

*Expanded Program in
Immunization*

For the Ethiopian Health Center Team



**Ethiopia Public Health
Training Initiative**

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TABLE OF CONTENTS

<u>TOPIC</u>	<u>PAGE</u>
Table of Contents.....	i
Preface	ii
Acknowledgement	iii
UNIT ONE Introduction	
1.1. Purposes and uses of the module.....	1
1.2. Directions for using the module	2
UNIT TWO Core Module	
2.1. Pre-test	3
2.2. Learning Objectives	7
2.3. Learning Activity One: Case Study	8
2.4. Definition and Epidemiology of EPI Target Diseases.....	10
2.5. Characteristics and Management of EPI Target Diseases.....	14
2.5.1. Pertussis (Whooping Cough).....	14
2.5.2. Tetanus.....	16
2.5.3. Poliomyelitis.....	18
2.5.4. Diphtheria	19
2.5.5. Measles	20
2.5.6. Tuberculosis	21
2.6. Prevention Control EPI Target Diseases.....	23
2.7. Immunization	23
Types of Vaccines	23
Side Effects.....	23
Contraindications	24
Immunization Schedule	25
2.8. The Cold Chain.....	26
2.9. EPI Delivery Strategies.....	27
2.10. Indicators	28
2.11. Immunization Problems	28
2.12. Assessment and Evaluation of EPI Services.....	30
UNIT THREE Satellite Module	
3.1. Health Officer.....	34
3.2. Public Health Nurse	47
3.3. Environmental Health Technician.....	58
3.4. Medical Laboratory Technician	66
3.5. Community/Front lines Health Workers	76
3.6. Take-home Messages for care givers	78
UNIT FOUR Glossary	80
UNIT FIVE Abbreviations	84
UNIT SIX References	85
UNIT SEVEN Annex	
Annex I Vaccination Reporting form.....	86
Annex II Key for pretest, posttest and learning Activities...	87
Annex III The Authors	91

PREFACE

The need of teaching materials in addition to the usual text and reference books is increasing as our demands are increasing. Hence, many modules to fill the gap are prepared and being prepared in collaboration with The Carter Center.

Gondar University College of Medical Science has so far produced two modules on Pneumonia in Under Five Children and Malaria Uncomplicated and this is the third on Expanded Program on Immunization (EPI).

EPI is one of the main integrated health services in the country. Expanding this program will decrease the morbidity and mortality due to vaccine preventable diseases.

Basically, this module is prepared for the health center team, but other professionals at the service areas can also use it.

It should be clear that this module is not a substitute for text books, but rather can help students to understand the program in a simplified way and push students to make the teaching student-centered and team approach.

ACKNOWLEDGMENTS

This module is the contribution of many scholars at Gondar University College. Hence, we would like to thank all those who contributed directly or indirectly for the development of this module.

We would like to extend our deep appreciation to Gondar University College and The Carter Center for funding and arranging everything for the completion of the module.

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Alemaya University, Faculty of Health Sciences deserves special thanks for reviewing and giving feed-back on time.

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Special thanks has to go to Ms. Carla Gale, Resident Technical Advisor, and Ato Aklilu Mulugeta, Business Manager, for The Carter Center, A.A. for the support and encouragement to complete the module. Without their support this material could have not been completed.

Finally, the Community Health, Health Officer, Environmental Health, Nursing and Medical Laboratory Technology Departments are highly appreciated to finalize this valuable teaching material through team work.

UNIT ONE

INTRODUCTION

1.1 Purposes and uses of the module

The expanded Program on Immunization (EPI) was launched in 1974 by the World Health Organization (WHO). In 1977 EPI set the following three long-term objectives:

- ◆ To reduce morbidity and mortality from six major childhood diseases, i.e. measles, tuberculosis, tetanus, pertussis, poliomyelitis and diphtheria by immunizing all children throughout the world by 1990,
- ◆ To promote national self-reliance in delivering immunization services within the comprehensive health service, and
- ◆ To promote regional self-reliance in vaccine production and quality control.

The Ethiopian health policy had given emphasis to the prevention and control of major communicable diseases. Thus, in Ethiopia EPI was initiated in 1980. The objective of the National Immunization Policy was to reduce mortality and morbidity in children from the EPI target diseases through the immunization of all children under the age of one. The program had been planned to make immunization services available to 10% of the population in 1980 and to increase immunization access by 10% each year.

Despite various initiatives and campaigns over the years, immunization coverage (DPT₃)¹ in most parts of Ethiopia remains low (41.91%), and this contributes to high morbidity and mortality among children. Some of the factors accounting for under immunization service are:

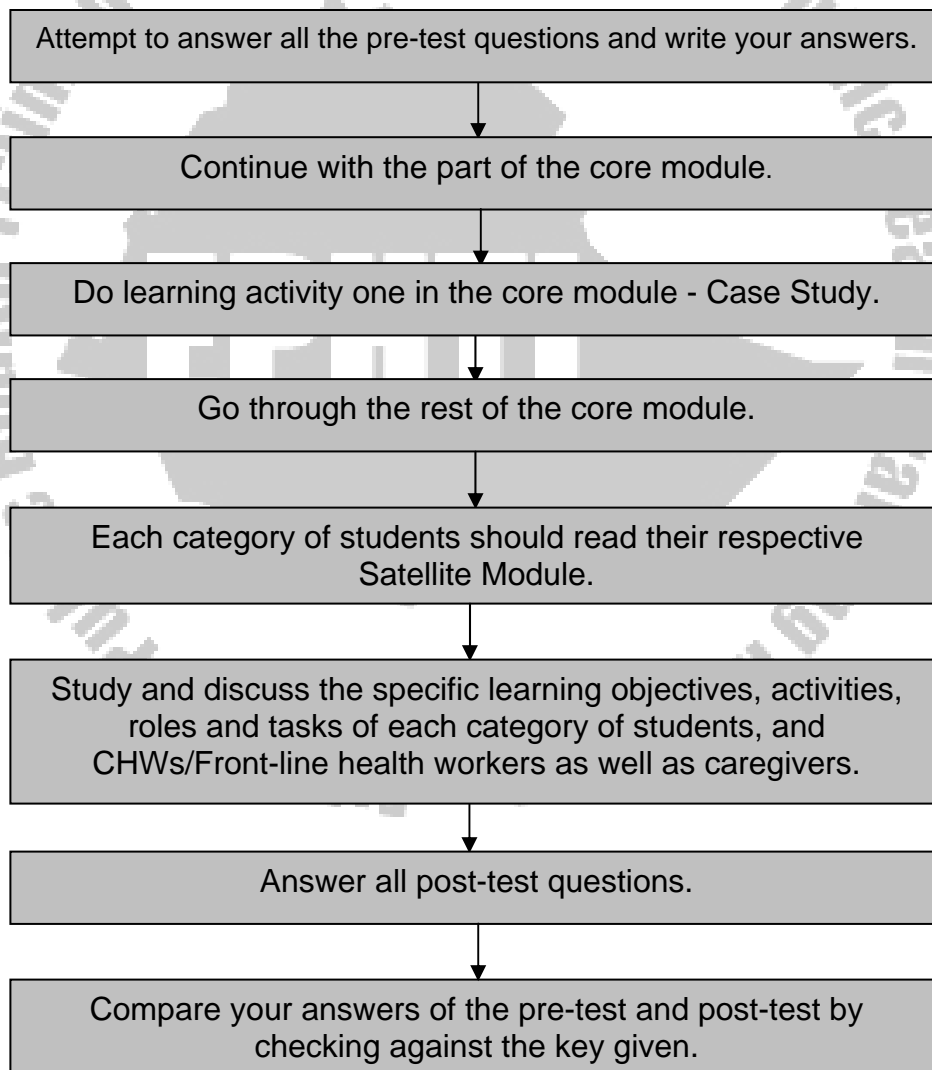
- lack of transportation
- ineffective cold chain
- shortages of trained health personnel

- poor inter-sectoral collaboration
- inadequate community involvement and participation.

The main purposes of this module are:

- To bring a significant change in EPI coverage, together with other strategies, proper training of health professionals is mandatory. This module will contribute a lot in training of the Health Center Team and other health professionals in the health service areas.
- To help students/users to learn through self-help, and
- To assist the shortage of texts and referenced books on the subject.

1.2. Directions for using the module



¹ DPT₃ = EPI coverage is measured using the third dose of DPT as indicator.

UNIT TWO

CORE MODULE

2.1. Pre-test

Before going into the core module, all categories of the Health Center Team should attempt to answer the following the questions.

Instruction: Choose the best answer and write on a separate paper.

1. Crippling is due to
 - a) Measles
 - b) Pertussis
 - c) Tetanus
 - d) Poliomyelitis
2. Which of the following is a chronic mycobacterium disease?
 - a) Whooping cough
 - b) Tuberculosis
 - c) Pertusis
 - d) Diphtheria
3. In terms of etiological agent, which one of the following is different?
 - a) Whooping cough
 - b) Poliomyelitis
 - c) Tetanus
 - d) Tuberculosis
4. Which one of the following EPI target diseases is highly contagious?
 - a) Tuberculosis
 - b) Poliomyelitis
 - c) Measles
 - d) Neonatal tetanus

5. Which one of the following is not an EPI target disease in Ethiopia?
- a) Hepatitis
 - b) Tuberculosis
 - c) Measles
 - d) Whooping cough
6. What percentage of the poliovirus infections leads to symptomatic poliomyelitis?
- a) 25%
 - b) 1%
 - c) 50%
 - d) 75%
7. Which one of the following EPI target diseases is targeted for eradication?
- a) Neonatal tetanus
 - b) Pertussis
 - c) Poliomyelitis
 - d) Tuberculosis
8. Which of the following is not a predisposing factor for acquiring neonatal tetanus?
- a) Non-immunized mother
 - b) Unclean cutting of the umbilical cord
 - c) Application of mud/cow dung on the umbilical stump
 - d) Coughing
9. The clinical features of neonatal tetanus include
- a) Board like abdomen
 - b) Hunger and crying
 - c) Stiffness to touch
 - d) All of the above

10. The etiology of diphtheria is
- a) Clostridium tetani
 - b) Bordetella pertussis
 - c) Polio virus type III
 - d) None of the above
11. Which of the following prevention and control methods work for all EPI diseases?
- a) Health education about the importance of immunization
 - b) Early diagnosis and treatment
 - c) Mass mobilization
 - d) All of the above
12. Oral Polio vaccine is
- a) Attenuated microorganism
 - b) Killed microorganism
 - c) Harmless form of toxin or poison
 - d) All of the above
13. The first DPT vaccine should be given at
- a) Birth
 - b) 6 weeks of age
 - c) 10 weeks of age
 - d) 9 months of age
14. The cold chain includes
- a) The equipment that ensure vaccine potency
 - b) The people that handle the vaccine
 - c) Keeping the vaccine cold all the way
 - d) All of the above

15. Polio and DPT vaccine should be stored at health centre and out reach sites respectively
- a) Up to 6 months and a week
 - b) Up to a month and a week
 - c) Up to a week and a month
 - d) Up to 9 months and a year.
16. The best acceptable proof of immunization includes
- a) BCG scar on the right shoulder
 - b) Immunization card
 - c) Mothers oral confirmation
 - d) A and B
17. In cases of pertussis infection, the stage which is defined by the gradual decreasing in intensity of the cough is
- a) Catarrhal
 - b) Paroxysm
 - c) Convalescent
 - d) All of the above
18. Which one of the following is part of strategies to deliver EPI services?
- a) Outreach
 - b) Mobile
 - c) Static
 - d) All of the above

2.2. Learning Objectives

Upon the completion of this module, the user will be able to:

- explain EPI
- mention EPI-target diseases
- describe the epidemiology of EPI target diseases
- State the etiology and pathogenesis of EPI target diseases
- describe the clinical features of EPI target diseases
- explain how to diagnoses EPI target diseases
- manage cases of EPI target diseases
- mention the preventive and control measures of EPI target diseases
- manage the cold chain
- describe schedules and strategies of EPI
- identify the tasks and roles of the health center team members regarding EPI and the EPI target diseases
- identify the contribution that could be made by the care-givers and community health workers in the prevention and control of EPI target diseases.

2.3. Learning Activity One: CASE STUDY

Part I

Woizero Kenubish Alemu, who delivered a week ago, came to Kossoyie health post with her male newborn.

The mother complained that her baby is unusually crying, has difficulty of sucking and swallowing. She gave further history that the delivery took place at home and was attended by local traditional birth attendant.

The assistant had used a blade to cut the cord and applied cow-dung. The mother responded that she had no history of any immunization and follow up of antenatal clinic.

Questions

1. What do you think the cause of illness of this child?
2. Why do you ask about immunization and antenatal care?
3. What do you advise to the local traditional birth attendant?

Part II

The Front-line community health worker (CHW) examined the newborn. On physical examination, he found out that the newborn was restless, difficulty of opening the mouth, and unhealed umbilical stump

Questions

1. What is your impression now as to the cause of this child's illness?
2. What measures should be taken by the community health worker to save the baby?

Part III

The CHW advised the mother to take her sick newborn to the nearest health center where you work.

Questions

1. What would you do for this baby?

Part IV

After proper management in the health institutions the baby recovered from his illness. W/ro. Kenubish thanked the health worker and returned home after two weeks. The newborn was in a good condition and the family was very happy.

Unfortunately, after a month, the child became sick again and developed fever, sneezing, running nose, and mild cough. Gradually the cough became worse and was continuous.

Because of this problem, the mother took the newborn to a local “Awaki” (local healer). Then the local healer looked at the child and gave chopped materials. He advised the mother to dissolve in water and give the child to drink. The mother gave the dissolved “medication” but there was no improvement and finally she took him back to the health center.

Questions

1. What is/are your probable impression/s of the infant's illness?
2. What will be the management of this case?
3. What do you advise to the mother?

