Ethiopian TVET-System

Health Extension Service

Level III

Based on Jan.2018G.C Occupational Standard

Module Title:	**Promoting and Implementing Immunization and manage cold chain**
TTLM Code:	**HLT HES3 M13TTLM 1019v1**

This module includes the following Learning Guides

LG46: Plan EPI activity

LG47: Promote EPI activity

LG48: Conductimmunization for children

LG49: Conductimmunization for mothers

LG50:Manage cold chain

LG51: Monitor immunization Practice

Instruction Sheet	LG46: Plan EPI activity

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Immunity, Vaccine and the expanded program on immunization (EPI)
- EPI: vaccine preventable diseases
- Types of vaccine
- EPI eligible target group identification and Resource mapping
- Prepare action plan to reach eligible

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Conduct Resource mapping using the standard format of FMOH.
- Identify EPI eligible and calculate from the catchment area.
- Collect, compile and analyze data for planning.
- Develop action plan to reach the eligible

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 ”**in page - 3, 8, and 11** respectively.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 ,”**in page 7, 10, and 13** respectively.

Information Sheet-1	Immunity, Vaccine , expanded program on immunization (EPI) and vaccine preventable diseases

1.1 Immunity

Immunity is a state in which the body has sufficient defense to be able to resist the development of communicable diseases caused by **infectious agents.** The main types of infectious agents are bacteria, viruses, fungi, protozoa and parasites. They are also referred to as **pathogen,** which means "**disease causing organisms"**. The immune system is the name given to the network of cells, proteins, tissues and organs within the body which act together to protect us against infectious agents. The cells of the immune system also circulate in the blood and some of them migrate through the tissues. These cells are usually known as white blood cells, which is a confusing name because they are found throughout the body — not just in the blood. Wherever an infectious agent gets into the body, it will soon be detected and attacked by the immune system.

1.1.1 Types of immunity

Specific immunity

Specific immunity is produced when the immune system reacts with specifically against one particular type of infectious agent. Specific immunity can be naturally acquired or artificially acquired — in both cases through either 'active' or 'passive' mechanisms.

Types of specific immunity:

I. Naturally acquired immunity

Naturally acquired immunity occurs 'naturally' without any intervention from a health professional. The difference between the 'active' and the 'passive' forms depends on whether the immune person makes the antibodies themselves (actively), gets them from someone else (passively).

- **Naturally acquired active immunity**

Naturally acquired active immunity occurs after an infection activates the person's immune system. For example, non-immunized children who develop measles and recover from the illness, get better because they have made an effective immune response against the measles virus. As a result, they acquire protection from measles for the rest of their lives (i.e. they are

immune to measles). They have naturally acquired active immunity because the protection developed naturally in their bodies, without a vaccine being given.
The immunity is active because the children produced their own antibodies and memory cells, which specifically attack any invading measles viruses they meet in the future.

- **Naturally acquired passive immunity**

Naturally acquired passive immunity occurs when a mother gives her own antibodies to her baby, transferring them from her blood to the fetal blood across the placenta, or giving them to the baby in her breast milk. The immunity created by these maternal antibodies is naturally acquired from the mother (without any medical intervention).
During the first few months of a baby's life, until the mother stops breastfeeding, her antibodies provide passive protection to the baby against infectious agents that the mother has encountered during her own life. The term 'passive' is used because the baby didn't produce the antibodies itself. The active production of antibodies by the immune system of the baby takes several years to develop properly.

II. Artificially acquired immunity

In artificially acquired immunity the person must be artificially and intentionally exposed to foreign antigens (actively), or given someone else's antibodies (passively), in order to generate a protective immune response.

- **Artificially acquired active immunity**

Artificially acquired active immunity is protection produced by intentional exposure of a person to antigens in a vaccine, so as to produce an active and lasting immune response. The antigens in the vaccine stimulate the immune system to produce antibodies and memory cells which are specifically directed against the antigens in the vaccine.
After the immunization, if the living infectious agents with the same antigens that were in the vaccine get into the person's body, the correct antibodies are already present and they bind to the infectious agents. The memory cells generate a rapid immune response from the rest of the immune system, and the infectious agents are quickly attacked and destroyed, often before symptoms of the disease can develop.

- **Artificially acquired passive immunity**

Artificially acquired passive immunity is protection acquired by giving a person an injection or transfusion of antibodies made by someone else. These antibodies neutralize the infectious agents in the usual way, but the protection lasts only a few weeks because the antibodies gradually break down and are not replaced. In artificial passive immunization there is no involvement of the person's own immune system.

1.1.2 Herd immunity

Herd immunity refers to the level of resistance against a specific communicable disease in the community as a whole. When a high proportion of a community is immune to a particular disease that spreads from person to person (e.g. measles), the infectious agents causing that disease find it difficult to infect any non-immune (susceptible) people. This could result in the infection 'dying out' in that community, because there are not enough infected people to act as a reservoir for the infectious agents. A high level of herd immunity benefits everyone, because it makes it more difficult for a particular infection to spread from person to person through that community.

Two ways in which the level of herd immunity can be increased in a community

- If a vaccine exists, immunization of a large proportion of community members is the best way to increase their herd immunity
- If there is no vaccine, but a large proportion have suffered from a particular infection in the past and recovered from it, herd immunity increases because many people have naturally acquired active immunity

Note: - there are reasons herd immunity created by vaccination may not be achieved:

- More than one strain of an organism that causes the disease which may not be included in the vaccine
- Humans may not be the only reservoir for the disease. The virus/bacteria may be found in other animals
- The virus/bacteria can mutate and the vaccine may not contain the mutated strain

1.1.2 Non-specific immunity

Non-specific immunity (also known as innate immunity – 'innate' means 'already formed at birth') includes protection from infectious agents by mechanical barriers, such as intact skin or the mucus membranes lining the inside of our nose, mouth, lungs, reproductive system and gut. It also includes the actions of some kinds of white blood cells that can engulf ('eat') or kill a wide range of infectious agents, without distinguishing between them.

1.2 Expanded program on immunization (EPI)

The Expanded Program on Immunization (EPI) began in 1974 when the World Health Assembly pledged to ensure that all children in all countries receive life-saving vaccines. Each year, immunization now prevents more than 2.5 million deaths among children worldwide. An additional 2 million lives could be saved if available vaccines reached every child.

Ethiopia started the EPI in 1980 to reduce mortality and morbidity from vaccine-preventable diseases among children and mothers. The immunization coverage rate has been increasing since that time, but not as fast as the original target. The Ethiopian Federal Ministry of Health (FMOH)

has prepared a plan to increase the immunization coverage rate to 80% of the population in 90% of the woreda (districts) in the country.

1.4 Vaccine-preventable diseases included in the EPI in Ethiopia are:

- Tuberculosis (TB)
- Poliomyelitis (polio)
- Diphtheria
- Pertussis (whooping cough)
- Tetanus
- Measles
- Pneumonia and meningitis caused by Haemophilus influenzae type b bacteria
- Liver disease caused by hepatitis B viruses
- Pneumonia and other infections caused by Streptococcus pneumonia bacteria
- Diarrheal diseases caused by rotaviruses

Self-Check -1	Written Test

Directions: Answer all the questions listed below

1.What type of immunity does the mother have

A. Artificially acquired active immunity
B. Naturally acquired passive immunity
C. Artificially acquired passive immunity
D. Naturally acquired active immunity

2. What types of immunity the infant get from her/his mother

A. Naturally acquired passive immunity
B. Artificially acquired active immunity
C. Naturally acquired active immunity
D. Artificially acquired passive immunity

3. Is the level of resistance against a specific communicable disease in the community as a whole.

A. Naturally acquired passive immunity
B. Herd immunity
C. Artificially acquired passive immunity
D. Naturally acquired active immunity

4.Not Vaccine-preventable diseases

A. TB
B. HIV
C. polio
D. measles

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-2	**Vaccine**

2 Vaccine

Vaccine is harmless preparation of antigens. It is made from killed or weakened viruses or bacteria, or antigens extracted from the infectious agents. Immunization should happen before the person develops a vaccine-preventable infection, so vaccines are usually given to babies and young children, either by injection or swallowing liquid drops.

2.1 **Types of vaccine**

There are five general types of vaccine and how they are made safe to use in the human body. They are:

- Live-attenuated vaccines
- Inactivated vaccines
- Sub-unit vaccines
- Recombinant vaccines
- Conjugate vaccines.

Live-attenuated vaccines

Live-attenuated vaccines are prepared from viruses or bacteria that are whole, active and able to cause infection, but they have been weakened in the laboratory. The term 'attenuated' means' made weak' so the infectious agents in the vaccine should cause no disease at all. Measles vaccine and oral polio vaccine (OPV) are live-attenuated antiviral vaccines. Bacillus of Calmette and Guerin (BCG) is a live attenuated antibacterial that protects infants and young children against severe forms of tuberculosis (TB).Live-attenuated vaccines generally activate the immune system very effectively, because they cause a similar reaction in the body as if to a natural infection.

Inactivated vaccines

Whole-cell inactivated vaccines are produced by first growing viruses or bacteria in the laboratory and then inactivating (killing) them with heat or chemicals. Because they are not alive, they cannot cause the disease. The Pertussis component of the pentavalent vaccine used in the EPI in Ethiopia is an example. The whole-cell inactivated version of this vaccine contains the Bordetella Pertussis bacteria, which cause whooping cough, but they have been killed so that they are no longer harmful.

Sub-unit vaccines

Sub-unit vaccines are made from parts of infectious agents, or certain chemicals produced by bacteria. Because the vaccine does not contain whole organisms, they cannot cause disease in immunized people. The diphtheria and tetanus components of the pentavalent vaccine are of

the sub-unit type. Diphtheria and tetanus bacteria each produce special toxins , harmful chemicals that cause the symptoms of these diseases.

The pentavalent vaccine contains diphtheria and tetanus toxoids — modified versions of the bacterial toxins, which have been developed in a laboratory. The toxoids don't cause disease symptoms, but they do stimulate a protective immune response in vaccinated people.

A sub-unit version of the Pertussis vaccine now exists and is increasingly being used instead of the older whole-cell inactivated version.

The pentavalent vaccine used in the EPI in Ethiopia contains five vaccines and is sometimes referred to as DPT-HepB-Hib vaccine. The letters refer to diphtheria-pertussis-tetanus-hepatitis B-Haemophilus influenzae type b.

Recombinant vaccines

Recombinant vaccines are produced by inserting genetic material from a disease-causing organism into a harmless cell, which then makes lots of copies of the antigens of the infectious agent. The antigens are then purified and used as a vaccine. An example is hepatitis B.

Conjugate vaccines

A conjugate vaccine is made by conjugating (joining together by chemical bonds) an antigen from an infectious agent and a large 'carrier' protein. The combination makes the antigen more immunogenic than it would be on its own. An example is the Haemophilus influenzae type b (Hib) vaccine included in the pentavalent vaccine in Ethiopia.

Self-Check -2	Written Test

Directions: Answer all the questions listed below

A. B.

_____1 Live-attenuated vaccines	A. diphtheria
_____2. Inactivated vaccines	B. hepatitis B
_____3. Sub-unit vaccines	C. BCG
_____4. Recombinant vaccines	D. Pertussis
_____5. Conjugate vaccines	E.Haemophilus (Hib)

Note: **Satisfactory rating -** **Unsatisfactory - below 5points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Information Sheet-3	Target Group Identification, Resource Mapping And Prepare Action Plan preparation

3.1 EPI eligible target group

EPI eligible target group is the number of people who are eligible for vaccination with a particular vaccine. We use the letters 'pt' to represent the target population in calculations. To calculate vaccine needs based on the target population, you need to know the size of the target population, the number of doses required according to the EPI schedule and the percentage immunization coverage rate you have been given as the target in your annual activity plan. example For BCG vaccine, the target population is all live births (i.e. complete expulsion from the mother, regardless of duration of pregnancy, showing any evidence of life).

For all other vaccines in the Expanded Program on Immunization (EPI) in Ethiopia, the target population is all surviving infants (i.e. survive to their first birthday).

3.2 Resource mapping

Resource mapping a process that enables community members to identify or inventory existing services and organizations matched to a particular purpose ,Youth workers, healthcare providers, housing activists and urban developers, librarians, social scientists, Peace Corps volunteers, technology planners, environmentalists, and college students are all doing it.

3.3 Prepare action plan to reach eligible

Action plan should include every activity to be performed during the year, the time when that activity is to be done, who will do it, how that person (or people) will do it, and what resources will be needed. In developing your action plan, you should ensure that your strategy and activities are relevant to resolving the identified problems, that they are technically feasible, financially affordable and acceptable to the community.

Your action plan should also include an estimate of your resource needs. Resources include people, materials, time, finance and information, and these should be determined in advance for each of the planned activities. The first and most important estimate is the total size of the population and the number in the target population for your activities.

You can then determine the resources required (vaccines, diluents, infection equipment, etc.) for delivering an effective immunization program for this target population.

The next step in the action plan is to allocate people (e.g. community volunteers), materials, time and finance to each of the activities in your plan.

Once the action plan for the year is complete, it should be communicated to all stakeholders at community level, your supervisor and the woreda health office. You should arrange a meeting with local government administration officials, community leaders and community volunteers to discuss your plan, and gain their approval and support. Once approved, it is your responsibility to implement the plan. You have to keep all stakeholders well informed about progress during the year, so that you can agree on a solution to any problems you encounter during the implementation period.

