

[Type the document title]

---

**THE UNITED REPUBLIC OF TANZANIA**

**MINISTRY OF HEALTH AND SOCIAL WELFARE– TANZANIA**



**IMMUNIZATION IN PRACTICE: ADAPTATION OF THE WHO IIP EIGHT  
MODULES IN TANZANIA 2014**



**USAID**  
FROM THE AMERICAN PEOPLE



**World Health  
Organization**

**unicef**  
unite for children

## Table of contents

Foreword.....	4
Chapter 1: Introduction and background of immunization in Tanzania.....	5
Chapter 2: Background of the EIGHT IIP modules.....	8
Module 1: Vaccine preventable diseases in Tanzania.....	9
Chapter 3: Module 2- Vaccines used to prevent diseases in Tanzania.....	42
Chapter 4: Module 3- The cold chain in Tanzania.....	65
Chapter 5: Module 4- Ensuring safe injections.....	90
Chapter 6: Module 5- Planning immunization sessions to reach every infant.....	102
Chapter 7: Module 6- Holding an immunization session.....	140
Chapter 8: Module 7- Monitoring and using your data.....	170
Chapter 9: Module 8- Building community support for immunization services.....	183

### **List of Abbreviations**

ADS	Auto disabled syringes
AEFI	Adverse Event Following Immunization
AFP	Acute Flaccid Paralysis
BCG	Bacille Calmette-Guérin
CCOs	Cold Chain Operators
CHMT	Council Health Management Team
CVS	Central Vaccines Store
DCCO	District Cold Chain Operator
DHO	District Health Officer
DMO	District Medical Officer
DTP – HB	Diphtheria, Pertussis, Tetanus and Hepatitis B
DTP-HepB-Hib	Pentavalent Vaccine
DRCHCO	District Reproductive and Child Health Coordinator.
DVS	District Vaccine Stores
DQA	Data Quality Audit
DQSA	Data Quality Self Assessment
EPI	Expanded Programme on Immunization
HMIS	Health Management Information System.
MCH	Maternal and Child Health
MNT	Maternal and Neonatal Tetanus
NBS	National Bureau of Statistics
NIDs	National Immunization Days
OPV	Oral Polio Vaccine
PHCC	Primary Health Care Committee
RAS	Regional Administrative Secretary
RCHS	Reproductive and Child Health Services
RED	Reaching Every District
RMO	Regional Medical Officer
RVS	Regional Vaccines Store
SIAs	Supplemental Immunization Activities.
SNIDs	Sub National Immunization Days
TDHS	Tanzania Demographic Health Survey
UNICEF	United Nations Children’s Fund
VVM	Vaccine Vial Monitor
WHA	World Health Assembly
WHO	World Health Organization
VAPP	Vaccine Associated Paralytic Polio

## **Foreword**

Tanzania has been doing well in reducing child mortality in line with the millennium development goal number four. This has been possible due to various efforts by a number of stakeholders working tirelessly to prevent deaths of such vulnerable populations. Of its own importance was the commitment by the government through the National Development vision 2025, the national social development vision and the Poverty reduction strategy Paper. These all emphasize health as an important ingredient to economic and national development of the country. In line with the millennium development goals, these visions and commitments by the government helped to focus on prevention of children deaths, in particular the vaccine preventable ones. As a result, much has been done to improve immunization through its Expanded Program on Immunization (EPI).

IVDP operates under the directorate of Preventive Health Services in the Ministry of Health and Social Welfare (MOHSW). Expansion of activities by EPI has resulted into coverage of 76.8% of all health facilities in the country. Coverage of immunization is projected to reach 85% of all available health facilities in 2014. Such rapid growth of immunization services in Tanzania worth commending. More has to be done, to ensure effective vaccination and use of this coverage to reach as many children as possible. In this way, the overall goal can be realized.

Challenges exist despite the achievements seen thus far. Such challenges and barriers include various information and guidance that are not carefully made to fit the local context of Tanzania. The IIP guide exists and so are the National policy on immunization and vaccine development, Reach every child strategy, Expanded Program of Immunization multi-year plan, and many others. These are not yet integrated into a mainstay immunization in practice. Under such circumstances, focus is lost. Every time a new vaccine is introduced, a new framework must be in place to accommodate it. In this regard, John Snow Inc, in collaboration with Ministry of Health and Social Welfare, and other partners, worked together to start adaptation of the WHO's IIP modules. This will help to synchronize the international accepted standards on immunization with the local context.

Adaptation of the eight modules in the WHO's IIP to the context of Tanzania will help standardize the practice, simplify introduction of new vaccines, and equip health workers with simplified ways of adaptation to the new and yet standard operating procedures. It is our hope that this work will help save more lives and improve lives of children in Tanzania.