2.4. Definition and Epidemiology of EPI Target Diseases

Table 1. Definition of EPI Target Diseases

Ser. No.	Target Disease	Definition
1	Pertussis / Whooping cough	An acute bacterial disease of the respiratory tract characterized by intense cough in paroxysms and sometimes with forceful inspiratory gasp and absence of fever, tachypnea, soar throat, hoarseness, etc.
2	Tetanus	A neurological disease characterized by generalized increased rigidity and convulsive spasms of skeletal muscles from the bacterial toxin.
3	Poliomyelitis / Polio	An acute viral disease with severity ranging from in apparent infection to paralytic disease. It is a crippling disease that can occur in adults but it is mainly commoner in children.
4	Diphtheria	An acute bacteria disease of tonsils, pharynx, larynx, and nose. It occasionally affects the conjunctiva, genitalia and can damage the heart.
5	Measles	It is a highly contagious acute viral disease characterized by fever, runny nose, cough, irritability, conjunctivitis, lacrimation, enanthema (Koplik's spots) on the buccal and labial mucosa, and maculopapular rash appearing in a shower distribution over a period of 3 days.
6	Tuberculosis (TB)	It is a chronic mycobacterial disease with a wide variety of clinical forms, pulmonary tuberculosis being the predominant form.

Table 2. Epidemiology of EPI Target diseases

Disease	Transmission	Predisposing factors	Magnitude and distribution
Pertussis	<ul style="list-style-type: none"> - Spreads from person to person by droplets, i.e. through coughing or sneezing etc. 	<ul style="list-style-type: none"> - Not being immunized - Overcrowding - Poor ventilation - Malnutrition 	<ul style="list-style-type: none"> - 60,000,000 cases of pertussis occur per year world wide, with more than half a million deaths
Tetanus	<ul style="list-style-type: none"> - Neonatal tetanus mainly occurs as a result of umbilical cord contamination at birth. - A person may become infected if contaminated soil or dung enters a wound or cut. 	<ul style="list-style-type: none"> - Cutting umbilical cord with non sterile instrument. - Lack of adequate tetanus toxoid (TT) immunization of mothers. - Applying cow dung, mud and other contaminated materials on the umbilical stump. - Home deliveries attended by untrained traditional birth attendants. - Harmful traditional health practices like uvulectomy, tonsillectomy. 	<ul style="list-style-type: none"> - Tetanus occurs worldwide and is endemic in 90 developing countries, but its incidence varies considerably. - Neonatal tetanus is the most common form, which kills approximately 800,000 infants each year. - In developing countries, neonatal tetanus represents about half of all neonatal deaths and about 25% of infant mortality. - In Ethiopia neonatal tetanus accounts for two thirds of all tetanus deaths.
Poliomyelitis	<ul style="list-style-type: none"> - Feco-oral (main) - Airborne droplets (rare). 	<ul style="list-style-type: none"> - Not being immunized - Poor sanitation and hygienic practices - Overcrowding - Poverty 	<ul style="list-style-type: none"> ▪ It occurs in many regions of the developing world. Globally in 2001 were: <ul style="list-style-type: none"> - 80% decrease in number of polio cases (from 2979 to 480) - 50% decrease in endemic countries (from 20 to 10) - 51 countries in Europe have been polio-free for 3 years. - No wild poliovirus type 2 isolated for the last 2 years.

Table 2. continued ...

Disease	Transmission	Predisposing factors	Magnitude and distribution
Diphtheria	<ul style="list-style-type: none"> - By droplets and secretions from the nose, throat and eyes. - Contact with skin ulcers - Clothing and other articles that have been contaminated with fluid from skin ulcers 	<ul style="list-style-type: none"> - Over crowding - Poor living conditions - Not being immunized - Malnutrition 	<ul style="list-style-type: none"> - It tends to be a disease of the colder months and of temperate climatic zones. - Affects people of all ages but mostly non-immunized children under 15 years old. - Although incidence has decreased worldwide, it remains endemic in many developing countries.
Measles	<ul style="list-style-type: none"> - By droplet spread or direct contact with nose/throat secretions of infected persons. - Also spread by indirect contact with articles soiled by secretions 	<ul style="list-style-type: none"> - Not being immunized - Overcrowding - Malnutrition 	<ul style="list-style-type: none"> - In countries with low immunization coverage, measles is common in children - In countries with effective childhood immunization programme such as Europe and U.S.A. measles is limited to older age groups. - In Ethiopia measles is among the most common cause of morbidity and mortality in children. - Major outbreaks with large attack rates resulting in as high as 15-20% case fatality rates have been reported in Ethiopia - It is highly contagious disease affecting nearly 90% of susceptible household contacts. - Epidemics occur every 2 – 3 years in population with large susceptible group.

Table 2. continued ...

Disease	Transmission	Predisposing factors	Magnitude and distribution
Tuberculosis	<ul style="list-style-type: none"> - Respiratory route: Airborne droplet nuclei from sputum of person with infectious tuberculosis. - Alimentary route: Ingestion of infected raw or non-pasteurized milk. 	<ul style="list-style-type: none"> - Poor nutritional status - Not being immunized - Infection with HIV/AIDS - Habit of drinking non-boiled/non-pasteurized milk - Overcrowding - Contact with pulmonary tuberculosis cases 	<ul style="list-style-type: none"> - About one third of the world's population is infected with tuberculosis. - Every year 3 million people die from tuberculosis, mostly in developing countries where it kills one in five adults. - Nearly 75% of pulmonary tuberculosis cases in developing countries belong to the economically active group of the population. - In Ethiopia in 1993 E.C. was the 3rd leading causes of out patient morbidity and the first cause in hospital death?



2.5. Characteristics and Management of EPI Target Diseases

2.5.1. Pertussis (Whooping Cough)

Etiologic agent - A gram-negative bacterium called *Bordetella pertussis*.

Pathogenesis - The organism produces exotoxin and affects the pharynx, larynx, trachea, bronchi, bronchioles and sometimes the alveoli.

Clinical features - Incubation period is 7 – 17 days. The symptoms of classical pertussis last about 6 weeks and are divided into 3 stages.

A. Catarrhal stage

- The onset is insidious,
 - Sneezing
 - Running nose
 - Anorexia
 - Malaise
 - Night cough
- lasts 1- 2 weeks

B. Paroxysmal stage

- Lasts 2-4 weeks following the infection.
- Characterized by rapid consecutive (5-15) cough before a breath is taken and followed by deep hurried inspiration (whoop).
- Post cough vomiting is common at all ages,
- Factors stimulating cough include fright, anger, crying, sneezing, inhalation of irritant, and over distention of the stomach.

C. Convalescent stage

- It begins after 4 weeks of the illness, and is manifested by a decrease in the frequency and severity of the paroxysms of coughing.

Diagnosis

A. Clinical

- The child is well appearing and playful between paroxysms of cough.
- Presence of children with similar illness in the family or vicinity.
- There is no chest finding on physical examination.
- The diagnosis is usually made on the distinctive clinical feature of the cough. To observe the classical type of cough put tongue depressor to stimulate the coughing.

N.B. Not all children with pertussis whoop. Whooping is uncommon in infants < 3 months.

B. Laboratory

- WBC 15000 - 20000/mm³ (rarely to 50,000/mm³)
- 60 - 80% Lymphocytes
- Microscopy; Gram stain
- Culture to isolate the organism

Differential Diagnosis

- Aspiration of foreign bodies
- Viral pneumonia
- Influenza
- Acute bronchitis and broncholitis.

Management

A. Specific measures

- Antimicrobial
 - Erythromycine
 - Ampicillin
- Sedatives
 - Promethazine Hydrochloride
 - Phenobarbitone (when there is seizure)
- Steroid
 - Prednisolone

B. General measures

- Frequent small feeding and continue feeding if vomiting occurs soon after meal.
- Oxygen if needed
- Severe cases especially infants are best managed in hospital.
- Prophylactic Erythromycin for all house hold members and other contacts regardless of age, history of immunization or symptoms.

Complications

- Apnea
- Conjunctival hemorrhage
- Otitis media
- Pneumonia
- Atelectasis
- Encephalopath

2.5.2. Tetanus

Etiologic agent

A gram positive anaerobic bacterium called *Clostridium tetani* (Cl.tetani).

Pathogenesis

Tetanus toxin, after germination of the *Cl.tetani* spores in a contaminated umbilical stump or wound in other parts of the body, is released to the peripheral nerves and circulation. This causes sustained excitatory neuronal discharge and muscle contraction.

Clinical features

Tetanus occurs in several clinical forms. One of the most important manifestations is neonatal tetanus (NNT). Its incubation period is from 1-14 days (in 90% of the cases) but it can last up to 54 days. The period of onset (the time between the first symptom and start of the spasm) ranges from hours to day.

The clinical feature has two forms:

A. Local tetanus

- pain around the umbilicus
- dirt, dung and clotted blood are usually present

B. Generalized tetanus

- It is the most common form of the disease and presents with early symptoms.
- Progressive difficulty in feeding (sucking and swallowing)
- Hunger and crying. This is followed by paralysis or diminished movement
- Lock jaw (clenched)
- Stiffness to the touch and spasms with or without opisthotonus.
- Board like abdomen.
- Hyper extended extremities.

Diagnosis

Diagnosis of neonatal tetanus is mainly by clinical features.

Prognosis

Indicators of poor prognosis are:

- Incubation period < 7 days
- Period of onset < 48 hrs.
- Presence of spasm
- Autonomic nervous system disturbances like, tachycardia, bradycardia, hypertension, hypotension, arrhythmia.

Complications

- Respiratory arrest
- Laryngeal spasm
- Presence of autonomic nervous system disturbances.

Prevention

- Immunization of children and women.
- Health information on harmful practices
- Training of Traditional Birth Attendants (TTBA).

2.5.3. Poliomyelitis

Etiologic agent - It is caused by polioviruses type I, II and III.

Pathogenesis

- The virus affects the anterior horn cells of the spinal cord and several areas of the brain. Damage may be reversible with recovery, but it may go on to irreversible nuclear destruction where muscle paralysis results.

Clinical features

- Incubation period is 6 – 14 days
- Fever, malaise, headache and muscle pain
- Nausea, vomiting, soar throat and stiffness of the neck and back with or without paralysis.
- Paralysis usually affects the legs, more often one.

Diagnosis

- It is mainly by clinical features.

Management

Acute phase

- Keep the limbs position with cushions
- Apply warm packs
- Provide analgesics
- Active and passive movements are assisted by physiotherapist after the acute phase ended.

Recovery phase

- Continue with full range of passive/active movement of the affected limb every day.

Residual phase

- Regular out patient supervision of physical, social and economic problems if needed.

2.5.4. Diphtheria

Etiologic agent - It is caused by Gram-positive bacterium called *Corynebacterium diphtheriae*.

Pathogenesis

- The bacterium produces exotoxin which causes local tissue inflammation and necrosis. In cases where the pharynx is involved, there are patches of a grayish membrane with a surrounding dull red inflammatory zone, which may cause pharyngeal obstruction.

Clinical features

- The incubation period is usually 2 - 5 days.
- Sore throat which may be followed by stridor.
- Grayish white membrane seen in oropharynx.
- Upper airway obstruction by the membrane.

Diagnosis

- Clinical signs mentioned above
- Microscopy -Gram stain

Management

A. Specific

- Diphtheria antitoxin if the diagnosis is strongly suspected clinically.
- Antimicrobial therapy with penicillin or erythromycin

B. General

- Strict bed rest and sedation
- Intubations if needed.

Complications

- Airway obstruction
- Toxic cardiomyopathy (50 – 60% of diphtheria deaths)
- Vocal cord paralysis

2.5.5. Measles

Etiologic agent - It is caused by Measles Virus.

Pathogenesis

- The essential lesion of measles is found in the skin; the mucous membranes of the nasopharynx, bronchi, and intestinal tract; and in the conjunctivae.

Clinical features

- The incubation period ranged from 7 - 18 days.
- The initial stage (catarrhal stage) starts with fever, cough, sneezing, running nose and red, runny eyes. Koplik's spots in the mouth occur before the rash.
- A characteristic red blotchy rash appears on the third to 7th day, beginning on the face becoming generalized, lasting 4 – 7 days.

Diagnosis

- It is made mainly by clinical features epidemiological grounds.

Management

- Severe cases only are admitted to the hospital.
- Mothers are advised about care at home which includes – reducing fever, maintaining hydration and nutrition.
- Serious complications are treated in hospitals.

Complications

- Pneumonia
- Otitis media
- Malnutrition
- Encephalitis
- Eye problems and blindness (abscribed with Vitamin A deficiency)

2.5.6. Tuberculosis

Etiologic agent

- Pulmonary tuberculosis is caused by *Mycobacterium tuberculosis*. Tuberculosis of the gastrointestinal tract is caused by *Mycobacterium bovis*.

Pathogenesis

- Tubercle bacilli infect the lung forming a tubercle (lesion).
- The tubercle:
 - May heal, leaving scar-tissue
 - May continue as a granuloma
 - May eventually proceed to necrosis, liquefaction, sloughing, and cavitations.
- The initial lesion may disseminate tubercle bacilli:
 - By extension to adjacent tissue
 - Via bloodstream
 - Via lymphatic system
 - Through the bronchi.

Clinical features

- The incubation period ranged is 4 – 12 weeks but the infection may persist for months or years before the disease develops.
- The clinical features of pulmonary tuberculosis are:
 - Persistent cough for more than 3 weeks.
 - Sputum production, which may or may not be blood stained.
 - Weight loss
 - Chest pain
 - Shortness of breath
 - Intermittent fever, night sweats
 - Less of appetite
 - Fatigue and malaise

Diagnosis

- Clinical features
- Laboratory diagnosis
 - Sputum smear microscopy using Ziehl Neelson Acid-Fast Staining technique-this is the commonly used laboratory technique
 - Culture
- Tuberculin skin testing
- Chest X-ray

Management

- Chemotherapy: there are two phases of treatment
 1. Intensive or initial phase
 - the first two or three months of treatment.
 2. Continuation phase
 - the remaining duration of treatment.
- Drug Regimens

There are two recommended standard tuberculosis drug regimens:

 - Directly observed Treatment short course (DOTS), which is for 8 months; in DOTS the patients are given the drugs under observation by health worker for the first two months.
 - Long course chemotherapy (LCC); which is given for 12 months.

During the initial phase of short course therapy the recommended regimen of uncomplicated pulmonary tuberculosis is two months of INH, Rifampin and Pyrazinamide followed by four months of Isoniazid and Rifampin.

