- Transportation Condition

From the regression result it is clear that information management system (with p value=0.01), man power availability (with P value=0.00) and storage facilities (with P value=0.002) are highly significant factors that affect the vaccines cold chain management practice. Information management system has negative association while man power availability and storage facilities are positively associated with vaccines cold chain management practice. The R square is 0.586 which indicates more than half of the independent variables considered affect the dependent variable.

4.3. Discussion

This study was conducted to assess the factors that affect the vaccines cold chain management practices in all the health centers found in Sebeta town and Sebeta Awas wereda in Oromia regional state, Ethiopia. To identify the factors, different assessment tools such as structured questionnaires for identifying the characteristics, knowledge and attitude of the respondents, unstructured interview questions and observation checklists were employed.

So the discussion of this study focuses on the findings which are based on the objectives so that the research questions can be answered. The results from both the quantitative and qualitative data analysis were used to draw a comprehensive conclusion.

There were many factors which affect the vaccines cold management among which some are significant. Most of the vaccine handlers fall in the age range of 24 – 38 years which are the most active portion of the whole workers. They represent majority of the respondents which account for 89.6% of the respondents. Almost all the vaccinators and vaccine handlers at all health centers were nurses indicating nurses are given the responsibility of handling and vaccinating the vaccines. 52.1% of the respondents have taken EPI training and the same number was diploma holders. Here, there should be a plan to give trainings to all the vaccinators regarding EPI and upgrading the level of education for diploma holders must be thought of. More than half, 66.7%, of the respondents have less than 11 years working experience revealing that the well experienced ones leave the health centers. This may expose the health centers to less knowledgeable health workers regarding vaccines handling and vaccination. Nevertheless, these are larger as compared to the study done in public heath institutions in east Gojam zone of Amhara region (Bogale et al., 2019).

More than 94% of the respondents know that freezing and heat affects the potency of vaccines, OPV is the most heat sensitive vaccine, labeling time and date of reconstituted vaccines is important and a contingency plan for power outage in order to maintain T^{o} for vaccines is necessary. This might be due to the existence of well trained and well experienced workers though they are small in number and this is comparable (in line with) the study conducted in Kelantan, Malaysia (Azira et al.,2013).

Few respondents, 10.5% of the vaccinators and the vaccine handlers do not know that keeping foods and items other than vaccines in vaccines refrigerators affect quality of vaccines. Ideally, the

fridge containing vaccines should not be used to store other products. This is linked with the negligence few vaccinators and vaccine handlers have. Because they don't exactly know that the vaccines' quality/potency is affected by foods and by items other than vaccines. There was knowledge gap regarding whether children with low grade fever can be vaccinated or not. 37.5% of the respondents have said that it is impossible to vaccinate children with low grade fever. These gaps may be due to less experienced and untrained vaccine handlers.

More than 94% of the respondents know the shake test process and how to read and interpret VVM. From this it is clear that the damage to heat and freeze sensitive vaccines is significantly minimal. This is because of the follow up the vaccinators do for the vaccines quality timely before they are damaged. Such follow up and early correction enables the vaccinators to provide vaccines with good quality.

From direct observation at the health centers, damaged vaccines were found at 2 health centers found in the wereda because of breakage. The mal practiced activity observed was that damaged vaccines were not recorded in the health centers. This has happened because of negligence of the workers. The vaccines storage capacity of the health centers was insufficient in the wereda's health centers as compared to that found in the town administration. It was observed that only one class room was used for handling vaccines and for vaccination. VRF is used in all health centers for reporting the vaccines consumption and refilling the required amount. In two health centers found in Sebeta town, items other than vaccines were found in vaccine refrigerators. The workers were asked why other items were put in the refrigerator and their response was "nothing happens since the vaccines are closed." Twice a day temperature record was practiced by all health centers and the record sheet/chart was attached on the refrigerators. Alternative power sources were found in 75% of the facilities. The rest 25% of the health centers use ice packs, wet sand or they carry the vaccines to health office or to a nearby health center if in case power outage takes longer time. Functional thermometers were found in all areas where vaccines are handled and distributed. EPI and vaccine storage areas were clean, ice packs and vaccine carriers were available in all health centers. In half of the facilities no SOP and EPI guidelines were available. The guidelines are taken home by few vaccinators from some health centers and they believe that they know all things without the use the guidelines.