## Chapter 1

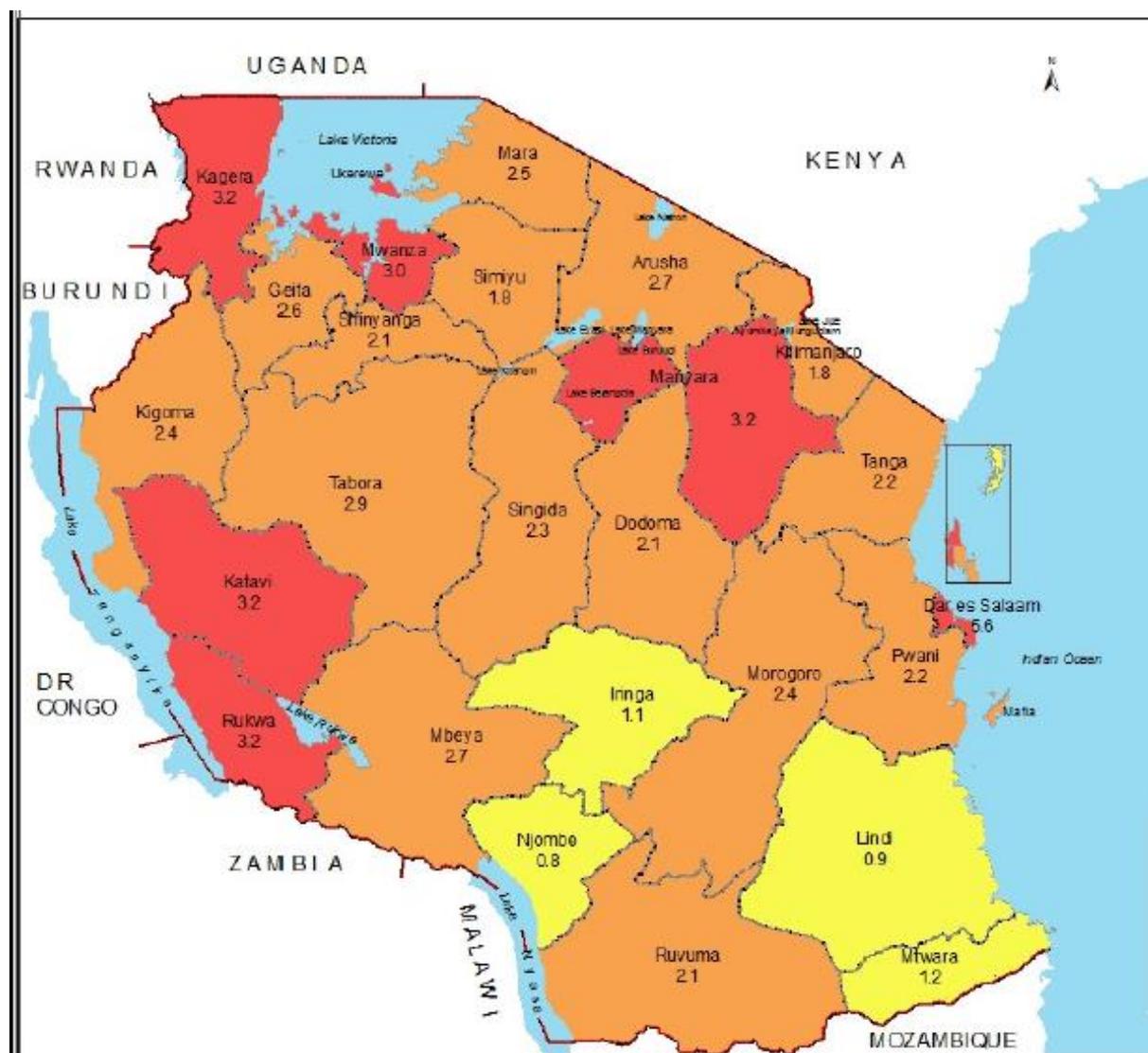
### Introduction

#### 1. Tanzania: Background and information on demographics

##### 1.1 Geographical

The United Republic of Tanzania is composed of Tanzania Mainland and Zanzibar islands. The mainland covers an area of approximately 945,050 Km<sup>2</sup> with a total of 59,050 Km<sup>2</sup> of inland waters. Tanzania mainland and Zanzibar both have separate ministries of health. In this regard health is not a Union Government matter. In this document, ministry of health will be referred as the mainland ministry of health and social welfare.

*Fig 1.1: Regions of Tanzania*



## **1.2 Administrative regions and districts: Tanzania mainland**

Tanzania Mainland has 26 regions. Each region is further subdivided into districts, municipal and Town councils. Thus, the mainland has a total of 162 councils. Councils are further subdivided into divisions, wards, and lastly villages. The council is the most important administrative and implementation unit for public services. For this reason the Ministry of Health and Social Welfare (MOHSW) in collaboration with the Prime Minister's Office Regional Administration and Local Government (PMORALG) through the Health Sector and Local Government reforms are currently strengthening the district health services, making the districts the focus for health development.

## **1.3 Demographic and Socio-economic**

The Tanzania Mainland is estimated to have a total of 47,777,220 people in 2014. The annual population growth of 2.9% means an increase in child population in the country. In 2014, Tanzania mainland is estimated to have 1,800,246 children under one year of age. Approximately 77% of the population resides in rural areas. Crude birth rate is 43.2 per 1,000 populations and life expectancy at birth is estimated at 58 years. In 2010, the child mortality rate was estimated to be 81 per 1000 live births and an infant mortality rate of 51 per 1000 live births.

## **1.4 Immunization in Tanzania: The Expanded Programme on Immunization**

The EPI in Tanzania was established in 1975 to protect children from deaths from Vaccine Preventable Diseases. This would ultimately contribute to the reduction of infant and child mortality rates. It runs under the Reproductive and Child Health (RCH) Section of the MOHSW.

EPI works with Medical Stores Department (MSD) to clear and store vaccine at national level and then it distribute them and other supplies to the regional level. Management and monitoring of the Regional and District EPI transport is done by the Central Transport Unit and monitoring and evaluation of EPI data is done by the Health Management Information System (HMIS). The EPI Unit has continued with the responsibilities of policy and guideline formulation, specific training and supervision to ensure services are of quality, and accelerated diseases control activities (Polio Eradication, Measles Control and Neonatal Tetanus (NNT) Elimination).

The EPI Programme Manager is the overall in charge of the Programme activities including administration, monitoring/evaluation, cold chain/logistics, new vaccine development and research, and training and Communication. The national level is responsible for formulating policies, guidelines and standards for strategic planning and budgeting. Other functions include monitoring, training, technical support, supervision, facilitating procurement of vaccines, equipments /related supplies and ensuring adherence to quality service delivery.

At regional level, there is a Regional Immunization Vaccine Officer (RIVO) and Regional Reproductive and Child Health Coordinator (RRCHCO) answerable to the Regional Medical Officer (RMO). Also is responsible for managing the Regional Vaccine Store. At District/Council level, there is a District Immunization Vaccine Officer (DIVO) and District Reproductive and Child Health Coordinator (DRCHCO) answerable to the District Medical Officer (DMO). Before the implementation of the health sector reform, they were responsible for management and coordination of immunization activities in the district, providing

technical support to health workers in immunization services and distribution of vaccines and supplies monthly. After the reform they were not included as part of the newly established District/Council Health Management Team (CHMT).

At health facility level, implementation of immunization activities is done by a Public Health Nurse (PHNB) responsible for immunization, social mobilization, outreach activities and record keeping. The human resource crisis in the health sector has resulted in the MCH Aide/Medical Attendant to run all activities in some health facilities. Staff have high moral obligation and commitment towards immunization but they lack motivation due to scarcity of funds, trainings and transport.

## **2. Immunization in Tanzania**

Tanzania provides immunization services countrywide both on routine and non-routine basis. This service is available on public and private facilities free of charge. As high as 78.8% of a total of 5,588 health facilities in the country provides immunization services. This figure is projected to reach 85% in 2014. Eighty five percent of all planned outreach sessions out of the 74,358 were conducted in 2008. (2008, *EPI Annual Evaluation Meeting Report*)

With regards to routine immunization, Tanzania provides the following vaccines: BCG, OPV, DTP-HepB-Hib (pentavalent), pneumococcal, rotavirus, TT, vitamin A, and Measles. Hepatitis B vaccine was introduced in January 2002 and *Haemophilus Influenzae* B in April 2009. Table 1 shows the vaccination schedule in Tanzania. Pneumococcal and Rotavirus vaccines were introduced in 2013.

Tanzania Mainland was the only country in the region giving the first dose of DTP-HepB-Hib and OPV at 4 weeks. Since 2012 WHO recommended the first dose of OPV and DTP-HepB-Hib to be given at 6 weeks; furthermore, this schedule is appropriate for integration with new vaccines such as rotavirus vaccine, whose first dose is recommended to be given at six weeks, and will also reduce the caretaker contacts to the clinic. Human papilloma vaccine (HPV) was also recommended to be integrated into the vaccination schedule for prevention of cervical cancer for women.