2.6. Prevention and Control of EPI target diseases

- Health Information about the importance of immunization.
- Proper management and inspection of vaccines.
- Early diagnosis and treatment.
- Ensuring a clean and safe environment.
- Avoid harmful traditional health practices.
- Training of community health workers (CHW) and traditional birth attendants (TBA)
- Integration of immunization into all aspects of primary health care
- Mass mobilization.
- Integration of nutrition education with health services.
- Provision of services and expansion of outreach sites.
- Integrated package of school health interventions.

2.7. Immunization

Immunization is the process of administering a weakened or killed microorganism or its product to stimulate the host's immunologic response to that antigen.

Types of Vaccines:

Vaccines can be

- Killed microorganisms (pertussis),
- live but weakened – attenuated – microorganisms (measles, polio TB)
- toxoids (tetanus and diphtheria).

Target group

- all under one year children and women of childbearing age (15 - 49 years).

Side effects of vaccines

BCG

1. Normal reaction

- a small red, tender swelling about 10 mm across appears at the place of immunization after about 2 weeks
- Abscess: due to injection errors
- Ulcer
- Scar

2. Severe reaction

- Sometimes there is severe local inflammation or deeper abscess.
- Sometimes the lymphatic glands near the elbow or in the axilla swell.

This may be because:

- You used a needle that was not sterile
- You injected too deeply under the skin by mistake
- You gave too large a dose of vaccine.

DPT

- Fever
- Soreness at the injection site
- Abscess
- Convulsion (rare)

Polio

- Usually none

Tetanus Toxoid (TT)

- Pain, redness and swelling at the infection site.

Measles

- Fever 5 – 8 days late
- Occasional rash

Contraindications of vaccines

- DPT should not be given if the child has developed severe reactions like shock, convulsions, anaphylactic reaction, etc. to the previous dose of DPT. This is a rare side effect due to the pertussis component of DPT vaccine.
- Infants with clinical AIDS should not receive BCG vaccine and oral polio, but should be given the other EPI vaccines.

Immunization Schedule

A. For those who start at birth:

Contact	Age of Child	Vaccines
1 st	At birth	BCG and Polio 0
2 nd	6 weeks	OPV ₁ and DPT ₁
3 rd	10 weeks	OPV ₂ and DPT ₂
4 th	14 weeks	OPV ₃ and DPT ₃
5 th	9 months	Measles

B. For those who start later

Age of child	Antigens
Less than 6 weeks	BCG and OPV ₁
Above 6 weeks	BCG if not given previously OPV (3 doses) DPT (3 doses)
Above 9 months	BCG if not given previously OPV DPT Measles

C. Tetanus toxoid vaccine schedule for women (15 - 49 years)

Dose	Minimum interval	Duration of protection
TT ₁	-	0
TT ₂	4 weeks	3 years
TT ₃	6 months	5 years
TT ₄	1 year	10 years
TT ₅	1 year	Life long

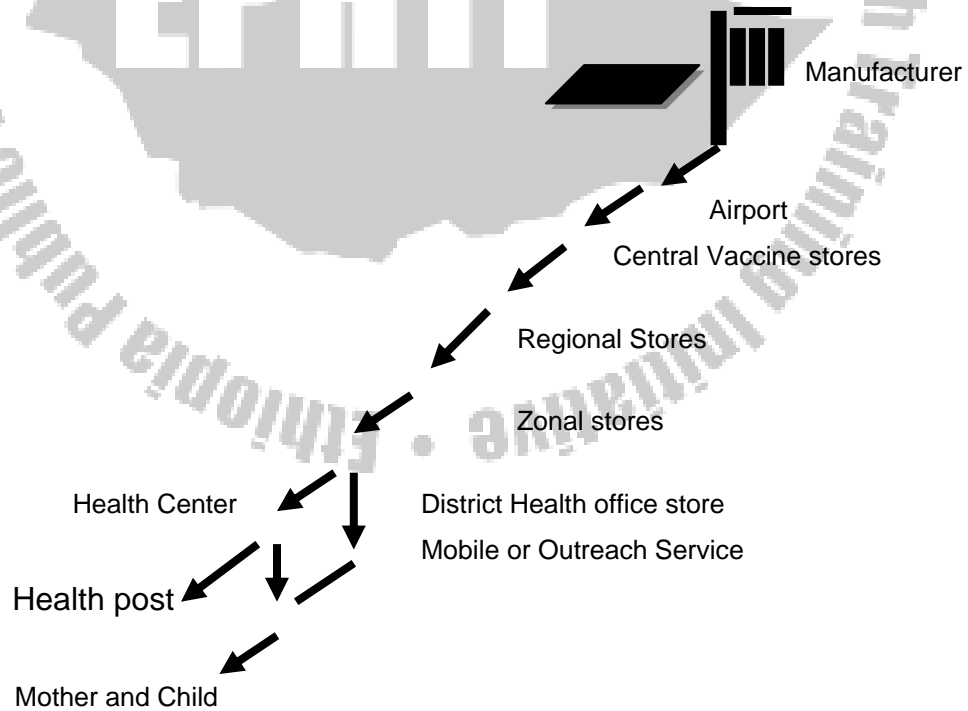
Note: If a woman was given 3 doses of DPT vaccine when she was a child, provided that a written document of her immunization is available, and the doses are given at the right intervals, the 3 doses of DPT can be counted as two doses of TT.

Childhood Immunization Schedule

Age	Birth	1 month	2 months	3 months	4 months	5 months	6 months	...9 months
Vaccine BCG	BCG							
Diphtheria Pertussis Tetanus			DPT ₁		DPT ₂		DPT ₃	
Oral polio	Polio 0		OPV ₁		OPV ₂		OPV ₃	
Measles								Measles vaccine
Age in week			6 th weeks		10 th weeks		14 th weeks	

2.8. The cold chain

The cold chain is the interconnection of equipment or people that ensure vaccine potency by keeping vaccine cold all the way from the manufacturer to the mother/child.



Source: WHO: immunization in practice 1989 (Slightly modified).

Equipment

Materials that are used in the cold chain include:

- thermometers
- ice packs
- vaccine carriers
- cold boxes
- refrigerators and freezers.

Note: Skilled human power to maintain the cold chain is necessary.

Precautions for vaccines

- All vaccines have to be stored at 0°C to 8°C both at the health center and the outreach unit.
- Storage time for all vaccines is up to a month at the health center/health station and up to 1-2 days at the outreach unit.
- Measles and polio be kept frozen.
- Never freeze DPT or tetanus vaccine.
- Keep diluents with vaccine in refrigerator if there is space.
- If not, refrigerate at least the diluents needed for the following day.

2.9. EPI Delivery Strategies

Static: immunization performed as part of routine activity of the Health units.

Outreach: an immunization approach in which the staffs of health unit go out and administer vaccine to mothers and children in their catchments areas.

Mobile: an immunization approach only single dose vaccination (measles, BCG) in nomadic, settlement areas and mostly used for controlling epidemics of measles.

Campaign: an immunization approach conducted by mobilizing the community, example polio and measles vaccination.

2.10. Indicators

The following are some indicators that show a successful immunization programme:

- BCG scar on the right shoulder.
- Completed immunization card.
- Vaccine storage times and temperatures at health centre and out reach level.

2.11. Immunization Problems

A. Drop Out

A drop out is defined as a child or a woman who failed to return for subsequent doses for which he or she is eligible.

The possible causes of drop out rates are:

- unsure of dates of return
- long wait at the vaccination centre
- vaccination centers open at inconvenient hours
- some health workers do not explain the need of completing vaccination.
- negative attitude of some health workers towards the program.
- mothers usually busy on other engagements.
- family left the place for a while.
- child develops side effects or was sick on the appointed date.
- was sick on the appointed date.

A child or a woman who discontinued the immunization program should not have to restart the immunization. There is no maximum interval between two immunizations.

B. Missed opportunities

Current policy is that all children and mothers at the health facility for any reason should be screened for immunization status and vaccinated if eligible.

Common causes of missed opportunities are:

- health workers do not know the policy
- health workers screen but tell patients to return later
- health workers only vaccinate women with TT if they are pregnant
- health workers only vaccinate the index child, miss the siblings.
- health workers only open a vial if there are enough clients who need it
- false contraindications to immunization, example not giving polio vaccine to a child with diarrhea.
- logistical problems, such as vaccine shortages, poor clinic organization, and inefficient clinic scheduling
- the failure to administer simultaneously all vaccines for which a child was eligible
- accessibility; time (women carry household responsibilities), distance, cost of transportation
- Acceptability: culture, rumors, beliefs, etc.

Dropouts and missed opportunities are causes of low vaccination coverage, and have potential solutions. These are:

- Social mobilization
- Dropout tracing mechanisms
- In service training to community health workers and utilization of other motivation mechanisms.
- High level advocacy.
- Get commitment by the local leaders.
- Monitoring and supervision the program
- Ensure financial and logistics support for the health institutions.
- Monitor coverage periodically.
- Daily integrated health service for all women and children attending the health units.

2.12. Assessment and Evaluation of EPI Services

The ultimate goal of EPI is not to provide immunizations to all populations but rather it is to significantly reduce the morbidity and mortality from the vaccine preventable diseases. Always priority should be placed on monitoring immunization coverage and disease incidence. This can be found from:

- **Health institution reports,**

- **Surveillance:**

It is defined as a regular collecting, compiling, analysis, and interpretation of current data on the frequency of specific diseases (WHO). It is the regular dissemination of acquired information to those responsible for disease control and health service planning.

Purposes of surveillance system include

- A. To facilitate the early recognition of changes in the patterns of diseases;
- B. To identify changes in environmental and host factors that may lead to an increase in the frequency of the diseases;
- C. To monitor the safety and effectiveness of prevention and control measures;

- **Survey, cluster survey**

The EPI Coverage Survey

Often routine reports are inaccurate and one may have to resort to EPI coverage survey to determine the coverage, and provide additional information. WHO's Expanded Program of Immunization has developed a rapid survey methodology which is valuable not only to determine vaccination coverage, but also reasons underlying for failure to vaccinate children. The main advantage of this methodology is that it can be completed quickly and it's technically much easier to carry out than a simple random sample survey in populations that are not censured.

Its principal disadvantage is that it allows one to draw conclusions about the population as a whole; one can't compare sub-populations. For example, one cannot compare rates between the boys and girls in the sample population using the standard 30 by 7 cluster methodology. However, with modification of sample size, this too is possible.

The standard cluster survey methodology involves choosing 30 different "clusters" of 7-10 households. A "cluster" is a randomly chosen group which, for the EPI coverage survey, contains 7-10 children of appropriate age (12-23 months). Thus, each unit randomly selected is a group or "cluster" of persons rather than an individual.

In order to select the clusters, one must first know the total population of the area under consideration, as well as the populations of the various towns, villages, or other centers in the area. These populations' centers are listed with their population, and a cumulative population besides it.

A sampling interval is determined by dividing the total population by 30. A random number will be selected between one and the determined sampling interval. The community for which the cumulative population equals or exceeds the random number is selected. It will contain the first cluster. Add the sampling interval to that random number. The community for which the cumulative population equals or exceeds this value is selected as the community containing the second cluster. And so on, until the all 30 communities have been chosen. Large communities may contain more one cluster.

Once the communities have been selected, one then chooses the cluster. This is done by selecting a starting household. If the community has been censused and a list of households available, this is relatively easy procedure. One numbers the houses and selects, at random, one house, the first house. If no household number exists, one goes to the center of the community (churches, mosque,

school, market, etc.) and selects a random direction in which to proceed (usually by spinning a bottle). One then counts the number of houses between the center and the periphery of the selected quarter and selects one house at random, this becomes the starting house. The second household to be visited is the one closest to the first (i.e. the household with the front door nearest to the first door) and so on until you complete the required cluster number.

If any of your households contain more than one child, it is advisable to consider including them all.

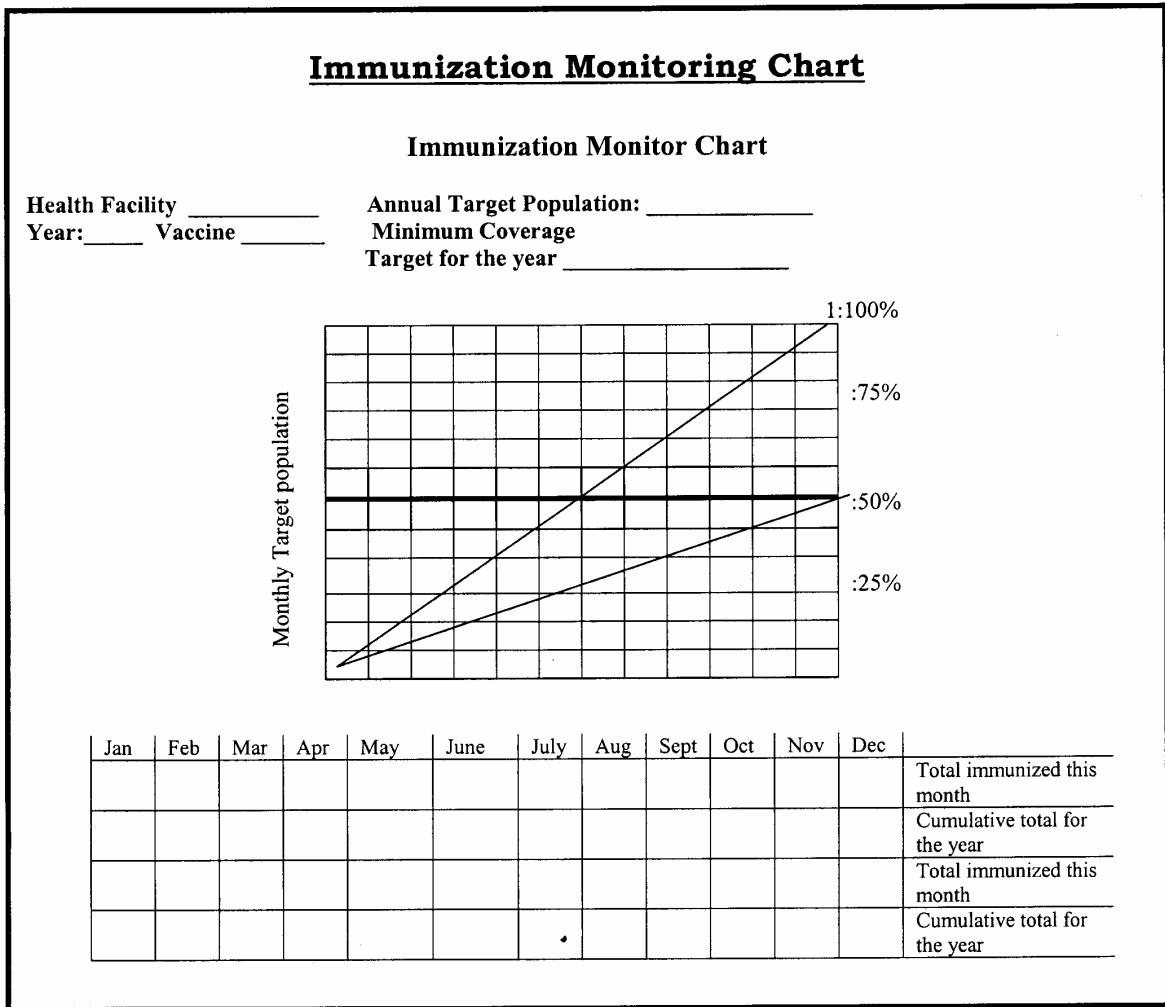
The vaccination status of each child is determined usually by card. Once all 30 clusters have been finished, one will have 210 or up to 300 children.