Self-Check -3	Written Test

Directions: Choose the best answer from the given alternatives

1. a process that enables community members to identify or inventory existing services and organizations

   A. need assessment
   B. resource mapping
   C. problem identification
   D. budgeting

2. Number of people who are eligible for vaccination

   A. surviving infants
   B. target group
   C. missed group
   D. total population

3.The first step in process of action plan preparation

   A. setting objectives
   B. problem identification
   C. implementation
   D. resource allocation

Note: **Satisfactory rating -** **Unsatisfactory -**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet	LG 47:Promote EPI activity

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Communication for an effective immunization program
- Meeting with target audiences to promote EPI activities
- EPI health promotion and education
- Involving stake holders to promote EPI activity

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Identify and consult Influential community representatives and Health Development Armies (HDAs)
- Organize and provide EPI health promotion and education in partnership with the community and relevant organizations.
- Sustain and promote EPI health promotion and education activities on the basis of stakeholders' participation and involvement.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information "Sheet 1, Sheet 2,"**in page 3, and 7** respectively.
4. Accomplish the "Self-check 1, Self-check 2, **in page 6, and 12** respectively

Information Sheet-1	Communication for an effective immunization program

1.Communication for an effective immunization program

Communication is the transmission of information from one person to another, or from a source to a destination. Immunization programs may be unsuccessful if incorrect or inadequate information is transmitted to the community. Sometimes, even though correct information may be communicated, it may be ineffective in achieving the desired outcome. One way to improve communication with

members of your community would be to organize a committee to look into reasons why people do not come to be vaccinated, or do not complete their vaccinations. This would help you to:

- Improve relations between you as a Health Extension worker and the community
- Promote participatory decision-making to improve community involvement in the EPI
- Support the community to develop strategies for identifying and tracing immunization defaulters
- Improve the quality of the immunization service
- Encourage the community to identify and report outbreaks of communicable diseases

1.1 Conduct a communication needs assessment

First, it is important to talk to people to find out about attitudes to immunization in the community, in particular whether there is opposition to it. If there is some resistance to immunization, you need to ask why this has occurred. Discussion with members of women's groups and youth groups in your kebele may help you to find answers to your concerns.

You may be able to identify specific behavior or attitudes which are creating a barrier to immunization in the community. This communication needs assessment will help you to assess what strategies and activities to plan for this community.

1.2 Define communication objectives, strategies and activities

If you can identify specific barriers to immunization, you will need to decide which of these might be targeted in order to look for a solution. Which of these barriers might it be possible to remove? How might this help to increase immunization coverage and decrease dropout rates? Why are so many children not brought for immunization.

1.3 Setting objectives

A well-constructed objective identifies what will be done in order to achieve it, who will do it and where ,what resources will be used, and the timescale in which the target should be achieved. You will also need to work out what resources are available in the community that can be used for the communication activities that you may wish to organize. Having set your communication objectives, you next need to decide what activities would be the most appropriate to help you to achieve them.

You should address the following questions:

- What message is it that you want to communicate?
- What media will be most suitable for communicating it?
- Will you be able to get the resources required?

1.4 Strategies and activities

There are a number of possible strategies or activities you can use to get your message across to the community. These might include a community conversation or a community mobilization or advocacy program.

1.5 Implementation/take action

This is the step on which you put your plans and strategies into action. According to the preset objective and strategy, you need to intervene on the identified communication barriers so that you may resolve the problem which in turn help you increase your immunization coverage and decrease dropout rates in your community.

1.6 Monitoring and evaluation:

This is a step to determine whether your strategies are working. You can assess if your intervention has brought a difference in different ways. You could record how many people attended the meeting or community conversation, and who they were. You could then monitor how many of these people have shown a change in behavior. You could see if these people brought their children for immunization, or brought them more regularly than before. In addition, if someone who is not known to you brings their children for immunization for the first time, you could ask how they knew the immunization was available.

Self-Check -1	Written Test

Directions : Choose the best answer from the given alternatives

1. Importance of effective immunization program

   A. Increase community participation
   B. Increase quality services
   C. Improve relation between hew and community
   D. All

2. The process of transmission of information from one person to another or from a source to a destination.

   A. Planning
   B. Evaluation
   C. Communication
   D. Feedback

3.Identifing existing resource and resource of community

   A. Setting objectives
   B. Need assessment
   C. Resource allocation
   D. Monitoring

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

2. Meeting with target audiences to promote EPI activities

In your efforts to increase immunization coverage and decrease dropout rates, you are likely to come across various interested groups of people and organizations. These may include health staff at various levels, politicians and policy-makers, community leaders, representatives from the private sector and from the NGOs (non-governmental organizations).

2.1 Meeting with community leaders

Community leaders may include kebele leaders, clan leaders, religious leaders, elders and school leaders, and the leaders of women's and youth groups. You should try to gather information about the community you are working in before you meet such community leaders. To increase the effectiveness of your meeting, you should identify who the relevant participants will be, decide on an agenda and what issues to discuss, and make sure that all those you want to attend the meeting are aware of the agenda and where and when to meet. To gain the maximum benefit from the meeting, try to find out beforehand what the participants already know about immunization. It is based on this background that you can introduce the topic and build up useful discussions.

2.2 Meeting with parents

One of the most effective ways to get a range of opinions in a short space of time might be to arrange small focus groups, with clear guidelines from you about the topic the discussion should 'focus' on. The ideal number of participants in a focus group is between six and ten, with a facilitator who keeps the discussion focused on the agreed topic (in this case, immunization) and makes sure that everyone's views are heard. You could select particular participants, such as parents you think may be unlikely to bring their children for immunization.

2.3 Meeting with NGOs and other partners

Try to meet with any other partners or institutions who you think might be able to help improve the immunization service. Who these might be will depend on your community, but could include traditional birth attendants (TBAs), traditional healers, private health practitioners, volunteer groups and representatives of NGOs that focus on health – particularly the health of children.

2.4 Meetings with special groups

In your community you may be aware of some special groups who have been largely unreached by immunization services, or have chosen not to participate in them. You should try to include

such people or groups in your meetings and planning process right from the start. Some examples of special groups.

include:

- Pastoralist groups
- Migrant workers
- Ethnic or other minority groups
- Groups in geographically remote areas, who may find it difficult to reach the site of the immunization services
- People who are injured, sick or disabled
- Religious or traditional sects that refuse immunization
- Refugees
- Homeless families.

Self-Check -2	Written Test

1.The ideal number of group of participants for conducting group discussion

A. 10-12
B. 6-10
C. 12-14
D. 16-20

2. Importance of meeting community leaders for implementation immunization program

A. to identify possible gaps
B. to increase immunization coverage
C. to get resource
D. All

3. Not included in special group for conducting immunization program

A. Pastoralist groups
B. Migrant workers
C. Homeless families
D. none

4. Target audiences to promote EPI activities

A. Community leaders
B. NGOs
C. Parents

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet	LG48: Conduct immunization for children's

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- EPI logistics/Materials an national EPI schedule
- Conducting Immunization at health facility and/or outreach
- Communicate program schedule
- Inform Adverse effects of different vaccines
- Defaulter tracing

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Prepare required EPI logistics/Materials to conduct immunization based on national protocol.
- Communicate with relevant health workers and institutions and concerned government agencies to ensure implementation of the planned immunization activities.
- Conduct Immunization in different sites on the basis of the national EPI procedure
- Identify and inform different vaccines based on the national EPI guideline of FMOH
- Conduct Default tracing according to the standard EPI protocol of FMOH.

Learning Instructions:

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below 3 to 5.
- Read the information written in the information “Sheet 1, Sheet 2,”**in page 3, and 8** respectively.
- Accomplish the “Self-check 1, Self-check 2, **in page 7, and 24** respectively
- operation sheet-1 ” **in page 26**
- Do the “LAP test-1” **in page 27**

Information Sheet-1	EPI logistics/Materials an national EPI schedule

1.EPI logistics/Materials an national EPI schedule

Ethiopia has stepped up efforts to ensure that EPI vaccines remain potent at all levels of storage and administration throughout the country. This is part of the government's health program that emphasizes quality vaccination as a key factor in the battle against vaccine preventable diseases for the achievement of child survival and other child development goals. One of the principal areas of focus is having efficient and effective cold chain storage equipment at all vaccine handling levels of Ethiopia.

The principal steps put forward to implementing this program were mainly to know what equipment actually exists, define the gaps where necessary and propose strategies for eliminating other weaknesses or short-comings in vaccine storage management. The common equipments used in Health Posts are refrigerators, cold boxes, vaccine carriers, ice-packs and foam pads.

1.1 Refrigerators

Health facility refrigerators may be powered by electricity, kerosene, or solar energy. Electric refrigerators are usually the least costly to run and the easiest to maintain, but they must have a reliable electricity supply.

Where the electricity or fuel supply is not reliable, ice-lined refrigerators can maintain the appropriate temperature for 16 hours without power if they operate with power continuously for at least eight hours a day. But the use of ice-lined refrigerators may expose vaccines to the risk of freezing. To prevent an ice-lined refrigerator from freezing vaccines, set the thermostat to 1 and put adhesive tape over the thermostat dial so that it does not get changed, and set the ice-lining switch to "off".

Refrigerators have different capacities for storing vaccines and for freezing and storing ice-packs. A refrigerator in a health facility should be able to hold:

- A one-month supply of vaccines and preferably diluents in the refrigerator compartment
- A one to two-week reserve stock of vaccines and diluents (an additional 25% to 50% of the one-month supply)
- Frozen ice-packs in the freezer compartment and
- Bottles of water or unfrozen ice packs in the refrigerator compartment (to act as a buffer to temperature changes, especially if there is a power failure).

Half the total space in the refrigerator should be left empty to allow air to circulate around the vaccines and diluents to keep them cool.

1.2 Cold Boxes

A **cold box** is an insulated container that can be lined with ice-packs to keep vaccines and diluents cold during transportation and/or short period storage (from two to seven days) depending on the environmental condition we are working in.

Cold boxes are used to collect and transport monthly vaccine supplies from national stores to regional, zonal, district and health facility. They are also used to store vaccines when the refrigerator is out of order or being defrosted and for outreach and mobile sessions in addition to vaccine carriers.

Different models of cold boxes have different vaccine storage capacities. Health facilities usually need one or more cold boxes that can hold:

- a one-month supply of vaccines and diluents; and
- a one–to–two week reserve stock of vaccines and diluents.

In addition to their vaccine storage capacity, cold boxes are selected according to their cold life. Different models have a cold life of two to seven days depending on the temperature outside.

When keeping vaccines in a cold box:

- Place conditioned ice packs at the bottom and sides of the cold box before loading the vaccines in cartons or polythene bags.
- Always keep a thermometer inside the cold box.
- Do not place DPT, PCV, Hep B, Rotarix and TT vials in direct contact with conditioned ice packs.
- Do not place weights or other cold boxes on the lid since it will damage the rubber seal.

1.3 Vaccine Carrier

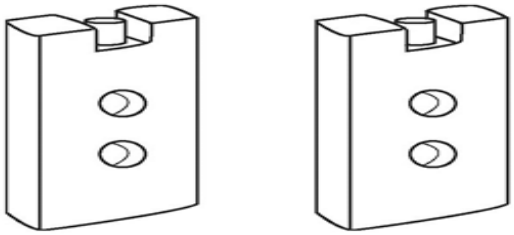
Vaccine carriers, like cold boxes, are insulated containers that, when lined with frozen ice-packs, keep vaccines and diluents cold during transportation and/or temporary storage. They are smaller than cold boxes and are easier to carry if walking. But they do not stay cold as long as a cold box only for a maximum of 48 hours with the lid closed.

Vaccine carriers are used to transport vaccines and diluents to outreach sites and for temporary storage during health facility immunization sessions. In small health facilities they are used to

bring monthly vaccine supplies from the district store. Vaccine carriers are also used to store vaccines when the refrigerator is out of order or is being defrosted

1.4 Ice Packs

Ice-packs are flat, square plastic bottles that are filled with water and frozen. Ice-packs are used to keep vaccines cool inside the vaccine carrier or cold box. The number of ice-packs required for a cold box or vaccine carrier varies. It is recommended to condition ice-packs before using them in a vaccine carrier



- **Conditioned ice-packs** have first been fully frozen, and then removed from the freezer and left at room temperature for a short time (it may take over 30 minutes if the room is cold). Allow the frozen ice-packs to sit at room temperature until the ice begins to melt and water starts to form.
- **Chilled water packs** can be made by almost filling the ice-pack containers or ordinary plastic water bottles with water and placing them in the main compartment of the refrigerator for about 24 hours. Using chilled water packs may be more efficient than using conditioned ice-packs, because it takes more electricity, gas or kerosene, and more time, to freeze ice-packs and then condition them.

1.5 Foam pads

A foam pad is a piece of soft foam that fits on top of the conditioned icepacks in a cold box or a vaccine carrier . There are some cuts in the foam to allow vaccine vials to be inserted in the pad. During immunization sessions, the foam pad can be used as a temporary lid to keep unopened vaccines inside the carrier cool, while providing a surface to hold and protect opened vaccine vials and keep them cool . Vaccines are protected from heat damage during an immunization session if they are inserted in the foam pad above the ice-packs in the vaccine carrier

1.6 Thermometer

A thermometer is an instrument for monitoring the temperature of your cold chain equipment ,refrigerator, cold box or vaccine carrier. It enables you to adjust the temperature to the correct range for the storage and transport of vaccines.

1.7 Auto-disable (AD) syringes

Auto-disable (AD) syringes were specially modified disposable syringes with a fixed needle; an AD syringe is automatically disabled after it has been used once, because the plunger cannot be pulled back a second time. The WHO recommends that immunization programs use AD syringes for all vaccinations, to prevent re-use of contaminated injection equipment.