Since the introduction of EPI in 1975 to 1984, routine immunization DPT3 coverage was below 60%. In 1985, the coverage started to improve after the introduction of Universal Child Immunization (UCI) from 67% in 1985 to 85% in 1988. UCI was a multi-sectoral approach to booster immunization with commitment from higher political, religious and other community leaders and resulted in increased public awareness and reception of immunization services. Coverage was maintained above 80% until initiation of implementation of the Health Sector Reform in 1996; subsequently the coverage dropped to below 80%. In 2001, the country started to receive GAVI support which contributed to increase in the coverage from 79% in 2000 to 94% in 2004, following which, the coverage started to decrease gradually to 83% in 2007, the lowest in the past 10 years.

Tanzania was among the five countries in the East Southern Africa countries with the highest number of unvaccinated children in 2008 and 2009. The trend of unvaccinated children has increased every year since 2004 to 2009. It was in 2009, the country decided to introduce the Reaching Every Child (REC) approach to address the large numbers of unvaccinated children. A total of 51 districts in 16 regions were selected for focused support using 2008 data and had 83.4% (216,185) of the unvaccinated children in the country. Cascaded trainings

[Type the document title]

---

were conducted on the REC approach up the health facility level, following which implementation of planned activities was done in 510 health facilities. All 51 districts included EPI activities in their Comprehensive Council Health Plans (CCHP). Twenty-eight districts were able to reduce the number of unvaccinated children by 57% compared with 2008 data. In addition, the number of District that achieved above 80% coverage increased from 19 to 27.

## **CHAPTER 2**

### **Background of the EIGHT modules**

The Immunization in practice, IIP, is a practical guide for immunization targeting districts and health facility staff. It was made by the World Health Organization (WHO) and intends to improve immunization services in order to reach more infants in a sustainable way. Originally, it was built upon the success of polio eradication. It consists of EIGHT modules, based on a global context that might not be relevant to each country, and therefore needs to be adopted and tailored to the need and context of a country under implementation.

In Tanzania the John Snow, Inc (JSI) under its MCHP project aims to support the Ministry of Health and Social Welfare (MOHSW) through the process of immunization. This is through vaccine development, capacity building, and help to ensure smooth introduction and immunization using new developed vaccines for all needy groups and populations in Tanzania. JSI through its MCHIP Tanzania team is involved in measles second dose introduction nationally and providing technical support in the country. As part of the global efforts to ameliorate vaccine preventable diseases in Tanzania, it is important to adapt the WHO IIP modules. Therefore the aim of this document is to streamline the WHO eight modules of IIP into the Tanzanian context, to render it practical and effective in the efforts of combating preventable diseases among children and other vulnerable populations.

## **MODULE 1: Target diseases**

### **About this module**

This module describes vaccine preventable diseases in Tanzania. These are diseases that are targeted by immunization programs in the country. Such diseases are described according to the vaccination schedule as stipulated by the policy guideline of immunization and vaccine development. They include Polio, Tuberculosis, Diphtheria, Tetanus, Pertussis, Pneumococcal disease (meningitis and pneumonia), Rotavirus diarrhoea, Hepatitis B, Haemophilic influenza type B, Measles, and Rubella.

According to the goal set by the United Nations General Assembly special session on children in 2002, the national coverage for immunization under one year of age should be 90% and at district level should be 80%. In Tanzania, the mission of the policy guideline for immunization and vaccine development and that of ministry of health and social welfare aim to provide quality immunization services which are proportional, equitable, affordable, sustainable, and gender sensitive. Also to ensure that all healthy employees and providers deliver health services to achieve the improved health status of the public.

In this module, the following contents of each disease will be described: Disease aetiology and definition; transmission or spread; signs and symptoms; complication; treatment or management; prevention and vaccination.

## **1. Poliomyelitis (polio)**

### **1.1 What is poliomyelitis?**

Poliomyelitis (also known as polio), is a crippling disease caused by Poliovirus, a single stranded RNA virus and a member of the family Picornaviridae. Poliovirus has three serotypes of poliovirus. These are poliovirus types 1, 2 and 3. According to the WHO, the standard case definition of polio, which is also adapted in Tanzania, is a suspected case with isolation of poliovirus in stool or rarely from CNS fluid and blood specimens collected from the suspected case or from a close contact of the suspected case.

#### ***Acute Flaccid Paralysis (AFP) case definition (What are we looking for?):***

*Acute Flaccid Paralysis (AFP) is defined as any child under 15 years of age with acute (sudden onset), flaccid paralysis (weakness of the limb – arm, leg or both), or any person of any age when paralytic illness if polio is suspected by a clinician*

### **1.2 How is polio spread?**

Polio is spread through the faecal/oral route. Polioviruses spread very easily in areas with poor hygienic conditions. The virus enters the body through the mouth when people eat food or drink water that is contaminated with faeces. It multiplies in the intestine, enters the bloodstream, and ultimately, it may invade certain types of nerve cells, where it can damage or destroy it.

Children living in a contaminated household are most vulnerable. Nearly all children living in households where someone is infected become infected themselves. They can further spread the virus through faeces that will be contaminated with similar virus. Children are most likely to spread the virus between 10 days before and 10 days after they experience the first symptoms of the disease. The incubation period is 6 to 20 days. The great majority of people who are infected may not present with symptoms even when they are potential to disease transmission.

### **1.3 What are the signs and symptoms of polio?**

Most people infected by polio do not show any sign and symptoms associated with the disease. In fact, about less than 5% of the infected individuals may have general flu-like symptoms including fever, headache, loose stools, sore throat, or stomach-ache. People infected with poliovirus infection without symptoms develop immunity and have lifelong protection against poliomyelitis and paralytic polio.

The crippling condition, the paralytic polio begins with mild symptoms and fever and other constitutional ailments. These symptoms are followed by severe muscle pain and paralysis, which usually develop during the first week of illness. Patients may lose the function of one or both arms or legs. In most people the paralysis affects the legs and arms. Most recover from the paralysis. A few of the patients get affection of respiratory muscles and are ones who die from the disease.

A diagnosis of polio is confirmed by laboratory testing of stool specimens or rarely CNS and blood samples as defined in the case definition.

#### **1.4 What is the treatment for polio?**

The initial symptoms including muscle pain, fever, and other constitutional symptoms can be relieved. However, to date, no treatment exists to cure paralysis from polio. A respirator can help patients who have difficulty in breathing especially when respiratory muscles have been affected. Regular physical therapy, as well as orthopedic treatment and operations and the use of braces, can help reduce the long-term crippling effects of polio. However without adequate physiotherapy the paralyzed limbs might not regain full function, often leaving a child seriously crippled and disabled for life.