So, after this procedure, we know where we are in terms of the coverage of vaccination for the target group is concerned. What is next?

In addition to determining coverage, the EPI coverage survey allows one to identify reasons for immunization failure. For all those in the target group who are found not to have been completely vaccinated, the mothers are asked to identify the major reasons why?

Immunization Monitoring Chart

It shows the progress you are making in raising immunization coverage in your catchment areas. This chart enables the number of people you actually immunize each month with your coverage targets.



UNIT THREE

SATELLITE MODULES

Satellite Module for Health Officer Students on Expanded Program on Immunization

3.1.1. Introduction

Purpose

This satellite module is prepared for health officer students on EPI. The module emphasizes on some points that are not well described and covered by the core module.

Directions

- After completion of the core module, attempt to answer the pre-test question of the satellite module.
- Go through this satellite module and are advised to refer to the core module whenever indicated.
- Attempt to answer the questions on learning activity one.
- After reading the entire satellite module attempt to revise the pre-test questions again as a post-test

3.1.2. Learning Objectives

At the end of the session the student will be able to:

- define immunity
- understand types of immunity
- identify the types of vaccines and their properties
- know the importance and mechanism of cold chain
- identify the major problems of EPI and their solutions
- understand the management of EPI
- assess and evaluate EPI
- identify the roles and tasks of health officer on EPI.

3.1.3. Pretest

Instruction: Answer the following questions before reading the satellite module.

1. Immunity can be
 - a. Induced
 - b. Natural
 - c. All of the above
 - d. None

2. Vaccination /Immunization is an example of
 - a. Active immunization
 - b. Passive immunization
 - c. Both
 - d. None

3. DPT vaccine is an example of
 - a. Live attenuated organisms
 - b. Inactivated organisms
 - c. Killed suspended organisms
 - d. None of the above

4. Toxins are produced only from the serum of human beings.
True _____ False _____

5. The target population for EPI in Ethiopia are
 - a. Under five years of children
 - b. All pregnant and non-pregnant women aged 15-49 years
 - c. Less than one year children
 - d. All men
 - e. a + d
 - f. b + c

6. BCG vaccine is an example of
- a. Live attenuated organism
 - b. Inactivated organism
 - c. Killed suspended organism
 - d. None of the above

7. Tetanus toxoid should be given only for pregnant women.

True _____ False _____

8. When do you consider to find out the reasons for drop out? If it is

- a. 1%
- b. 5%
- c. 8%
- d. >10%

9. The range of missed opportunities in Ethiopia is

- a. 20 - 25%
- b. 35 - 47%
- c. 50 - 60%
- d. >70%

10. Causes of missed opportunities include

11. Reasons for dropouts include

12. The problems associated with EPI include

- a. Culture and beliefs
- b. Accessibility
- c. Vaccines related
- d. All of the above
- e. Only a and b

13. Managements of EPI include

- a. Identifying the target population
- b. Planning the strategy to be used
- c. Allocating resources
- d. All of the above
- e. All of the above except "a"

3.1.4. Immunization

A. Active immunization

The protection of the host in which either the altered organism or its product induces the host to produce antibodies. It involves stimulating the immune system to produce antibodies and cellular immune responses that protect against the infectious agents.

B. Passive immunization

The protection of the susceptible host by administration of protective antibodies produced by another host, e.g. tetanus antitoxin. It consists of providing temporary protection through administration of exogenously produced antibody such as immune globulin.

3.1.5. Assessment and Evaluation of EPI

- A. Health institution reports
 - B. Surveillance
 - C. Survey, cluster survey
- } See the core module

3.1.6. Immunization problems, solutions and drop out rates calculation Problems

- Reasons for drop out - See core module

Dropout rates calculations

- Over all drop out rate

$$= \frac{\text{Coverage with BCG} - \text{Coverage with measles}}{\text{Coverage with BCG}} \times 100$$

- Drop out rate for a single antigen (e.g. OPV)

$$= \frac{\text{Coverage with OPV}_1 - \text{Coverage with OPV}_3}{\text{Coverage with OPV}_1} \times 100$$

There is a problem whenever the dropout rate is greater than 10%. It is essential to determine why the failure occurred.

- Missed opportunities- See core module
- Culture and Beliefs

Though the immunization service is accessible, there are some people who are not using the service because of culture and beliefs.

- Lack of geographic access includes lack of transportation facilities and spare parts for vehicles.
- Problems associated with the vaccines

a) BCG

Efficacy is uncertain

b) Pertussis

- Low immunogenicity
- Requires 3 doses

- Common minor side effects in 50%
- Rare serious toxicity e.g. Seizures, neurological disorder

c) OPV

- Thermal instability
- Poor immunogenicity
- Requires multiple doses

d) Measles

- Thermal instability
- Inadequate immunogenesis when circulating maternal antibodies present.
- Problems of knowing the target population
 - Knowing the target population is important because the necessary vaccines and logistic could be prepared earlier.
- Problems related to the supplies, cold chain and maintenance.
 - Shortages of supplies like syringes, needles, vaccines, ice boxes, vaccine carriers, etc.
 - Maintenance of cold chain equipment is costly and unavailability of spare parts.
- Problem of community involvement
 - Without the involvement of the community EPI program will fail. They are important in the planning, implementation & evaluation process.

- Lack of inter-sector collaboration
 - EPI is the responsibility of all sectors/ministerial offices, not only left to health workers. It needs the collaboration of all bodies/authorities. Without them it is impossible to reach EPI goal.
- Ineffective management
 - Assignment of unskilled manager.
 - Poor scheduling and allocation of resources.
 - Poor information system resulting in inadequate recording and reporting.

Solutions

- Developing dropout or defaulters tracing mechanisms like using community health workers/front line health workers to trace defaulters. This is sensitizing the population through health education, discussion, etc. about the program.
- Refer to the core module for other solutions.

Calculations on Drop Out Rate

Instruction: Work out the following questions based on the data given in the table.

In 2000, the Family Health Department of one of the Regional Health Bureaus conducted EPI cluster survey. A total of 300 children age 12 month of 23 months were identified by the survey.

Out of the 300 children, 70 didn't start vaccination at all. The vaccination cards of the remaining 230 children were checked. The table below shows the number of children who got different vaccines.

Vaccine	No. of children who got the vaccine
BCG	230
DPT ₁ /OPV ₁	200
DPT ₂ /OPV ₂	180
DPT ₃ /OPV ₃	150
Measles	130

Calculate:

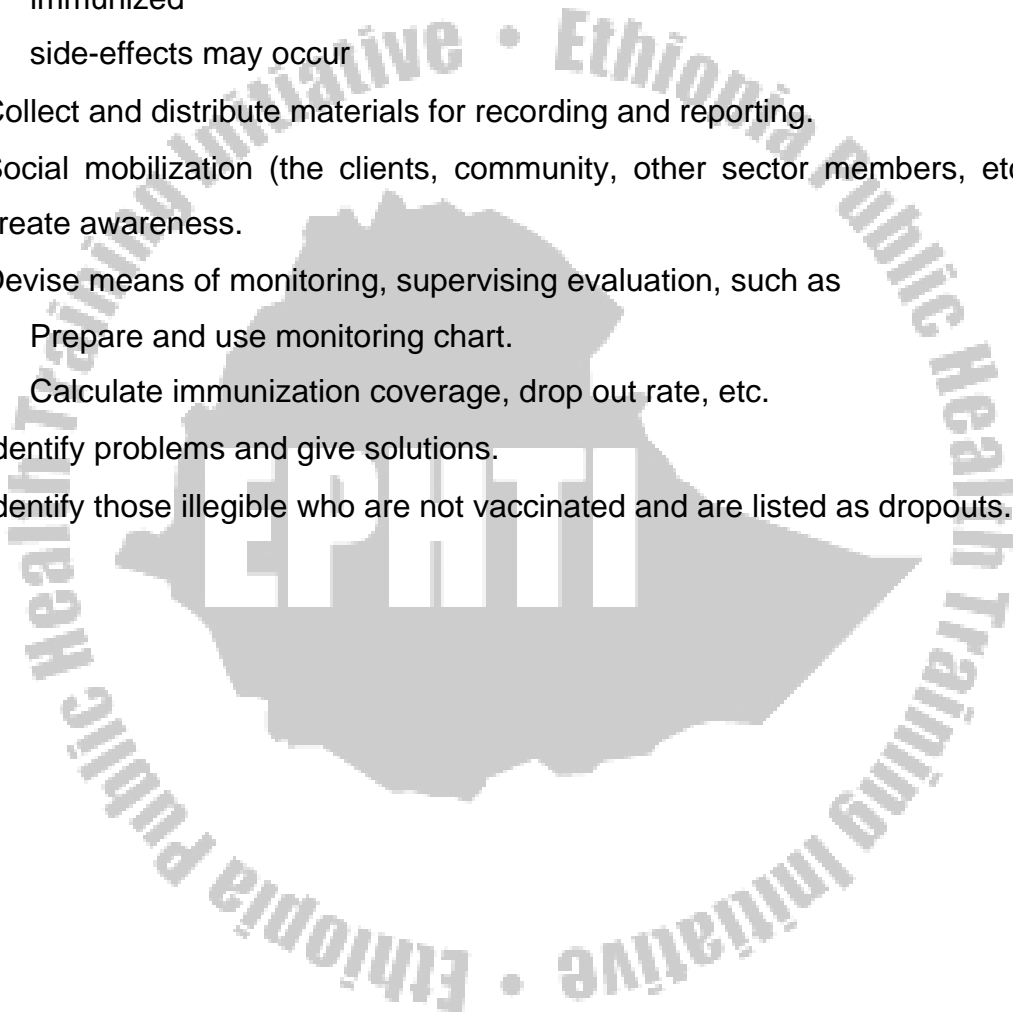
1. The overall drop out rate.
2. Drop out rate for DPT.

3.1.7. Management of EPI

Procedures to follow in conducting EPI include:

- Know the catchment area.
- Know the target population through survey.
- Organize and conduct in service training for the staff.
- Allocate resources such as
 - Assign staff,
 - Procure the required amount of vaccines, refrigerator and other supplies,
 - The necessary financial support (budget),
 - Transportation, etc.
- Manage the cold chain
 - Arrangement of vaccines in the refrigerator
 - Use different mechanisms of ensuring the cold chain.
- Identify the strategy to be used and their frequencies.
- Prepare and organize immunization schedule/session (e.g. how many out reach sites?)

- Give appropriate information for the clients such as:
 - be specific on the date and time of the next immunization.
 - give the client a written note of the date and time.
 - the place of the next immunization, particularly if you change the previous site.
 - number of visits a child and mother still need in order to be fully immunized
 - side-effects may occur
- Collect and distribute materials for recording and reporting.
- Social mobilization (the clients, community, other sector members, etc.) to create awareness.
- Devise means of monitoring, supervising evaluation, such as
 - Prepare and use monitoring chart.
 - Calculate immunization coverage, drop out rate, etc.
- Identify problems and give solutions.
- Identify those illegible who are not vaccinated and are listed as dropouts.



Learning Activity: Two

Instruction

Fill the boxes by selecting related facts listed from A - D.