In this study, attitude on vaccine cold chain management was not significantly associated with most of the variables. However, information management system (P<0.009), storage facility (P<0.002) and man power (P < 0.000) were reported as determinants of attitude having effect on vaccines cold chain management. As we can see from the linear regression model R square is 0.586 which means 58.6%. This means that the data are well explained with this model and less than half of the data cannot be explained with the model.

Among the factors, insufficient man power and lack of consistent electric power and transportation were the major ones, according to the data finding from qualitative approach. This needs attention to be given by the health offices officers for the vaccines be managed as per the standard.

Lack of timely feedback from the officers of the health offices to the reports and requests of the health centers was the problem encountered by the health centers. This is due to lack of awareness about the nature of vaccines. No timely maintenance of nonfunctioning equipment was practiced because of different problems like budget constraints.

I have been told that the vaccine handlers were using some means for minimizing damages to vaccines. Some of the ways utilized were using ice packs, using other sources of power in case of power outage and regularly checking/monitoring temperature. This is what should be appreciated for the vaccine handlers to maintain the required temperature under which the vaccines are stored.

For the existence of shortage of storage space, the vaccine handlers used cold boxes with ice packs and temperature monitoring thermometers. Shifting the vaccines to health offices storage was the other means of storing extra vaccine. The other is using sand containing water buried under ground. These all are the best practices that have to be also exercised by all health facilities of the region especially by those facilities found in remote areas with insufficient infrastructures.

EPSA, OHB and sometimes UNICEF and MOH were partners that provide support to the health centers in different concerns like supportive supervision and product availability and this should be appreciated to continue and address all the health care facilities in the region even the country.

CHAPTER FIVE

5.1. Conclusion

Despite high percentage of good knowledge and positive attitude, poor availability and adherence to cold chain guideline, insufficient number of man power, insufficient storage space in some health centers and low coverage of EPI trainings are determinant factors that directly or indirectly affect the vaccines cold chain management practice in the study area.

5.2. Recommendation

The study has several practical implications for the respondents and management at large in order to change the direction of current malpractices that have been observed in this study. Improving training, making available sufficient man power, building rooms where vaccines are managed alone and adhering to EPI guidelines help program managers to minimize or even eliminate malpractices and the vaccines cold chain management at Sebeta town and Sebeta Hawas wereda which may also be applied at regional and national level.

5.3. Consent

Prior to commencing the study, verbally informed consent was obtained from each respondent. Confidentiality was maintained by omitting their name and personal identification.

5.4. Limitations of the Study

One of the limitations in this study could be the lack of sufficient information because of the small area of the study. The other limitation is lack of incorporating all health professionals working in the health centers from which necessary data would be obtained. Not gathering data from health posts by itself is one of the limitations. Due to these limitations the study could be seen as not representative of the other facilities outside the study area.

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APPENDICES

Appendix I

Questionnaire

General Instructions

There is no need of writing your name

Where answer options are available please circle possible answers from among the available alternatives for part I and please tick (√) the answer in part II.

Contact Address

If you have any query contact me when needed through (Mobile: 09-85-62-63-62 or e-mail: *healthfirstfgm98@gmail.com*)

I thank you in advance for scarifying your precious time!

The questionnaires are used to assess the factors that affect the supply chain management practices of vaccines at health centers found in Sebeta town and Sebeta Hawas Woreda

Name of the organization.……

Location of the organization…….

City/Town……

Region……..

Sub-city……..

Operating Authority……

Date……..

Interviewer/s

Good day. My name is_____ and I am conducting a survey regarding vaccines logistics/supply chain system. I am looking at the factors affecting the vaccines supply chain management activities. Your organization was selected to conduct the survey whether the factors affecting the vaccines supply chain management at your organization is different from or similar to others.

The results of this study will provide information to make decisions and to promote improvements.

I would like to ask you a few questions about the vaccines available/managed at your organization.

I would like to actually see the vaccines you have in stock today and observe the general storage conditions. Do you have any question?

Part I

Demographic Characteristics

1. Indicate your Age: _____
2. Indicate your health center name:_____
3. Indicate your position:_____
4. Sex: Male:____ Female:_____
5. Indicate your highest educational attainment:_____
6. What is your profession? _____
7. Indicate the number of years you have spent in service:_____
8. Do you have EPI training? Yes No

Part II

Knowledge of Vaccine Handling and Storage

Please respond honestly and sincerely to the following questions by ticking (✓) the response option that best represents your feeling. You are required to tick one option per item. Thank you.