#### **1.5 How is polio prevented?**

Polio can be prevented through immunization with oral polio vaccine (OPV) or inactivated polio vaccine (IPV). OPV is recommended for both routine immunization and supplementary campaigns for polio eradication. IPV is also an effective vaccine. But OPV is less expensive, safe, and easy for health workers and volunteers to administer.

#### **1.6 What are the eradication goals and strategies for polio?**

All member states of WHO agreed in 1988 to eradicate polio. Since the global initiative to eradicate polio was launched, the number of reported cases of polio has been reduced from an estimated 350 000 in 1988 to 483 cases associated with wild poliovirus in 2001. The last case of polio in Tanzania was reported in 1996

There are four core strategies to stop transmission of the wild poliovirus: -

- High infant immunization coverage with four doses of oral polio vaccine in the first year of life;
- Supplementary doses of oral polio vaccine to all children under five years of age during national immunization days (NIDs);
- Surveillance for wild poliovirus through reporting and laboratory testing of all cases of acute flaccid paralysis (AFP) among children under fifteen years of age;
- Targeted “mop-up” campaigns once wild poliovirus transmission is limited to a specific focal area.

Strategies to also eradicate the wild type of poliovirus in countries with such virus are underway.

#### **Key points**

Polio is caused by any of three polioviruses serotypes and can easily spread by the fecal /oral route.

Many people/children who are infected with poliovirus do not become paralyzed but may still spread the disease to others.

Less than one in 100 non-immunized children infected by poliovirus develop paralysis.

The recommended method of prevention in children is immunization with oral polio vaccine (OPV) but also IPV may be used.

## **2. Tuberculosis (TB)**

### **2.1 Tuberculosis- definition and etiology**

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis* that usually attacks the lungs. Tuberculosis can also affect all other parts of the body and the condition is known as extra-pulmonary tuberculosis.

Fewer of the people infected with tuberculosis bacteria can eventually develop the disease. People who are infected may not feel ill and may have no symptoms. People who are infected but who do not develop the disease do not spread the infection to others. After the infection, the bacteria may lie dormant for life. It can however cause disease in an event of low immunity such as the one caused by infections including HIV/AIDS, malignancies, or under nutrition. Globally in 2001, TB caused approximately two million deaths. Tanzania too is not exception on the magnitude and sheer effect of TB. It is a disease of public health importance.

### **2.2 How is TB spread?**

TB is spread from one person to another through the air often when a person with the disease coughs or sneezes. TB spreads rapidly, especially in areas where people are living in crowded conditions and inadequate flow of air, have poor access to health care, and are malnourished. Consuming raw milk from infected cattle transmits a variety of animal-transmitted TB, also known as bovine tuberculosis.

People of all ages can contract tuberculosis. However, the risk of developing TB is highest in children younger than three years old and in older people. People with TB infection who have weakened immune systems (for example, people with HIV/AIDS) are more likely to develop the disease.

### **2.3 What are the signs and symptoms of TB?**

The period from infection to development of the first symptoms is usually 4 to 12 weeks, but the infection may persist for months or even years before the disease develops. A person with the disease can infect others for several weeks after he or she begins treatment.

The symptoms of TB include general weakness, weight loss, fever, and night sweats. In called pulmonary tuberculosis, the symptoms include persistent cough, coughing up of blood, and chest pain. In young children, however, the only sign of pulmonary TB may be stunted growth or failure to thrive. Other signs and symptoms depend on the part of the body that is affected. For example, in tuberculosis of the bones and joints there may be swelling, pain, and crippling effects on the hips, knees, or spine.

### **2.4 What are the complications of TB?**

TB can present in many ways and may be very difficult to diagnose. Untreated TB results in debility and death. This may be more rapid in persons infected with HIV/AIDS.

### **2.5 What is the treatment for TB?**

People with TB must complete a course of therapy, which usually includes taking two or more anti-tuberculosis drugs for at least six months. This is often called DOTS, for (Directly Observed Treatment Schedule). Unfortunately, some people fail to take the medications as prescribed or to complete their course of therapy. When people who have developed TB fail to complete standard treatment regimens or are given the wrong treatment regimen, they may remain infectious. In such cases also bacteria can be resistant to the first line of therapy or even subsequent lines. This can lead to multidrug-resistant TB, which can be dangerous if it spreads to other people.

## **2.6 How is TB prevented?**

Immunization of infants with Bacille Calmette-Guérin vaccine (BCG) can protect against TB meningitis and other severe forms of TB in infants. BCG vaccine is not recommended after 12 months of age because the protection provided is variable and less certain.

In Tanzania, BCG vaccine is given at birth. According to the IMCI guideline, health workers are advised to repeat if no BCG scar is seen. This should be done before the recommended age of maximum BCG vaccination.

Treatment of TB in Tanzania is based on the guidelines of management of TB by the IMCI, and TB and leprosy programs. In all circumstances, DOTS is the mainstay treatment method.

### **Key points**

TB usually affects the lungs but can also affect other parts of the body, including the bones, joints, and brain.

TB is spread through the air droplets.

The symptoms of TB include general weakness, weight loss, fever, and night sweats.

People who develop TB must complete a course of drug therapy or they can spread the disease to others.

The recommended method of prevention for children who are younger than 12 months old is to immunize them as soon after birth as possible with BCG vaccine.

### 3. Diphtheria

#### 3.1 What is diphtheria?

Diphtheria is caused by the bacterium *Corynebacterium diphtheriae*. This germ produces a toxin that can harm or destroy human body tissues and organs. One type of diphtheria affects the throat and sometimes the tonsils. Another type, more common in the tropics, causes ulcers on the skin.

Diphtheria affects people of all ages, but most often unimmunized children. In temperate climates, diphtheria tends to occur during the colder months. In 2000, 30 000 cases and 3000 deaths of diphtheria were reported worldwide.

**In Tanzania, the last reported cases of diphtheria were in 1983 (MOHSW reports).** The presence of this infection worldwide still necessitates vaccination for prevention of all young children.

#### 3.2 How is diphtheria spread?

Diphtheria is transmitted from person to person through close physical and respiratory contact. It can cause infection of the nasopharynx, and may lead to breathing difficulties and other complications including death.

#### 3.3 What are the signs and symptoms of diphtheria?

When diphtheria affects the throat and tonsils, the early symptoms are sore throat, loss of appetite, and slight fever. Within two to three days a bluish-white or grey membrane forms in the throat and on the tonsils. This membrane sticks to the soft palate of the throat and may bleed. If there is bleeding, the membrane may become grayish-green or black. The patient may either recover at this point or develop severe weakness and die within six to ten days. Patients with severe diphtheria do not develop a high fever but may develop a swollen neck and obstructed airway.

#### 3.4 What are the complications of diphtheria?

During the early phase of the illness or even weeks later, patients may develop abnormal heartbeats, which can result in heart failure. Some patients with diphtheria experience inflammation of the heart muscle and valves, leading after many years to chronic heart disease and heart failure. The most severe complication of diphtheria is respiratory obstruction followed by death.