Pertussis	Tetanus	Poliomyelitis	Diphtheria	Tuberculosis	Measles

A. Causative agent

- A1. Polio Virus
- A2. Measles Virus
- A3. Bordetella Pertussis
- A4. Corynebacterium Diphtheria
- A5. Mycobacterium
- A6. Clostridium Tetanis

B. Incubation Period

- B1. 3 – 5 days
- B2. 4 weeks or longer
- B3. 6 – 14 days
- B4. 1 – 14 days
- B5. 7 – 18 days
- B6. 7 – 17 days

C. Special features

- C1 – Whooping cough
- C2 – Koplik's Spot
- C3 – Toxin production
- C4 – Lock jaw
- C5 – Muscle paralysis
- C6 – Chronic Cough

D. Vaccine (type, administration and schedule)

D1 – DPT vaccine	D7 – IM injection
D2 – Polio vaccine	D8 – TT vaccine
D3 – Start at 6 weeks	D9 – Weakened toxin
D4 – Start at birth	D10 – Killed organism
D5 – Oral drop	D11 – BCG Vaccine
D6 – Start at ninth months	D12 – Live attenuated
	D13 – Intra-dermal

E. Contra indication

E1 – Fever	E4 – Anaphylactic reaction
E2 – Convulsion	E5 – Clinical AIDS
E3 – Diarrheas	

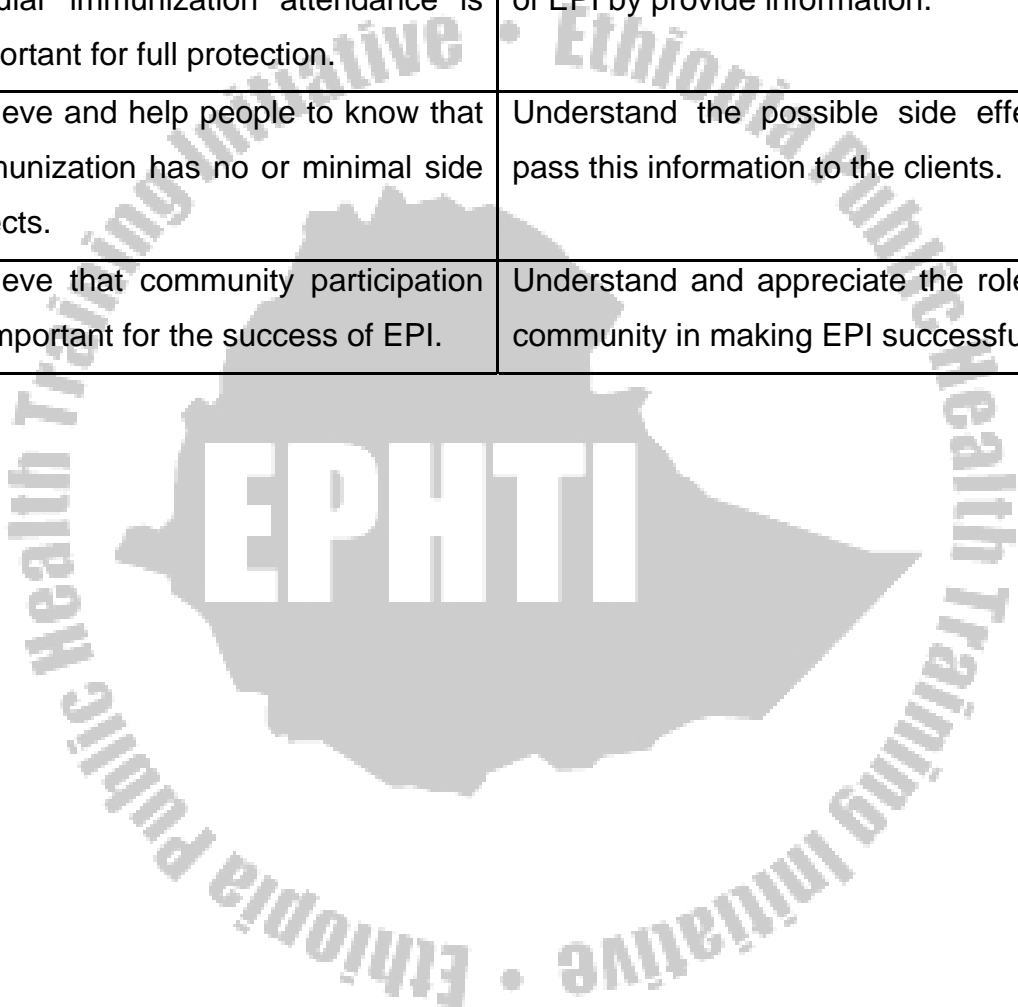
Roles and Tasks of Health Officer Students

A. Knowledge, Objectives and Activities Regarding EPI Target Diseases

Knowledge Objectives	Activities
Describe the causes of EPI target diseases.	- Study the causes of EPI target diseases.
Describe the modes of transmission of EPI target diseases.	- Study the modes of transmission of EPI target diseases.
State the diagnostic approach of EPI target diseases.	- Study the epidemiological pattern and clinical features. - Study and observe methods of laboratory investigations.
Describe the types of vaccines, EPI schedule, route of administration of vaccines, and strategies.	- Study the types of vaccines, EPI schedule. - Study and observe route of administration of vaccines, and strategies.
Describe the mechanisms of maintaining cold chain.	- Study and observe the mechanisms of maintaining cold chain.
Describe the problems of EPI and their solutions.	- Study the problems of EPI and their solutions.
Out line the managements of EPI.	- Study the managements of EPI.
Describe the methods of assessment and evaluation of EPI.	- Study the assessment and evaluation methods of EPI.

B. Attitude Objectives and Activities of Health Officer Students Regarding EPI Target Diseases

Attitude Objectives	Activities
Believe and help people to know that EPI target diseases are preventable.	Make an effort to have better understanding of EPI target diseases.
Believe and help people to know that regular immunization attendance is important for full protection.	Enhance in understanding of the schedule of EPI by provide information.
Believe and help people to know that immunization has no or minimal side effects.	Understand the possible side effects and pass this information to the clients.
Believe that community participation is important for the success of EPI.	Understand and appreciate the roles of the community in making EPI successful.



C. Practice Objectives and Activities of Health Officer Students Regarding EPI Target Diseases

Practice Objectives	Activities
Identify catchment area for EPI.	<ul style="list-style-type: none"> . Visit the area. . Discuss with the community leaders, health workers, and other relevant bodies. . Prepare sketch map.
Identify the target population.	<ul style="list-style-type: none"> . Conduct survey. . Register the targets and know the number. . Find the total population count from possible sources and make a working estimate of the target population.
Organize the EPI program.	<ul style="list-style-type: none"> . Plan the program with other members. . Prepare the schedule for vaccination date. . Secure the necessary resources and logistics.
Conduct vaccination.	<ul style="list-style-type: none"> . Participate in vaccination. . Conduct vaccination campaigns if necessary.
Regular recording and reporting.	<ul style="list-style-type: none"> . Compile and analyze the data. . Record data. . Report.
Increase community involvement.	<ul style="list-style-type: none"> . Conduct health education. . Organize and Conduct social mobilization.
Maintain cold chain.	<ul style="list-style-type: none"> . Regular checkup of temperature of the refrigerator. . Prepare ice pack, cold box, etc. . Learn and practice to maintain the refrigerators and other cold chain equipment.
Monitor and evaluate EPI program.	<ul style="list-style-type: none"> . Monitor and supervise sessions, cold chain, and availability of resources. . Conduct EPI coverage survey and be involved in surveillance. . Do regular vaccines and supplies inventory.

3.2. Satellite Module for Public Health Nurse Students on Expanded Program on Immunization

3.2.1. Introduction

Purpose and Use

There are six important EPI target diseases that are very serious, and which kill and disable many children. This satellite module is prepared for the public health nurse students with the main goal of enabling them run vaccination program effectively.

Directions

- After completion of the core module go through the satellite module and refer to the core module whenever needed.
- Attempt to read points step by step.
- Attempt to answer questions on learning activity.
- Go through the entire satellite module.

3.2.2. Learning objectives

Upon completion of this module the public health nurse will be able to

- Describe the importance of EPI.
- State the six vaccine preventable diseases.
- Demonstrate comprehensive assessment and list pertinent nursing diagnoses of four vaccine preventable diseases.
- Provide holistic nursing care for individual child the EPI target diseases.
- Mention essential prevention and control measures.
- Define immunization and vaccination.
- Explain vaccines and how to administer them.
- Organize an out reach sessions.
- Conduct health education on immunization sessions.
- Evaluate the effectiveness of EPI program.

- 3.2.3. Pretest** (refer the core module)
- 3.2.4. Causes of the childhood EPI target diseases** (refer to the core module)
- 3.2.5. Clinical features of EPI target diseases** (refer to the core module).
- 3.2.6 Epidemiology of EPI target diseases** (refer to the core module)
- 3.2.7. Learning Activity** (refer to the core module).
- 3.2.8. Client care using the Nursing process**

Clients Assessment

Take pertinent and adequate history, subjective and objective data.

Nursing diagnoses

The nursing diagnoses listed below are actual and potential symptomatic patients' problem:

- ◆ Ineffective breathing pattern related to EPI targeted diseases.
- ◆ Altered body temperature (fever, hypothermia) related to the disease.
- ◆ Fluid volume deficit (potential or actual) related to fever, diarrhea and inability to ingest.
- ◆ Altered body nutrition related prolonged course of infection.
- ◆ Potential for spread of infection to others.
- ◆ Knowledge deficit in the control and prevention of EPI target diseases.

Plan

- To easy breathing.
- To reduced the elevated body temperature to the normal range.
- To correct fluid volume deficit.
- To maintain nutrition according the body's requirement.
- To prevent the potential spread of infection to others.

- To give health education on the prevention and control of EPI target diseases.

Nursing Intervention

- Attaining a normal breathing pattern.
 - Turn the patient frequently to drain the secretion and suction when indicated.
 - Encourage mobilization.
 - Encourage a high fluid intake.
 - Evaluate the respiratory rate.
- Attaining normal body temperature
 - Rest
 - Take vital signs
 - Increase fluid intake
 - Give frequent and hygiene.
 - Apply tepid sponge.
- Attaining fluid balance
 - Assess for signs of dehydration
 - Maintain input and output record
- Improving nutritional status
 - Monitoring the nutritional status, weight, height and arm circumference
 - Encourage balanced food intake.
 - Assess food intake and tolerance.
- Preventing the spread of infection
 - Implement an appropriate isolation technique.
 - Wash hands before and after each patient contact.
 - Control dissemination of infection droplets.
 - Ventilate the patient's room.
 - Patient education.

Evaluation

- Maintains normal breathing pattern
- Demonstrates absence of elevated body temperature
- Attains fluid balance; normal skin.
- Appears to have more energy
- Protects self and others from spread of infection
- Becomes informed the infectious process of EPI targeted diseases.

3.2.9. Prevention and Control of EPI Target Diseases

(For complete information refer to the core module)

Vaccine and their administration

a) DPT (Diphtheria, Pertussis and Tetanus)

- It is a liquid vaccine
- Dose: 0.5 ml
- Route: intramuscular (IM)
- Site: thigh
- Number of doses: 3

b) OPV (Oral polio vaccine)

- Damaged more easily by heat than other antigens but frozen and refrozen without damages
- Prepared in plastic or glass dropper.
- Dose: 2 drops
- Route: oral
- Number of doses: 3 – 4

Note: If the child has diarrhea give the vaccine but give an extra-dose after you finish the normal course. But do not register this dose.

c) Measles

- Before using it you must reconstitute it with diluents
- Dose 0.5ml – each time check the manufacturer instruction

- Route IM
- Number of dose 3
- Interval at least 4 weeks apart
- Keep the diluents cold
- Keep the vaccine at the correct cold temperature and out of sunlight

d) BCG (Bacillus Calmette Cuerin)

- Before using it, you must reconstitute it with diluents dose 0.05 ml below one year and 0.1 ml above one year old child
- Check manufacturer instruction
- Route ID
- Site (right upper arm)
- Number dose 1
- Keep the diluents cold
- Keep the vaccine at the correct cold temperature and out of sunlight

e) Tetanus Toxoid (TT)

- It is a precipitated liquid vaccine
- Dose: 0.5ml
- Route: IM (upper arm)
- Number of doses: 5

Preparation of syringes and needles

a) Syringes of:

- 5 ml for mixing
- 0.5ml for administration of DPT measles and TT
- 0.05 ml for BCG

b) Needles

- 18 gauge for mixing
- 22 gauge for IM and Sc.
- 26 gauge for ID

Complications of unsafe Injection

Injections of vaccines are only safe when the correct vaccines are properly administered with sterile equipment.

a) Infections

- Transmission of blood borne pathogens

Examples: Hepatitis B

- HIV/AIDS
- Abscess
- Septicemia

b) Non-infectious

Injuries due to improper injection technique

E.g. nerve damage.

Measures to prevent risks of vaccine complications

- Equipment and supply selection
- Sterilizing the instruments using the steam sterilizes

The necessary items needed for sterilization

- Steam sterilizer
- Round/square boiling pan
- Stove
- Forceps
- Timer clock
- Fuel or electricity

Prevention of unsafe injection

- Periodic assessment
- Effective training and supervision of health care workers
- The development of a national safe injection policy
- Uninterrupted provision of supplies and equipment

Tasks of PHN at the immunization session

There are several tasks that the public health nurse may have to do at the immunization session:

- Arranging the flow mothers and children at station
- Registering clients
- Weighing clients
- Health education on immunization
- Screening clients
- Treating clients
- Immunizing clients
- Cleaning the site and equipment

Strategies of health education

- Planning a program
- Planning with the community
- Finding a contact person
- Making the program work
- Training people to help you including health education
- Making immunization a good experience for the families
- Giving the community some feedback
- Working with individuals
- Working with groups
- Planning what you teach about
- Being polite and friendly
- Teaching in an interested way
- Use simple words
- Demonstrate something, like role-play.
- Encourage discussion

The role of public health nurse in evaluating the effectiveness of EPI program

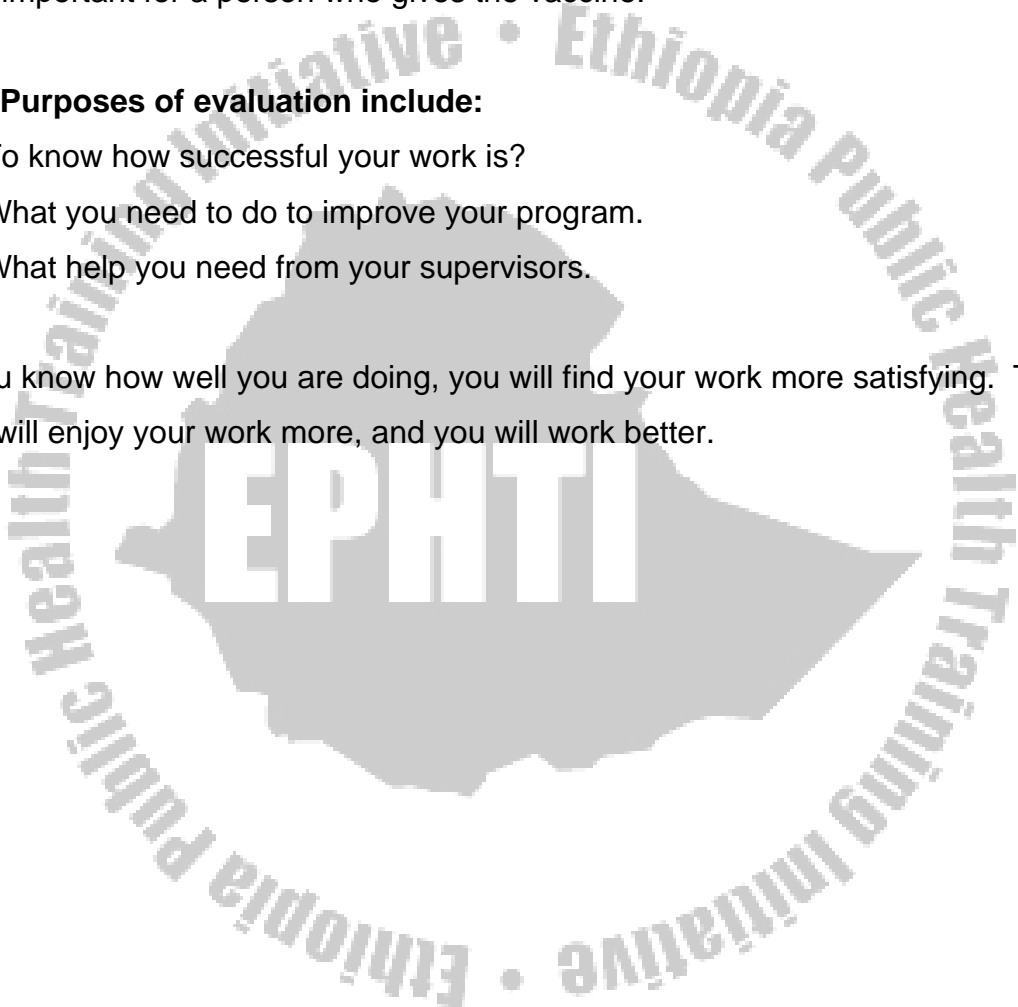
Why should you evaluate your work?