Self-Check -1	Written Test

Directions : choose the beast answer from the given alternatives

1. w/c one is not cold chain equipment

   A. Refrigerators
   B. Cold Boxes
   C. vaccine carrier
   D. none

2. Ice packs first been fully frozen, and then removed from the freezer and left at room temperature for a short time.

   A. Chilled water packs
   B. Conditioned ice-packs

3. Used to transport vaccines and diluents to outreach sites and for temporary storage

   A. cold boxes
   B. vaccine carrier
   C. foam pad
   D. refrigerator

4.Type of syringe used for immunization activity

   A. 1 ml syringe
   B. 5 ml syringe
   C. AD syringe
   D. 3 ml syringe

Note: **Satisfactory rating** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-2	Conducting Immunization at health facility / outreach and Conduct Tracing defaulters

2.1 Immunization delivery at various sites

Immunization can be delivered at various sites, each of which has some differences in terms of preparation and delivery. To increase immunization coverage, a combination of these three approaches should be used:

- . **Fixed-site service** is delivered at your Health Post. Ideally, immunization should be routinely available on a daily basis, but this may not be possible in your setting. In order to increase attendance, the regular days should be fixed after discussion with community members.
- . **Outreach service** involves Health Post staff and volunteers giving immunizations in the community on well-publicized dates and at well known locations. Establishing an outreach immunization service on a regular basis, in addition to the service at your Health Post, is a key part of the approach in Ethiopia called 'Reaching Every Infant/Child'.
- **Mobile service** involves a team going to remote or hard-to-reach parts of an area and staying there for more than one day to deliver immunizations, for example to pastoral or nomadic communities. The key difference with other ways of delivering immunization is that it requires a mobile team to travel from place to place, carrying all the immunization equipment and maintaining absolute cold chain conditions for several days. The organization of a mobile team requires careful planning.

2.1.1 Setting up an immunization session at a fixed site

First, you need to prepare the area where you can give the immunizations and record what you have done, and you need a waiting area for children and their caregivers. The workplace should be in the shade so that you can keep your vaccines away from direct sunlight. It is also important to keep yourself and your clients from direct sunshine, dust and rain. You have to keep the working area clean and quiet to make it conducive for your work.

Determine the number of vials you will need to take out of the refrigerator and place them in a vaccine carrier with the correct number of conditioned ice-packs, check the quality of all vaccines and diluents ,discard any vials or ampoules if the expiry date has passed, or if the

vaccine vial monitor (VVM) has changed to the discard point, or any freeze-sensitive vaccines that have accidentally been frozen.

Also discard any vaccine vial or diluents which has lost its label, because you cannot be sure what it is. The other materials you will need for the immunization session include:

- Source of water and soap for hand washing
- Auto-disable (AD) syringes for immunizations and single-use disposable syringes and needles for mixing diluents with freeze-dried vaccines
- Cotton swabs and antiseptic or alcohol for cleaning the skin at the
- injection site
- Metal file to open ampoules
- Stationery, including the immunization tally sheet, EPI Registration Book,
- pencils or pens
- immunization cards for infants and
- Safety boxes for syringes, needles and other sharp instruments, and another container for non-medical rubbish.

2.1.2 Immunization delivery at an outreach site

There are very few differences between delivery of an immunization service at an outreach site, and the details already described for a fixed site such as your Health Post. The key point is that the dates, times and sites for regular outreach sessions should be planned carefully, with the goal of covering the target population within the target period. It is very important to work with the community in selecting the most suitable sites and the most appropriate days for outreach immunization sessions. The site should be readily accessible, such as a school or kebele office, or in the shade of a large tree.

2.2 Provide Immunization To The Infant According To National EPI Guideline

2.2.1 Antibacterial vaccines

BCG vaccine

BCG is a live-attenuated antibacterial vaccine protects against tuberculosis. The letters, B, C and G stand for bacillus of Calmette and Guerin. Bacillus means bacterium/germ, Calmette and Guerin are the names of the people who developed the vaccine.

BCG vaccine comes in powder form and before use it must be reconstituted with 1ml of accompanying diluents from the same manufacturer. The reconstituted vaccine is even more sensitive to heat than the powder and must therefore be used within six hours or discarded. Wrap reconstituted BCG vaccine in foil or paper to protect it from sunlight.

Who is eligible

BCG vaccine is given at birth or as soon as possible after birth. It should not be given to children who have clinical AIDS.

Dosage

One dose of 0.05 ml for children less than 12 months old and 0.1 ml for children above 12 months

Route and Site

BCG vaccine is injected in the top layer of the skin (intradermal) of the upper right arm (see Figure below). Health workers use the same anatomical site on every child for BCG injections so that everyone knows where to look for the scar .

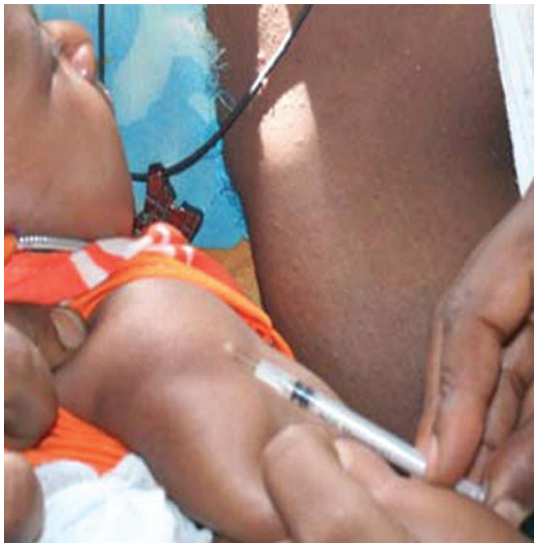


fig. 1 Position of syringe and needle for BCG intradermal (under the skin) injection

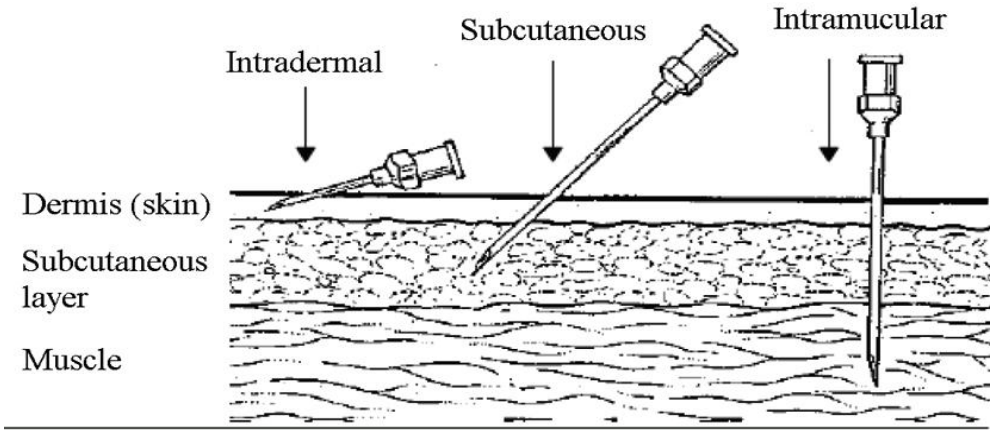


fig .2 different injection method

Normally after BCG vaccines have been administered a small raised swelling appears at the injection site. This usually disappears within 30 minutes. After approximately two weeks, a red

sore develops which is 10mm in diameter (the size of the end of an unsharpened pencil). The sore remains for another two weeks and then heals. A small scar about 5mm across, resulting from the sore, remains for life. This is a sign that the child has been effectively immunized.

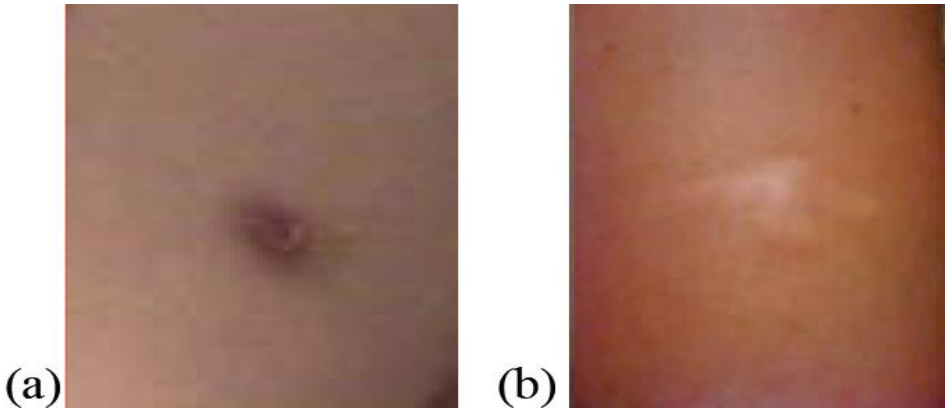


Figure 3 (a) presence of small sore at the injection site is a sign that the child has been effectively immunized with BCG vaccine. (b) A healed BCG vaccination scar on the arm of an adult. (Photos: supplied by Dr Kalid Asrat and Dr Basiro Davey)

Sometimes there is abnormal side effects following BCG immunization like swelling of glands in a child's armpit or near the elbow after BCG vaccine injection, or he / she may develop an abscess.

Reasons for abnormal side effects are

- Use of un-sterile needle or syringe
- Too much vaccine was injected
- The vaccine was injected to deeply under the skin, instead of in to top layer

Table 1 summery of BCG vaccine

Characteristics	Disruptions
Vaccine type	Live- attenuated anti bacterial vaccine
Amount(dose) given	Infants aged under 1 year, give 0.05 mg of BCG vaccine powder reconstituted in 0.05 ml of diluent; over 1 year, give 0.01 mg in 0.1 ml of diluent
Rout of administration	Intradermal (into the top layer of skin).
Site of administration	Upper right arm in top layer of skin
Number of doses	One

Schedule	At birth, or as soon as possible after birth. If not given at birth, it is better to give within the first 3 months, when the infant is at greatest risk of developing the most severe forms of TB, such as TB meningitis. Immunization is generally ineffective at older ages.
Booster(additional) dose	None
Storage	Store between +2°C and +8°C. BCG vaccine powder may be frozen for long-term storage, but the diluent and reconstituted vaccine must never be frozen. Discard any reconstituted vaccine after 6 hours. Vaccine storage will be described in Study Session 4
Contra-indications	Clinically AIDs Babies or infants which include chronic lung infection, tuberculosis, persistent diarrhea and other serious symptoms of HIV-related diseases
Adverse effect	Mild normal reaction (swelling, small sore). Rarely, severe reaction, e.g. local abscess, or swelling of glands (lymph nodes)
Management of AEFIs	-For mild cases Keep dry and clean (do not put any ointment or medicine on it) -For severe reaction Refer or try antibiotic if bacterial infection is suspected
Special requisitions	-Correct intradermal administration is essential. A special syringe and needle is used for the administration of BCG vaccine -Do not rub or apply anything to injection site

Pentavalent vaccines

vaccine which contains five different antigens in one vial is called pentavelent ("penta" comes from Greek work which means five). pentavalent vaccine in Ethiopia contains four antibacterial called DPT Hib (diphtheria, pertussis, tetanus and Haemophilus influenzae type b bacteria) these four components are described below and one antiviral vaccines (hepatitis b virus).

Diphtheria vaccine

Diphtheria is caused by bacteria called ***Corynebacterium diphtheria***. The bacteria produce a toxin that can harm or destroy human body tissues and organs. One type of the disease affects the pharynx and other parts of the throat. Diphtheria affects mostly non-immunized children under 15 years of age but it can affect people of all age's groups.

When diphtheria affects the throat and tonsils, the early sign and symptoms are: sore throat, loss of appetite and fever. The most effective way of preventing diphtheria is to maintain a high level

of immunization in the community. A mother can pass protective antibodies to her baby, but this protection lasts for only about six months after birth.

Pertussis

Pertussis, or whooping cough, is a disease of the respiratory tract caused by inactivated (killed) bacteria called *Bordetella pertussis*. The germ lives in the mouth, nose and throat. The disease is common in non-immunized children all over the world. Severe epidemics can occur where immunization coverage is low. The disease is most dangerous in children less than 12 months old.

Tetanus toxoid for neonatal tetanus (TT)

Tetanus or lockjaw is caused be a bacteria Clostridium tetani. Tetanus toxoid is a sub unit antibacterial vaccine. Tetanus affects person's muscles all contract, making the body stiff. The disease is particularly common and serious in newborn babies, when it is called neonatal tetanus (NNT). TT vaccine is also given on its own as a 'booster' to women of childbearing age,

Haemophilus influenza type b (Hib)

Haemophilus influenzae type b(Hib) is one of the six sero types of Haemophilus bacteria That causes about 95% of morbidity and mortality among under five children where Hib vaccine is not routinely given to all infants. This bacteria causes majority of the serious childhood illnesses like pneumonia, bacterial meningitis, parotitis and septicaemia.

Hib vaccine is a conjugate antibacterial vaccine, which protects against pneumonia and meningitis caused by the bacteria Haemophilus influenza type b.

Note that Hib vaccine only protects against diseases caused by type b Haemophilus influenzae bacteria (there are other types), and it does not prevent pneumonia or meningitis caused by other infectious agents.

Hepatitis B vaccine (HepB)

Hepatitis B viruses which cause Hepatitis B diseases are protected by a recombinant vaccine called Hepatitis B (HepB) vaccine. If a child is infected with hepatitis B viruses, liver disease may develop many years later in adult life.

In Ethiopia, HepB vaccine is routinely given to infants as one of the five vaccines combined in the pentavalent vaccine .