	Items	Yes	No	Not Sure
SNo	**Knowledge of Vaccine Handling and Storage**	1	2	3
1	Does freezing and heat exposure of vaccines affect potency?			
2	Do you know the recommended temperature range for vaccine storage?			
3	Oral polio vaccine is the most heat sensitive of all vaccines			
4	All vaccines can be kept between 2 & 8 Degree Celsius for a month at clinics			
5	Are you aware of any contingency plan in case of power failure?			
4	Do you always label the vial with date and time of reconstitution?			
8	Do you think keeping food with vaccines in the same fridge affect the vaccines?			
9	Low-grade fever person can receive vaccination			
10	Are you aware of multi-dose vaccine policy?			
11	Do you discard vaccines without checking with your supervisor?			
12	Did you experience any shortage of vaccines in the past three months?			

Attitudes on Handling and Distribution of vaccines

The responses will generate on a five point Likert scale whereby the respondents are required to state their level of agreement Where: *SD=strongly disagree D=Disagree N=Neutral A=Agree SA=Strongly Agree

SNo	ITEMS	Level of Agreement				
		SD	D	N	A	SA
A. Transportation Condition						
1	While transporting vaccines carriers, boxes and ice packs are used whether vehicles are available or not					

2	The T^o condition for vaccines must be maintained within any transport system					
3	Health professionals take care of the vaccines during transportation (e.g. by monitoring their temperature, protecting them from any damage)					
B. Availability of Equipment						
4	Fully functional storage equipment are available at the health center					
5	Accessory devices for monitoring temperature exist within the storage equipment					
6	Storage equipment are regularly checked for compliance					
7	Vaccines are kept in separate fridge					
8	The equipment are sufficient for accommodating all available vaccines					
10	Alternative power source is available at the health center in case of outage					
C. Storage facilities						
9	Special storage area is available for storing vaccines					
10	Enough storage space that can accommodate the vaccines is available at the health center					
11	The storage area is built in the compound of the health center					
D. Temperature Monitoring Practice						
12	The temperature is always observed and recorded regularly, two times a day					
13	The recommended temperature range for vaccine storage in refrigerator and freezer is known at the health center					
15	Freezing and heat exposure of vaccines is not common					
17	Temperature record sheet is attached on refrigerator and filled regularly					
E. Man Power and Their Knowledge						
19	The number of available workers in vaccines management and delivery are sufficient					

20	All workers who manage and deliver vaccines are health professionals					
21	Pre-service training in vaccine management was given					
22	In-service training in vaccine management was given					
23	Multi-dose vaccine policy is known by all vaccine handlers					
25	The workers know how and when to perform vaccine shake test					
26	The vaccine managers know how to read and interpret Vaccine Vial Monitoring (VVMs) at the health center					
29	The vials are always labeled with date and time of reconstitution at your health center					
G. Information Management System						
30	Bin card must be available and updated for each vaccine					
31	Computerized data management exists in your health center					
32	IFRR and RRF is used for reporting and refilling the vaccines at your health center					
H. Vaccine Cold Chain Management Practice						
33	Existing SOPs/EPI guidelines are implemented to ensure proper handling					
34	Care is taken with the maximum possible effort to protect vaccines (by having sufficient storage space, monitoring temperature frequently, assigning trained professionals, fulfilling the necessary storage and transport equipment, etc.)					
35	The information related to vaccines management is prepared, reported and well communicated among supervisors, vaccines administrators and handlers					

Thank you for your participation!

Part III: Observational Checklist

SNo	Items	Yes	No
1	Expired and frozen vaccines exist		
2	The health center has sufficient storage capacity		
3	Requisition forms are used for reporting and ordering		
4	Damaged vaccines are recorded		
5	Items other than vaccines are found in refrigerators		
6	To is recorded twice daily and the record sheet is attached on the refrigerator		
7	Alternative power source is available		
8	Functional thermometer is available		
9	EPI and vaccine storage rooms are clean		
10	Ice packs and vaccine carriers are available		
11	SOP and EPI guideline are available and well implemented		

Part IV:- Open Ended Interview Questions

Dear respondent, I am Fikadu Getachew. The purpose of this questionnaire is to collect data on the factors affecting supply chain management of vaccines at your facility. The study is purely for academic purpose. So, your genuine, frank and timely response is vital for the success of the study. I would like to ask you a few questions about the vaccines available at your organization and how they are managed. I would like to actually see the vaccines you have in stock and observe the general storage conditions. Therefore, I kindly ask you to respond to each question very carefully.