Everybody who works in an immunization program needs to evaluate or monitor his/her work. Evaluation is not only for supervisors and program managers, it is also important for a person who gives the vaccine.

The Purposes of evaluation include:

- To know how successful your work is?
- What you need to do to improve your program.
- What help you need from your supervisors.

If you know how well you are doing, you will find your work more satisfying. Then you will enjoy your work more, and you will work better.



Roles and Tasks of a Public Health Nurse

A. Knowledge, objective and activities regarding EPI target diseases

Learning Objectives	Activities
Describe the cause of EPI Target diseases	Identify the causes of EPI target diseases
Describe the modes of transmission of EPI target diseases.	Explain the mode of transmissions of EPI target diseases.
State the diagnostic approach of EPI target diseases.	<ul style="list-style-type: none"> ▪ Investigate the epidemiological patterns of EPI target diseases. ▪ Assess and monitor the clinical features of EPI target diseases. ▪ Identify the specimen to be sent to the laboratory.
Describe the management of EPI target diseases.	State the drug, dose, route and time of administration.
Describe the types of vaccines, EPI schedule, route of administration of vaccines and strategies.	<ul style="list-style-type: none"> ▪ Differentiate the type of EPI vaccines. ▪ Design the EPI schedules. ▪ Identify the routes of vaccine administration. ▪ Explain the strategies to be used.
Describe the mechanism of maintaining cold chain.	List how the cold chain system is maintained from the manufacture to the delivery unit.
Describe the problems of EPI and their solutions.	<ul style="list-style-type: none"> ▪ Mention the problems of EPI. ▪ Solve the problems of EPI.
Outline the management of EPI	Categorize the management of EPI.
Describe the method of assessment and evaluation of EPI.	<ul style="list-style-type: none"> ▪ Assess the implemented activities of EPI. ▪ Evaluate the outcomes of the activities.
Describe immunization card	<ul style="list-style-type: none"> ▪ Maintain the immunization card to be carried by the client

B. Attitude, objectives and activities of PHN students regarding EPI target diseases

Learning Objectives	Activities
Help people believe that the EPI target diseases are preventable.	<ul style="list-style-type: none"> ▪ Encourage people to come for immunization. ▪ Teach families, community about EPI target diseases using appropriate teaching aids.
Help believe that regular immunization attendance is important for full protection.	Provide the family and the community with health information on EPI schedule.
Help people believe that immunization has very minimal side effects.	Discuss the possible side effects of each vaccine.
Help people that community participation is important for the success of EPI.	Initiate and convince community leaders and other influential people in the community that the community participation is vital for the prevention of EPI diseases.
Help people recognize that breast milk represents the first immunization.	Emphasize the importance of breastfeeding, especially the need to give colostrums.

C. Practice of objective and activities of PHN students regarding EPI target diseases

Learning Objectives	Activities
Identify catchments area for EPI	<ul style="list-style-type: none"> ▪ Organize the visit with the community leaders and health workers. ▪ Use the developed sketch map.
Identify the target population	<ul style="list-style-type: none"> ▪ Conduct a working survey. ▪ Conduct registration of the target population.
Organize the program	<ul style="list-style-type: none"> ▪ Construct vaccination schedule. ▪ Assemble the necessary equipment.
Conduct vaccination	<ul style="list-style-type: none"> ▪ Give vaccines. ▪ Create a vaccination campaigns.
Regular reporting	<ul style="list-style-type: none"> ▪ Have an organized documentation. ▪ Analyze the data. ▪ Report to the concerned body.
Increase community involvement	<ul style="list-style-type: none"> ▪ Create a friendly atmosphere with the community. ▪ Create community awareness through health education. ▪ Demonstrate EPI using appropriate teaching aids.
Maintain cold-chain	<ul style="list-style-type: none"> ▪ Regulate the cold-chain system. ▪ Prepare ice pack and cold box. ▪ Arrange the vaccine according to their temperature. ▪ Demonstrate the arrangement of the vaccine to other staff. ▪ Follow the first in and the first out principles when using vaccines.
Monitor and evaluate EPI program	<ul style="list-style-type: none"> ▪ Supervise the EPI sessions and the cold chain. ▪ Calculate the EPI coverage. ▪ Make an inventory on vaccines and supplies and report to the concerned body.

3.3. Satellite Module for Environmental Health Technician Students on Expanded Program on Immunization

3.3.1. Introduction

Purpose and use of the Satellite Module

This satellite module is prepared for Environmental Health Technician students. The satellite module emphasizes only areas that were not covered by the core module.

Direction on how to use this satellite module

- After completion of the core module, go through the satellite module.
- Students are advised to refer the core module whenever indicated.
- After completing the satellite module answer the questions given as pretest at the beginning in the core module.
- Compare your results.

3.3.2. Learning objectives

At the end of the satellite module you will be able to:

- identify the preventive and control measures of EPI targeted diseases.
- state the methods of health education to prevent EPI targeted diseases.
- describe the management and inspection of vaccines under cold chain.
- discuss reasons why vaccines are not effective.

3.3.3. Prevention and control of EPI target diseases

A. Survey and surveillance

1. **Survey** – An investigation in which information is systematically collected.

Conditions to conduct survey when:

- developing new site
- an out break occurs

- there is need to know EPI target groups
- laboratory analysis indicates a danger to health
- there are changes in the health of the community.

Activities under survey are:

- mapping of the catchment areas and house numbering.
- identification of total number of population and house holds in the catchment area
- identification of target groups particularly mothers and children
- assessment of environmental health conditions
- data compilation, analysis and interpretation

2. Surveillance - is an ongoing scrutiny of the factors that determine the occurrence and distribution of diseases with the purpose of detecting changes in trends or distribution in order to initiate investigative or control measures.

Surveillance systems are:

- routine reporting (see Annex I)
- compiled reporting

Components of surveillance system

- Surveillance of cases.
- Surveillance of animal reservoirs or vectors
- Surveillance of environmental factors relevant to health.
- Surveillance of demographic changes.

B. Information, Health Education and Communication (IEC)

- Mass mobilization through health information.
- Increase immunization awareness/knowledge for:
 - pregnant women attending antenatal services
 - women of child bearing age through regular health services

- women coming with children to immunization or regular primary care facilities.
- women coming with or without children to immunization
- community as whole
- Ensure clean and safe delivery which can be achieved by:
 - clean hands of the birth attendants.
 - clean cutting and care of the umbilical stump.
 - clean surface where the delivery is performed.
- Training and supervision of delivery staffs
 - Health workers
 - front line health workers (CHW)
- Eliminate use of certain traditional practices such as
 - cow dung,
 - ash,
 - contaminated blades,
 - Contaminated cord tie.

C. Cold Chain

1. Management and inspection of vaccines

- Read the cold chain record paper about the previous dates and time.
- Record the external thermometer reading of the refrigerator.
- Open the refrigerator.
- Record the internal thermometer reading.
- See the arrangements of vaccines on the shelf inside the refrigerator
- Close the refrigerator.
- Record the thermometer reading of the refrigerator externally and check weather it has increased or not.
- Check the shelf life of vaccines and expiry dates.

2. Vaccine storage times and temperature (refer to the core module)

3. Refrigerators and Freezers

- Is vaccine storage space sufficient?
 - Is there sufficient air space between the vaccines?
 - Have you considered new activities to increase immunization coverage which may raise the maximum stocks needed in the refrigerator?
 - Have you remembered to load bottles of water (or icepacks with water) in the refrigerator to keep the refrigerator to cool if the energy source fails?
 - Do you have more than one-month supply of vaccine stored in the refrigerator?

- Is the temperature efficiently controlled?

Your refrigerator is adequate for vaccine storage only if it can maintain an internal temperature between 0°C – 8°C. If the temperature rises above + 8°C

- Store water bottles or icepacks filled with water in every spare place in the refrigerator, except one half of the volume, which needed for air circulation. This helps stabilize the temperature stops it from fluctuating widely during the day.
- Close the windows or ventilator at night to keep the store room warmer.

D. Environmental sanitation and proper hygienic practices related to EPI target diseases

- Proper disposal of human excreta and other liquid wastes.
- Perfect of food from all kinds contaminants.
- Proper hygienic practices (hand washing)
- Proper ventilation (through and cross ventilation)to facilitate air circulation
- Avoid over-crowding
- Proper construction, maintenance, and treatment of drinking water supplies.
- Proper management of infectious and other solid wastes.
- Provision of adequate artificial and natural lighting.

3.3.4. Learning Activity:

Instructions

- A. Read carefully part I and part II.
- B. Part I is the strategy for prevention and control of EPI target diseases.
- C. Part II is the specific tasks and roles that can be performed by Environmental Health Technicians.
- D. Match part I with part II by writing the appropriate letter on a separate sheet of paper.

Part I

Strategies for prevention and control of EPI target diseases.

Survey and Surveillance	Health information	Cold chain	Environmental Health

Part II

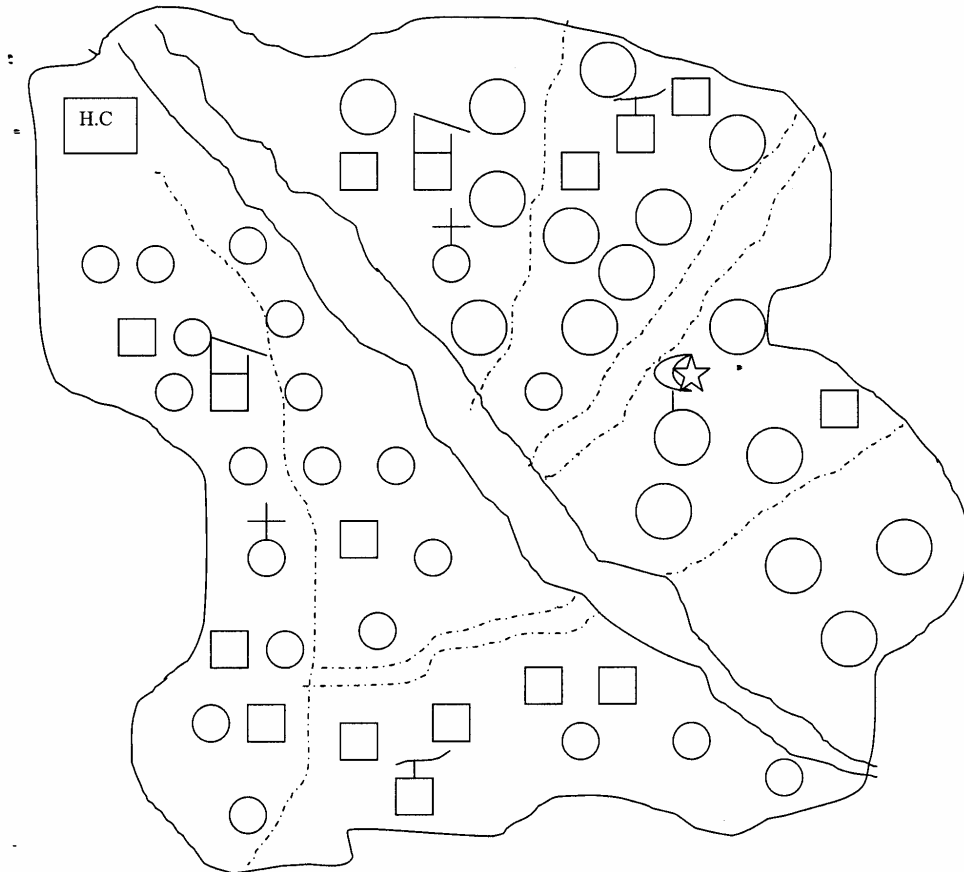
Specific tasks and roles to be performed

- A. Disinfection of springs and wells
- B. Identification of the causes of poliomyelitis.
- C. Check that enough vaccines are available in the refrigerator to cover the monthly supply.
- D. Mass mobilization
- E. Proper ventilation of residential houses
- F. Monitoring of time and temperature of the refrigerator.
- G. Check sufficient air space between vaccines.
- H. Control the refrigerator must not be used for other purposes.
- I. Identification of EPI target groups.
- J. Collect and compile data from the routine report.
- K. Identification of EPI sites.
- L. Construction of proper latrines for the community.
- M. Collect the monthly supply of vaccines from the district health with special precaution.
- N. Persuade mothers to bring their children to immunization center.
- O. Instruct mothers about the disadvantage of harmful health practices.
- P. Conduct home visit.
- Q. Proper disposal of all used vials, syringes and needles to appropriate site.
- R. Training of CHW/Front line health workers
- S. Identify investigate and control outbreaks or epidemics.


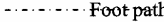








3.3.5. Activity two

Based on the sketch map of village A drawn below answer the following questions.