Table 2 .Summary of pentavalent vaccine

Characteristics	Disruptions
Vaccine type	Five different antigens combined, including one inactivated whole-cell Vaccine, two sub-unit vaccines (toxoids), one conjugate vaccine and one recombinant vaccine
Amount(dose) given	0.5 ml
Rout of administration	Intramuscular (IM)
Site of administration	Upper outer left thigh
Number of doses	Three (Penta1, Penta2 and Penta3)
Schedule	At 6, 10 and 14 weeks of age
Booster(additional) dose	None in males; boosters of tetanus toxoid vaccine are given to women of childbearing age groups (15-49 years)
Storage	Store between +2°C and +8°C. Never freeze.
Contra-indications	Severe allergic reaction or encephalopathy to a previous pentavalent immunization
Adverse effect	Mild local reactions are common, rarely, injection-site abscess
Management of AEFIs	-For mild cases Keep dry and clean (do not put any ointment or medicine on it) -For severe reaction Refer or try antibiotic if bacterial infection is suspected
Special requisitions	Usually not given after 6 years of age because of the increased risk of serious adverse reactions

Pneumococcal *vaccines (PCV10)*

Pneumococcal vaccines (PCVs) protect against pneumonia and other pneumococcal infections caused by Streptococcus pneumonia bacteria. These bacteria can attack different parts of the

body, causing serious infections in the lungs (pneumonia), the inner ear (acute otitis media), the bloodstream (bacteraemia), and the membranes covering the brain and spinal cord (meningitis). The WHO estimates that up to one million children die of pneumococcal infections every year, mainly in sub-Saharan Africa and South East Asia.

In Ethiopia, pneumonia is the leading cause of death among children under five years, accounting for 28% of all deaths in this age group.

The Streptococcus pneumonia bacteria exist in many different 'strains'. Several different conjugate pneumococcal vaccines have been developed to give protection against different subsets of these strains.

The vaccine that is being introduced in Ethiopia as part of the EPI is called PCV10, also known by its brand name ***Synflorix***. PCV10 is highly effective at preventing infections caused by the strains of Streptococcus pneumoniae bacteria included in the vaccine preparation.

Storage, Dosage, Rout Of Administration And Schedule Of PCV10 Vaccines

PCV 10 vaccine is a freeze sensitive vaccine which must be stored within $+2^{o}_{C}$ to $+8^{o}_{C}$. Together with other vaccine like pentavalent vaccine because they are given to infants at the same immunization session. The liquid PCV10 does not contain any preservative, so once you have opened a vial, any unused vaccine should be discarded after six hours and not returned to the refrigerator.

The vaccination schedule for PCV10 (Synflorix) is the same as for the pentavalent vaccine: three doses are given at 6, 10 and 14 weeks of age by intramuscular (IM) injection into the right outer upper thigh muscle (the opposite thigh to the pentavalent vaccine). The dosage for each vaccination with PCV10 is 0.5 ml. The vaccine is a liquid that comes in two-dose vials.

Table 3 Summary of pneumococcal vaccines (PCV10) characteristics

Characteristics	Disruptions
Vaccine type	Different conjugate pneumococcal strains vaccine
Amount(dose) given	0.5 ml
Rout of administration	Intramuscular (IM)
Site of administration	Right outer upper thigh muscle(opposite thigh to the pentavalent vaccine)
Number of doses	Three (PCV1, PCV2 and PCV3)
Schedule	At 6, 10 and 14 weeks of age together pentavalent vaccine
Booster(additional) dose	None

Storage	Store between +2°C and +8°C. Never freeze. Vaccine storage is described in Study Session 4
Contra-indications	same as for pentavalent vaccine
Adverse effect	Mild local reactions (redness, pain and slight swelling at the injection site), Rare severe reactions like convulsions, severe allergic reaction (anaphylaxis), swollen lymph glands, and encephalitis
Management of AEFIs	-For mild cases Keep dry and clean (do not put any ointment or medicine on it) -For severe reaction Refer or try antibiotic if bacterial infection is suspected

2.2.2 Antiviral vaccines

Oral Polio Vaccines (OPV)

Oral polio vaccine (OPV) gives protection against the three types (types 1, 2 and 3) of viruses that cause poliomyelitis or polio which lead to crippling disease of the brain and spinal cord called acute flaccid paralysis. OPV is a light red or light yellow liquid supplied in vials which either have droppers as caps, or they come with separate glass droppers.

All OPV vials supplied by WHO/UNICEF have had a vaccine vial monitor (VVM) attached. The VVM shows the health worker whether the OPV in the vial has been damaged by heat. Note that the vaccine used for routine immunizations in the EPI is not the only type of OPV available. Other types may be issued to control outbreaks of polio if they occur, but are not used for routine protection of infants; after the supplementary immunization campaign these vaccines should be returned to the central store.

Storage, dose, schedule and contraindications of OPV

OPV storage is the same as like other vaccines that is between +2°C and +8°C; it is easily damaged by heat. OPV is not harmed by freezing or by freezing and thawing multiple times. The number of doses are four, each of them are two drops. OPV should be given at birth, 6 weeks, 10 weeks and 14 weeks of age. The interval between all doses must be at least four weeks.

The birth dose is known as OPV0; the subsequent doses are referred to as OPV1 (at 6 weeks), OPV2 (at 10 weeks), and OPV3 (at 14 weeks). Don't give OPV0 (the birth dose) to an infant who is more than 14 days old. If this dose has not been given by 14 days, miss this dose and wait

until the child is six weeks old and then give OPV1. You should also give the first doses of the other routine EPI vaccines, including PCV10, at six weeks.

The remaining doses should be given as scheduled at 10 and 14 weeks. If a child spits out the vaccine drops, or vomits immediately after a dose of OPV, it is quite safe to repeat the dose. You should still give the scheduled dose even if a child has diarrhea at the time; give OPV as usual, but administer an extra (fifth) dose at least four weeks after he or she has received the final dose in the schedule. 99% of those who are vaccinated with four doses of OPV are protected from polio for life, but during campaigns children are often given additional boosters of OPV to ensure high herd immunity.

Table 4 summary of OPV Vaccine

Characteristics	Disruptions
Vaccine type	Live-attenuated antiviral vaccine
Amount(dose) given	Two drops
Rout of administration	In to the mouth (Oral)
Number of doses	four (OPV0, OPV1,OPV2 and OPV3)
Schedule	At birth, 6, 10 and 14 weeks of age together with other vaccines
Booster(additional) dose	If the child spits or vomits after OPV, repeat the dose immediately; if the child has diarrhea, give a fifth dose at least 4 weeks after the scheduled fourth dose
Storage	Store between +2°C and +8°C. Never freeze. Vaccine storage is described in Study Session 4
Contra-indications	None
Adverse effect	Very rarely AFP; refer immediately to a health centre
Special precautions	None

Rotavirus vaccine (RotarixTM)

Rotaviruses are the leading cause of severe diarrheal disease and dehydration among children in developed and developing countries. Globally, more than 125 million cases and up to 610,000 deaths annually are due to rotavirus diarrhea.

According to WHO report 20% of under five years child deaths from diarrheal diseases worldwide are due to rotavirus infection , most of them in countries like Ethiopia. Rotavirus vaccines are Become available as part of the routine EPI in Ethiopia.

Dosage And Schedule Of Rotavirus Vaccine (Rotarixtm)

Two new live-attenuated rotavirus vaccines have been licensed for use in routine immunization program. They are both given orally to infants as drops into the mouth. The vaccine chosen for the EPI in Ethiopia is known by its brand name RotarixTM. It is a liquid suspension vaccine, supplied in single-dose 'squeeze-tube' vials. RotarixTM is given in oral doses, each of 1.5 ml, at the following time intervals.

During administration

The vaccine should be inspected visually for any foreign particulate matter and/or abnormal physical appearance. In the event of either being observed, discard the vaccine. The vaccine should be well shaken before use. It is important to open the vaccine tube correctly to prevent the small nozzle being dropped, and possibly inhaled by the child.

Schedules of the vaccine

- First dose at 6 weeks of age, but no later than 12 weeks
- Second dose at least 4 weeks after the first dose

The two-dose schedule should be completed within 16 weeks, but no later than 24 weeks of age. Note that the ideal schedule is to give the first dose of RotarixTM to all infants at 6 weeks of age at the same time as giving Penta1 and OPV1, and give the second dose at 10 weeks at the same time as Penta2 and OPV2.

Storage and effectiveness of RotarixTM

RotarixTM is a freeze-sensitive vaccine which must be stored in the refrigerator at a temperature of between +2oC to +8oC. It is a very safe vaccine, which provides 90–100% protection from severe rotavirus disease to fully immunized infants, and 74–85% protection against rotavirus diarrhea of any severity. You will receive instructions on the contraindications for giving rotavirus vaccine, and the management of possible adverse events following immunization, when RotarixTM is introduced into the EPI in Ethiopia. .

Common side effects of the rotavirus vaccine

Babies who have taken the vaccine sometimes become restless and irritable, and some may develop mild diarrhea.

Contraindications of RotarixTM

- Reported hypersensitivity following previous administration of the same vaccine, or reported hypersensitivity to any of the vaccine components will be a contraindication.
- Previous history of intussusceptions
- Subjects with uncorrected malformation of GI tract that would predispose to intussusceptions
- Severe immune deficiency
- Vaccine should not be re-administered after regurgitation or spitting out a dose.

Precautions: - Vaccination in infants with ongoing severe gastroenteritis or serious febrile illnesses should be postponed until the child completely recovers. The presence of minor infections, however, is not a contraindication for vaccination.

Measles vaccine

Measles is caused by the measles virus and is highly infectious, i.e. very easily spread from person to persons. It kills more children than any other of the EPI target diseases. In the absence of immunization, all children eventually develop measles and about 3 of every 100 will die. Unimmunized children under 5 years of age, and especially infants, are at highest risk for measles and its complications like Encephalitis, a dangerous swelling of the brain, Blindness even lead to death.

The first sign of infection is a high fever lasting 1 to 7 days. In order to diagnose measles, in addition to fever, there must be a generalized rash and at least one of the following: cough, runny nose, and red eyes. These problems are prevented by providing measles vaccine.

Storage, Dosage And Schedule Of Measles Vaccine

The vials containing the dry measles vaccine powder can be frozen for long term storage, but after reconstitution with the correct diluents, measles vaccine should be kept at between +2°C and +8°C, never frozen. Any remaining reconstituted vaccine must be thrown away after six hours, or at the end of the immunization session, whichever comes first.

One dose of 0.5 ml of measles vaccine is injected subcutaneously (into the fatty layer below the skin and above the muscle) in the outer upper arm as soon as possible after nine months of age. Waiting this long is advisable because the maternal antibodies against measles that are transferred to the unborn baby before birth last longer in the blood of the baby than other

antibodies. As a result, immunization with measles vaccine is often not effective before nine months of age.

The aim in the EPI in Ethiopia is to give measles vaccine to all children at nine months of age. To achieve high-level herd immunity, a second dose is ideally given after 12 months of age during supplementary immunization activities.

Table 5 Summary of measles vaccine.

Characteristics	Disruptions
Vaccine type	Live-attenuated antiviral vaccine
Amount(dose) given	0.5 ml
Injection site	Left outer upper arm
Rout of administration	Subcutaneous
Number of doses	One in routine EPI schedule, plus one in supplementary campaigns
Schedule	At 9 months in the EPI; after 12 months in campaigns
Booster(additional) dose	At 6 months in some circumstances
Storage	Store between +2°C and +8°C (Note: the vaccine powder maybe frozen for long-term storage, but not the diluents or the reconstituted vaccine) Vaccine storage is described in Study Session 4
Contra-indications	Severe allergic reaction to previous dose
Adverse effect	Fever, rash and (rarely) severe allergic reaction or abscess
Management of adverse effect	-mild cases give paracetamol syrup and reassure the mother -sever cases like Refer urgently to a higher health facility
Special precautions	None

2.3 Tracing defaulters

Defaulters are those infants who started the routine EPI immunizations but failed to complete the schedule for whatever reason. If you trace defaulters regularly every month, it will make the task of follow-up much easier. You may be able to contact the mothers directly, or ask other members of the community to help you to find them. Try to ensure that every infant receives the immunizations that are overdue. There are many ways to monitor and follow-up on defaulters. Here we describe two tracking systems that can easily be used.

2.3.1 Using the EPI Registration Book

At the end of each month, review the EPI Registration Book to identify infants and mothers who have not received doses of vaccine at the appropriate time, according to the recommended EPI schedule.

2.3.2 Using reminder cards

Make reminder cards, which are copies of the infant's immunization cards. File them in a box behind the divider for the month when the infant's next immunization is due Refer to these every month to identify the default

Self-Check -2	Written Test

1. live-attenuated antibacterial vaccine protects against tuberculosis

A. Pentavalent
B. BCG
C. OPV
D. PCV

2.Route of administration of pentavalent vaccine

A. intradermal
B. intramuscular
C. oral
D. subcutaneous

3.Correct dosage of PCV vaccine

A. 0.5 ml
B. 0.1ml
C. 0.01 ml
D. 0.05 ml

4.Vaccine that protect against diarrheal disease

A. Rotavirus vaccine
B. Pentavalent
C. PCV

5.The correct temperature for storing vaccine

A. b/n 2 oC and 6 oC
B. b/n +2oC to +8oC
C. less than +2oC
D. greater than +8oC

6. Infants who started the routine EPI immunizations but failed to complete.

A. Defaulters
B. Missed opportunity

7. Before administering vaccine check

A. Expire date
B. VVM
C. Conduct shake test

D. All

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation Sheet-1	Reconstituting Vaccines

S/N	Necessary equipment

- Syringe
- Diluents
- Vaccine
- Safety box

Procedure

1.	Read the label on the ampoule

- It is the diluent the manufacturer sent with the vaccine.
- The vaccine has not expired (check expiry date).
- The diluent should be at the same temperature as the vaccine. The diluent should not be hot

2	Open an ampoule

- Hold it between your thumb and middle finger
- Use your index finger to support the top
- Take the metal file that is packed with the ampoules and file hard around the neck of the ampoule you wish to open.

