

# **MIDWIFERY LEVEL-III**

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## **MODULE TITLE : Promoting and Providing Immunization and Manage Cold Chain**

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## **Acronyms**

BCG	Bacillus of Calmette and Guerin (tuberculosis vaccine)
DPT	Diphtheria-Pertussis-Tetanus Vaccine
EPI	Expanded Program on Immunization
HepB	Hepatitis B
Hib	Haemophilus Influenza Type b
ID	Intradermal
ILR	Ice Lined Refrigerator
IM	Intramuscular
OPV	Oral Polio Vaccine
PAB	Protected at birth
PCV	Pneumococcal vaccines
SC	Subcutaneous
TB	Tuberculosis
TT	Tetanus Toxoid
UNICEF	United Nations Children's Fund
VAD	Vitamin A Deficiency
VVM	Vaccine Vial Monitor
WHO	World Health Organization

## **Introduction to Immunization**

Immunization is one of the most accepted and cost-effective health care practices worldwide. Vaccines prevent illness and death from more than a dozen serious diseases and have fewer direct medical costs than the treatment of these diseases. More than two to three million lives are saved only by immunization in the world annually.

Health care providers, particularly for Midwives, play an important role in achieving immunization coverage levels and reducing the morbidity and mortality associated with vaccine-preventable diseases. Immunization is one of the best opportunities vaccine providers have to promote health and prevent disease for clients, families and communities. Health care providers have a key role as vaccine providers, educators and advocates for immunization.

In Ethiopia, currently vaccines against diseases like tuberculosis, measles, poliomyelitis, diphtheria, pertussis, tetanus, pneumonia and meningitis caused by hemophilus influenza type b, hepatitis b, and diarrhea caused by rotavirus are available in the Expanded Program on Immunization.

This module will help you acquire the knowledge, skills and right attitudes for planning and efficient and effective implementation of the immunization programs. You will learn about Expanded Program on Immunization (EPI), and how body defense mechanism works. You will also learn the type, route and site of administration, contraindication, and adverse effects of each antibacterial and antiviral vaccine in the routine Ethiopian EPI program. Vaccine potency is the basic determinant factor in immunization, so that you will be given detail information on how to ensure the vaccine potency until you provide to the clients by keeping in a good temperature and appropriate vaccine supply and stock management. Planning and monitoring immunization program is one major areas of focus in this module. The importance of communication with parents and community leaders about the benefits of immunizing infants aged under one year and women of childbearing age (15 to 49 years) is emphasized throughout this Module. You will also learn about the effective organization of immunization activities at your Health Post, in outreach sites, and in mobile teams. The ability to deliver improved immunization coverage rates and reduced levels of dropout from immunization programs also requires excellent record-keeping and thorough monitoring and evaluation of the outcomes of your activities.

The role of Midwife in the Expanded Program on Immunization is significant. Therefore, this module will help you play your indispensable role in protecting children, women and community in general from vaccine preventable diseases.

## UNIT ONE: I Plan EPI activity

This Learning Module 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
- 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 –**

- Calculate from the catchment area.
- Collect, compile and analyze data for planning.
- Develop action plan to reach the eligible

## **I.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.

### **I.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.

#### **I.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.

### **I.3. Identifying types OF Vaccines**

- Vaccines are made from weakened or killed bacteria or viruses, or extracts taken from them, which are intended to produce immunity against a disease.
- At present, there are no vaccines in the EPI in Ethiopia to prevent infections by fungi, protozoa or parasites
- But researchers are trying to develop vaccines against malaria and HIV and many other important diseases.
- **There are five general categories of vaccine and how they are made safe to use in the human body:**
  1. Live-attenuated vaccines
  2. Inactivated vaccines
  3. Sub-unit vaccines
  4. Recombinant vaccines
  5. Conjugate vaccines.

#### **I.3.1. 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, oral polio vaccine (OPV) and yellow fever vaccine are live attenuated antiviral vaccines.
- Bacillus of Calmette and Guerin (BCG) is a live attenuated antibacterial vaccine that protects infants and young children against 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.
- For example, a single dose of measles vaccine produces lifelong protection against measles because it is highly immunogenic, and it has a very high ability to produce immunity.
- However, live-attenuated vaccines can sometimes produce a weakened disease pattern in a small proportion of vaccinated children. For example, measles vaccines can induce fever and an occasional rash, but this is very unusual and is nothing to worry about.
- The live-attenuated oral polio vaccine (OPV) can very rarely cause a type of paralysis, but on average this happens in only one child in every 1–10 million vaccinated children

### **1.3.2 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 diphtheria-pertussis-tetanus (DPT) vaccine 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.
- Even though they cannot cause infection in the immunized person, the infectious agents in an inactivated vaccine are still immunogenic.
- They are still capable of causing a strong immune reaction in the immunized person, which usually protects him or her from that particular infection in the future.

### **1.3.3 Sub-unit vaccines**

- Sub-unit vaccines are made from parts of infectious agents, or certain chemicals produced by bacteria in both cases, the extracts include antigens that are unique to the infectious agent. Because the vaccine does not contain whole organisms, they cannot cause disease in immunized people.
- The diphtheria and tetanus components of the DPT 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 DPT vaccine contains diphtheria and tetanus toxoids modified versions of the bacterial toxins, which have been developed in a laboratory and 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.

#### **1.3.4 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 vaccine (HepB).

#### **1.3.5. 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 influenza type b (Hib) vaccine. Now we turn our attention to how these vaccines are used in Ethiopia.

#### **1.3.6 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 influenza type b bacteria
- Liver disease caused by hepatitis B viruses
- Pneumonia and other infections caused by Streptococcus pneumonia bacteria
- Diarrheal diseases caused by rotaviruses

#### **1.3.7. Strategies of EPI**

- ✓ Increase and sustain high immunization coverage rates.
- ✓ Increase the quality of immunization services.
- ✓ Reduce missed vaccination opportunities and trace defaulters

- ✓ Improve public awareness and community participation in immunization programmes
- ✓ Ensure prompt reporting and improved control of vaccine-preventable diseases.

#### **I.4. Planning immunization program**

Planning for routine immunization is a continuous process of analyzing data, evaluating progress and constraints and making decisions about reaching program objectives.

An effective immunization plan for any health information needs collection of some basic information like:

- Total population of your local area (kebele) and target population for immunization
- Kebele map showing important features in your local area
- Details of infrastructure in the area and energy sources of the community
- Partners in the kebele who may assist you , for example. Associations, NGOs, etc

#### **Steps in planning**

There are six basic steps in planning process (in this case planning immunization program). These are:

**1. Need Assessment:** Is identifying and understanding the health needs of your community in relation to immunization services. It also includes identification of any problems and their possible causes that make it harder to meet those needs. For example, possible problems that may need to be addressed to increase your immunization coverage in your local kebele may include: Road access to the health post, immunization only given on certain days, low vaccine supply, high dropout rates etc.

**2. Prioritize problems:** it means, after identifying problems, ranking them in their order of importance or urgency. It is impossible to solve all problems at once because there are always many resource constraints. In order to select your priority activities in this case, with the aim of reducing vaccine-preventable diseases through delivery of an effective immunization program you may prioritize the identified problems based on the following criteria.

- Magnitude of the problem: what percentage of the population is at high risk of developing the disease, or is already affected by it?
- Severity of the problem: how serious is the disease in question, in terms of its impact on health and the risk of death?
- Socioeconomic impact of solving the problem: how will the social and economic circumstances of individuals, families and the community benefit if immunization coverage increases?

- Feasibility of tackling the problem: do solutions exist, and is it realistic to increase immunization coverage with the available technical resources, personnel and organizational capabilities?
- Affordability of tackling the problem: is the financial support adequate for an improved immunization program?
- Acceptability to the beneficiaries of tackling the problem in the ways suggested: does it meet community and government concerns?

**3. Setting goals and objectives:** After prioritizing the identified problems, the next step you should do is setting SMART (S-Specific, M-Measurable, A-Achievable, R-Relevant and T-Time bound) objectives for each problems you prioritized in order to progress towards your overall goal. For example, one possible objective of an improved immunization program might be: To achieve 90% coverage of all eligible children in the catchment area with the third dose of PCV10 by the end of the year.

**4. Developing strategy:** Developing the strategy for the stated objectives means working out the methods you will use and the activities you will undertake, and writing a clearly stated action plan. The 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 and those they are technically feasible, financially affordable and acceptable to the community.

**5. Implementation of the action plan:** Before implementing your action plan, you need to communicate 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. .



Fig.1.1.Approval for your action plan from local officials and community leaders

**6. Monitoring and Evaluation:** Monitoring is the systematic and routine collection of information beginning in the planning stage of a project or program. Monitoring allows results, processes and experiences to be documented and used as a basis to steer decision-making and learning processes. Monitoring is checking progress against plans. Evaluation is assessing, as systematically and objectively as possible, a completed project or program (or a phase of an ongoing project or program that has been completed). Evaluations appraise data and information that inform strategic decisions, thus improving the project or program in the future. The main EPI indicators of progress that are commonly used to monitor and evaluate immunization program are:

- Immunization coverage rate for each vaccine, i.e. the percentage of all eligible children who have received all doses of a vaccine less than one year of age, according to the EPI schedule.
- Percentage of fully immunized children aged less than one year, who have received all recommended doses of all vaccines (including measles vaccine at age 9 to 11 months), according to the EPI schedule.
- Percentage of pregnant women with adequate Td doses, defined as receiving any of Td3, Td4 or Td5. This indicator is often abbreviated to Td2+ (because more than two doses of Td vaccine have been given).
- Percentage of children protected at birth (PAB) from neonatal tetanus, because their mother received a valid dose of Td2+ vaccination at least two weeks before delivery.
- Dropout rates: the percentage of children and mothers not completing all the scheduled EPI immunizations.