Sketch map of village A



Key:

- | | | | |
|---|-----------------------------|--|-------------------|
|  | Health center |  | Foot path |
|  | Corrugated iron sheet house |  | All weather roads |
|  | Tukul house |  | Main road |
|  | Mosque |  | Hand pump |
|  | Church | | |
|  | Traditional pit latrine | | |

1. Describe the role of the following variables indicated on the sketch map of village A in the prevention and control of EPI target diseases.
 - A. mosques and churches
 - B. protected water sources
 - C. latrines
 - D. health center and health posts
 - E. housing condition

2. Identify the EPI target diseases associated with the following variables indicated in the sketch map.
 - A. unprotected water supply sources
 - B. open defecation
 - C. poor housing
 - D. inaccessibility to health institutions

3. Suppose the community in the village A has no protected water supply source, poor housing condition, inaccessibility to health institution and poor sanitation and hygienic practices. These have a great impact on the EPI programme to be satisfactory.

Therefore, how do you organize the community and community leaders to increase the identified problems using the role play meeting.

3.4. Satellite Module for Medical Laboratory Technology Students on Expanded Program on Immunization

3.4.1. Introduction

Purpose and use of the satellite module

This satellite module is prepared for Medical Laboratory Technology students. It emphasizes only areas that were not covered by the core module.

Directions

- Students are advised to study the core module before going into the satellite module.
- After completing the satellite module answer all the questions given as a pretest at the beginning of the core module.
- Compare your results with that of the previous pretest given.

3.4.2. Learning objectives

Upon completion of the activities in this satellite module, the students will be able to:

- Describe the basic microbiological procedures for specimen collection, handling, processing, examination or dispatching to a reference laboratory.
- Identify and differentiate the specific bacterial agents from bacteriological specimens.
- Determine some hematological tests

3.4.3. Laboratory Diagnosis

The EPI target diseases are usually diagnosed based on clinical features.

This is because:

- The diseases are acute and therefore prompt management of the patient is crucial before laboratory results are available.
- Health center laboratories have no adequate facilities to investigate the etiologic agents.

Nevertheless, the health center laboratories can perform Gram stain & investigate microscopically the etiologic agents for pertussis, diphtheria, tetanus for confirmation of cases when requested. The most important role of health center laboratory is to refer microbiological specimens to a reference laboratory for further investigation.

Laboratory investigations of EPI target diseases.

A. *Corynebacterium diphtheria*

Morphology and staining characteristics

- Gram positive rod
- Non motile
- Non capsulated, non spore former
- Appear in clusters joined at angle like 'Chinese letters'

Specimens

- Throat, nasopharyngeal swab, and other suspected lesions.

Collection and dispatch of specimens

- Using a sterile cotton wool swab a specimen can be collected either from the throat or nasopharynx
- Put it in a sterile container with care not to contaminate the swab.
- To do investigation in the health center laboratory, label the specimen, make a smear, stain and look under the microscope
- To dispatch the specimen to a reference laboratory, put the swab in the appropriate transport media, label and send it as soon as possible.

Staining method – Gram's stain

- Make a smear of the specimen and fix the dried smear.
- Cover the fixed smear with crystal violet stain for 30 seconds.
- Rapidly wash off the stain with clean water.

- Tip of all the water and cover the smear with Lugol's iodine for 30-60 seconds.
- Wash of the iodine with clean water.
- Decolorize rapidly (few seconds) with acetone alcohol.
- Wash immediately with clean water.
- Cover the smear with neutral red stain for 2 minutes.
- Wash off the stain with clean water.
- Wipe the back of the slide clean, and air dry.
- Examine the smear microscopically.

B. Bordetella pertussis

Morphology and staining characteristics

- Gram negative coccobacillus (short rod)
- Non motile
- Capsulated
- It may occur singly or in chains and may show bipolar staining

Specimen

- a) For bacteriological examination
Nasopharyngeal secretions collected using pernasal swab or by aspiration.
- b) For haematological examination – blood
Get blood either from the vein or finger and perform the total and differential white cell counts.

Procedure for total white cell count

- Dilute the blood with white cell diluting fluid.
Use either 1% HCl or 2% acetic acid solutions (these solutions breaks the RBCs and suspend and disperse the WBCs).
- Mix the solution very well and discard the first four drops before charging the counting chamber.
- Transfer a small representative solution taking care not to overfill or create air bubbles into the counting chamber.

- Count the white cells in the 4 'W' sections using the 10X objective.
- Make the calculations; add the four counts and multiply by the dilution and volume correction factors.
- Report the white cell count per cubic millimeter of blood.

Procedure for the differential white count

- Make a smear of the blood specimen on a glass slide.
- Allow to dry and stain it with Wright's or Gram's stain
- Wipe the back of the slide with cotton and allow the film to dry.
- Put a drop of oil (immersion) and look under the microscope using 100X objective
- Count 100 WBCs and report the different type of WBCs in percentage.

Collection and dispatch of specimen: Do the same as mentioned above for *Corynebacterium diphtheriae*.

Staining method – Gram's stain

C. Clostridium tetani

Morphology and staining characteristics

- Gram positive rod
- Motile
- Non capsulated long thin rods with round spore at one end (terminal) giving the typical 'drum stuck' appearance
- Mostly found in chains and tends to be pleomorphic
- Not often seen in smears

Specimen

- Wound exudate (pus) and infected tissue

Collection and dispatch of specimen

- Collect a sample of the pus or infected tissue on a sterile cotton wool swab.
- Make a smear of the sample on a clean slide for Gram stain and examine for typical drumstick spore formers.
- To dispatch, put the specimen in a sterile transport media, label and send it with a request form to reach a reference microbiology laboratory within 6 hours.

D. Polio virus

Characteristics

- Polio viruses are enteroviruses that contain single stranded RNA of positive polarity.
- The virion is naked
- The three serotypes of poliovirus are highly cytopathic to many primary cell cultures and permanent cell lines, causing cell death with changes in cell morphology.

Specimens

Feces, throat swab

Collection and transport of specimens

Stool: Mix about 1 ml of specimen with 9 ml of sterile phosphate buffered saline, and allow to sediment for about 30 minutes (or centrifuge). Transfer the supernatant fluid to a sterile container, label, and send in an insulated cold box to reach the virology laboratory within a short period of time.

Throat swab: Using a sterile swab, collect a specimen from the infected area by the help of a spoon to depress the tongue.

- Put it in a sterile tube.
- Label and send the swab using a virus transport media (VTM) with its request form to a reference laboratory.

E. Measles Virus

Characteristics

Measles virus is a single stranded RN virus belonging to the family paramyxovirus and genus Morbillivirus.

Collection and transport of specimens

Isolation of the virus from clinical specimens is difficult. The following specimens can be used to diagnose measles.

1. Nasopharyngeal and conjunctiva specimens (at the initial stage of the disease)
2. Stool and urine (at later stages)
3. Cerebrospinal fluid (CSF) and serum

Specimen collection is made strictly following the standard procedures of the World Health Organization (WHO).

Specimens, if not sent to virology laboratory immediately after collection, should be kept in a refrigerator, but never freeze them

The transport medium of choice for measles virus is bovine serum since it contains proteins that are essential to stabilize viral infectivity.

The diagnosis of measles is best done from clinical grounds. However, in laboratories where there are special facilities, the following techniques can be followed:

- Virus isolation using cell cultures and observing cytopathic effects
- Electro microscopic examination of the virus directly from the clinical specimens
- Serological test – a four-fold increase of specific antibody titers in a serum taken 7 – 14 days interval is the basis for diagnosis.
- Histological examination and hybridization of RNA.

F. Mycobacterium Tuberculosis

Morphology and staining characteristics

- Straight or slightly curved rod shaped organism
- Is strictly aerobic acid fast bacilli
- Non spore forming, non capsulated, and non motile
- Acid fastness depends on the waxy envelop mycolic fatty acid of cell wall
- Once stained with primary stain (carbol fuchsin) they resist decolorization by acid alcohols.

Laboratory diagnosis of P. tuberculosis

This is mainly based on the identification of the bacilli M. tuberculosis from different clinical specimens.

Specimens

Sputum, Pleural, peritoneal, and cerebrospinal fluid

Collection and transport of specimens

For reliable lab diagnosis, three sputum samples should be collected properly and submitted. Morning samples are more likely to contain tubercle bacilli. However, it may be difficult for an outpatient to provide three early morning sputum samples. Accordingly, an outpatient usually provides a spot morning spot sputum samples as follows:

- Day one – sample one- “on the spot” sample when the patient first presents himself/herself to the health station
- Day two – Sample two- an early “morning” sample
- Day two – Sample three-another “on the spot” sample in the sam day the morning sample is given.

Laboratory diagnosis: Microscopic examination of Sputum for acid fast bacilli (AFB)

⇒ Ziehl-Neelsen Technique

- Direct method: A small portion of the purulent sputum is transferred to a slide to make a thin smear.

- Concentration technique using a hours hold bleach-“barakina”: This technique kills some normal flora microorganisms, inactivates the virulence of mycobacterium, and also helps to digest the mucous substance that suspends the bacteria and this increases the chnce of positivity.

⇒ Culture

- Lowenstein-Jensen Medium is the ordinary culture media for tubercle bacilli.
- Raised, dry, cream colored colonies of tubercle bacilli are looked for

⇒ Biochemical reaction

- Niacin test is positive

⇒ New techniques

- Molecular probes (DNA probes) – it detects Mycobacterial RNA sequence
- High performance liquid chromatography
- Polymerase chain reaction (PCR)
- Enzyme immunoassay

Roles and Tasks of Medical Laboratory Technicians

A. Knowledge, Objective and Activities Regarding EPI Target Diseases

Objective	Knowledge
<ul style="list-style-type: none"> Describe the etiology of EPI target diseases. State the laboratory diagnostic techniques. Describe the modes of transmission of EPI target diseases. Describe the types of vaccines, EPI schedule, route of administration of vaccines, and strategies. Describe the method of assessment and evaluation of EPI. 	<ul style="list-style-type: none"> Study the etiologic agents and their general characteristics. Study the laboratory Methods and procedures. Study the modes of transmission of EPI target diseases. Study types of vaccines, EPI schedule, route of administration of vaccines, and strategies. Study method of assessment and evaluation of EPI.

B. Attitude Objective and Activities of MLT regarding EPI-Target Diseases

Learning Objective	Activities
<ul style="list-style-type: none"> Help believe that EPI target diseases are preventable. Help believe that regular immunization attendance is important for full protection. Help believe that community participation is important for the success of EPI 	<ul style="list-style-type: none"> Encourage preventive and control measures using different approaches of health education. Provide information of EPI schedule. Convince community leaders, elders and other influential people in the community that community participation is vital for prevention of EPI.

C. Practice Objectives and Activities of MLT regarding EPI- Target Diseases

Learning Objective	Activities
<ul style="list-style-type: none"> • Early diagnosis of EPI target diseases • Identify the target population • Regular reporting • Increase community involvement • Monitor and evaluate EPI-program 	<ul style="list-style-type: none"> • Conduct home visit • Collect specimens for examination or to send to a reference laboratory, if required. • Collect data, compile, interpret and take appropriate prevention and control measures • Mass mobilization • Proper documentation • Compile and analyze the data • Reporting • Conduct IEC • Perform social mobilization • Do EPI coverage survey and surveillance.



3.5. Satellite Module for Community Health Workers/ Front-Line Health Workers on Expanded Program on Immunization

3.5.1. Introduction

This satellite module is prepared by considering important issues that can help the Community Health Workers (CHWs) in the prevention and control of EPI target diseases.

EPI target diseases are common childhood communicable disease that can disable and kill many children.

Being a health agent of the community, your knowledge on EPI and EPI target diseases will save many children's lives. Therefore, this short and precise satellite module is prepared to help teach, take care of sick child in the community, and health post in the control and prevention of EPI target diseases.

3.5.2. Learning Objectives

- List EPI target diseases
- Mention disabilities related to EPI target diseases.
- State the activities of the CHWs concerning the EPI

3.5.3 Short information about EPI

Prevention is always better than cure. It is much more cost-effective to protect children from a disease by immunization than to treat. In addition, serious illness affects the happiness and economic well being of the whole family of the community.

Causes of EPI target diseases

In our country, most of the babies born die before they are five years old. These deaths are often due to six deadly diseases:

Measles

Tuberculosis

Tetanus (lock jaw)

Whooping cough (pertussis)

Diphtheria

Poliomyelitis

All of these diseases can be prevented by immunization. Routine immunization will prevent thousands of deaths. Children not only die from these six diseases, many more thousands will be left with disabilities, such as; lameness, deafness, permanent mental handicap etc.

Activities and preventive measures

- EPI target diseases are vaccine preventable.
- Identify the disease.
- Notify the nearby health institution.
- Provide the prescribed medications.
- If no improvement, help them visit the health professionals.
- Children could be prevented from EPI target disease by attending the full immunization schedule.
- Give health education to the community on the importance of the vaccination.
- Remind the community about the monthly immunization schedule/program.
- Participate in the immunization programs.

3.6. Take-Home Messages for Caregivers

3.6.1 Short information about EPI

- Many children suffer from vaccine preventable diseases.
- Children are liable to most of these diseases due to lack of immunity.
- Immunizing children will prevent them against these diseases.

Causes and transmission of the six childhood vaccine preventable diseases

- These diseases are caused by bacteria and viruses.
- Transmissions take place through; droplets inhalation, freco-oral, and contamination of wounds (umbilical stump).