#### 3.5 What is the treatment for diphtheria?

Children who develop diphtheria should be given diphtheria antitoxin and antibiotics, such as erythromycin or penicillin. They should be isolated to avoid exposing others to the disease. About two days after starting antibiotic treatment patients are no longer infectious.

For confirmation of diagnosis, health workers should obtain throat cultures from suspect cases. However, treatment should begin without waiting for culture results.

Treatment in Tanzania is based on the IMCI guideline. In this guide, a child suspected of diphtheria should be managed using injectable procaine penicillin for seven days, and diphtheria antitoxin. Severe cases should be administered with oxygen and or tracheostomy when airways obstruction is suspected. These should be done by specialized health workers.

### **3.6 How is diphtheria prevented?**

The most effective way of preventing diphtheria is to maintain a high level of immunization in the community. In most countries, diphtheria TOXOID vaccine is given in combination with tetanus toxoid, pertussis, Hepatitis B and *Haemophilus influenzae* type b (Hib).

#### **Key points**

Diphtheria is spread from person to person in airborne droplets.

Symptoms of the disease include sore throat, loss of appetite, and a slight fever.

Patients with the disease can experience complications such as abnormal heartbeats and inflammation of the heart muscle and valves.

Children with diphtheria should be treated with diphtheria antitoxin and antibiotics.

The most effective way of preventing the disease is to maintain a high level of immunization within a community.

Treatment in Tanzania is based on the IMCI guideline.

## 4. Tetanus

### 4.1 What is tetanus?

Tetanus is acquired through exposure to the spores of the bacterium *Clostridium tetani*, which are universally present in the soil. The disease is caused by the action of a potent neurotoxin produced during the growth of the bacteria in dead tissues, e.g. in dirty wounds or in the umbilicus following non-sterile delivery.

People of all ages can get tetanus. But the disease is particularly common and serious in newborn babies. This is called neonatal tetanus. Most infants who get the disease die.

Neonatal tetanus is particularly common in rural areas where most deliveries are at home without adequate sterile procedures. In 2000, WHO estimates that neonatal tetanus killed about 200 000 babies. **In Tanzania 5 cases of neonatal tetanus cases were reported in 2010.**

#### Standard case definitions:

**Suspected case:** Any neonatal Deaths between 3-28 days in which the cause of death is unknown

**Confirmed case:** Any neonate with normal ability to suck and cry during the first 2 days of life and between 3-28 days of age cannot suck normally and becomes stiff or has convulsion or both

### 4.2 How is tetanus spread?

Tetanus is not transmitted from person to person. A person usually becomes infected with tetanus when dirt enters a wound or cut. Tetanus germs are likely to grow in deep puncture wounds caused by dirty nails, knives, tools, wood splinters, and animal bites. Women face an additional risk of infection if a contaminated tool is used during childbirth or during an abortion.

A newborn baby may become infected if the knife, razor, or other instrument used to cut its umbilical cord is dirty, if dirty material is used to dress the cord, or if the hands of the person delivering the baby are not clean.

Infants and children may also contract tetanus when dirty instruments are used for circumcision, scarification, and skin piercing, and when dirt, charcoal, or other unclean substances are rubbed into a wound.

### 4.3 What are the signs and symptoms of tetanus?

The time between getting the infection and showing symptoms is usually between three and 10 days. But it may be as long as three weeks. The shorter the incubation period the higher the risk of death.

In children and adults muscular stiffness in the jaw is a common first sign of tetanus. This symptom is followed by stiffness in the neck, difficulty swallowing, stiffness in the stomach muscles, muscle spasms, sweating, and fever. Newborn babies with tetanus are normal at birth, but stop sucking between three and 28 days after birth. They stop feeding and their bodies become stiff while severe muscle contractions and spasms occur. Death follows in most cases.

#### **4.4 What are the complications of tetanus?**

Fractures of the spine or other bones may occur as a result of muscle spasms and convulsions. Abnormal heartbeats and coma can occur, as can development of pneumonia and other infections. Death is particularly likely in the very young and in old people.

#### **4.5 What is the treatment for tetanus?**

Tetanus at any age is a medical emergency best managed in a referral hospital.

Treatment for neonatal tetanus generally includes administration of tetanus antitoxin and muscle relaxants and parenteral feeding.

- **Control of muscle spasms.** The patient should be admitted to a quiet, darkened room where all possible auditory, visual, tactile, or other stimuli are minimized. The first priority in spasm management should be the administration of appropriate drugs to reduce the number and the severity of spasms. Diazepam (Valium) has proved to effectively control spasms and hyper tonicity without depressing the cortical centers.
- **Antitoxin therapy.** After adequate sedation has been achieved, human tetanus immunoglobulin should be given intramuscularly in a single dose (3,000 to 6,000 IU). If human serum immunoglobulin is unavailable, tetanus antitoxin should be given, assuming sensitivity reactions to horse serum are negative. The antitoxin is given intravenously and intramuscularly (half of the dose via each route).
- **Antimicrobial therapy.** The antimicrobial drug of choice is oral (or intravenous) metronidazole (30 mg/kg/day, given at six hour intervals; maximum 4 g/day), which is used to eliminate vegetative forms of *C. tetani*. Parenteral penicillin G (100,000 U/kg/day) is an alternative. Treatment for 10 to 14 days is recommended.
- **Wound treatment.** After the patient has been sedated and received antitoxin, the wound should be thoroughly cleansed and debrided.
- **Supportive treatment.** Oxygen should be available. During early stages, oral feeding should be avoided because of the danger of aspiration.

#### **4.6 How is tetanus prevented?**

Immunizing infants and children with **pentavalent (DTP-HB-Hib)** and adults with tetanus toxoid (TT) prevents tetanus.

Neonatal tetanus can be prevented by immunizing women of childbearing age with tetanus toxoid, either during pregnancy or out of gestation period. This protects the mother from tetanus and enables tetanus antibodies to be transferred to her baby.

Hospital delivery and clean practices are especially important when a mother is delivering a child, even if she has been immunized. People who recover from tetanus do not have natural immunity and can be infected again and therefore need to be immunized.

In Tanzania, Pentavalent vaccine is provided at 6 weeks, 10 weeks, and 14 weeks. TT vaccine is given at the age of 15-49 years.

#### **4.7 Global accelerated disease control issues**

WHO, UNICEF and UNFPA agreed to set the year 2005 as the target date for worldwide elimination of neonatal tetanus. This implies the reduction of neonatal tetanus incidence to below one case per 1000 live births per year in every district. This goal was reaffirmed by the United Nations General Assembly Special Session (UNGASS) in 2002. Because tetanus

## [Type the document title]

---

survives in the environment, eradication of the disease is not feasible and high levels of immunization have to continue even after the goal has been achieved.