#### 1.4.1. Immunization delivery at various sites

In Ethiopia, the three common immunization service delivery sites are fixed site service, outreach service, and mobile service. In order to increase the immunization coverage of your catchment area, you should use a combination of these three approaches.

##### Fixed site service



This kind of service is the time when you provide immunization service at your health post on a regular day fixed after discussion with the community even though the ideal assumption is immunization should be routinely available on a daily basis.

In order to give effective immunization service at a fixed site, you need to be ready in aspects including:

- Prepare a waiting area for children and caregivers
- Make the work place in the shade to protect vaccines from light
- Avoid workplace from becoming crowded
- Determine the number of vaccines needed for the specific session
- Assemble all necessary material including vaccines, water and soap, auto-disable syringe, swab with antiseptics, metal file to open ampoules, stationery, safety boxes, etc.
- Decide what vaccine to give child and whether to give TT to the mother
- Record all you have done on EPI registration book and immunization card.

### **Outreach site**

Immunization service delivery at an outreach site requires careful planning of the dates, times, and sites of regular outreach sessions 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. Monitoring and evaluation of the outreach service, with community input, is crucially important for its success. Regular meetings should be organized to discuss ways of increasing the immunization coverage locally, for example by changing the location to a more convenient site, or adding new outreach sites. Prior to your departure to the outreach site, you need to pack all necessary materials essential to give the service. When you arrive, inspect the site to ensure that it has been arranged correctly to ensure a good workflow and that all surfaces have been properly cleaned. When you leave the outreach site, you should collect all the safety boxes and any other waste, and take them back to your Health Post, where you can dispose of them in a safe way. Do not leave any waste at the site. You started your work in a clean area and it is important to leave the site as clean as when you began. Make sure that you thank all the community volunteers who helped you deliver a successful immunization session that day.

## **Mobile sites**

In countries like Ethiopia, where pastoral community has a significant number in the total population, mobile immunization service is likely to be the most appropriate approach. 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. Decisions about where to conduct the immunizations should be discussed and agreed with local government officials, community leaders and other stakeholders. Once the area is identified, you should use all possible ways to get information on the eligible target population in the area, so you can estimate what resources you will need for the number of sessions planned during this trip. Make sure that news reaches every community well in advance of the dates when your mobile service will be coming, and advertise where local people should go to meet you and your team.

### **I.4.2. Monitoring EPI indicators**

By the end of one year, every child should be fully immunized taking all the vaccine in order to make the immunization effective in preventing and reducing vaccine preventable diseases. A fully immunized child is a child who has received all doses of EPI vaccine (BCG, OPV, Pentavalent, PCV10, and Measles) before the age of one year.

Internationally there are two main EPI indicators used to monitor whether your immunization service has the potential to reduce the target EPI vaccine preventable diseases. These are; immunization coverage rate for each vaccine and drop out rates from completion of scheduled immunization.

#### **I.4.3. Immunization coverage rates:**

Immunization coverage is the percentage of eligible fully-immunized infants compared to the total number of surviving infants in the target population. The immunization coverage rate is measured by comparing the number of doses actually given and the number in the target population of surviving infants less than one year of age (these are the eligible infants). The result is expressed as a percentage. The equation below shows you how to calculate immunization coverage rate in your kebele.

- Number receiving all doses: is the number of surviving infants under one year of age receiving all the required doses during the previous 12 months for the selected vaccine.
- Target population is the total number of eligible infants under one year of age (or total number of surviving infants) at the start of that reporting period.

#### **1.4.4. Dropout rates:**

It is the difference between the number of children who started vaccination and who finished it in percentage. Common ways to measure dropout rates are:

- the dropout rate between infants receiving the first dose of pentavalent vaccine (Penta I) and the third dose (Penta3)
- the dropout rate between receiving the first dose of pentavalent vaccine (Penta I) and the single dose of measles vaccine.

Pentavalent I to pentavalent 3 dropout rates is calculated by:

-Penta I is the number (or percentage) receiving the first pentavalent vaccine dose

-Penta3 is the number (or percentage) receiving the third dose.

Note that, If an infant fails to complete the schedule of three doses of pentavalent vaccine, it indicates that there is an **access** problem for the parents, i.e. they have difficulty in getting to (accessing) the immunization sessions for the second or third doses.

Pentavalent I to Measles dropout rates is calculated by taking penta I given at six weeks of birth and measles at 9 months of age as:

-Penta I is the number (or percentage) of infants receiving the first pentavalent I dose

-measles is the number (or percentage) of infants receiving the measles vaccine.

Note that, if there is a high dropout rate between Penta I and the measles immunization, it suggests that there is a problem for parents of utilizing (making use of) the health services generally. A dropout rate of more than 10% indicates that the particular Health Post has a utilization problem i.e. many people are not using the services on offer.

Calculating the number of un-immunized infants (those infants who have not completed any of the scheduled immunization) can be done by:

-target population is the total number of eligible infants in the target age group for immunization (under one year) fully-immunized infants is the number in the target age-group who have received all doses of all the EPI vaccines.

## Self-Check - I

Part I: Say true or false

I. Diphtheria is vaccine preventable diseases

A. True      B. False

Part-2: MCQ

I. Which one is Strategies of EPI

- A. Increase and sustain high immunization coverage rates
- B. Increase the quality of immunization services
- C. Reduce missed vaccination opportunities and trace defaulters
- D. All

PART 3: Answer all the questions listed below.

1. What does mean immunization?
2. List Vaccine-preventable diseases in Ethiopia

## **UNIT TWO: PROMOTE EPI ACTIVITIES**

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

- Consultation of Influential community leaders and HEWs
- Organizing and sustaining EPI promotion and education

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 –

- Consult Influential community leaders and HEWs
- organize and sustain EPI promotion and education

### **Learning Instructions:**

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP test”

## 2.1. Consultation of Influential community leaders and HEWs

-It is important to determine the extent of community involvement in planning, providing, and evaluating health services. The level of utilization of services is more likely to rise if community participation (partnering with communities), is linked with health services in each phase.

- Community involvement especially community leaders can help in planning, implementation, and monitoring for EPI activities.

**Planning:** Midwives should consult communities about service locations and timing to ensure a convenient service. Options include the following:

- Having immunization available one evening a week or one Saturday or Sunday afternoon a month, to ensure that working parents are able to bring their children for immunization.
- Moving vaccination hours from early mornings to afternoons in areas where mothers are busy in the fields or selling at the market in the morning.

### Implementation steps

- Communities can assist with
  - ✓ Arranging a clean outreach site (school, community meeting room, etc.)
  - ✓ informing community members when the health worker arrives at the outreach site
  - ✓ registering patients, crowd control, and making waiting areas more comfortable (by providing shade and organizing space and seating)
  - ✓ health education — disseminating appropriate messages
  - ✓ motivating fellow community members to use the immunization and primary health care (PHC) services
  - ✓ transporting vaccines and health workers
  - ✓ arranging home visits when children are behind schedule, to explain immunization And to motivate caregivers.

### Evaluation

Community leaders and health workers can contribute by responding to questions about the quality of services.

## 2.2. Organizing and sustaining EPI promotion and education

**Community mobilization** is a process, through which action is stimulated by a community itself, or by others, that is planned, carried out, and evaluated by a community's individuals, groups, and organizations on a participatory and sustained basis to improve the health, hygiene and education levels so as to enhance the overall standard of living in the community. The advantage of community mobilization is it can motivate the people in the community, build their capacity, mobilize and release local resources, promote long term commitment to sustain behavioral change, develop feeling of ownership and etc.

**Community conversation** is a process of discussion of a particular issue, for example, the causes of high dropout rate in the immunization program, and can lead to a way of finding solutions to particular problems. When you conduct community conversation you need to consider the purpose of the conversation, which should attend or be invited, preparing the agenda for the meeting, deciding on the date, time and place of conversation, and facilitating the conversation in non-judgmental approach.

## Self-Check -I

### Part I: say True or false

I. Planning: Midwives should consult communities about service locations and timing to ensure a convenient service

### Part-2: MCQ

I. In which EPI activity is Community involvement is very essential?

- A. Planning
- B. Monitoring
- C. Implementing
- D. all of the above

2. Moving vaccination hours is mandatory from early mornings to afternoons in areas where mothers are busy in the fields or selling at the market in the morning.

- A. True
- B. False

### Part 3: short answer

I. Explain Implementation steps?



## Operation Sheet I

### **Steps for Communities can assist during Implementation of EPI activities**

Step 1• arranging a clean outreach site (school, community meeting room, etc.)

Step 2• informing community members when the health worker arrives at the outreach site

Step 3• registering patients, crowd control, and making waiting areas more comfortable (by providing shade and organizing space and seating)

Step 4• health education — disseminating appropriate messages

Step 5• motivating fellow community members to use the immunization and primary health care (PHC) services

Step 6• transporting vaccines and health workers

Step 7• arranging home visits when children are behind schedule, to explain immunization and to motivate caregivers

## **UNIT THREE: CONDUCT IMMUNIZATION FOR CHILDREN**

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

- Developing schedule and communicating with stakeholders
- Preparing the required EPI logistics/Materials
- Conducting Immunization or vaccine
- Vaccine Preventable disease
- Missed opportunities and trace defaulters
- Vaccine supply and stock management

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 –

- develop and communicate EPI schedule to stake-holders
- Prepare EPI logistics
- Conduct immunization
- describe Vaccine preventable disease
- trace defaulters and missed opportunities
- Supply vaccine and stock management

### **Learning Instructions:**

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP test”

### **3.1. Developing schedule and communicating with stakeholders**

- Communications to stakeholders may consist of either good news or bad news. ... Reports, meetings, online databases, online schedules, and project websites. ... as possible so that as you and your team develop project planning documents.