Some signs and symptoms

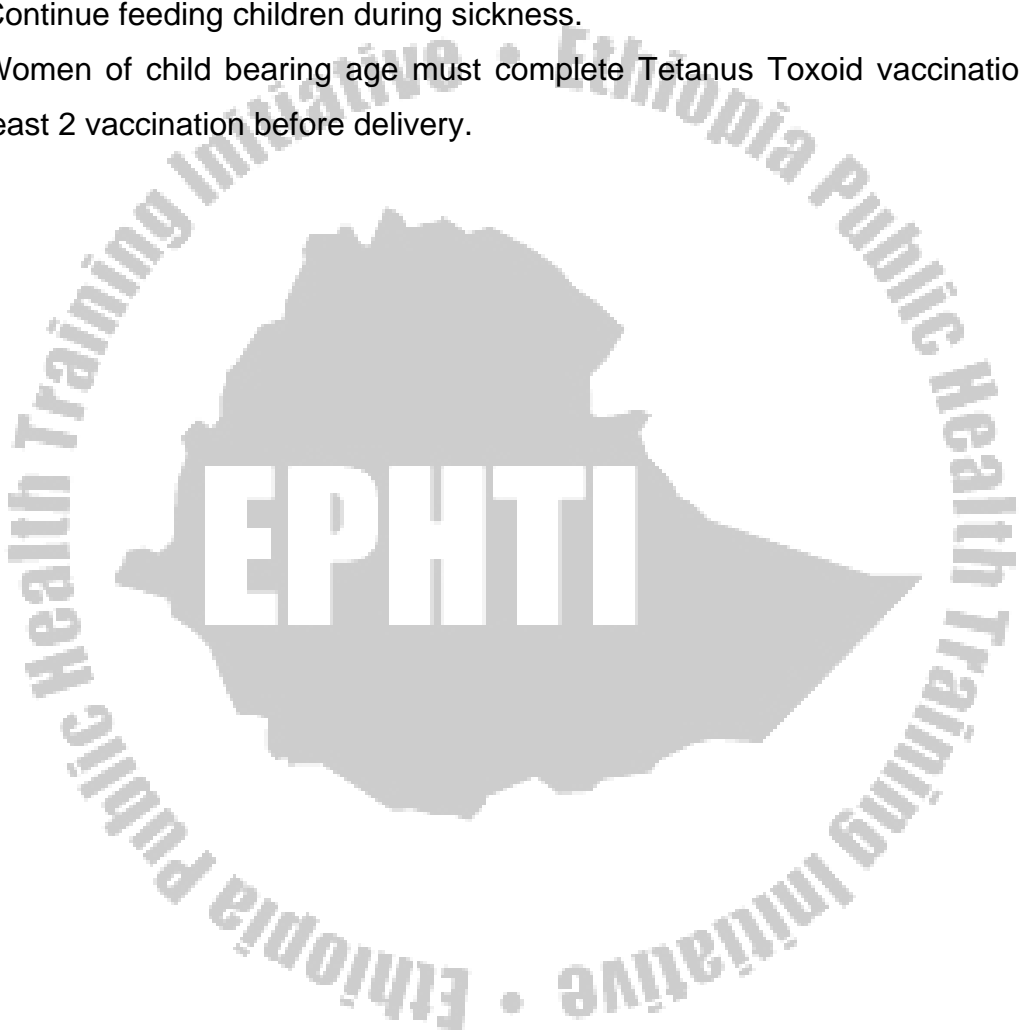
- High body temperature
- Can not eat or drink normally
- Difficult breathing
- Fit
- Rash (measles)
- Irritable and doesn't like being touched.
- Passes little or no urine

Measures to be taken at home

- Keep the child cool using cold sponging if there is fever.
- Give frequent drinks or sips.
- Prevent other children from catching the illness by avoiding contact with cases /isolation/.
- Visit the nearby clinic.

Prevention

- Report to the CHW or to the nearest health institution if your child is sick
- Have your children fully vaccinated.
- Understand the advantages of vaccination.
- Do not miss your vaccination schedule when the child is sick.
- Continue feeding children during sickness.
- Women of child bearing age must complete Tetanus Toxoid vaccination, at least 2 vaccination before delivery.



UNIT FOUR

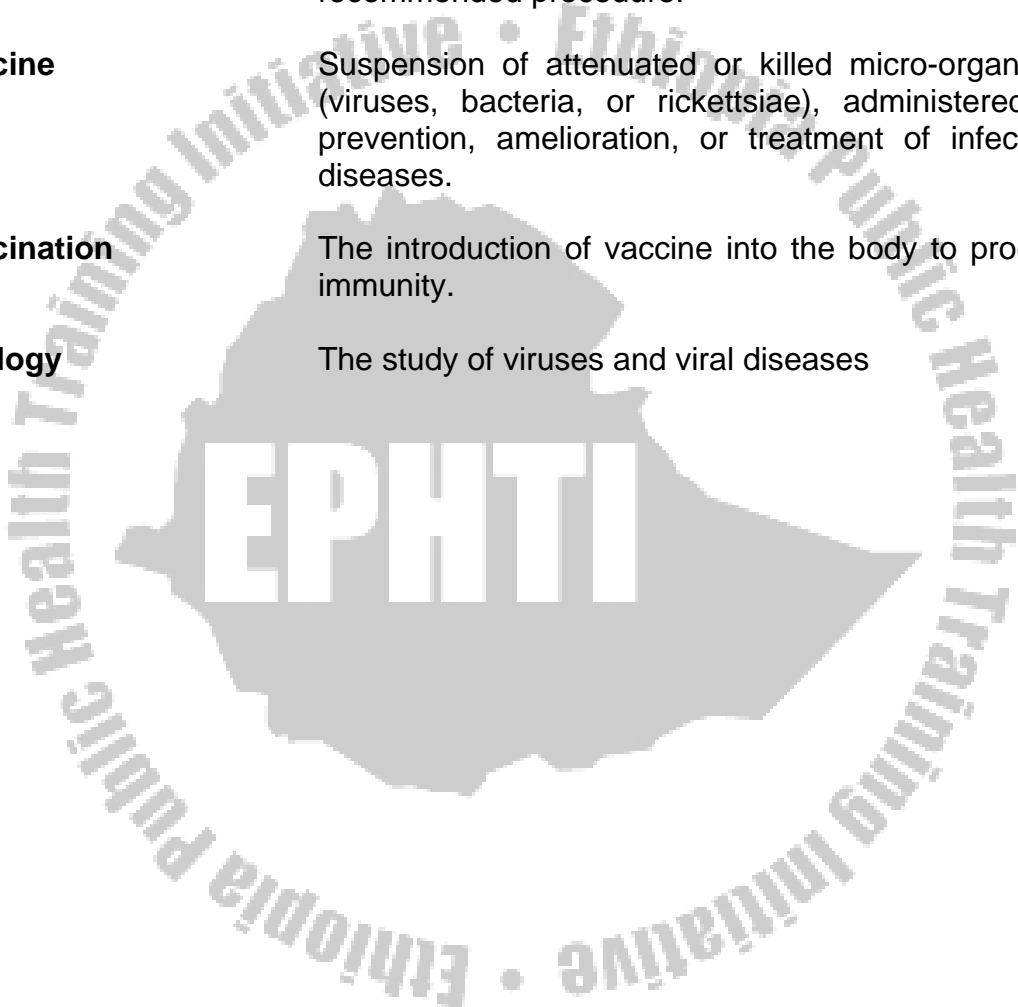
Glossary

Attenuation	The act of thinning or weakening, as the alteration of virulence of a pathogenic microorganism by passage through another host species, decreasing the virulence of the organism for the native host and increasing it for the new host
Active immunization	Stimulation with a specific antigen to induce an immune response.
Active Immunity	
Antigen	Any substance capable of inducing a specific immune response and of reacting with the products of that response; i.e. with specific antibody.
Antibody	An immunoglobulin molecule that reacts with a specific antigen that induced its synthesis and with similar molecules.
Apnea	Cessation of Breathing
Arrhythmia	Variation from the normal rhythm of the heart beat.
Anorexia	Lack or loss of appetite for food
Antitoxin	Antibody produced in response to a toxin of bacterial (usually an exotoxin) animal (zootoxin), or plant (phytoxin) origin, which neutralizes the effects of the toxin.
Anaphylaxis/anaphylactic reaction	Exaggerated reaction of an organism to a foreign protein or other substances to which it has previously become sensitized; resulting from the release of histamine, serotonin, and other vasoactive substances.
Atelectasis	A collapsed or airless condition of the lung.
Bradycardia	Slowness of the heart beat, as evidenced by slowing of the pulse rate less than 60.

Cardiomyopathy	A general diagnostic term designating primary myocardial (= the middle and thickest layer of the heart wall, composed of cardiac muscle), disease
Catchment area	The area from which people are sent a particular health institution.
Contagion/contagious	Spread of disease from person-to-person
Contraindication	Any condition which renders a particular line of treatment improper or undesirable.
Convulsion	An involuntary contraction or series of contractions of the voluntary muscles
Enanthema	An eruption upon a mucous surface.
Encephalopathy	Atrophy (= a wasting away), of the brain.
Endemic	A disease that occurs continuously in a particular population, but has no mortality
Epidemic	Appearance of an infectious disease or condition that attacks many people at the same time in the same geographical area.
Exotoxin	A potent toxin formed and excreted by the bacterial cell, and free in the surrounding medium.
Granuloma	A tumor-like mass or nodules of granulation tissue, with actively growing fibroblasts and capillary buds.
Herd immunity	The resistance of a group to attack by a disease to which large proportions of the members are immune.
Hypothermia	Body temperature below the normal
Immunity	The condition of being immune (= resistance to a disease because of the formation of humoral antibodies or the development of cellular immunity), securing against a particular disease.
Immunization	The process of rendering a subject immune, or of becoming immune

Immunogenicity	The property enabling a substance to provoke an immune response, or the degree to which a substance possesses this property.
Incubation period	The interval between exposure to infection and the appearance of the first symptom
Leukocytosis	A transient increases in the number of leukocytes/white blood cells/ in the blood, due to various causes.
Maculopapular	Consists of or pertaining to macules (= discolored spot or patch on the skin, neither elevated nor depresses, of various colors, sizes, and shapes), and papules (red elevated area on the skin, solid and circumscribed.)
Malaise	A vague feeling of discomfort
Morbidity	The condition of being diseased
Mortality	The state of being dead
Opisthotonus	Form of spasm in which head and heels are bent backward and body bowed forward
Passive Immunity	Produced by actual injection of sera containing the antibodies into the subject to be protected.
Pleomorphic	Having many shapes
Septicemia	Blood poisoning: systemic disease associated with the presence and persistence of pathogenic microorganisms of their toxins in the blood.
Tachycardia	Abnormally rapid heart rate.
Tachypnea	Very rapid respiration
Tonsilectomy	Excision of a tonsil
Toxin	A poison, especially a protein or conjugated protein produced by some higher plants, certain animals, and pathogenic bacteria, that is highly poisonous for other living organisms.

Toxoid	A modified or inactivated exotoxin that has lost toxicity but retains the ability to combine with, or stimulate the production of antitoxin.
Umbilical stump	The part of umbilicus that left after the umbilical cord is cut.
Uvulectomy	Cutting/removal/ excision of the uvula and not a recommended procedure.
Vaccine	Suspension of attenuated or killed micro-organisms (viruses, bacteria, or rickettsiae), administered for prevention, amelioration, or treatment of infectious diseases.
Vaccination	The introduction of vaccine into the body to produce immunity.
Virology	The study of viruses and viral diseases



UNIT FIVE

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome.
BCG	Bacterium Calmette-Guerin
CHWs	Community Health Workers. They are also called Front-line health workers
DPTs	Directly Observed Treatment Short Course
DPT	A combined vaccine for Diphtheria, Pertussis, and Tetanus Toxoids
EPHTI	Ethiopian Public Health Training Initiative
EPI	Expanded Program on Immunization.
GCMS	Gondar College of Medical Sciences
HCl	Hydrochloric acid
HO	Health Officer.
Id	Intradermal
IEC	Information, Education, Communication
IM	Intramuscular
MLT	Medical laboratory technology
NNT	Neonatal Tetanus
OPV	Oral Polio Vaccine
RBC	Red blood cell
RNA	Ribo nucleic acid
Sc	Subcutaneous
TT	Tetanus toxoids
TBA	Traditional Birth Attendant
TTBA	Trained Traditional Birth Attendant
WBC	White Blood Cell
WHO	World Health Organization.

UNIT SIX

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UNIT SEVEN

Annex I

Vaccination Reporting Form

Signature _____

Date from _____ to _____

Place _____

Age group (in months) Vaccines	3-5	6-8	9-11	12-14	Other children	Pregnant women	Vaccination information					
							Doses per bottle	Number per bottle	Total doses supplied	Doses administered	Doses not administered	
BCG												
DPT I												
DPT II												
DPT III												
POLIO I												
POLIO II												
POLIO III												
MEASLES												
Tetanus #1												
Tetanus #2												
Others												

Annex II

2.1. Key: For Pre-test Questions on the Core Module (2.1)

1. d
2. b
3. b
4. c
5. a
6. b
7. c
8. d
9. d
10. d
11. d
12. a
13. b
14. d
15. b
16. a
17. c
18. d

2.2. Key: For Pre-test Questions for Health Officer Satellite Module

1. c
2. a
3. c
4. False
5. f
6. a
7. false
8. d
9. a

- 10. - Health workers do not know the policy
 - Accessibility and acceptability problems
 - Logistics problems
 - Health workers only open a vial if there are enough clients who need it, etc.
- 11. - Unsure of dates of return
 - Long wait at the vaccination center
 - Negative attitude of some health workers towards the program,
 - Mothers usually busy with other engagement, etc.
- 12. d
- 13. d

2.3. Key: For Learning Activity Two: Health Satellite Module

1. Pertussis Box

- A3- B. pertusis
- B5- 7 – 17 days
- C1- Whooping cough
- D1- DPT
- D3- Start at 6 weeks
- D7- IM Injection
- D10- Killed organism
- E2- Convulsion
- E4- Anaphylactic Reaction

2. Tetanus Box

- A6- C. tetani
- B4- 1 – 14 days
- C4- Lock jaw
- D1- DPT
- D3- Start at 6 weeks
- D7- IM Injection
- D8- TT vaccine
- D9- Weakened Toxin
- E2- Convulsion
- E4- Anaphylactic Reaction

3. Polio Box

- A1- Polio virus
- B3- 6 – 14 days
- C5- Muscle paralysis
- D2- Polio Vaccine
- D4- Start at birth
- D5- Oral Drop
- D12- Live attenuated
- E5- Clinical AIDS

4. Diphtheria Box

- A4- C. diphtheria
- B1- 3 – 5 days
- C3- Toxin production
- D1- DPT
- D3- Start at 6 weeks
- D7- IM Injection
- D9- Weekend Toxin
- E2- Convulsion
- E4- Anaphylactic shock

5. Tuberculosis Box

- A5- Mycobacterium
- B2- 4 weeks or longer
- C6- Chronic cough
- D4- Start at birth
- D11- BCG vaccine
- D12- Live attenuated
- D13- Intra-dermal
- E5- Clinical AIDS

6. Measles Box

- A2- Measles Virus
- B5- 7 – 18 days
- C2- Koplik's spot
- D6- Start at nine months
- D7- IM Injection
- D12- Live attenuated

Annex III

The Authors

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