3	Draw diluent into syringe

- Choose a sterile mixing (5ml) syringe and sterile needle
- Fix the needle tightly into the syringe.
- Put the needle in the open top of the ampoule and pull back the plunger to draw all the diluent from the ampoule into the syringe

LAP Test -1	Practical Demonstration

Name: _____ Date: _____

Time started: _____Time finished: _____

Instructions: Given necessary tools and materials you are required to perform the following tasks within 15 min.

Task 1. Read instruction on the ampoule

Task 2. Open the ampoule correctly

Task 3. Draw diluent into syringe

Instruction Sheet	LG49: Conduct immunization for mothers

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Conducting Immunization at health facility and/or outreach
- Adverse effects of different vaccines
- Defaulter tracing

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Conduct Immunization in different sites on the basis of the national EPI procedure
- Identify and inform adverse effect of different vaccines based on the national EPI guideline of

  FMOH
- Conduct Default tracing according to the standard EPI protocol of FMOH.

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1,”**in page 3**
4. Accomplish the “Self-check 1, **in page 5**

Information Sheet-1	Conducting Immunization for mothers and inform adverse effects of vaccine

1. Conducting Immunization for mothers

1.1 Provide Tetanus toxoids (TT) vaccine

Tetanus Toxoid (TT) vaccine that is given to infants in the pentavalent vaccine is also given on its own, as a single vaccine, to women of childbearing age. (The vaccine is a cloudy liquid, and the powder can settle to the bottom of the vial if it is left to stand for a long time. Shake the vial to mix the vaccine powder and liquid before use. women's are of childbearing age and should be immunized with TT vaccine to protect them and their babies from tetanus.

1.2 Schedule, Dosage, Storage And Effectiveness Of TT Vaccine

If given as a separate vaccine to pregnant and non-pregnant women of childbearing age, at least two doses of 0.5 ml of TT vaccine are given intramuscularly (IM) into the upper arm but for maximum long lasting protection throughout the childbearing years women should receive more than two doses (TT2+), the ideal is to give five doses. It should be stored at between +2oC and +8oC and never frozen.

Table 1.Summary of tetanus toxoids (TT) vaccine characteristics in women

Category	Description
Type of vaccine	Toxoid (sub-unit vaccine)
Number of doses	Women: at least two doses — ideally five (see Table 2.7)
Schedule	Women: first dose at first contact during childbearing years, or as early as possible in pregnancy (then see Table 2.7)
Booster	Every 10 years during childbearing years
Contraindications	Severe allergic reaction to a previous dose, or encephalopathy
Adverse events	Mild reactions, e.g. low-grade fever, soreness, redness and pain at the injection site: usually disappears after 1–3 days.
Dosage	0.5 ml
Injection site	Women: outer upper arm
Injection type	Intramuscular (IM)
Storage	Store between +2°C and +8°C. Never freeze

Table 2. Duration of protection in women following 1–5 doses of TT vaccine.

Dose (0.5ml)	When given	Duration of protection
TT1	At first contact with women of childbearing age, or as early as possible in the pregnancy	No protection
TT2	At least 4 weeks after TT1	3 years
TT3	At least 6 months after TT2	5 years
TT4	At least 1 year after TT3	10 years
TT5	At least 1 year after TT4	All childbearing years

2. Adverse events and contraindications of TT vaccine

The possible adverse events following immunization of women with TT vaccine are usually mild: low-grade fever, and soreness/pain at the injection site, which can be treated with paracetamol in women who are not already pregnant.

Women of child-bearing age who developed a severe allergic reaction or encephalopathy to a previous dose of TT vaccine should not be given TT again.

3. Defaulters Tracing

Defaulters are those infants who started the routine EPI immunizations but failed to complete the schedule for whatever reason. If you trace defaulters regularly every month, it will make the task of follow-up much easier. You may be able to contact the mothers directly, or ask other members of the community to help you to find them.

Try to ensure that every infant receives the immunizations that are overdue. There are many ways to monitor and follow-up on defaulters. Here we describe two tracking systems that can easily be used.

3.1 Using the EPI Registration Book

At the end of each month, review the EPI Registration Book to identify infants and mothers who have not received doses of vaccine at the appropriate time, according to the recommended EPI schedule.

3.2 Using reminder cards

Make reminder cards, which are copies of the infant's immunization cards. File them in a box behind the divider for the month when the infant's next immunization is due . Refer to these every month to identify the defaulters.

Self-Check -1	Written Test

1.Route of administration of TT vaccine

A. intradermal
B. intramuscular
C. oral
D. subcutaneous

2.Correct dosage of TT vaccine

A. 0.5 ml
B. 0.1ml
C. 0.01 ml
D. 0.05 ml

3.Pregenant mothers should take _____doses of TT vaccine during the course pregnancy?

A. 3 doses
B. 2 doses
C. 5 doses
D. 4 doses

4. TT vaccine is categorized under_____

A. recombinant
B. conjugate
C. toxoids
D. all

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet	LG50: Manage cold chain

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Definition of cold chain
- Storage of vaccines
- Maintaining cold chain and operational defects
- Monitor refrigerator

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Identify how to store vaccines according to the required procedure
- Mange temperature of the refrigerator according to EPI guideline of FMOH
- Maintain minor operational defects cold chain.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 ”**in page 3, 9 and 19** respectively.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3” ,”**in page 8, 16, and 24** respectively
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, ”**in page 17.**
6. Do the “LAP test” **in page 18**

Information Sheet-1	Cold chain management

1.**Cold Chain** is a system of storing and transporting vaccines at recommended temperatures from the point of manufacture to the point of use. The key elements/components of the cold chain are:

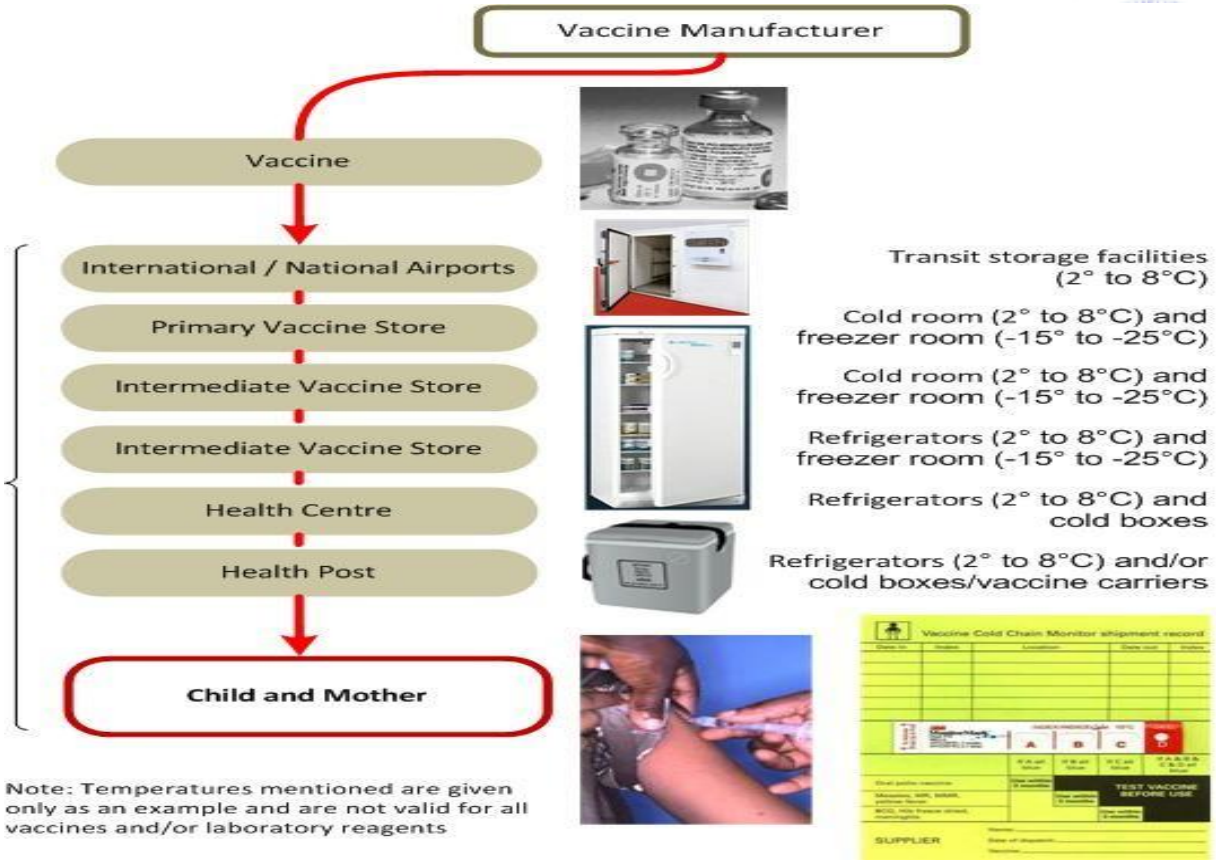
- Personnel: to manage vaccine storage and distribution
- Equipment: to store and transport vaccine and to monitor temperature

Procedures: to ensure that vaccines are stored and transported at appropriate temperatures

Keeping vaccines at the right temperature is not an easy task, but the consequences of not doing so can be disastrous. Once vaccine potency is lost, it cannot be regained. The damaged vaccines must be destroyed, leading to inadequate vaccine stocks and wastage of expensive vaccines. Moreover, children and women who receive a vaccine that is not potent are not protected.Since vaccines are sensitive to heat and freezing, they must be kept at the correct temperature from the time they are manufactured until they are used.

The cold chain consists of a series of storage and transport links, all designed to keep vaccines within an acceptable range until it reaches the user. This requires vaccines and diluents to be:

- collected from the manufacturer or an airport as soon as they are available
- transported between +2ºC and +8ºC from the airport and from one store to another
- stored at the correct temperature in primary/central and intermediate vaccine stores and in health facilities
- transported between +2ºC and +8ºC to outreach sites and during mobile sessions
- kept between +2ºC and +8ºC range during immunization sessions and kept between +2ºC and +8ºC during return to health facilities from outreach sites.



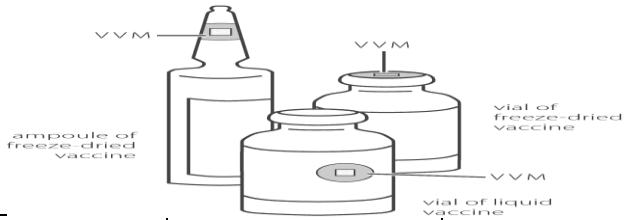
2.Cold Chain Monitoring Equipment

The physical appearance of the vaccine may remain unchanged even after it is damaged. However, the loss of potency due to either exposure to heat or cold is permanent and cannot be regained.

2.1 Vaccine vial monitor (VVM)

All vaccines are damaged by temperatures more than $+8^0$C, whether they are exposed to a lot of heat in a short time (e.g., as a result of keeping vaccine in a closed vehicle in the sun) or a small amount of heat over a long period (e.g., as a result of the frequent opening of lid of vaccine carrier).

Reconstituted BCG, and measles vaccines are the most sensitive to heat and light. Since these live vaccines do not contain preservatives, there is risk of contamination with staphylococcus aureus leading to Toxic Shock Syndrome and, therefore, they should not be used after 6 hours of

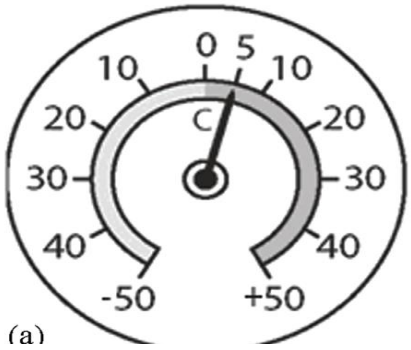


reconstitution Checking for heat damage the Vaccine Vial Monitor (VVM).

A VVM is a label containing a heat-sensitive material which is placed on a vaccine vial to register cumulative heat exposure over time. The combined effects of time and temperature cause the inner square of the VVM to darken gradually and irreversibly**.** Before opening a vial, check the status of the VVM.

2.2 Thermometer

A thermometer is an instrument for monitoring the temperature of your cold chain equipment – refrigerator, cold box or vaccine carrier. It enables you to adjust the temperature to the correct range for the storage and transport of vaccines.



(a)

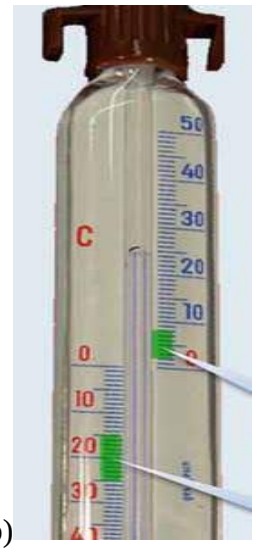
(b) 

Fig 4.8 Different types of thermometer (a) dial (b) stem

Health facility staff use dial or stem thermometers to monitor the temperature of refrigerators. On a dial thermometer, the needle moves around the scale, pointing to plus (+) numbers when it is warmer and to minus (-) numbers when it is colder. On a stem or bulb thermometer, coloured fluid in the bulb moves up the scale as it becomes warmer, and down the scale as it becomes colder.

Dial thermometers tend to lose their accuracy over time. Most dial thermometers can be re-calibrated by adjusting a facility screw on the back of the thermometer. To re-calibrate, match the temperature on the dial thermometer to the temperature shown on a stem thermometer. But to

be sure that the dial thermometer still works properly, make a comparison at two different temperatures .