#### **Communicating with Stakeholders:**

- Exhibit you have a basic understanding of their work and domain and be able to empathize.
- Apply the right format at the right time with the right audience. ...
- Leverage your teammates when the time is right. ...
- Constantly educate stakeholders. ...
- Build relationships outside of work meetings

#### **Why is communication important with stakeholders?**

- ✓ Communicating regularly with stakeholders and creating a positive understanding can help you build effective long-term relationships with key groups. A strong relationship brings a range of benefits. Communicating with customers can put you in a strong position when customers are making purchasing decisions.

#### **What is a stakeholder communication plan?**

- ✓ In its simplest form, a stakeholder communications plan outlines who you need to communicate with, about what, how you're going to do it, and how often.

#### **How do you communicate with external stakeholders?**

#### **Keep Your Stakeholders Engaged**

- ✓ Listen when they speak: Communication is a two-way street. ...
- ✓ Give credit where it's due: Acknowledge your stakeholders when they comment and provide feedback. ...
- ✓ Set realistic expectations: ...
- ✓ Provide regular updates

#### **How can you communicate effectively?**

## Ways to Create Effective Communication in the Workplace

- ✓ Open Meeting. It is easier to communicate your passion and how you feel to your team via open meetings. ...
- ✓ Emails. ...
- ✓ One on One. ...
- ✓ Create a Receptive Atmosphere. ...
- ✓ Communication via Training. ...
- ✓ Display Confidence and Seriousness. ...
- ✓ Use Simple Words. ...
- ✓ Use Visuals.

### 3.2. Preparing the required EPI logistics/Materials

- ✓ Different levels within the health care system need different equipment for transporting and storing vaccines and diluents at the correct temperature.
  - ✓ **Primary** vaccine stores need cold or freezer rooms, freezers, refrigerators, cold boxes, and sometimes refrigerator trucks for transportation.
  - ✓ **Intermediate** vaccine stores, depending on their size/capacity, need cold and freezer rooms, and/or freezers, refrigerators, and cold boxes.
  - ✓ **Health facilities** need refrigerators with freezing compartments, cold boxes and vaccine carriers.
- There are five major cold chain equipment used in health facilities:
- A. Refrigerators
  - B. Cold boxes
  - C. Vaccine carriers
  - D. Foam pads and
  - E. Ice packs

#### A. 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.
- ✓ Refrigerators have different capacities for storing vaccines and for freezing and storing icepacks.
- ✓ A refrigerator in a health facility should be able to hold:
  - one-month supply of vaccines and preferably diluents in the refrigerator compartment
  - 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.

**B. 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.

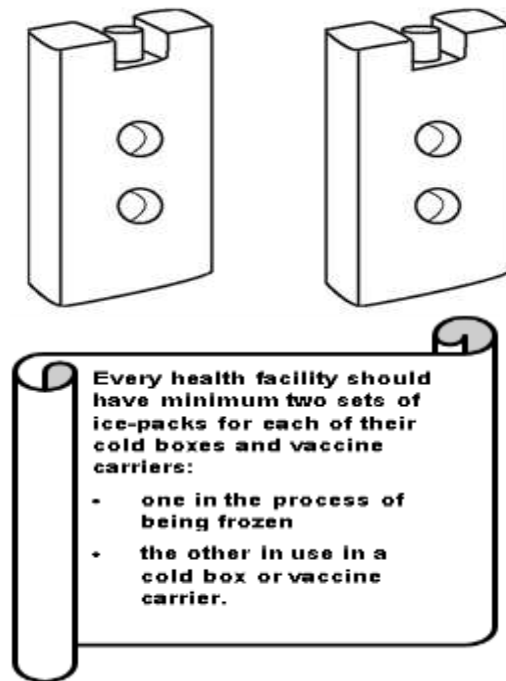
- ✓ When keeping vaccines in a cold box:
- ✓ Place conditioned ice packs at the bottom and sides of the cold box before loading the
- ✓ Vaccines in cartons or polythene bags.
- ✓ Always keep a thermometer inside the cold box.
- ✓ Do not place DPT, PCV, Hep B, Rotarix and TT vials in direct contact with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

### **C. 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.

### **D. 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.



**Fig: 1 Ice packs**

- ✓ Taking ice-packs out of the vaccine carrier will shorten its cold life. During sessions,

it is not recommended to keep vaccines on ice-packs or in cups filled with ice to keep vaccines cool. During sessions, stick the vaccine and diluent vials into the foam pad to keep them cool and to protect them.

- ✓ Ice melts quickly and vials may become contaminated if they float in water from melted ice and labels may fall off the vials. You can avoid this by putting the vials in a sealed plastic bag. Consider open vials that have been under melted water to be contaminated and discard them.

### **E. Foam Pad**

Foam pads a piece of soft foam that fits on top of the ice-packs in a vaccine carrier. There are Some cuts on it to allow vaccines to be inserted in the foam. During immunization sessions, the Foam pad serves as a temporary lid to keep unopened vaccines inside the carrier cool while

Providing a surface to hold, protect and keep cool opened vaccine vials.

Previously, ice packs were used to keep vaccines cool during immunization sessions outside of vaccine carriers. It is now recommended to use the supplied foam pads for this purpose.



**Fig 2:** Foam pad cuts to hold vaccine vials

### 3.3. CONDUCT OF IMMUNIZATION OR VACCINE

Contact	Vaccine	Age of child
<sup>1st</sup> <b>1 vaccination</b>	Polio-o & BCG	at birth
<sup>nd</sup> <b>2 Vaccination</b>	DPT1-HepB- Hib, PCV1, polio-1 and Rotarix 1	6wks
<b>3<sup>rd</sup> Vaccination</b>	DPT2-HepB- Hib, PCV2, polio-2 and Rotarix 2	10 wks
<b>4<sup>th</sup> Vaccination</b>	DPT3-HepB- Hib, PCV3 & polio-3, IPV	14 wks
<b>5<sup>th</sup> Vaccination</b>	Measles	9 month

Table I -Schedule of the immunization

#### 3.3.1. BCG vaccine

- BCG is a live-attenuated antibacterial vaccine that protects against tuberculosis in infants.
- Tuberculosis (TB) is a disease caused by the bacterium *Mycobacterium tuberculosis*.



- It usually attacks the lungs, but can also affect other parts of the body, including the bones, joints and brain.
- The letters, B, C and G stand for Bacillus of Calmette and Guerin.
- Bacillus describes the rod shape of the tuberculosis bacteria; Calmette and Guerin are the names of the people who developed the vaccine.
- What does a live-attenuated antibacterial vaccine mean?
  - Bacteria in the vaccine are alive, but they have been weakened (attenuated) in the laboratory so that they cannot cause the disease.

#### ◆ **BCG storage**

- BCG vaccine can be also affected and damaged by heat. It should be stored between 2°C and 8°C. The vaccine powder may be frozen for long-term storage, but the diluent and the reconstituted vaccine must never be frozen. Since BCG vaccine is easily destroyed by sunlight. The vials containing the vaccine powder are mostly made from black or brown glass.

#### ◆ **BCG dosage and schedule**

- The recommended injection dose for newborns and infants under one year is 0.05 ml. Reconstitute 0.05 mg of BCG vaccine powder with 0.05 ml of the specific diluent supplied with the vaccine. For children aged over one year, the dose is twice this amount –0.1 ml containing 0.1 mg of BCG vaccine powder. BCG vaccine is given at birth or as soon as possible thereafter. The vaccine is given intradermally (into the top layer of the skin) on the right upper arm. This is so the injection site can be inspected later.

#### **Adverse effects following BCG immunization and how to treat them**

Adverse effects may occasionally occur after immunization, in addition to the desired protective effect. They can include swelling and tenderness at the injection site. For BCG immunization, the normal reaction is a small raised swelling, which immediately appears at the injection site. This usually disappears within 30 minutes.



Figure 2.2 A small raised swelling can be seen at the site of an intradermal BCG injection.  
(Photo: AMREF Ethiopia/Demissew Bizuwork)

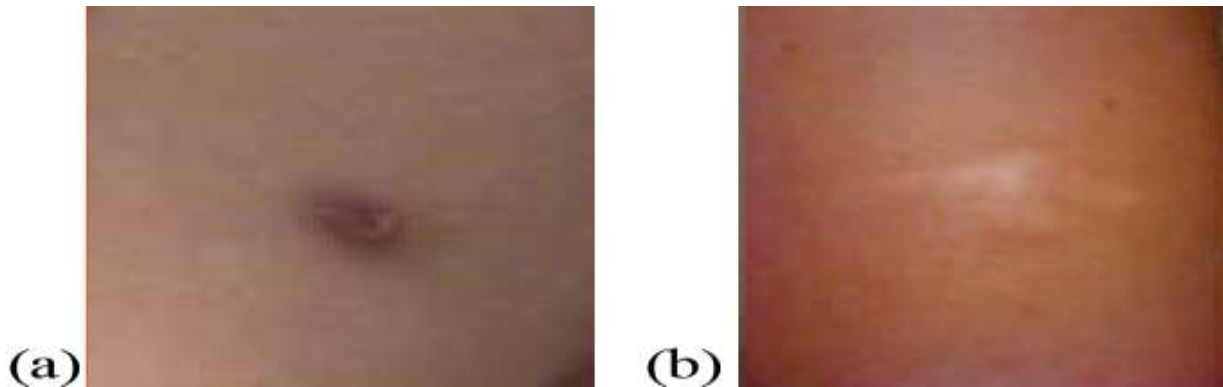


Figure 2.3 (a) The small sore at the injection site is a sign that the child has been effectively immunized with BCG vaccine. (b) A healed BCG vaccination scar on the arm of an adult.  
(Photos: supplied by Dr Kalid Asrat and Dr Basiro Davey)



Figure 2.4 an abscess is a rare adverse effect following BCG immunization. This one is about 1.5 cm in diameter, but they can be larger. (Photo: supplied by Dr Kalid Asrat)

- Swollen glands or abscesses occur because: An unsterile needle or syringe was used, too much vaccine was injected and the vaccine was injected too deeply under the skin, instead of into its top layer.