Do you have any question?

1. If you are willing for the interview, would you tell me your responsibilities?
2. Have you taken any training related to vaccines and their cold management? If not how do you know how vaccine handlers are practicing vaccines cold management?
3. How do partners such as regional health bureau, ministry of health and EPSA support you in vaccines management? What is their contribution concerning vaccine management?
4. Have you ever encountered any damage to the vaccines and if yes tell me why it happened?
5. Tell me how you have tried to minimize the damage to the vaccines
6. Can you mention the challenges commonly and routinely facing vaccines cold chain management from the point of receiving to the point of delivery? How do you set a system for controlling the challenges?
7. How do you make the challenges be known by higher officials for solution?
8. Would you tell me why these challenges continue to exist? If yes, why?
9. Where do you put vaccines temporarily if, as a chance, refrigerators are out of storage space? How do you monitor the temperature for the vaccines kept outside?

Thank you for your participation!

መጠይቅ

መመሪያ

ስሞትን መፃፍ አያስፈልግም

የጥናቱ ባለቤት አድራሻ

ማንኛውም አይነት ጥያቄ ካሎት በሚቀጥለው አድራሻ ያግኙን

ስልክ ቁጥር፡ +251-985626362

e-mail: *healthfirstfgm98@gmail.com*)

የድርጅቱ ሙሉ ስም……

የድርጅቱ መገኛ ስፍራ…….

ከተማ……

ክልል……..

ክፍለ ከተማ……..

ቀን……..

የቃለ ምልልስ አካሄጆች

ጤና ይስጥልኝ; ስሜ .....ይባላል። የክትባቶች ሎጂስቲክ እና ሰንሰለት አስተዳደር ስርዓት ላይ ጥናት በማካሄድ ላይ እገኛለሁ። የክትባቶች አስተዳደር ሰንሰለት ላይ ተፅእኖ ሊያሳድሩ የሚችሉትን ሁኔታዎች ለይቶ ለማዎቅ እየሰራሁ ነው። በእርስዎ ድርጅት ውስጥ ያሉት የክትባቶች አስተዳደር ሰንሰለት ላይ ተፅእኖ ሊያሳድሩ የሚችሉት ሁኔታዎች ከሌላ ድርጅቶች አንፃር ሲገመገም ተመሳሳይ መሆን አለመሆናችውን ለማዎቅ የእርስዎ ድርጅት ለጥናቱ ሊመረጥ ችሏል።

ከዚህ ጥናት የሚገኝም መረጃ የክትባቶች ሰንሰለት አስተዳደርን ለማሻሻል ይረዳል ተብሎ ይጠበቃል።

ማንኛውም አይነት ጥያቄ ካለዎት እባክዎ ቀድመው ይጠይቁ።

ክፍል አንድ

የእርስዎ ጠቅላላ መገለጫዎች

1. እድሜ: _____
2. የጤና ጣብያዎት ሥም
3. የስራ ድርሻዎ_____
4. ፆታ፡ ወ:____ ሴ:____
5. የትምህርት ደረጃዎት _____
6. ሞያዎትን ይግለፁ _____
7. እስከ አሁን ድረስ የሰሩበት የግዜ ብዛት (በዓመት) _____
8. የክትባት አሰጣጥ ፕሮገራም ላይ የወሰዱት ስልጠና አለ? አዎ____ አይደለም____