To maintain the elimination goal, the following are emphasized:

- Improve the percentage of pregnant women immunized with tetanus toxoid.
- Administer tetanus toxoid to all women of childbearing age in high-risk areas. This is usually implemented through a three round campaign approach.
- Promote hospital delivery with clean delivery and cord care practices.
- Improve surveillance and reporting of neonatal tetanus cases.

Tanzania had achieved elimination of the disease since 2012. Strengthening the routine tetanus immunization is a strategy to maintain such elimination status.

### **Key points**

Tetanus is caused by bacteria found in the environment.

Infection occurs during unclean delivery of babies, when contaminated objects are used to cut the umbilical cord, or anytime tetanus bacteria enter a puncture or cut in the skin.

Neonatal tetanus remains a serious problem in countries with poor immunization coverage and unclean practices at childbirth.

Most newborns with tetanus die.

The best way to prevent tetanus is to immunize with pentavalent vaccine for children and tetanus toxoid for adults and to clean wounds thoroughly and remove dead tissue.

The best way to prevent neonatal tetanus is to immunize women of childbearing age (or pregnant women) and to ensure clean delivery and cord care practices.

## 5. Pertussis

### 5.1 What is pertussis?

Pertussis, or whooping cough, is a disease of the respiratory tract caused by bacteria that live in the mouth, nose, and throat. Many children who contract pertussis have coughing spells that last four to eight weeks. The disease is most dangerous in infants. Pertussis affects a total of 16 million children and caused about 195,000 deaths in children in 2008 alone (WHO data).

### 5.2 How is pertussis spread?

Pertussis spreads very easily from child to child in droplets produced by coughing or sneezing. Children exposed to the germs become infected. In many countries the disease occurs in regular epidemic cycles of three to five years.

### 5.3 What are the signs and symptoms of pertussis?

The incubation period is five to 10 days. At first, the infected child appears to have a common cold with runny nose, watery eyes, sneezing, fever, and a mild cough. The cough gradually worsens, and involves many bursts of rapid coughing. At the end of these bursts the child takes in air with a high-pitched whoop. The child may turn blue because he or she does not get enough oxygen during a long burst of coughing. Vomiting and exhaustion often follow the coughing attacks, which are particularly frequent at night.

During recovery coughing gradually becomes less intense. Children usually do not have a high fever during any stage of the illness.

### 5.4 What are the complications of pertussis?

Complications are most likely in young infants. The most common and deadly complication is bacterial pneumonia.

Children may also experience complications such as convulsions and seizures due to fever or reduction in oxygen supply to the brain. This is caused either by coughing attacks or by toxins released by the pertussis bacteria. They may also experience loss of appetite, inflammation of the middle ear, and dehydration.

### 5.5 What is the treatment for pertussis?

Treatment with an antibiotic, usually erythromycin, may make the illness less severe. Because the medication kills bacteria in the nose and throat, the use of antibiotics also reduces the ability of infected people to spread pertussis to others.

Children infected with pertussis should get plenty of fluids to prevent dehydration. In Tanzania, treatment follows the IMCI guidelines.

### 5.6 How is pertussis prevented?

Prevention involves immunization with pentavalent vaccine. This is usually given in combination with diphtheria, tetanus, Hepatitis B and *Haemophilus influenzae* type b (Hib). The vaccine is known as Pentavalent.

According to the immunization schedule in Tanzania, pentavalent vaccine is given at 6 weeks, 10 weeks, and 14 weeks to complete the schedule.

[Type the document title]

---

**Key points**

Pertussis, or whooping cough, is a disease of the respiratory tract.

Pertussis is a bacterial infection spread from person to person by sneezing and coughing.

Infants and young children are most likely to be infected, to have serious complications, and to die from the disease.

The most effective way to prevent pertussis is to immunize all infants with pentavalent vaccine.

## 6. Pneumococcal disease

### Epidemiology of pneumococcal diseases

It is a serious caused by an infection caused by the *Streptococcus pneumoniae*. It is commonly found in the nose and throat of healthy people without causing disease. It can spread to different parts of the body to cause a variety of diseases, one of which is pneumonia. The most common types of pneumococcal infections include pneumonia, middle ear infections (otitis media), sinus infections, bacteremia, and meningitis. Other pneumococcal infections include febrile bacteremia, arthritis, peritonitis, osteomyelitis and bronchitis.

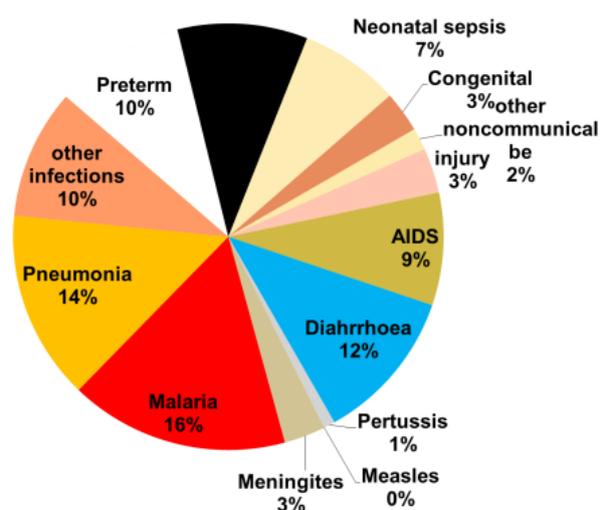
### Disease Burden

Pneumonia is the single largest cause of death in children worldwide. Every year, it kills about 1.4 million children under the age of five years. In Africa, it is responsible for 18% of below 5 years mortality. Infants have the highest rates of pneumococcal disease, while the most at-risk group are children below two years of age.

**In Tanzania**, pneumococcal infection is among the leading causes of deaths in children under the age of five years and contributes to about 14% of overall under five years mortality. WHO estimates that the number of severe illness cases and deaths from Hib and *Streptococcus pneumoniae* in children from one month to less than five years of age in Tanzania are:

- About 104,095 cases of *Haemophilus influenzae* type b with 6,459 deaths
- Whereas *Streptococcal pneumoniae* cases are 222,256 with annual estimated deaths among under 5 children is 15,206

**Figure 6.1: Causes of under five years mortality in Tanzania**



### **Mode of Transmission**

The disease is spread from person to person. It spreads through breathing, sneezing and coughing by droplets in the air. The pneumococcal bacteria are common inhabitants of the human respiratory tract. They may be isolated from the nasopharynx in 5–70% of normal, healthy adults.

### **Signs and symptoms**

The symptoms of pneumonia include cough, fever, rapid or difficult breathing, chills and loss of appetite. When pneumonia is severe, children may experience lower chest in-drawing. Infants may be unable to feed or drink and may also lead to loss of consciousness, hypothermia and convulsions.

Complications of pneumococcal diseases include empyema (pus in the pleural space), pericarditis (inflammation of the sac surrounding the heart), endo-bronchial obstruction with atelectasis (collapse of lung tissue) and lung abscess formation.