### ✚ **Contra-indications to BCG vaccine**

- Contraindication means a medical reason for not giving the vaccine, either temporarily or permanently. The only contraindications for BCG immunization are symptoms of HIV infection;
- These include chronic lung infection, tuberculosis, persistent diarrhea and other serious symptoms of HIV-related diseases

**Table2. Adverse effects following BCG immunization and their treatments.**

Adverse effect	Treatment	Comments
Small sore at the site of injection after 2weeks, which may last 2weeks	Keep dry and clean(do not put any ointment on the sore or give the child any medicine)	Will leave small scar
Swollen glands(lymph nodes)in the armpit.	Surgical or drug treatment may occasionally be required	Refer to health center
Abscess at the injection site	Amoxicillin syrup orally two times daily until referral is possible	Refer to higher health

### **3.3.2. PENTAVALENT VACCINE**

- What is pentavalent vaccine?
- A vaccine that contains five different antigens in one combined preparation is called a pentavalent vaccine and common use in Ethiopia is a combination of;-
  - One inactivated whole-cell vaccine (against pertussis bacteria),
  - Two sub-unit vaccines (the diphtheria and tetanus toxoids),
  - One conjugate vaccine (against Haemophilus influenzae type b bacteria) and
  - One recombinant vaccine (against hepatitis B virus).
- Thus, it combines five different vaccines in one injection to protect against four bacterial diseases:
  - Diphtheria

- Tetanus
- Pertussis and Haemophilus influenza type b, and
- One viral disease caused by hepatitis B viruses.
- It is a fully liquid vaccine which comes in a single dose vial.
- What is an inactivated antibacterial vaccine?
- It consists of bacteria that have been killed so that they cannot cause the disease.

What is a toxoid?

- It is a modified version of the toxin (harmful protein) produced by certain bacteria, including those causing diphtheria and tetanus.
- The toxoid is used in vaccines to immunize against the disease.

### ❖ **Storage, schedule and dosage of pentavalent vaccine**

Pentavalent vaccine comes in glass bottles called vials. Should be stored at between 2°C and 8°C. It should never be frozen, or allowed to become warmer than +8°C, as this will destroy its effectiveness. If it is allowed to stand for a long time, fine particles settle to the bottom of the vial leaving a cloudy liquid above them. This is normal. Shake the vial to mix the vaccine with the liquid before using it. Three doses of 0.5 ml each are given intramuscularly (IM, into the muscle) of the outer part of the thigh. The injections are given to babies at the age of 6,10 and 14 weeks. If an infant misses a scheduled dose, give it as soon as possible. it usually not given after 6 years of age because there is an increased risk of adverse reactions in older children.

### **Summary of pentavalent immunization characteristics**

Category	Description
Type of vaccine	Five different antigens combined, including one inactivated whole-cell vaccine, two sub-unit vaccines (toxoids), one conjugate vaccine and one recombinant vaccine
Number of doses	Three(referred to as Penta1, Penta2 andPenta3
Schedule	At 6, 10 and 14 weeks of age
Booster (additional doses)	none
Contraindications	Severe allergic reaction or encephalopathy to previous pentavalent immunization
Adverse effects	Mild local reactions are common

Special precaution	Usually not given after 6 years of age because of the increased risk of serious adverse reactions
Dosage	0.5 ml
Injection site	Outer mid-thigh.
Injection type	Intramuscular
Storage	Store between 2°C and 8°C. Never freeze

### Adverse effects following pentavalent immunization and how to treat them

- The possible adverse effects following immunization with pentavalent vaccine are generally mild: Serious reactions are very rare. The mild reactions are:

#### A. Soreness.

Some children may develop mild soreness, redness, or swelling at the injection site, But this will go away within 1–3 days.

#### B. Fever.

- Some children may develop a mild fever (a temperature of around 37.3°C to 38.4°C, measured with a thermometer in the child's armpit, is termed a low-grade fever).

- It should disappear within a day.
- Fever that begins more than 24 hours after a pentavalent injection is unlikely to be a reaction to the vaccine and should be investigated.

#### C. Crying for more than three hours

- Mostly because of pain, occurs in up to 1% of infants.

- A more serious but rare adverse effect is an abscess, which may develop a week or more after immunization usually because an unsterile needle or syringe was used, or the vaccine was not correctly injected into the muscle.

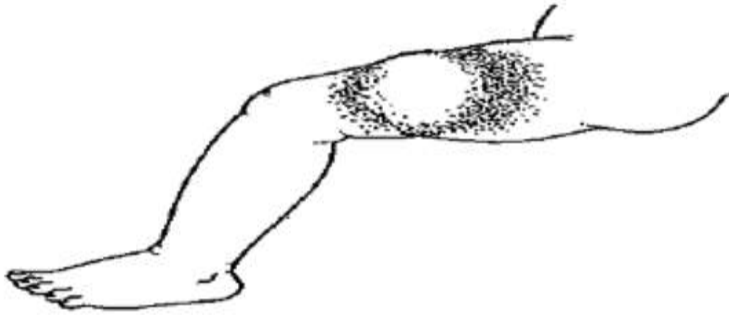


Fig: I Infant muscle

#### ▪ **Contra-indications to pentavalent**

Do not give another dose of the pentavalent vaccine if a child develops any of these severe reactions to the first dose:

- Severe allergic reaction, like severe rash, breathing difficulty, weak and rapid pulse, dizziness or fainting.
- Encephalopathy;-presents with coma, decreased level of consciousness and/or prolonged convulsions, occurring within seven days of a pentavalent vaccination, and where the symptoms are not due to another identifiable cause.

### 3.3.3 Tetanus toxoid (Td) vaccine for mothers

- Tetanus toxoid (Td) is given to women of childbearing age and pregnant women to prevent maternal and neonatal tetanus. It is the same tetanus toxoid as that given to children in DPT-HepB-Hib vaccine. When given to a woman, who is or becomes pregnant, the antibodies that formed in her body cross the placenta into the fetus. These antibodies protect the baby against tetanus during birth and for a few months thereafter. It also protects the woman against tetanus. 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.

#### ✚ **Schedule, dosage, storage and effectiveness of Td vaccine**

If given as a separate vaccine to women of childbearing age, at least two doses of 0.5 ml of Td 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 (Td2+).The ideal is to give five doses. It should be stored at between 2oC and 8oC and never frozen.

**Table 2.4 Duration of protection in women following 1–5 doses of Td vaccine**

Dose(0.5ml)	When given	Duration of protection
Td1	At first contact with women of childbearing age, or as early as possible in the pregnancy	No protection
Td2	At least 4 weeks after Td1	3years
Td3	At least 6 months after Td2	5years
Td4	At least 1 year after Td3	10 years
Td5	At least 1 year after Td4	All childbearing years

### **Adverse effects and contraindications of Td vaccine**

The possible adverse effects following immunization of women with Td vaccine are usually mild:

- Low -grade fever, and soreness/pain at the injection site
- This 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 Td vaccine should not be given Td again.

### **3.3.4 Hepatitis B vaccine (HepB)**

- Hepatitis B (HepB) vaccine protects against the hepatitis B diseases, which affect the liver and are caused by hepatitis B viruses. It is a cloudy liquid that comes in single- or multi-dose vials. In Ethiopia, HepB vaccine is routinely given to infants as one of the five vaccines combined in the pentavalent vaccine and is a recombinant vaccine. A recombinant vaccine is produced by inserting genetic material from a disease-causing infectious agent into harmless cells in the laboratory. The cells with the new genes begin to manufacture the unique antigens that identify the infectious agent. These antigens are then purified and used in the vaccine.

### **Storage, schedule, dosage and effectiveness of HepB vaccine**

- ✓ Should be stored between 2°C and 8°C, and never frozen.
- ✓ Three doses, each of 0.5 ml of the HepB vaccine, should be given intramuscularly (IM) into the outer thigh at 6, 10 and 14 weeks of age in the routine EPI schedule.

- ✓ The effectiveness of HepB vaccine is very high; up to 95% of those who are immunized with all three doses are protected from hepatitis B virus infection

### **Contraindications, adverse effects and how to treat them**

HepB vaccine is one of the safest vaccines. Mild reactions can include soreness or tenderness, redness, or mild swelling at the injection site, and a mild fever that lasts one or two days after the immunization. The treatment is as for reaction to pentavalent vaccine. Give paracetamol syrup (5 ml) and apply warm compresses to the injection site.

### **3.3.5 Oral polio vaccine (OPV)**

- Oral polio vaccine (OPV) is made from live-attenuated polioviruses (note that ‘poliovirus’ is all one word). OPV is a light red or light yellow liquid supplied in vials which either have droppers as caps, come with separate glass droppers. The vaccine is given by putting two drops into the child’s mouth. OPV gives protection against the three types of polioviruses (types 1, 2 and 3). That cause poliomyelitis (polio) a crippling disease of the brain and spinal cord. Paralysis (AFP), which is the sudden onset of severe weakening or loss of muscle tone in the legs, arms or hands.