ክፍል ሁለት

በክትባቶች አያያዝ እና ክምችት ላይ ስላሎት ጠቅላላ ግንዛቤ/እውቀት

እባክዎ መልስዎን በታማኝነት ከተሰጡት አማራጮች ውስጥ በአንዱ ስር ብቻ የ✓ምልክት ያድርጉ

	ጥያቄዎች	አዎ	አይደለም	እርግጠኛ አይደለሁም
ተ.ቁ	**በክትባቶች አያያዝ እና ክምችት ላይ ስላሎት ጠቅላላ ግንዛቤ/እውቀት**	1	2	3
1	ከፍተኛ ቅዝቃዜና ሙቀት የክትባቱ አቅም ላይ ተፅእኖ አለው?			
2	የተለያዩ ክትባቶች የሚከማቹበትን የሙቀት ማጠን ያውቃሉ?			
3	የፖልዮ ክትባት ከሁሉ ክትባቶች በላይ ሙቀትን መቋቋም አይችልም			
4	ሁሉም የክትባት አይነቶች ለወር ያህል የመፈወስ አቅማቸው ሳይቀንስ ከ 2 አስከ 8^{o} c ባለ የሙቀት መጠን ውስጥ ልቆዩ ይችላሉ			
5	ኤሌክትሪክ ቢጠፋ አማራጭ የሀይል ምንጭ መኖር እንዳለበት ያውቃሉ?			
4	ሊሰጥ የተዘጋጀ ክትባት የተዘጋጀበት ቀንና ሰዓት ይፃፍበታል?			

8	ምግብ ነክ ነገሮችን በፍሪጅ ውስጥ ማስቀመጥ ክትባቶቹ ላይ ተፅእኖ ያደርሳል ብለው ያስባሉ?			
9	ዝቅተኛ የሙቀት መጠን ያለው ሰው ክትባት መውሰድ ይችላል			
10	ስለ ብዙ ክትባቶች በአንድ ላይ ተዘጋጅተው አገልግሎት መስጠት ያለውን ፖሊሲ ያውቃሉ?			
11	ሳያማክሩ ክትባቶችን ያስወግዳሉ?			
12	በባለፉት ሁለት ወራት ውስጥ ማንኛውም የክትባት አጥረት አጋጥሞት ያውቃል?			

በክትባት አያያዝ እና ስርጭት ላይ ያለ አመለካት

ይህኛው መጠይቅ በ ሊከርት ስኬል ‹ Likert scale› ላይ በመመስረት የመላሹን በሀሳቡ ላይ የመስማማት ደረጃን ፍፁም አልስማማም፣ አልስማማም፣ ገለልተኛ፣ እስማማለሁ እና በጣም እስማማለሁ በሚሉ መስፈርቶች ላይ የራሱን ምላሽ እንዲሰጥ ይጠበቃል።

ተ.ቁ	ጥያቄዎች	የመስማማት ደረጃ				
		ፍፁም አልስማማም	አልስማማም	ገለልተኛ	እስማማለሁ	በጣም እስማማለሁ
የክትባቶች ስርጭትን የማጓጓዝ ሁኔታ						
1	ክትባቶችን ከቦታ ቦታ በምናጓጉዝበት ጊዜ መኪና ቢኖርም ባይኖርም የማጓጓዣ ሳጥኖችን ከበረዶ ጋር ልንጠቀም ይገባል					
2	ክትባቶች ሲጓጓዙ ሙቀታቸው ላይ ክትትል ማድረግ ያስፈልጋል					
3	ክትባቶች ከቦታ ወደ ቦታ መጓጓዝ ያለባቸው በጤና ባለሞያ ነው (ለምሳሌ፡ ሙቀታቸውን ለመቆጣጠር፤ ከብክለት ለመከላከል፤ ወዘተ)					
ለመድሃኒት ማከማቻ የሚያስፈልጉ መሳሪያዎች አቅርቦት						
4	በጤና ጣቢያው ውስጥ በትክክል የሚያገለግሉ ክትባቶች የሚቀመጡባቸው መሳሪያዎች አሉ					