2.3 The shake test

The shake test is designed to determine whether adsorbed vaccines (DPT, PCV, TT or Hepatitis B) have been frozen at some point of time in the cold chain. Once the vaccine is frozen it tends to form flakes which gradually settle to the bottom after the vial is shaken. Sedimentation occurs faster in a vaccine vial which has been frozen as compared to a vaccine vial which has not been frozen.

Conduct the shake test if you suspect that vials could have been frozen if:

- The temperature goes below recommended ranges
- Freeze-sensitive vaccines are stored below the basket of Ice Lined Refrigerator (ILR).

Steps to perform shake test

Step 1: Take a vial of vaccine of the same batch number and from the same manufacturer as the vaccine you want to test, and freeze the vial until the contents are solid (at least 8 hours at -18°C). Let the vial thaw by keeping it at room temperature until it becomes liquid. Label the vial as 'control' clearly so that it is easily identifiable and will not be used. Similarly label the test (suspect vial)

Step 2: Hold the 'control' and 'test' samples together in the same hand and shake vigorously for 10 to

15 seconds.

Step 3: Place both the vials on a table and do not move them further.

Step 4: View both vials against the light to compare their sedimentation rates.

- If the test sample shows a much slower sedimentation rate than the control sample,
  the test sample has most probably not been frozen and can be used.
- If the sedimentation rate is similar or more, the vial has probably been damaged by

freezing and should not be used. Record the details in the stock register.

Note: Some vials have large labels which conceal the vial contents. This makes it difficult to see the sedimentation process. In such cases, turn the control and test vials upside down and observe sedimentation taking place in the neck of the vial.

Self-Check -1	Written Test

1. is a system of storing and transporting vaccines at recommended temperatures from the point of manufacture to the point of use.

   A. Logistic management
   B. Cold chain
   C. Vaccine transportation
   D. All

2.Coldchain monitoring equipment

   A. Vaccine vial monitor
   B. thermometer
   C. Freeze indicator
   D. all

3.Shake test is conducted to identify exposure of vaccine to_____

   A. Heat
   B. Freeze

4.Before administering vaccine

   E. Expire date
   F. VVM
   G. Conduct shake test
   H. All

Note: **Satisfactory rating -** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

2. Loading cold chain equipment

Cold chain equipment, including refrigerators, cold boxes, and vaccine carriers, must be loaded correctly to maintain the temperature of the vaccines and diluents inside.

2.1 Vaccine Refrigerators

Vaccines, diluents, and ice-packs should be kept in a refrigerator that is used only to store them. If, however, you are in an area with only one refrigerator and you need to store other heat sensitive supplies such as drugs, ointments, serum, and samples, be sure to label them clearly and keep them separate from vaccines and diluents. Do not put vaccines on the door shelves.

The temperature is too warm to store vaccines, and when the door is opened shelves are instantly exposed to room temperature. Do not keep expired vaccines, or vaccines with VVMs that have reached or are beyond their discard point or reconstituted vaccines for more than six hours or until the end of an immunization session in the refrigerator. Discard them immediately according to your national guidelines.

Food and drinks should not be stored in a vaccine refrigerator. Do not open the refrigerator door frequently since this raises the temperature inside the refrigerator.

Vaccine refrigerators have two compartments:

A main compartment (the refrigerator) for storing vaccines and diluents should be kept between +2ºC and +8ºC. The thermostat is used to adjust the temperature.

A second compartment (the freezer) is meant for freezing ice-packs. If the refrigerator is working properly, this section will be between -5ºC and -15ºC.

2. 2 Load a vaccine refrigerator as follows:

1. Freeze and store ice-packs in the freezer compartment.

2. All the vaccines and diluents have to be stored in the refrigerator compartment. If there is not enough space, diluents can be stored at ambient temperature. It is important, however, that diluents be chilled by putting them in the refrigerator before use.

3. Arrange the boxes of vaccine in stacks so air can move between them; keep boxes of freeze sensitive vaccine away from the freezing compartment, refrigeration plates, side linings or bottom linings of refrigerators where freezing may occur.

4. In multi-dose vial policy for vaccines, keep opened vials of OPV, and TT vaccine in the "use first" box for first use during the next session.

Multi-dose vials of OPV and TT from which one or more doses of vaccine have been removed during an immunization session may be used again within four weeks if all of the following conditions are met:

- the expiry date has not passed;
- the vaccines are stored under appropriate cold chain conditions at all times;
- the vaccine vial has not been submerged in water;
- sterile technique has been used to withdraw all doses
- VVM, if attached, has not reached the discard point.

5. Keep vials with VVM showing more heat exposure than others in the box labelled "use first." Use these vials first in the next session.

6. Only keep vials that are good for use in the refrigerator. Do not include expired vaccines, reconstituted vials with doses remaining after an immunization session, and vials with VVMs that have reached or are beyond their discard point.

7. Keep ice-packs filled with water on the bottom shelf and in the door of the refrigerator. They help to keep the temperature cool in case of a power cut.

8. Store vaccines in locations appropriate to the style of refrigerator you use. See recommendations below.

2.3 Load front-loading refrigerator with freezer on top as follows:

1. Measles, BCG and OPV on the top shelf
2. DPT-HepB- Hib, PCV, TT and Rotarix on the middle shelves; and
3. Diluents next to the vaccine with which they were supplied.

Correct Storage and Use of Diluents

Only use the diluents supplied and packaged by the manufacturer with the vaccine, since the diluent is specifically designed for the needs of that vaccine, with respect to volume, PH level and chemical properties. Store the diluents, between +2° to +8°C in the ice lined refrigerator (ILR).

If there are constraints of space, then store diluents outside the cold chain. However, remember to cool diluents for at least 24 hours before use to ensure that vaccines and diluents are at +2° to +8°C when being reconstituted. Otherwise, it can lead to thermal shock i.e. the death of some or all the essential live organisms in the vaccine. Store the diluents and droppers with the vaccines in the vaccine carrier during transportation. Diluents should not come in direct contact with the ice pack.

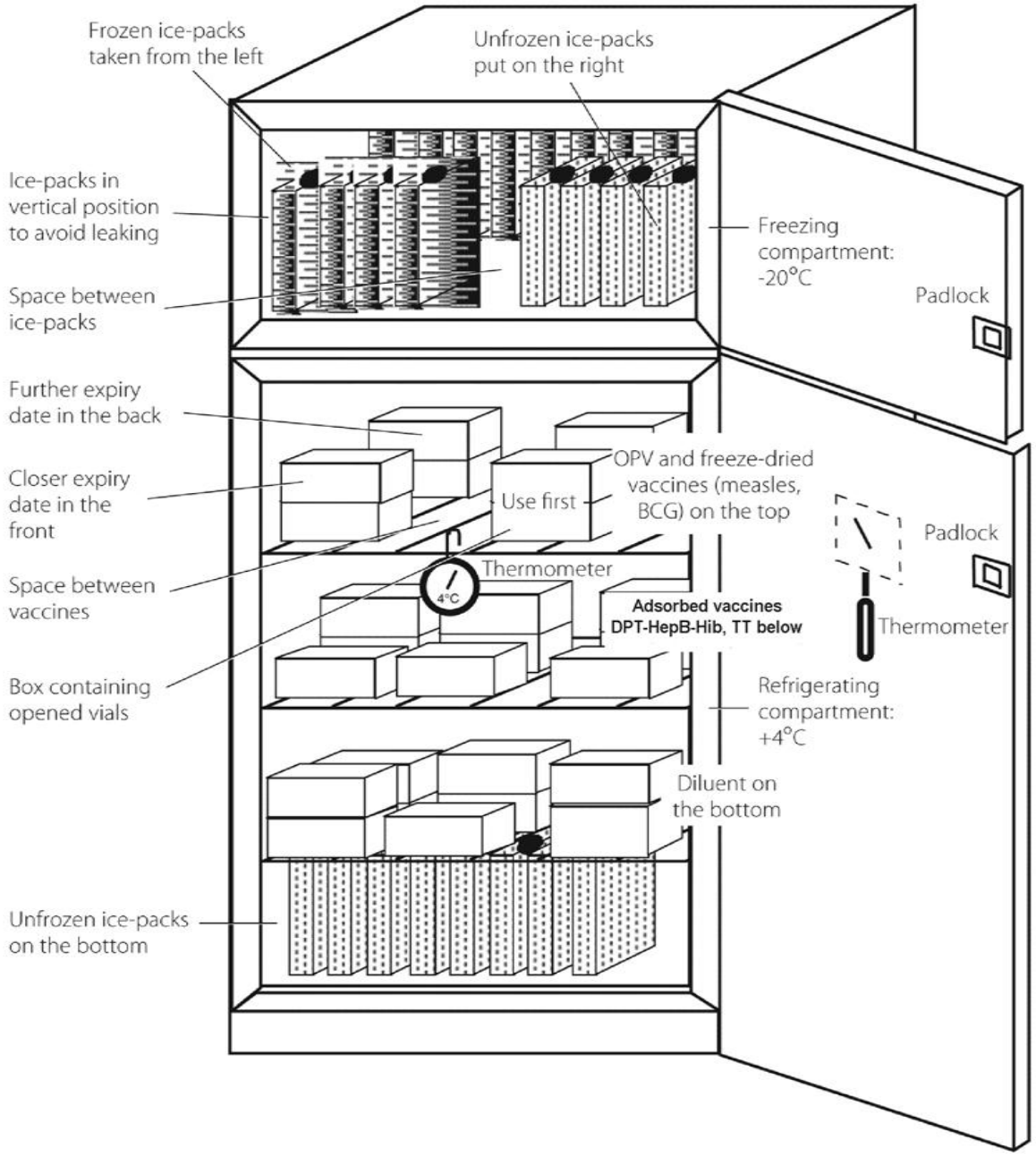


fig 1. Showing different compartments of refrigerator with vaccines, diluents and ice packs

2.4 Loading ice-lined refrigerators (ILR)

All the vaccines should be stored in the basket provided with the refrigerator

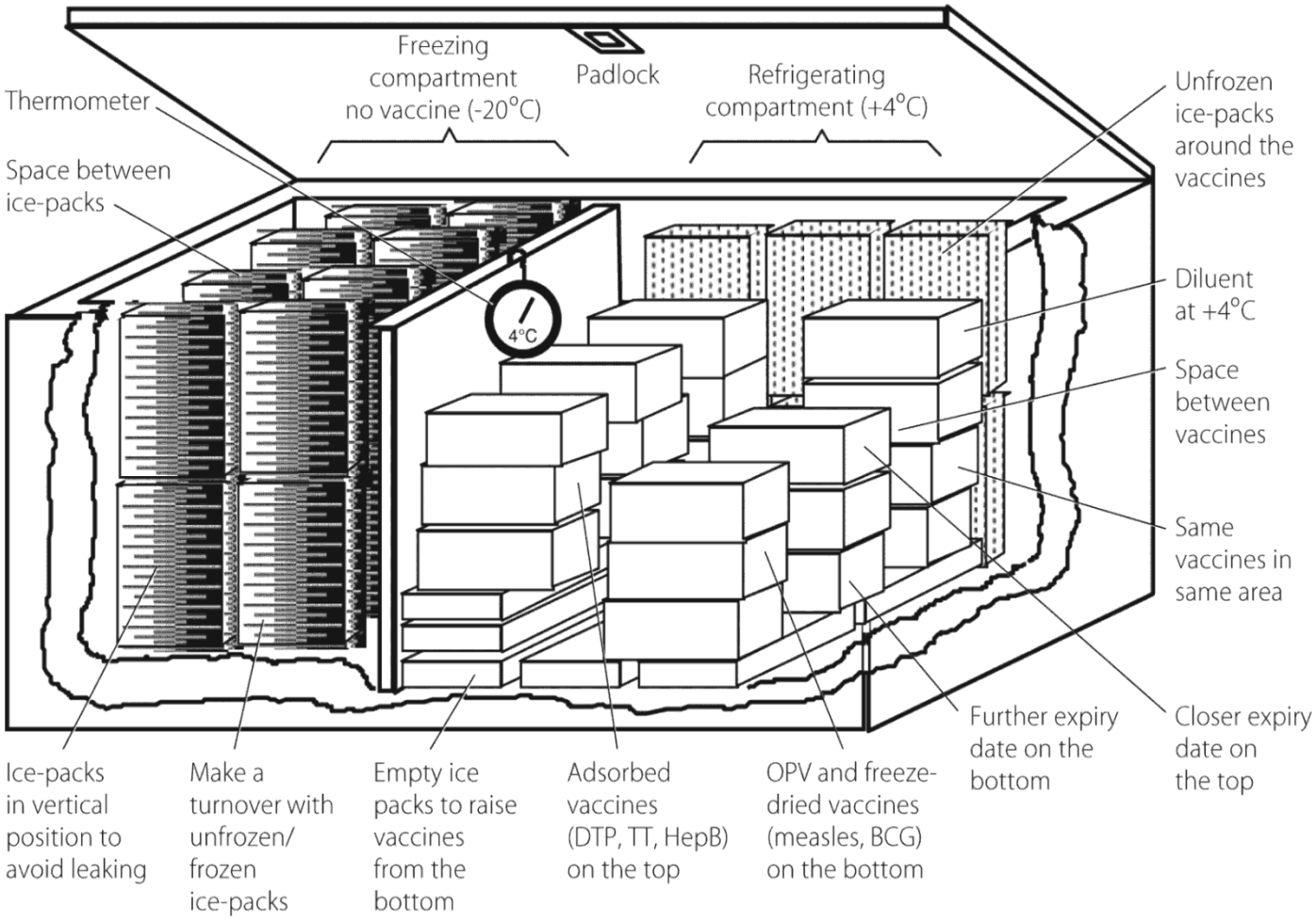


fig 2. how to load vaccine, diluents, ice packs in lined refrigerators

2.5 Loading cold boxes and vaccine carriers

With 4 conditioned ice packs, maintain the inside temperature between $+2^0$C to $+8^0$C for 12 hours, if not opened frequently. They are used for carrying vaccines (16-20 vials) and diluents from PHCs to session sites. Ensure the return of unused vaccine vials from session sites to the PHC on the same day in the cold chain through alternate vaccine delivery. Keep a box labeled 'returned unused' in the ILR for all unused vaccines that can be used in subsequent sessions. Discard vaccines that have been r

Guidelines for loading cold boxes and vaccine carriers

- At the beginning of the day of the immunization session, take all the ice-packs you need from the freezer compartment of the refrigerator and close the door.
- Allow the frozen ice-packs to sit at room temperature until the ice begins to melt and water starts to form. This is important because if the ice packs are too cold, freeze-sensitive vaccines may be damaged by freezing.
- Check to see if each ice-pack has been prepared properly by shaking it and listening for the sound of water moving around the ice inside. Ice-packs in which the ice has begun to melt are called conditioned ice-packs.
- Put conditioned ice-packs against each of the four sides of the cold box or vaccine carrier, and also on the bottom of the cold box. Ordinary plastic bottles of chilled water can also be used.
- Put the vaccines and diluents in the middle of the cold box or carrier.
- In vaccine carriers, place a foam pad on top of the conditioned icepacks. In cold boxes, place conditioned ice-packs on top of the vaccines.
- Close the lid of the cold box or vaccine carrier tightly. It is then ready to be taken to the immunization session.