### **Storage, schedule, dosage and effectiveness 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.



**Table 2.5 Dose & route of administration of vaccine**

Vaccine	Dose	No of Dose	Route	Site	S/E
BCG	<1yr=0.05 >1yr=0.1ml	one	ID	right upper arm	✓ Local inflammation or deep abscess.
Polio	2 drops	Four	Orally	Mouth	✓ Usually none
IPV	0.5 ml	One	IM	Rt. Upper outer thigh	✓
DPT-HepB-Hib	0.5 ml	Three	IM	Left Anterior- thigh	✓ Fever ✓ Local swelling ✓ Convulsion
PCV	0.5 ml	Three	IM	Rt. Upper outer thigh	✓ Local reaction ✓ Fever ✓ irritability
Measles	0.5 ml	one	SC.	left upper arm	✓ Fever & Rash
Rotarix	1 tube (1.5ml)	two	Oral	Mouth	✓ Irritability, loss of appetite, fever, fatigue, and vomiting

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.
Contra-indications	None
Adverse effect	Very rarely AFP; refer immediately to a health center
Special precautions	None

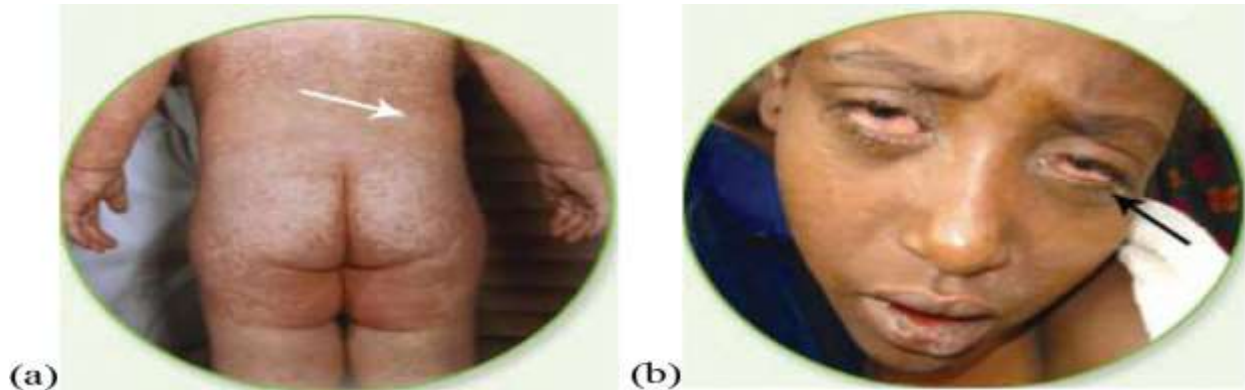
## Contraindications and adverse effects

- ✓ OPV is a very safe vaccine and there is no contraindication to prevent giving it.
- ✓ It very rarely has any adverse effects
- ✓ Acute flaccid paralysis has been reported in approximately one child in every 1–10 million children who have been vaccinated with OPV.

### 3.3.6. 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.



**Fig 2: Measles**

- Measles vaccine is a live-attenuated vaccine. It means it has been made from measles viruses that have been weakened in the laboratory so that they cannot cause the disease. But they are still immunogenic, which means they activate the immune system of the vaccinated person to produce immunity against measles viruses if encountered in the future.
- **Note:** Infants born to mothers who have had measles are usually immune for six to eight months.

#### **Storage, schedule and dosage of measles vaccine**

- The vials containing the dry measles vaccine powder can be frozen for long term storage, but after reconstitution with the correct diluent, measles vaccine should be kept at between  $+2^{\circ}\text{C}$  and  $+8^{\circ}\text{C}$ , and 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. In special situations, for instance in urban areas or schools with high measles

transmission, or in hospitals or among HIV-infected children, an ‘early’ extra dose of measles vaccine may be given at six months.

- If a child has received measles vaccine before nine months of age, a second dose should be administered at nine months, or as soon as possible afterwards.

### **Contraindications, adverse effects and how to treat them**

- In around 20% of children, a mild fever lasting one to three days may occur approximately one week after immunization.
  - A few children (less than 5%) develop a mild rash.
  - Severe allergic reactions including rash, breathing difficulty and fainting occur very rarely.

**Table 2.6: 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	Two doses
Schedule	Mcv 1 at 9 month,mcv2 at 15 month
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 diluent or the reconstituted vaccine)
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

### 3.3.7. Vitamin A deficiency (VAD) and “EPI plus”

- ✚ Immunization not only protects infants from several vaccine preventable diseases, but the immunization service also provides a platform for delivering other health interventions, a strategy commonly known as “EPI plus.” Other interventions that can be integrated with the immunization services include Vitamin A supplementation, insecticide treated bed nets for malaria prevention and de-worming. The most success has been achieved with integrating Vitamin A supplementation with routine immunization services.
- ✚ Any immunization contact is an opportunity to screen mothers and infants for eligibility to receive Vitamin A, particularly if immunizations have been delayed and the child is six months or older. Vitamin A is a substance that is required by the human body to
  - ✓ strengthen resistance to infection, increases a child’s chances of surviving an Infection promotes growth, and protects the transparent part of the eye called the cornea.
- If a person does not have enough Vitamin A in his or her body, the person may have difficulty of seeing in dim light which called night blindness. It is important to know that in countries such as Ethiopia where vitamin A deficiency frequently occurs among children
- Vitamin A should be given routinely at the same time as the measles vaccine. Because measles increases the risk of blindness due to vitamin A deficiency.
- Signs of vitamin A deficiency are white spots on the sclera (white part of the eye) and Clouding of the cornea (the thin tissue covering the black centre of the eye and the colored parts around it). In severe cases, blindness results. The routine dose of vitamin A for a child aged 6–11 months is the drops from one capsule (100,000 IU);
- The drops from two capsules (200,000 IU) are given to children aged 12–59 months at regular intervals, every six months. This ensures that all children are fully protected from the adverse effects of vitamin A deficiency. Vitamin A for children with measles
- Do not give vitamin A drops if the child has received a dose within the last month.
- But if a child with measles has not recently received a vitamin A supplement, give the vitamin A treatment dosages summarized.

### **Vitamin-A treatment dose**

- ✓ Immediately on diagnosis
- ✓ After 24 hours Third dose given two to four weeks later if there are still signs of vitamin A deficiency
- ✓ Dose - Infants less than 6 months old 50,000 IU

### **3.3.8. Rotavirus vaccine**

- Rotavirus vaccine is one of the new antiviral vaccines that is available as part of the routine EPI in Ethiopia. It also the leading cause of severe diarrheal disease and dehydration among children in many developed and developing countries.
- The WHO estimates that 20% of child deaths from diarrheal diseases worldwide are due to rotavirus infection. Live-attenuated vaccines that are given orally to babies as drops into the mouth.

#### **◆ Dosage and schedule of Rota virus vaccine(RotarixTM)**

- Two new live-attenuated rotavirus vaccines have been licensed for use in routine immunization Programme. 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.

### **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 Rotarix™

- Rotarix™ is a freeze-sensitive vaccine which must be stored in the refrigerator at a temperature of between +2°C to +8°C. 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.

### 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 Rotarix™

- 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.

### Fig. Rotavirus vaccine and its administration



**Fig 3** Rota vaccine administration

### 3.4. Vaccine Preventable disease

#### 3.4.1 Measles

Is a highly infectious disease caused by a virus?

Kills more children than any other vaccine preventable diseases

Tends to occur in epidemic form causing more children among malnourished children

##### ▪ **Mode of spread**

Airborne droplets released when an infected person sneezes or coughs

Contact with nose and throat secretions of infected people

Cases can infect others for several days before and after they develop symptoms

Spreads easily in overcrowded areas (schools, military barracks, health facilities etc)

##### ▪ **Signs and symptoms**

High fever which begins approximately 10 -12 days after exposure and lasts for several days

- ◆ i.e. Runny nose,
- ◆ Cough,
- ◆ Red eyes
- ◆ watery eyes
- ◆ Small white spot inside the cheeks

After several days, slight raised rash develops usually on the face and neck

Over a period of three days the rash spreads to the body and then to the hands and feet

Lasts three to five days and fades

The incubation period from exposure to the onset of the rash averages 14 days (range 7 -18 days)

##### ▪ **Complications**

Unimmunized children < 5 years and infants are at highest risk of measles and its complications.

Infected infants may develop severe diarrhea, otitis media, and respiratory tract infections

Pneumonia is the most common cause of death as the virus weakens the immune system

Encephalitis

Blindness

##### ▪ **Treatment**

General nutritional support and rx of dehydration

Antibiotics only to ear and severe respiratory infection



Vitamin a two doses in 24 hours

## **Prevention**

Measles vaccine

Global accelerated disease control strategy

- Increase routine measles coverage

- Secondary opportunity (routine or campaign)

- Measles surveillance

- Improved case management

### **3.4.2 Poliomyelitis**

Is a crippling disease caused by any one of the three related viruses (1, 2 and 3)

#### **Signs and symptoms**

Most infected children never feel ill. 5% of those infected show flu –like symptoms (upset stomach, fever, headache, sore throat, loose stool)

Immunity is life long

Paralytic polio begins with mild symptoms and fever

Severe muscle pain and paralysis follows usually in the 1<sup>st</sup> week.