5	በማከማቻ መሳሪያዎች ውስጥ ሙቀት የምንለካባቸው እንደነ ቴርሞሜትር ያሉ ተጨማሪ መሳሪያዎች ይገኛሉ					
6	ማከማቻ መሳሪያዎች እንደሚጠበቅባቸው ስለማገልገላቸው ክትትል ይደረግባቸዋል					
7	ክትባቶች ለራሳቸው ብቻ በተለየላቸው ማቀዝቀዣ ውስጥ ይቀመጣሉ					
8	የማከማቻ መሳሪያዎች ያሉትን ክትባቶች ሁሉ ለመያዝ በቂ ናቸው					
10	ኤሌክትሪክ በሚጠፋበት ሰዓት የሀይል ምንጭ ሊሆን የሚችል መሳሪያ አለ					
የክትባቶች ማከማቻ ክፍሎች						
9	ልዩ የሆነ የክትባቶች ማከማቻ ክፍል/ስፍራ አለ					
10	ሁሉንም ክትባቶች ለመያዝ የሚችል በቂ የሆነ ስፍራ አለ					
11	የክትባቶች ማከማቻ ክፍሉ/ስፍራው በጤና ጣቢያው ግቢ ውስጥ ነው የሚገኘው					
ሙቀትን የመከታተል እና የመቆጣጠር ልምድ						
12	ሙቀት ሁሌ በቀን ሁለት ጊዜ እየታየ ይመዘገባል					
13	በማቀዝቀዣ ውስጥ ላሉ ክትባቶች ሊኖር የሚገባ የሙቀት መጠን ይታወቃል					
15	የክትባቶች በረዶ መስራት እና ለሙቀት መጋለጥ ብዙም አይታይም					
17	የሙቀት መለኪያ ቅፅ ማቀዝቀዣው ላይ ሲሆን በየጊዜውም ይሞላል					
የሰው ሀይል እና ያላቸው እውቀት						
19	ለክትባት አስተዳደር እና ስርጭት ያለው የሰው ሀይል ብዛት በቂ ነው					
20	የክትባት አስተዳደር እና ስርጭት ላይ የሚሰራው የሰው ሀይል ሁሉ የጤና ባለሙያ ነው					
21	ለባለሞያዎቹ ስራ ከመጀመራቸው በፊት ስልጠና አግኝተዋል					
22	ለባለሞያዎቹ ስራ ላይ እያሉ የክትባት አስተዳደር ስልጠና ተሰቷቸዋል					
23	የክትባት ሰራተኞቹ ከአንድ በላይ ክትባቶችን በአንድ ላይ የማዘጋጀት ፖሊሲን ያውቃሉ					

25	ባለሞያዎቹ ‹ሼክ ቴስት› እንዴት እና መቼ እንደሚሰሩ ያውቃሉ					
26	ክትባት አስተዳደር ላይ የሚሰሩ ሰራተኞች ‹ቫክሲን ቪያል ሞኒተሪንግ›ን ማንበብና መቶርነም ይችላሉ					
29	ክትባቶቹ ሊሰጡ ከተዘጋጁ በኋላ ብልቃቶቹ ላይ ቀንና ሰዓቱ ይፃፍበታል					
ስለመረጃ አስተዳደር ሁኔታ						
30	ለእያንዳንዱ ክትባት ‹ቢን ካርድ› ሊኖርና በየጊዜው ሊሞላ ይገባል					
31	በኮምፒዩተር የታገዘ የመረጃ አያያዝ በጤና ጣቢያው ውስጥ አለ					
32	የክትባት ፍጆታን ለማሳወቅና የሚያስፈልገውን መጠን ለመጠየቅ ‹ IFRR and RRF› የሚባሉ ቅፆች ጥቅም ላይ የውላሉ					
በክትባቶች አስተዳደር የቀዝቃዛ ሰንሰለት ላይ ስላለው የአሰራር ልምምድ						
33	ክትባቶችን በአግባብ ለማስተዳር የሚያስችሉ መመሪያዎች ስራ ላይ ይውላሉ					
34	በስርጭት ወቅት ክትባቶች እንዳይበላሹ አስፈላጊ የሆነ ክትትል ይደረጋል (በቂ የማከማቻ ቦታ በማዘጋጀት፤ በየጊዜው ሙቀት በመቆጣጠር፤ የሰለጠነን ሰው በመመደብ፤ አስፈላጊ መሳሪያዎችን በማሟላት፤ ወዘተ)					
35	ከክትባት አስተዳደር ጋር የሚያያዙ መረጃዎች በአግባቡ ይዘጋጃሉ እናም ሪፖርት በመደረግ አስፈላጊ ውይይት በሱፐርቫይዘሮችና በክትባቱ አስተዳዳሪዎች መካካል የካሄዳል					