### **Control and management**

Adequate nutrition is important in improving child's natural defenses. Exclusive breastfeeding for the first six months of life prevents pneumonia and helps to reduce the length of the illness if a child does become ill.

In reducing risks of spread of infection in children encourage good hygiene; avoid overcrowded houses and indoor air pollution. In children infected with HIV, cotrimoxazole when given daily will decrease the risk of contracting pneumonia.

Management of severe childhood Acute Respiratory Infection (ARI) and meningitis are managed with antibiotics according to IMCI guideline. Hospitalization is recommended for severe cases and infants aged two months or younger. In many countries however, strains of pneumococcus are becoming increasingly resistant to some commonly used antibiotics. Pneumococcal infections which are resistant to the commonly used antibiotics require treatment using other broad spectrum and expensive antibiotics.

### **Prevention**

Immunization against pneumococcus, Haemophilus Influenza B, measles and whooping cough (pertussis) is the most effective way to prevent pneumonia. Preventing pneumonia in children is an essential component of a strategy to reduce child mortality. **Tanzania has also introduced pneumococcal vaccine (PCV) since 2013. The vaccine, also known as PCV 13, is given at week 6, 10, and 14. Three doses are thus provided.**

## 7. Rotavirus diarrhoea

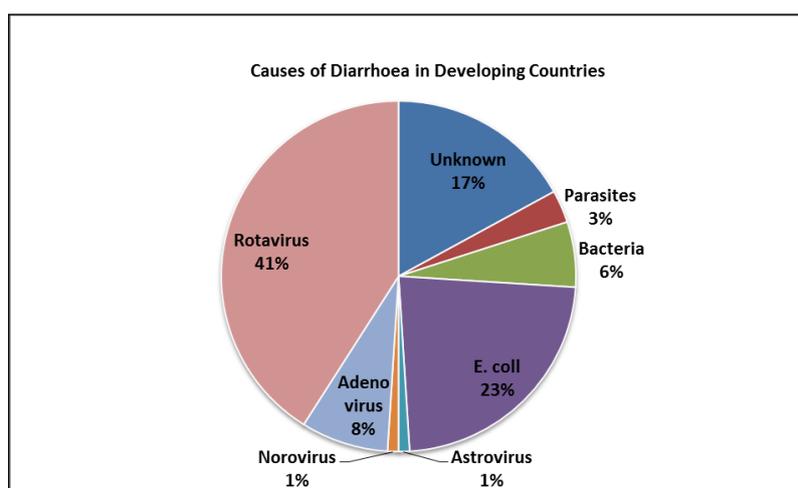
### Epidemiology of Rotavirus

#### Diarrhea Diseases

Globally diarrhea disease is the second leading cause of death in children under five years old, and is responsible for killing 1.5 million children every year. It is estimated that there are about two billion cases of diarrhea disease every year. Mainly affects children under two years old. It is a leading cause of malnutrition in children under five years old. In developing countries, children under three years old experience on average three episodes of diarrhea every year.

In 2008, diarrhea was responsible for approximately 15% of childhood deaths worldwide. Rotavirus contributes 41% of the total diarrhea cases in developing countries as shown in figure 8.1. In Tanzania diarrhea diseases are estimated to be responsible for 17% of all deaths in children below 5 years of age.

**Figure 8.1: Causes of Diarrhea in Developing Countries**

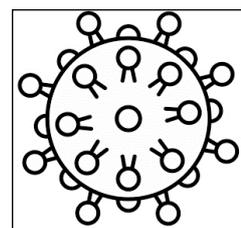


#### Rotavirus Diarrhea Diseases

A virus called rotavirus causes rotavirus diarrhea disease. Rotaviruses are the leading cause of severe, dehydrating diarrhea in children aged below 5 years globally. More than 25 million outpatient visits and 2 million hospitalizations attributable to rotavirus infections each year. In developing countries, three-quarters of children acquire their first episode of rotavirus diarrhea before the age of 12 months. Severe rotavirus gastroenteritis is largely limited to children aged 6–24 months. In Tanzania several studies indicates that rotavirus is responsible for 30 – 50% of all hospitalised children with diarrhoea.

#### Causative agent

The name rotavirus comes from the wheel-like appearance of the virus under the microscope. There are five species of rotavirus (A, B, C, D and E) and **Rotavirus A causes more than 90% of infections in**



**human.**

### **Modes of transmission**

Rotaviruses are shed in very high concentrations ( $>10^{12}$  particles/gram) and for many days in the stools and vomits of infected individuals. Transmission occurs primarily by the fecal–oral route, directly from person to person or indirectly through contaminated vomits. Rotavirus illness follows an incubation period of 1 to 2 days followed by a progression from asymptomatic to severe diarrhea. Rotavirus re infection is common, although the primary infection is usually the most severe clinically. The universal occurrence of rotavirus infections shows that clean water supplies and good hygiene are unlikely to have a substantial effect on virus transmission.

### **Signs and symptoms**

The rotavirus infection affects primarily the small intestinal villi. Destruction of the affected cells reduces digestion and absorption of nutrients, resulting in secretory diarrhea with a loss of fluids and electrolytes into the intestinal lumen. The rotavirus infection does not cause an inflammatory response, and therefore dysentery does not occur

The clinical spectrum of rotavirus disease is wide, ranging from transient mild diarrhea to severe diarrhea, which can result in dehydration, electrolyte disturbances, shock and even death. In infants aged  $>3$  months, the first exposure to rotavirus frequently results in gastroenteritis, whereas reinfections are mostly asymptomatic or cause mild disease only. In typical cases, following an incubation period of 1–2 days, the onset of disease is abrupt, with fever and vomiting followed by explosive, watery diarrhea and mucus in stool.

The diarrhea symptoms normally disappear within 3–7 days, but may last for up to 2–3 weeks. Recovery is in general complete.

### **Prevention and Control**

Although hand washing and improved sanitation has helped to reduce the incidence of diarrhea, notably those attributable to bacteria and parasites, the proportion due to viruses has not been reduced. Prevention options that address other causes of diarrhea (i.e., good hygiene, sanitation and exclusive breast feeding) are significantly less effective for children with rotavirus infections.

**Rotavirus vaccines represent the most cost effective intervention for preventing the most severe episodes of rotavirus infection. In Tanzania, Rotavirus vaccine is given at week 6 and 10**

## **8. Hepatitis B**

### **8.1 What is hepatitis B?**

Hepatitis B is caused by a virus that affects the liver. Patients who get hepatitis B usually recover. However most infants infected at birth become chronic carriers i.e. they carry the virus for many years and can spread the infection to others. Every year there are over 4 million acute clinical cases of HBV globally, and about 25% of carriers, 1 million people a year, die from chronic active hepatitis, cirrhosis or primary liver cancer (WHO 2014).