Victims may lose the function of one or both legs or arms

Respiratory muscle paralysis may occur

- **Diagnosis**

Confirmed by laboratory testing of the stool specimen

- **Complications**

Crippling disease because of paralysis

Death due to paralysis of respiratory muscles

- **Prevention**

Immunization with oral polio (opv) or inactivated polio vaccine (ipv)

Oral polio is less expensive, safe and easy for health workers/volunteers to administer

#### **Eradication goals and strategies for polio**

- High infant immunization coverage 4 doses

- Supplementary doses of polio vaccine for the < 5 year children

Surveillance for wild polio virus through reporting and laboratory testing of all cases of afp in < 15yrs

Targeted “mop –up” campaigns once wild polio virus transmission is limited to a specific focal area

### 3.4.3 Diphtheria

Caused by the bacterium corynebacterium diphtheriae

Produces a toxin that can destroy human body tissues and organs

One type affects the throat and the tonsils

Another type common in the tropics causes skin ulcer

- **Mode of spread**

Person to person through close physical and respiratory contact

Cause infection of the naso-pharynx which may lead to breathing difficulties and death

- **Signs and symptoms**

Early symptoms include:

Sore throat

Loss of appetite

Mild fever

Bluish –white or grey membrane forms in the throat and tonsils

Patient may recover within 6 – 10 days

Severe diphtheria may cause swollen neck and obstructed airway and death

- **Complications**

Abnormal heart beats which may lead to heart failure

Inflammation of heart muscles and valves (lead to chronic heart disease and heart failure)

The most severe complication is respiratory obstruction followed by death.

- **Treatment:**

Antitoxin and antibiotics (penicillin, erythromycin)

Prevention –DPT vaccine.

Maintain high level of immunity in the community with three doses of DPT in the routine immunization or in the form of penta-valent

### 3.4.4 Pertussis (whooping cough)

Pertusis or whooping cough is a disease of the respiratory tract caused by bacteria, *bordetella pertusis*, that lives in the mouth, nose and throat.

Many children that contract pertusis have coughing spells that lasts for eight weeks

The disease is most dangerous in infants

### **Mode of spread**

Spreads very easily from child to child by droplets produced by coughing or sneezing

In many countries the disease occurs in regular epidemic cycles of three to five years

### **Signs and symptoms**

Incubation period is 5 -10 days

Common cold-like symptoms (runny nose, cough, watery eyes, sneezing, fever )

The cough worsens and become spasmodic

Child may turn blue during a long burst of coughing

Vomiting and exhaustion follow the coughing attacks

#### **▪ Complications:**

Bacterial pneumonia

Convulsion and seizures due to fever or brain anoxia.

This may be by the coughing spells or toxins released by the bacteria

Loss of appetite, otitis media, dehydration and anorexia

#### **▪ Treatment**

Antibiotics usually erythromycin

Plenty of fluids

Prevention = DPT

### **3.4.5 Tetanus**

Acquired through exposure to the spores of the bacterium *clostridium tetani*

Universally present in the soil

Potent neurotoxin produced during the growth of bacteria in dead tissue

The disease is common and serious in new borns

Most babies who get the disease die

Neonatal tetanus is common in rural areas where the deliveries are at home.

- **Mode of spread**

Not transmitted from person to person

A person becomes infected when dirt enters a wound or cut

Grows in deep cut wounds

Women have additional risk due to child birth/abortion

A new baby may get infected when the umbilical cord is contaminated with dirty hands, knives, razor etc.

- **Signs and symptoms**

Time between the infection and symptoms is usually 3 -10 days. (3 weeks)

The shorter the incubation period, the higher the risk of death

Muscular stiffness of the jaw is the first symptom

Stiffness of the neck, abdominal muscles, spasms, sweating, fever etc

Newborn babies are normal at birth but stop sucking between 3 – 28 days

Stop sucking and bodies become stiff and death often occurs

- **Complications**

Respiratory distress

Difficulty of feeding

- **Prevention**

Immunization of infants with three doses of DPTt or penta-valent vaccines.

Immunizing women of child bearing age women during or outside pregnancy

Clean delivery practices

Those who recover from infection don't develop natural immunity

## **Global accelerated disease control issues**

2005 target d for elimination of NNT.

To reduce the incidence of case to 1: 1000 per year in every district

Increase Td coverage

Td campaign in high risk areas

Promote clean delivery

Improve surveillance & reporting of neonatal tetanus

As the bacteria also survives in the environment, eradication is not feasible and vaccination has to continue after the goal

### 3.4.6 Hepatitis b

Caused by a virus that affects the liver

Adults who get hepatitis b usually recover

Infected infants become chronic carrier

Carry the virus for many years and can spread the virus to others

- **Mode of transmission**

Unsafe injection or needle stick

Mother to child during birth

Through cuts during contacts

Sexual intercourse

Sign and symptoms

Jaundice

- **Complications**

Chronic hepatitis, cirrhosis, liver cancer

Prevention = mono hep b, pentavalent

### 3.4.7 Haemophilus influenza

#### **Signs and symptoms**

Pneumonia and meningitis are the most important diseases caused by Hib bacteria

Hib disease should be suspected in the case of any child with signs and symptoms of meningitis and pneumonia

- **Complications**

Infants who survive Hib meningitis develop neurological disability (brain damage, hearing loss, mental retardation)

- **Treatment for Hib**

Specific antibiotics

#### **Prevention**

Effective vaccines when given during infancy (Hib mono-valent or penta-valent

Temporary redness at the injection site.

### **3.4.1 Informing caregivers on adverse effects**

- Vaccines are highly pure. Vaccines represent only a minor stimulation of the infant immune system compared to the large number of potentially dangerous bacteria and viruses babies routinely encounter: starting immediately after a baby is born; thousands of different bacteria begin to live on the skin and the lining of the nose, throat, and intestines. The baby's immune system rapidly launches immune responses to these bacteria that prevent them from invading the blood stream.
- Each ingredient in a vaccine is included for a reason.
- The scientific evidence does not support a link between vaccination and autism or other developmental disorders.
- **Adverse Effects following vaccine administration:**
  - ✓ **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. 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.
  - ✓ Following Pentavalent vaccination, mild local reactions are common, rarely, injection-site abscess.
  - ✓ Following PCV administration , 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

In general, An Adverse event following immunization (AEFI) is any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine. The adverse event may be any unfavorable or unintended sign, abnormal laboratory finding, symptom or disease.

### **3.6. Missed opportunities and trace defaulters**

It is common in Ethiopia to see many children and mothers, who have been to a health facility, but have not been immunized. Thus, another important strategy is to reduce missed opportunities and trace defaulters.

Improve public awareness and community participation in immunization programs. In the EPI, you are expected to improve public awareness through intensive, regular social mobilization and health education campaigns, in order to:

- Maximize participation of community members in EPI activities
- Increase public demands for immunization and the vitamin A supplements that are routinely given to infants during the immunization programme.

It is very important to involve the whole community, including political and religious leaders, through seminars, public meetings and direct contacts. You should aim to work with and fully utilize women's groups, youth associations and idirs (self-help associations at village level), so that they support and help to promote the immunization service

### **3.7. Vaccine supply and stock management**

- VSSM is an inventory management tool whose overarching goal is to improve management of the supply chain in order that vaccines and diluents and other related commodities neither suffer from being over stocked and avoid that any item is out of stock.
- **Vaccine management** involves estimating the number of vaccine doses, diluents and injection equipment (e.g. syringes, needles) needed for a particular population over a stated supply period. In order to run an efficient and effective immunization session you need to have an adequate supply of vaccines of acceptable quality. This is essentially dependent on reliable planning and monitoring. On the other hand, health facilities may have an excess stock of vaccine that has passed its expiry date and has to be thrown away. You should try to ensure that these situations do not arise in your Health Post.

Self-check I	Written test
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**PART 1: Say True Or False**

1. 4. In order to promote the immunization service political and religious leaders involvement is necessary
- A. True                      B. False

**PART 2: MCQ**

1. The vaccination type administered during the third vaccination period is (3 points)
- A. BCG              B. Pentavalent              C. Measles              D. Polio -0
2. After administering of which type of vaccine a small raised swelling appears at the injection site
- A. Measles
- B. Pentavalent
- C. BCG
- D. all of the above

**PART.3: Short answer**

1. Briefly explain Signs and symptoms measles?



## UNIT FOUR: MANAGE COLD CHAIN

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

- Vaccines safety
- Cold chain management
- Maintaining cold chain minor operational defects

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 –

- Describe vaccine safety
- Describe cold chain management
- Maintain cold chain minor operational defects

### **Learning Instructions:**

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP test”

#### 4.1. Vaccines safety

Vaccines are safe and effective. Because vaccines are given to millions of healthy people — including children — to prevent serious diseases, they're held to very high safety standards.

How are vaccines tested for safety?

Every licensed and recommended vaccine goes through years of safety testing including

Testing and evaluation of the vaccine before it's licensed by the Food and Drug Administration (FDA) and recommended for use by the Centers for Disease Control and Prevention (CDC)

Monitoring the vaccine's safety after it is recommended for infants, children, or adults. Vaccines are tested before they're recommended for use

Before a vaccine is ever recommended for use it's tested in labs. This process can take several years. FDA uses the information from these tests to decide whether to test the vaccine with people. During a clinical trial, a vaccine is tested on people who volunteer to get vaccinated. Clinical trials start with 20 to 100 volunteers, but eventually include thousands of volunteers.

These tests take several years and answer important questions like:

- ✓ Is the vaccine safe?
- ✓ What dose (amount) works best?
- ✓ How does the immune system react to it?

Throughout the process, FDA works closely with the company producing the vaccine to evaluate the vaccine's safety and effectiveness. All safety concerns must be addressed before FDA licenses a vaccine. Every batch of vaccines is tested for quality and safety.

Once a vaccine is approved, it continues to be tested. The company that makes the vaccine tests batches to make sure the vaccine is:

- ✓ Potent (It works like it's supposed to)
- ✓ Pure (Certain ingredients used during production have been removed)
- ✓ Sterile (It doesn't have any outside germs)

FDA reviews the results of these tests and inspects the factories where the vaccine is made. This helps make sure the vaccines meet standards for both quality and safety.

Vaccines are monitored after they're recommended to the public.