እናመሰግናለን

ክፍል ሶስት

የምልከታ ግኝት መሙያ ቅፅ

ተ.ቁ	ጥያቄዎች	አዎ	የለም
1	የተበላሹ እና በረዶ የሰሩ ክትባቶች አሉ		
2	ጤና ጣቢያው በቂ የሆነ የማከማቻ ስፍራ/ክፍሎች አሉት		
3	ክትባት መጠየቂያ ቅፆች ጥቅም ላይ ይውላሉ		
4	የተበላሹ/የተሰባበሩ ክትባቶች ይመዘገባሉ		
5	በማቀዝቀዣ ውስጥ ከክትባቶች ውጪ ሌላ ነገሮችም ይገኛሉ		
6	የሙቀት መጠን በቀን ሁለቴ ለእያንዳንዱ ክትባት ይመዘገባል		
7	ለእያንዳንዱ ክትባት ‹ቪቪ ኤም› ይመዘገባል		
8	አገልግሎት የሚሰጥ የሙቀት መለኪያ መሳሪያ አለ		
9	ክትባቶችን በአግባብ ለማስተዳር የሚያስችሉ መመሪያዎች (SOP and EPI guideline) አሉ		
10	የክትባት መስጫ እና ማከማቻ ክፍል ንፅህናው የተጠበቀ ነው		
11	የበረዶ መያዣና የክትባት ማስቀመጪያ ሳጥኖች አሉ		

ክፍል አራት፡ ክፍት የምልልስ ጥያቄዎች

ጤና ይስጥልኝ; ፍቃዱ ጌታቸው እባላለው። የክትባቶች ሎጂስቲክ እና ሰንሰለት አስተዳደር ስርዓት ላይ ጥናት በማካሄድ ላይ እገኛለሁ። የክትባቶች አስተዳደር ሰንሰለት ላይ ተፅእኖ ሊያሳድሩ የሚችሉትን ሁኔታዎች ለይቶ ለማዎቅ እየሰራሁ ነው። በእርስዎ ድርጅት ውስጥ ያሉት የክትባቶች አስተዳደር ሰንሰለት ላይ ተፅእኖ ሊያሳድሩ የሚችሉት ሁኔታዎች ከሌላ ድርጅቶች አንፃር ሲገመገም ተመሳሳይ መሆን አለመሆናቸውን ለማዎቅ የእርስዎ ድርጅት ለጥናቱ ሊመረጥ ችሏል።

ከዚህ ጥናት የሚገኝም መረጃ ያለውን የክትባቶች አስተዳደር ሰንሰለት ለማሻሻል ይረዳል ተብሎ ይጠበቃል።

1. ለቃለምልልሱ ከፈቀዱልኝ በጤና ጣቢያው ውስጥ የሎትን ስልጣንና ሐላፊነት ሊነግሩኝ ይችላሉ?
2. ከክትባት ጋር የተያያዘ ማንኛውንም ዓይነት ስልጠና ወስደው ያውቃሉ? ስልጠናው ባለዎት እውቀት ላይ ተጨባጭ የሆነ ግንዛቤ ጨምሮሎታል?..... አዎ ከሆነ እንዴት?
3. የክልል ጤና ቢሮ፣የጤና ሚኒስቴር እና የመድሃኒት አቅርቦት ኤጀንሲ በክትባት አያያዝና አስተዳደር ዙሪያ እንዴት ነው ድጋፍ የሚያደርጉላችሁ?
4. የተበላሹ ክትባቶች አጋጥሞት ያውቃሉ? ብልሽቱ ለምን ሊያጋጥም ቻለ?
5. የክትባቶችን መበላሸት ለመቀነስ ምን አይነት እርምጃ ወሰዱ?
6. የክትባቶች አስተዳደር ላይ ሁሌ የሚያጋጥሟችሁ ውጣ ውረዶች ወይም ፈተናዎች ምንድን ናቸው?
7. እነኝህ ችግሮች በበላይ አካላት እንዲታወቁ ምን ዓይነት ጥረት ያረጋሉ ?
8. እነኝህ ችግሮች እስከ ዛሬ ለምን ላይጠፉ ቻሉ?
9. ማቀዝቀዣዎች በአጋጣሚ ቢሞሉ ክትባቶችን ለጊዜ የት ነው የሚያስቀምጧቸው? የእነኝህን ክትባቶች የሙቀት መጠን እንዴት ነው የሚከታተሉት?

እናመሰግናለን