2.6 How to freeze ice-packs

It takes 24 hours to freeze an ice-pack. The proper freezing and use of ice-packs is essential for good quality of the vaccines. Make sure that the ice-packs you have correspond (sizes and number) to the cold boxes and carriers you are using.

To freeze an ice-pack:

- Fill with water leaving about 20% air space at the top, and put the cap on tightly.
- Hold each ice-pack upside down and squeeze it to make sure it does not leak.
- Put the ice-packs upright or on their sides in the freezer so that the surface of each ice-pack is touching the evaporator plate, and close the door.
- Gas refrigerators or ice-lined refrigerators with a freezing compartment can freeze up to six large or 12 small ice packs per day. More packs will take longer to freeze.
- Leave ice-packs in the freezer for at least 24 hours to freeze solid.
- After the session put the ice-packs back in the freezer.

Keep extra unfrozen ice-packs that do not fit in the freezer on the bottom part of the main refrigerator compartment to keep this section cold in case of a power failure. When you put these ice-packs into the freezer they will freeze relatively quickly because the water inside already is cold. However, do not store already frozen ice-packs in the refrigerator compartment as this will increase the risk of freezing the vaccine.

Remember

In order to maintain the temperature in cold boxes and vaccine carriers:

- Place the adequate number of conditioned ice packs in the cold box or vaccine carrier.
- Keep the cold box or vaccine carrier in the shade.
- Keep the lid tightly closed.
- Use the foam pad to hold vials during immunization sessions.
- Avoid unnecessary openings

Self-Check -2	Written Test

1.False about loading of vaccine in refrigerator

A. store vaccine both compartment
B. use freeze compartment for ice packs
C. remove expired vaccines
D. All

2.Not a criteria for multi-dose vials

A. expiry date has not passed
B. VVM not reached the discard point
C. vaccines are stored under appropriate temperature
D. none

3.Vaccine stored on top in the second compartment in the refrigerator

A. DPT-HepB- Hib, PCV, TT
B. Measles, BCG and OPV

4.Not true about effective utilization refrigerator for cold chain management

A. used for storing vaccines, diluents, and ice-packs
B. remove expired vaccines
C. store food if there is free space
D. don't open frequently

5. Conditioned should be fulfilled to use multi dose vials vaccine

A. expire date
B. VVM, not reached the discard point
C. stored under appropriate cold chain condition
D. all

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Operation Sheet-1	Cold Chain Management

S/N	Necessary equipment
	• **2-3 clean towel,** • **Clean water,** • **Soapy water,** • **Temperature monitoring chart,** • **Disposable glove #01,** • **Ice packs** • **Refrigerator** • **Vaccine carrier** • **Foam pad**
Procedure	
2.	Collect necessary equipment
3.	Check the refrigerator for functioning, compartments, thermometer, cleanness, gas tanker
4.	Put the clean towel in clean water and soapy water to clean the refrigerator
5.	Fill the ice pack 80% with clean water put for 24 hour in freezing compartment
6.	Make conditioned ice pack by putting outside the refrigerator up to about 30 minute
7.	Put the conditioned ice pack lowest shelf of the refrigerator and/or use it in vaccine carrier or cold box
8.	Arrange vaccines based on heat and cold sensitivity
9.	Conduct shake taste Step 1 — Prepare a frozen control vial Step 2 — Choose a test vial Step 3 — Shake the control and test vials Step 4 — Allow the vials to rest Step 5 — Compare the vials: after 30minutes.
10.	Draw temperature monitoring chart
11.	Record and report your findings

LAP Test -1	Practical Demonstration

Name: _____ Date: _____

Time started: _____Time finished: _____

Instructions: Given necessary tools and materials you are required to perform the following tasks within 2hr min.

Task 1. Collect necessary equipment

Task 2. Check the refrigerator for functioning and all compartments

Task 3.prepare icepacks

Task 4.Arrange vaccines based on heat and cold sensitivity

Task 5.Conduct shake taste

Task 6.Draw temperature monitoring chart

Task 7. Record and report your findings

Information Sheet-3	Maintaining cold chain, operational defects and Monitor refrigerator

3.1 Maintaining vaccine refrigerators

A refrigerator works well only if it is properly installed, cleaned and defrosted regularly.

Thick ice in the freezer compartment does **not** keep a refrigerator cool. Instead, it makes the refrigerator work harder and uses more power, gas or kerosene. You should defrost the refrigerator when ice becomes more than 0.5 cm thick, or once a month, whichever comes first.

To defrost and clean a refrigerator:

- Take out all the most heat-sensitive vaccines (OPV, Measles, BCG) and transfer them to a cold box lined with frozen ice-packs.
- Take out all the freeze-sensitive vaccines (DPT-HepB-Hib, PCV, TT, Rotarix) and diluents, and transfer them to a cold box lined with conditioned ice-packs.
- Turn off the power supply to the refrigerator.
- Leave the door open and wait for the ice to melt. Do not try to remove the ice with a knife or ice pick, since doing so can permanently damage the refrigerator. You can place a pan of boiling water inside and close the door.
- Clean the inside of the refrigerator and door seal with a clean wet cloth.
- Turn the refrigerator on again.
- When the temperature in the main section falls to +8°C or lower (but not less than +2°C), return the vaccines, diluents, and ice-packs to their appropriate places.

3.2 What to do when a vaccine refrigerator is out of order

If your vaccine refrigerator stops working, first protect the vaccines and then repair the refrigerator.

Protecting the vaccines

Move the vaccines to another place until the refrigerator is repaired. If you think that the problem will last only a short time, you may use a cold box or vaccine carrier lined with conditioned ice-

packs for temporary storage. For a longer duration, use another refrigerator. Always keep a freezer indicator with the freeze-sensitive vaccines to monitor eventual freezing.

Restoring the refrigerator to working order

Check the power, gas or kerosene supply. If there is no power, make other arrangements (e.g. store the vaccine in a household refrigerator) until power is restored. If there is no gas or kerosene, get it as soon as possible.

If a lack of power, gas or kerosene is not the problem, repair the refrigerator or report to your repair technician or supervisor. Record the breakdown on the daily temperature recording chart.

Note: Concerning the routine maintenance and the servicing of refrigerators, WHO technical manuals exist for each kind of refrigerator.

3.3 Maintaining cold boxes and vaccine carriers

Vaccine carriers and cold boxes must be well dried after their use. If they are left wet with their lids closed, they will become mouldy. Mould may affect the seal of the cold boxes and vaccine carriers. If possible, store cold boxes and vaccine carriers with the lid open, when not being used.

Knocks and sunlight can cause cracks in the walls and lids of cold boxes and vaccine carriers. If this happens the vaccines inside will be exposed to heat. If a cold box or vaccine carrier wall has a small crack you may be able to repair it with adhesive tape until you can get an undamaged one

3.4 Monitoring the temperature in vaccine refrigerators

To monitor the temperature of the main section of a refrigerator you need:

- A thermometer;
- A temperature chart, which you should tape to the outside of the door.

To monitor the temperature, proceed as follows:

- Set the refrigerator thermostat during the coldest part of the day to around +2ºC to +4ºC.
- Monitor temperatures first thing in the morning and before you leave the post in the afternoon. If the temperature is between +2ºC to +8ºC, do not adjust the thermostat.

- Continue to monitor the temperature first thing in the morning and before you leave the post in the afternoon, including workdays, weekends, and holidays.
- Record the temperature for the day and time on the refrigerator temperature chart.

Keep the booklet of 12 monthly temperature recording forms on the top of each unit and check daily to see that the temperature record is maintained as given below.

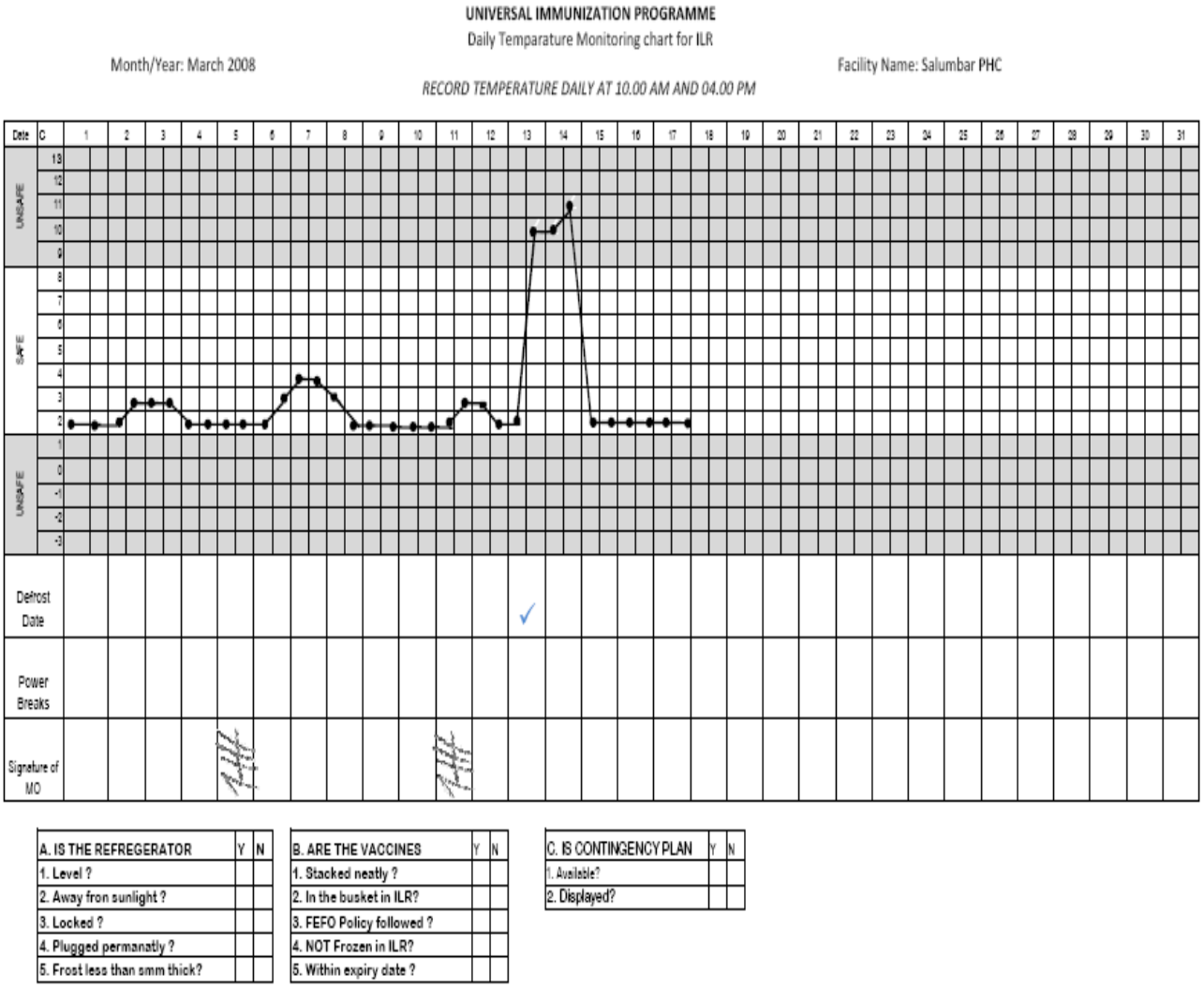


Fig 3.1 Temperature monitoring chart

Record the details about the equipment (Make, Machine Number, Functional Status, date of breakdown, Date of Intimation and Date of Restoration) in Monthly PHC Report. This will provide the information that is needed to schedule maintenance and repair and evaluate the adequacy of equipment.

3.5 Maintaining the correct temperature in cold boxes and vaccine carriers

If the ice-packs inside the cold box or vaccine carrier have completely melted:

- Discard all reconstituted vials.
- Check VVMs status and return the vaccines that can be used to a working refrigerator as soon as possible.
- If there is no VVM and the vaccine has only been exposed to warm temperatures for a few hours, return the vials to the refrigerator, place them in the “use first” box, and use them before other vials.