Once a vaccine is licensed and recommended for use, FDA, CDC, and other federal agencies continue to monitor its safety.

Check out this info graphic for details on how vaccines are developed, approved, and monitored.

There are many different parts of the national vaccine monitoring system

The United States has one of the most advanced systems in the world for tracking vaccine safety. Each of the systems below supplies a different type of data for researchers to analyze. Together, they help provide a full picture of vaccine safety.

**Vaccine Adverse Events Reporting System (VAERS):** VAERS is an early warning system managed by CDC and FDA that is designed to find possible vaccine safety issues. Patients, health care professionals, vaccine companies, and others can use VAERS to report side effects that happen after a patient received a vaccine. Some side effects might be related to vaccination while others might be a coincidence (happen by chance). VAERS helps track unusual or unexpected patterns of reporting that could mean there's a possible vaccine safety issue that needs further evaluation.

**The Vaccine Safety Data link (VSD):** VSD is collaboration between CDC and several health care organizations across the nation. VSD uses databases of medical records to track vaccine safety and do research in large populations. By using medical records instead of self-reports, VSD can quickly study and compare data to find out if reported side effects are linked to a vaccine.

✓ What are the risks of vaccination?

Any vaccine can cause side effects. Usually, these side effects are minor — a low-grade fever, fussiness and soreness at the injection site. Some vaccines cause a temporary headache, fatigue or loss of appetite.

✓ How safe is vaccination?

Most childhood vaccines are 90% to 99% effective in preventing disease. And if a vaccinated child does get the disease, the symptoms are usually less serious than in a child who hasn't been vaccinated. There may be mild side effects, like swelling where the shot was given, but they do not last long.

✓ Who is responsible for vaccine safety?

The FDA and the CDC are the government offices in charge of vaccine safety

✓ What are the risks of not vaccinating?

Those most at risk include: People with weakened immune systems due to other diseases or medications they are taking. People with chronic medical conditions like lung, heart, liver, kidney disease or diabetes. Newborn babies, who are too young to be vaccinated against most diseases

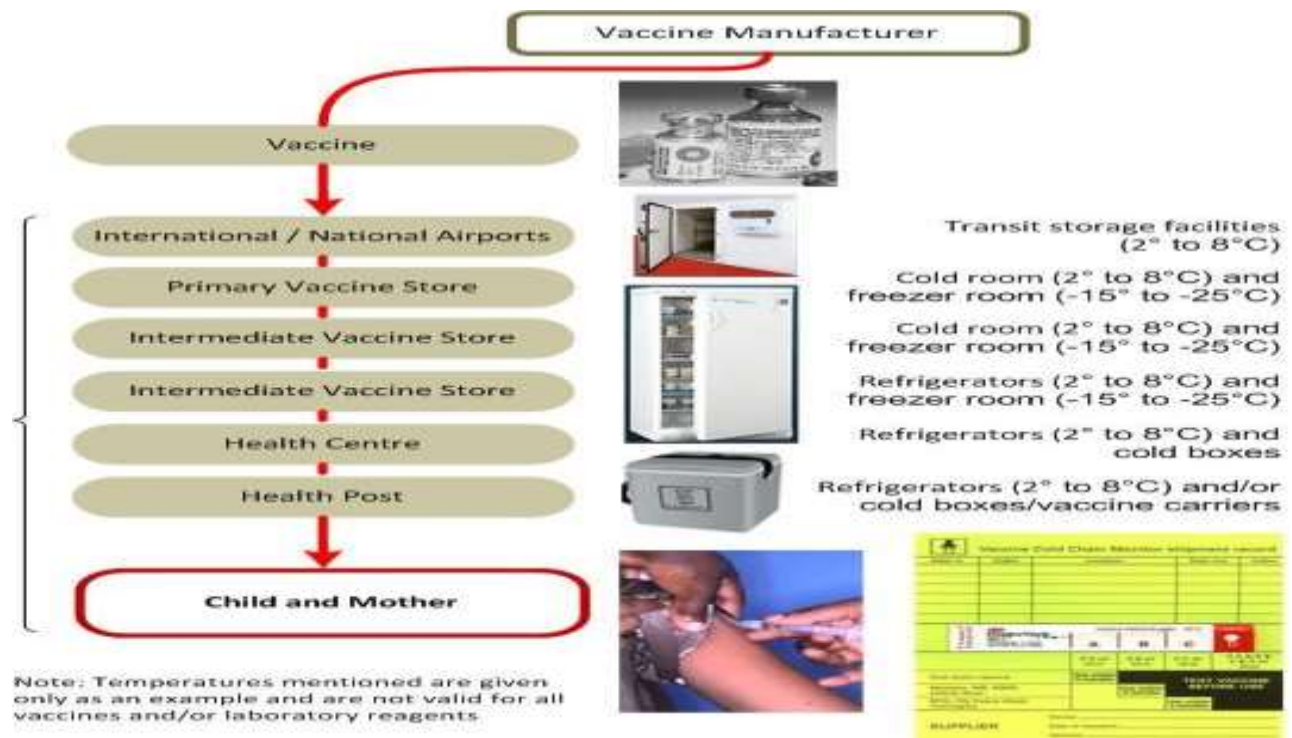
## 4.2. Cold chain management

### 4.2.1. Definition

- The cold chain is the system used for keeping and distributing vaccines and other and distributing vaccines and other. It consists of a series of storage and transport links, all designed to keep vaccines within an acceptable range until it reaches the user, Vaccines are sensitive to heat and freezing and must be kept at the correct temperature from the time they are manufactured until they are used.

#### ✓ Vaccine Transportation

- ❖ From Manufacturer ----->national airport -----> central vaccine stores ----->regional store--- --> zonal stores -----> district - health center -----> health post or child & mother.



Vaccine Manufactu	Air Transport (+2° to 8°C & -15° to -25°C)	Primary Store (GMSD &/State) WIC (+2° to 8°C) & WIF (-15° to -25°C)	Refrigerated / Insulated Van (+2° to 8°C & -15° to -25°C)	State Store WIC (+2° to 8°C) & WIF (-15° to -25°C)	Insulated Van (+2° to 8°C & -15° to -25°C)
Mother & Child	Sub-Centre/ Session Sites	Vaccine Carrier to 8°C)	Primary Health Centre ILR +2° to 8°C & All Vaccines in ILR	Insulated Van (+2° to 8°C)	District Vaccine Store ILR (+2° to 8°C) & DF (-15° to -25°C)

**Fig 4: Cold chain transportation**

### 4.3. 1. The cold chain equipment

Different levels within the health care system need different equipment for transporting and storing vaccines and diluents at the correct temperature.

- ✓ Primary vaccine stores: need cold or freezers rooms, freezers, refrigerators, cold boxes and sometimes refrigerator trucks for transportation.
- ✓ Intermediate vaccine stores: depending on their size and capacity need cold and freezer rooms, and/or freezers , refrigerators and cold boxes
- ✓ Health facilities: need refrigerators with freezing compartments, cold boxes and vaccine Carriers,

**Cold Boxes** is container which is lined with frozen icepacks to keep large quantities of vaccines .icepacks to keep large quantities of vaccines between 2°C- 8°C for several days.

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.



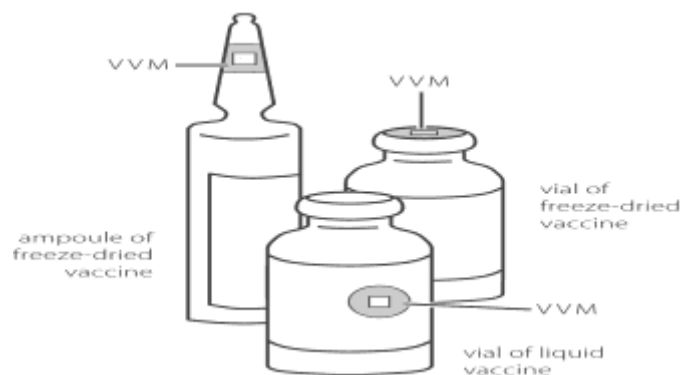
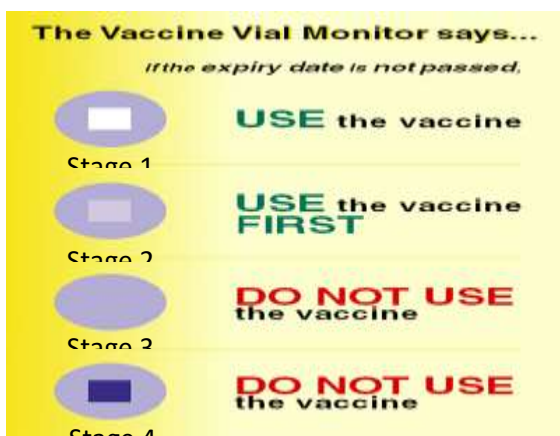
**Fig 5:** vaccine carrier

- ✓ **Vaccine carriers:** a container which is lined with frozen icepacks to keep small quantities of vaccines between 2°C-8° C for 24 to 72 hours. Used for vaccination sessions and short journey.
- ✓ **Cold chain monitoring equipment:** The purpose of cold chain monitoring equipment is to keep track of the temperature to which vaccines and diluents are exposed during transportation and storage.

The different monitors are:

- Vaccine vial monitors(VVM)
- Vaccine cold chain monitor card
  - ✓ Thermometers
  - ✓ Freeze indicators

VVM



## Vaccine Cold Chain Monitor Card

- ✓ A vaccine cold chain monitor is a card with an indicator strip that changes color when the indicator strip that changes color when the vaccines are exposed to temperatures too high.
- ✓ The vaccine cold chain card is used to estimate the length of time that vaccine has been exposed to high temperatures exposed to high temperature.

### Thermometers

- ✓ Used to monitor temperatures of refrigerators and /or cold boxes
- ✓ Dial thermometers tend to lose their accuracy over time.

### Freeze watch

Irreversible temperature indicator which shows if a product, such as vaccine, has been exposed to freezing temperatures. If exposed to freezing temperatures . If exposed to temperatures below 0°C for more than 1 hour the vial releases the colored liquid.

### Freeze indicators

**Freeze Tag** : electronic temperature measuring circuit with LCD display. if indicator exposed circuit with LCD display. If indicator exposed to temperatures below 0 °C for more than 1 hour the display changes to alarm

## 4.3. Maintaining cold chain minor operational defects

### • 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 the refrigerator cool, it makes the refrigerator work harder and use more power,refrigerator work harder and use more power, gas or kerosene. You should DEFROST the refrigerator when the ice becomes more than 0,5 cm thick or once a ice becomes more than 0,5 cm thick or once a month.
  - How to defrost and clean a refrigerator
    - ✓ Take out all the most heat sensitive vaccines (OPV, measles, BCG, yellow fever) and transfer them to a cold box lined with frozen ice packs
    - ✓ Take out all the freeze sensitive vaccines (DTP, DT,Td, hepatitis B, ) and diluents, and transfer them to a cold box lined with conditioned ice packs
    - ✓ Turn off the power supply to the refrigerator Leave door open and wait for the ice to melt

- ✓ Clean the inside and the door seal with a clean wet cloth and turn the refrigerator on again.

### **Equipment required for performing defrost and clean a refrigerator**

- Cold box, frozen ice-packs, Refrigerator
- Vaccines like (OPV measles ,BCG)
- Power supply and wet cloth
- Maintaining cold boxes and vaccine carriers
  - ✓ Must be dried after their use
  - ✓ If left wet with closed lids, they become moldy and the seal will be affected
  - ✓ Store them with the lid open when not used, if possible
  - ✓ Don't store them outside under the sunlight, it can cause cracks and reduce the Efficiency of the cold box.



## Self-check

## Written test

### Test 1. Say true or false

I. **Vaccine management** involves estimating the number of vaccine doses, diluents and injection equipment

A. True

B. False

### Test 2: MCQ

I. What are the risks of not vaccinating?

A. People with weakened immune systems

B. people having Diarrhea

C. people with convulsive disorder

D. all of the above

Test 3: short answer

I. Explain how to vaccines is transport?

## Operation Sheet I

## Defrost and clean a refrigerators

**Instruction:** Defrost and clean refrigerators

**Purpose:** to separate heat sensitive vaccine

**Required tools and equipment:** chek list,N/S, gouze

**Precaution:** to prepare nessecery material

**Procedure:** Steps for defrost and clean a refrigerator:

Step 1: Take out all the most heat sensitive vaccines (OPV, measles, BCG, yellow fever) and transfer them to a cold box lined with frozen ice packs

Step 2: Take out all the freeze sensitive vaccines (DTP, DT,Td, hepatitis B, ) and diluents, and transfer them to a cold box lined with conditioned ice packs

Step 3: Turn off the power supply to the refrigerator Leave door open and wait for the ice to melt

Step 4: Clean the inside and the door seal with a clean wet cloth and turn the refrigerator on again

**Quality criteria:** based on check list after performed the procedure

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time allowed for procedure two is -30min

You are required to perform:

Task I: defrost and clean a refrigerator

## **UNIT SIX: MONITOR IMMUNIZATION PRACTICE**

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

- Documentation of immunization activities
- Collecting data on immunization activities
- Timely updating data on immunization activities
- Monitoring immunization practice at catchment areas
- Periodically revising plan of immunization schedule
- Screening of mothers and children

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 –

- document immunization activity
- update Timely data on immunization activities
- Monitor immunization practice at catchment areas
- revise Periodical plan of immunization schedule
- Screen mothers and children for immunization activity

### **Learning Instructions:**

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP test”

## 6.1. Documentation of immunization activities

-Global Immunization Vision and Strategy (GIVS) sets a goal of protecting more people against more diseases by expanding the reach of immunization to every eligible person, extending immunization beyond infancy, and promoting immunization to a high level of visibility on every health agenda.

**-Vaccination records** (sometimes called immunization records) provide a history of all the vaccines you or your child received. This record may be required for certain jobs, travel abroad, or school registration

### **Complete the infant immunization and reminder cards**

- Follow these steps to complete infant immunization and reminder cards:
  1. Write the date for each vaccine administered in its corresponding section on the card.
  2. Mark the next immunization due date on the card if another dose is needed, and ensure that the caregiver understands when and where to return for the next dose(s) of vaccine(s).
  3. If new vaccines are not included on immunization registers and/or cards, ask your supervisor for instructions about how to record them on all reporting tools.
  4. Use the immunization card to update the reminder card
  5. Return the immunization card to the caregiver.
  6. Explain to the caregiver that the immunization card must be kept in good Condition since it is an important document for future health care visits.
  7. Remind the caregiver that the card should be taken to all of the child's health care visits for review. Do not miss any opportunity to immunize; health workers should be in the habit of asking for and reviewing immunization cards for each child at each visit regardless of the reason for coming
- When you maintain a copy of your child's vaccination record:
  - ✓ Keep the record in a safe place where you can easily locate it.
  - ✓ Bring it to each of your child's doctor visits.
  - ✓ Ask the doctor or nurse to jot down the vaccine given, date, and dosage on your child's vaccination record.
  - ✓ Write down the name of the doctor's office or clinic where your child got the shot so you know where to get official records when you need them.

- What if you can't find your child's records
  - ✓ Your child should be considered susceptible to disease and should be vaccinated (or revaccinated) if you can't find his or her records or their records are incomplete. It is safe for your child to receive a vaccine, even if he or she may have already received it. Alternatively, your child could also have their blood tested for antibodies to determine his or her immunity to certain diseases. However, these tests may not always be accurate and doctors may prefer to revaccinate your child for best protection. Talk to your child's doctor to determine what vaccines your child needs for protection against vaccine-preventable diseases.

## 6.2. Collecting data on immunization activities

The following tools are used for routine recording of immunization-related activities

at the service-delivery level.

- 1) Tally sheet.
  - 2) Immunization register.
  - 3) Immunization card.
  - 4) Defaulter register.
  - 5) Stock record.
  - 6) Refrigerator temperature chart.
  - 7) Health-facility consultation register
- **Immunization Register**
    - ✓ While tally sheets record the doses given for each session, the immunization register records doses given to each individual and helps health workers Keep track of the immunization services they offer to each infant and pregnant Woman.
    - ✓ Each dose given to every child or pregnant woman in the catchment area should be recorded against their names in the register.
    - ✓ In this way the immunization register is the basis for tracking individual immunization Status, and defaulters.

## 6.3. Timely updating data on immunization activities

- It is very important that immunization data be collated into a monthly report at each level of the health service. The monthly report should contain critical data on most of the components of the immunization system, without being too detailed and

without putting too much burden on health staff. Most of the data collected from health facilities will be consolidated into a monthly report that is forwarded to the district level. The district then consolidates data from all the health facilities into a monthly report, and forwards this on to the provincial level. Finally, the province consolidates all the district data in a provincial monthly report, which is then sent up to the national level.

#### **6.4. Monitoring immunization practice at catchment areas**

- What is Monitoring and why is it important
  - ✓ Monitoring is the systematic and continuous process of examining data, procedures and practices. It is used to measure progress, identify problems, and develop solutions, and guide policies and interventions.
  - ✓ Monitoring is an important tool for mid-level managers. It can help improve the quality of the immunization Programme by ensuring :
    - -All infant and pregnant women are immunized
    - -vaccines and safe injection equipment are delivered in correct quantities and on time
    - -Staff are well trained and adequately supervised
    - -Information on disease incidence and adverse events following immunization are collected and analyzed
    - -The community has confidence in the vaccine delivered and the immunization service they receive.

#### **6.5. Screening of mothers and children**

In order to reduce mortality, morbidity and disability, immunization session must safely administer potent vaccines to susceptible children and women before they are exposed to immunization preventable diseases.

The immunization programme aims at resolving vaccine and management problems include:

- Reduction of the incidences of overstocking or under stocking of vaccines
- Ensuring proper accountability for all vaccines at all levels and reduction of vaccine wastages

<b>Self-Check -I</b>	<b>Written test</b>
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**Part I: say true or false**

I. Vaccination records (sometimes called immunization records) provide a history of all the vaccines you or your child received.

**Test 2: MCQ**

I. -----is the systematic and continuous process of examining data, procedures And practices.

A. Planning      B. Monitoring      C. Evaluating      D. all

**Test 3: short answer**

1. Discuss necessary tools to collect data on immunization activities

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## Developers Profile

No	Name	Qualification (Level)	Field of Study	Organization/ Institution	Mobile number	E-mail
1	Amare Kiros	MSc	Midwifery	Pawi HSC	+251920843010	Amarekiros9@gmail.com
2	Bezabih Gallo	Bsc	Health Officer	Mettu Hsc	+251917718413	gallobezabih@gmail.com
3	Gizaw kifle Zena	MSc	MSc in Midwifery education	Harar HSC	+251912383882	gizawkifle21@gmail.com
4	Tsegaw Alemye	MSc	Maternity & Neonatal nursing	EMA	+251925993377	tsegaw25@gmail.com
5	Zekariyas Muluneh	MSc	Midwifery	Debre Berhan HSC	+251913748423	zekubk@gmail.com
6	Kubra Gobeze			Minister of health	+251921970038	<a href="mailto:Kubra.gobeze@mohgov.et">Kubra.gobeze@mohgov.et</a>