Self-Check -3	Written Test

1.False about loading of vaccine in refrigerator

A. store vaccine both compartment
B. use freeze compartment for ice packs
C. remove expired vaccines
D. All

2.Not a criteria for multi-dose vials

A. expiry date has not passed
B. VVM not reached the discard point
C. vaccines are stored under appropriate temperature
D. none

3.Vaccine stored on top in the second compartment in the refrigerator

A. DPT-HepB- Hib, PCV, TT
B. Measles, BCG and OPV

4. ____is/are important for maintaining the correct temperature in cold boxes and vaccine carriers

A. Discard all reconstituted vials.
B. Check VVMs
C. return vaccine not exposed to heat and can be used in use first" box
D. All

Note: **Satisfactory rating - Unsatisfactory rating -**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet	LG51: monitor immunization practice

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Registration of immunization activities
- Continuous collection of data on immunization activities
- Prepare immunization report

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Register immunization activities according to HMIS standards of FMOH
- Conduct immunization data collection continuously on the basis of HMIS guideline of FMOH
- Report Immunization activities to the higher level and relevant body.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, in page 3
4. Accomplish the “Self-check 1 in page 6

Information Sheet-1	Registration of immunization activities , immunization data collection, prepare immunization Report

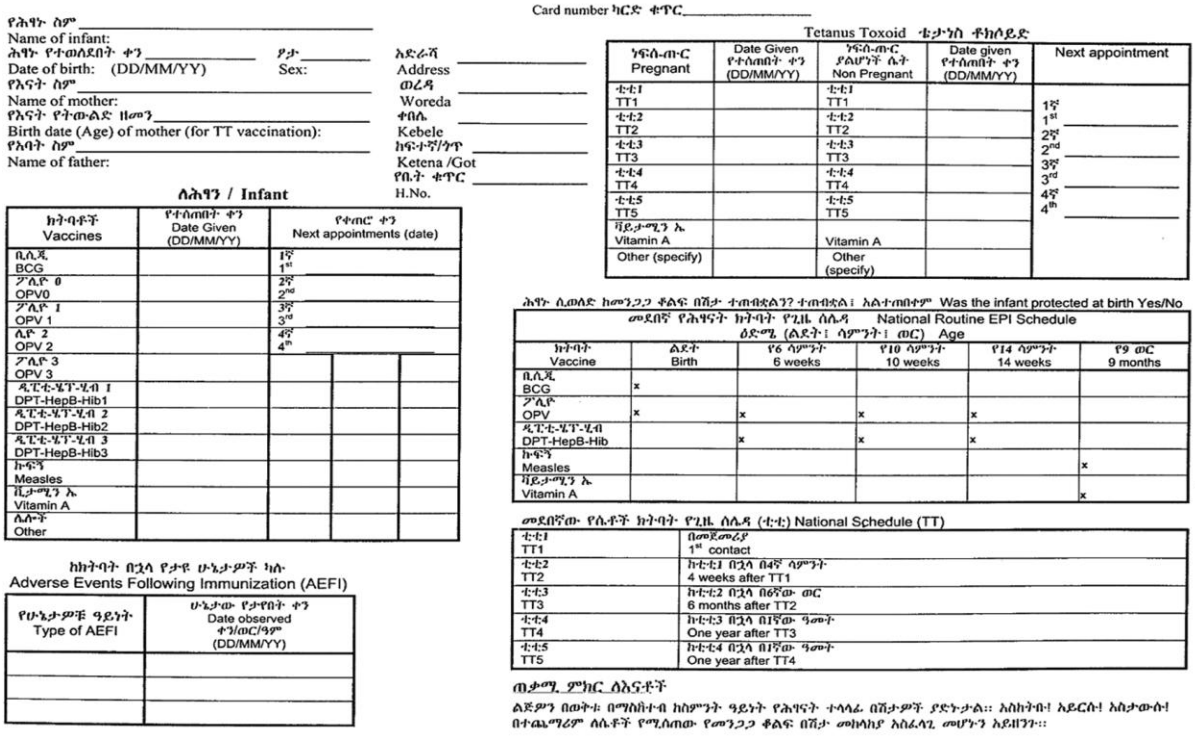
1.1 Recording Immunization Activities

In immunization program the EPI recording tools commonly used includes: Infant immunization card, the EPI registration book, the tally sheet and summary report form.

1.1.1 Infant immunization card

Infant immunization card is a small card that contains relevant information about the child and his or her immunization history is called infant immunization card (or vaccination card). It is kept by the mother or other principle caregiver of the infant. It contains the following basic information:

- a unique identification number (card number)
- name of the infant
- his/her birth date
- his/her sex
- name and address of mother/parent
- date that infant was protected at birth (PAB) from neonatal tetanus
- date of each subsequent immunization and vitamin A supplement given
- Date when the next immunization is due.



Infant immunization card የእናቶችና የህፃናት ክትባት ካርድ

የሕፃኑ ስም _____
Name of infant:
ሕፃኑ የተወለደበት ቀን _____ ፆታ _____
Date of birth: (DD/MM/YY) Sex:
የእናት ስም _____
Name of mother:
የእናት የትውልድ ዘመን _____
Birth date (Age) of mother (for TT vaccination):
የአባት ስም _____
Name of father:

Card number ካርድ ቁጥር _____

አድራሻ _____
Address
ወረዳ _____
Woreda
ቀበሌ _____
Kebele
ክፍለ-ኛ/ጎጥ _____
Ketena /Got
የቤት ቁጥር _____
H.No.

ለሕፃን / Infant

ክትባቶች Vaccines	የተሰጠበት ቀን Date Given (DD/MM/YY)	የቀጠሮ ቀን Next appointments (date)
ቢሲጂ BCG		1ኛ 1st
ፖሊዮ 0 OPV0		2ኛ 2nd
ፖሊዮ 1 OPV 1		3ኛ 3rd
ሲዮ 2 OPV 2		4ኛ 4th
ፖሊዮ 3 OPV 3		
ዲፒቲ-ሄፕ-ሂብ 1 DPT-HepB-Hib1		
ዲፒቲ-ሄፕ-ሂብ 2 DPT-HepB-Hib2		
ዲፒቲ-ሄፕ-ሂብ 3 DPT-HepB-Hib3		
ኩፍኝ Measles		
ቪታሚን ኤ Vitamin A		
ሌሎች Other		

ከክትባት በኋላ የታዩ ሁኔታዎች ካሉ
Adverse Events Following Immunization (AEFI)

የሁኔታዎቹ ዓይነት Type of AEFI	ሁኔታው የታየበት ቀን Date observed ቀን/ወር/ዓም (DD/MM/YY)

Tetanus Toxoid ቴታነስ ቶክሶይድ

ነፍሰ-ጡር Pregnant	Date Given የተሰጠበት ቀን (DD/MM/YY)	ነፍሰ-ጡር ያልሆነች ሴት Non Pregnant	Date given የተሰጠበት ቀን (DD/MM/YY)	Next appointment
ቲቲ1 TT1		ቲቲ1 TT1		1ኛ 1st
ቲቲ2 TT2		ቲቲ2 TT2		2ኛ 2nd
ቲቲ3 TT3		ቲቲ3 TT3		3ኛ 3rd
ቲቲ4 TT4		ቲቲ4 TT4		4ኛ 4th
ቲቲ5 TT5		ቲቲ5 TT5		
ቫይታሚን ኤ Vitamin A		Vitamin A		
Other (specify)		Other (specify)		

ሕፃኑ ሲወለድ ከመንጋጋ ቆልፍ በሽታ ተጠብቋልን? ተጠብቋል፣ አልተጠበቀም Was the infant protected at birth Yes/No

መደበኛ የሕፃናት ክትባት የጊዜ ሰሌዳ National Routine EPI Schedule

ክትባት Vaccine	ልደት Birth	የ6 ሳምንት 6 weeks	የ10 ሳምንት 10 weeks	የ14 ሳምንት 14 weeks	የ9 ወር 9 months
ቢሲጂ BCG	x				
ፖሊዮ OPV	x	x	x	x	
ዲፒቲ-ሄፕ-ሂብ DPT-HepB-Hib		x	x	x	
ኩፍኝ Measles					x
ቫይታሚን ኤ Vitamin A					x

መደበኛው የሴቶች ክትባት የጊዜ ሰሌዳ (ቲቲ) National Schedule (TT)

ቲቲ1 TT1	በመጀመሪያ 1st contact
ቲቲ2 TT2	ከቲቲ1 በኋላ በ4ኛ ሳምንት 4 weeks after TT1
ቲቲ3 TT3	ከቲቲ2 በኋላ በ6ኛው ወር 6 months after TT2
ቲቲ4 TT4	ከቲቲ3 በኋላ በ1ኛው ዓመት One year after TT3
ቲቲ5 TT5	ከቲቲ4 በኋላ በ1ኛው ዓመት One year after TT4

ጠቃሚ ምክር ለእናቶች

ልጅዎን በወቅቱ በማስከተብ ከስምንት ዓይነት የሕፃናት ተላላፊ በሽታዎች ያድኑታል። አስከትበ! አይርሱ! አስታውሱ! በተጨማሪም ሰሌቶች የሚሰጠው የመንጋጋ ቆልፍ በሽታ መከላከያ አስፈላጊ መሆኑን አይዘንጉ።

1.2 Continuous collection of data on immunization activities

The EPI Registration Book (Immunization Register) is a book for entering immunization data. It helps you to keep a record of the immunization services you offer to each infant and to women of childbearing age, particularly all those who are pregnant. Your Health Post can either have two separate EPI Registration Books, one for recording infant immunizations and another for recording TT given to women, or one book to record both.

The Immunization Register can also be used like a birth register. As soon as an infant is born in the community, its name can be entered in the register even before the infant has received any immunizations. This will help you to follow up all infants in the community. All women of childbearing age should be entered in your EPI Registration Book the first time they come to your Health Post, or outreach site.

Information written on EPI Registration Book is the same as the infant immunization cared except same difference like whether the infant was protected at birth (PAB) from neonatal tetanus and growth monitoring.

1.2.1 Immunization tally sheets

Tally sheets are forms on which health workers make a mark every time they administer a dose of vaccine. These are used as the basis for monitoring and making regular summary reports of vaccine use. Use a new tally sheet for each immunization session.

The same tally sheet can be used to mark vaccines given to infants, and vaccines given to pregnant and non-pregnant women in the childbearing age-group. After you have immunized an infant, record the immunization in the EPI Registration Book and on the infant's immunization card, and inform the mother which doses were given. On the tally sheet, place a mark next to the dose you have just given. Mark each vaccine dose given on the tally sheet immediately after giving it.

1.3 Reporting immunization data

All the data that have been collected on your immunization program has to be organized into a Summary Report for transmission from the Health Post to the Health Centre that supervises you. The Health Centre collects data from all the satellite Health Posts and transmits it to the woreda (district) health office.

The woreda health office compiles data from health facilities in the district for transmission to the higher level, and eventually to the Federal Ministry of health. At each level the data should be analyzed and used to improve the immunization program.

1.3.1 What data should the Summary Report Contain?

The Summary Report from your Health Post should include the following information:

- Vaccinations and vitamin A supplements given to infants and women.
  Data collected on the tally sheets should be organized clearly
- Vaccine-preventable diseases in your area. State the number of cases of each vaccine-preventable disease and the immunization status of each case. Even if there are no cases of a disease during the reporting period, you should still provide a 'zero' report.
- Adverse events following immunization (AEFI). If there have been any adverse events during the month, the details of any that are life threatening, resulted in hospitalization, disability (or have the potential to result in disability), or resulted in death, should be reported. If there are no cases, provide a 'zero 'report.

- Vaccine usage and wastage patterns. The usage and wastage of vaccines will vary from one session to another. However it is useful to monitor wastage and usage patterns regularly at all immunization sessions, in order to improve supply and avoid stock shortages. This can be done by recording the number of vaccine vials at the start and end of every session, and the number of vials received or wasted each month.
- Any specific problems encountered during the reporting period (e.g. stock Shortages, transportation problems, cold chain failure, etc.)

1.4 Characteristics of good Summary Reports

You should ensure that the Summary Reports you prepare on your immunization service are:

Complete: Ensure all the sections of the reports have been completed; no parts have been left blank and all reports due from outreach sites or mobile teams have been received.

Timely: When reports are sent and received on time, there is a greater possibility of a prompt and effective response to any problems you have identified.

Accurate: Before sending the reports, check the totals and all calculations to make sure that the reported figures correspond to the actual figures in the tally sheets, the EPI Registration Book and the immunization cards.

Self-Check -1	Written Test

1. Collecting immunization data continuously is important for

A. to identify defaulters
B. for reporting
C. for planning
D. all

2.Not used for recording immunization activities

A. Infant immunization card
B. EPI registration book
C. tally sheet and summary report form
D. none

3.it is used to register daily immunization activity

A. Infant immunization card
B. EPI registration book
C. tally sheet
D. summary report form

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Reference

1. **COMPREHENSIVE MULTI-YEAR PLAN 2016 - 2020 ,Federal Ministry of Health, Addis Ababa Ababa April, 2015.** http://www.nationalplanningcycles.org/sites/default/files/country_docs/Ethiopia/ethiop_cmyp_latest_revised_may_12_2015.pdf
2. **Micro Planning For Immunization Activities Health Managers Modules for Immunization.** https://www.undp.org/content/dam/india/docs/NIPI/Resources_CapacityBuildingMaterials_Immunization-Module2.pdf
3. **WHO, Expanded Programme on Immunization of the Department of Immunization, Vaccines and Biological,2014.** https://www.who.int/immunization/documents/MLM_module7.pdf?ua=1
4. **Ethiopian demographic and health survey,EDHS,2016**
5. **Blended Learning Module for the Health Extension Program**.