### **8.2 How is hepatitis B spread?**

The hepatitis B virus is carried in the blood and other body fluids. It is usually spread by contact with blood in the following ways:

- Through an unsafe injection or needle prick injury. Unsterilized needles or syringes can contain hepatitis B virus from an infected person, for example from a patient or a needle user.
- Transmission of the virus by mothers to their babies during the birth process, when contact with blood always occurs.
- Transmission between children during social contact through cuts, scrapes, bites, and scratches.
- Transmission during sexual intercourse through contact with blood or other body fluids.

### **8.3 What are the signs and symptoms of hepatitis B?**

The incubation period averages six weeks but may be as long as six months.

Infection in young children usually is asymptomatic. However, a larger proportion of children may become chronic carriers compared to adults.

People who do show symptoms may feel weak and may experience stomach upsets and other flu-like symptoms. They may also have very dark urine or very pale stools. Jaundice is common (yellow skin or a yellow color in the whites of the eyes). The symptoms may last several weeks or months. A laboratory blood test is required for confirmation.

Most acute infections are followed by complete recovery. However, many children become chronic carriers. People who recover from acute hepatitis B (and who do not become chronic carriers) are protected from becoming infected again throughout their lives.

### **8.4 What are the complications of hepatitis B?**

A small portion of acute infections can be severe and lead to death. The most serious complications, including chronic hepatitis, cirrhosis, liver failure, and liver cancer, occur in people with chronic infection.

### **8.5 What is the treatment for hepatitis B?**

There is no effective treatment for the acute condition. Supportive treatment is indicated. In chronic infection the disease can sometimes be stopped with medications. In Tanzania, management in districts and other health facilities is based on IMCI guidelines.

### **8.6 How is hepatitis B prevented?**

It is recommended that all infants receive three doses of hepatitis B vaccine during the first year of life. In Tanzania Hepatitis B vaccine is given in combined form as Pentavalent that

[Type the document title]

---

includes vaccines for diphtheria, tetanus, pertussis, hepatitis B (HepB) and *Haemophilus influenzae* type b (Hib). This vaccine is given at 6 weeks, 10 weeks, and 14 weeks to complete the schedule.

In Tanzania, Hepatitis B is prevented through Hep B vaccine that comes in a combination of four other vaccine, administer together. This is called pentavalent vaccine and given at week 6, 10, and 14 according to the EPI schedule.

**Key points**

Every year there are over 4 million acute clinical cases of HBV globally, and about 25% of carriers, 1 million people a year, die from chronic active hepatitis, cirrhosis or primary liver cancer.

Most of them are unaware they are carriers.

People who carry the virus often have no symptoms.

The hepatitis B virus is spread through unsafe injection practices and needle stick injuries.

The younger a person is when infected, the less likely it is that symptoms will occur. But it is more likely that he or she will become a carrier of the disease.

Most infants born to mothers who are carriers are at risk of being infected.

In Tanzania, all children should receive hepatitis B vaccine in a combination with others under pentavalent vaccine, starting at 6 weeks since birth, 10, and 14 weeks.

## 9. Measles

### 9.1 What is measles?

Measles is a highly infectious disease caused by a virus. In 2008 it was estimated that there were 278,358 measles cases and 164,000 measles-related deaths. Measles kills more children than any other vaccine preventable disease.

Because the disease is highly infectious, it tends to occur as epidemics, which may cause many deaths especially among malnourished children.

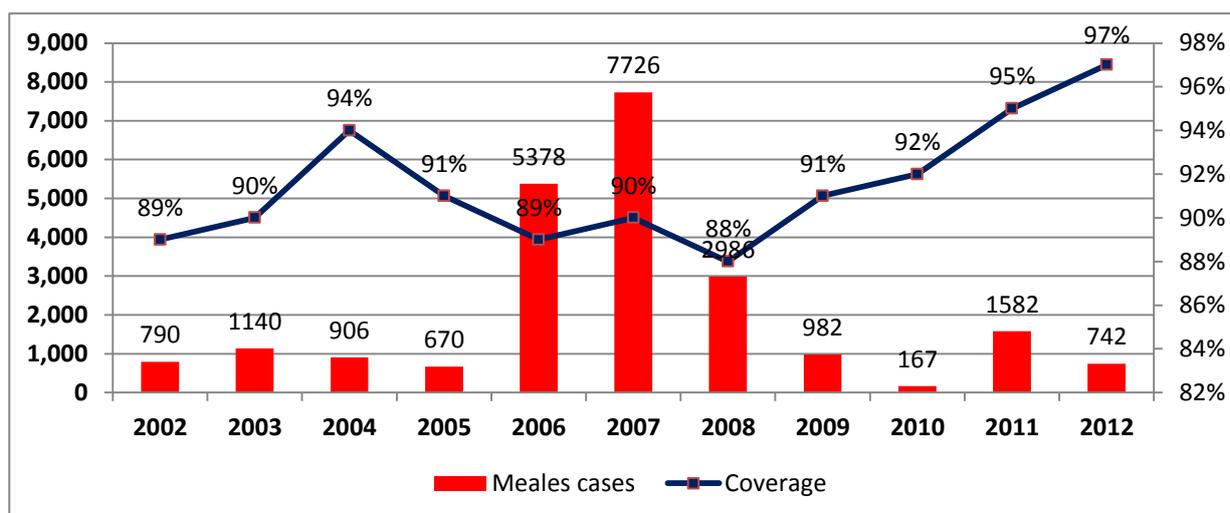
#### Definitions:

- **Suspected Case:** Any person with history of fever, skin rash and any of the following: cough, runny nose, and red eyes
- **Confirmed case:** Suspected case with lab confirmation (positive IgM antibody)

### Measles Epidemiology in Tanzania

During the pre-immunization era, measles outbreaks were commonly experienced on annual cyclic in Tanzania. They ranged between 100-800 cases /100,000 populations, mainly in the under five year age group with high case fatality rates of more than 25%. The Expanded Program on Immunization was launched in 1975 and included measles as one of the vaccines to be delivered to children at the age of 9 months. The coverage increased from 5% to 50% with subsequent decrease in incidence of measles from 800 to 600/100,000 population within the same time. The case fatality rate has decreased to less than 5% with a higher proportion of cases occurring in the children above five years.

#### *Routine measles immunization coverage and number of measles cases from 2002 to 2010(2)*



Tanzania is committed to reach the global measles elimination goal by the end of 2020 in line with the Africa regional measles elimination plan endorsed by the regional committee of Africa<sup>1</sup>. One of the activities is the introduction of MCV2 in the routine immunization<sup>1</sup>.

## **9.2 How is measles spread?**

The virus is spread by coughing and sneezing, close personal contact or direct contact with infected nasal or throat secretions. It remains active and contagious in the air or on infected surfaces for up to two hours. An infected person from four days prior to the onset of the rash to four days after the rash erupts can transmit it. The incubation period is 10 to 14 days from exposure to onset of rash. Measles outbreaks can result in epidemics that cause many deaths, especially among young, malnourished children.

## **9.3 What are the signs and symptoms of measles?**

The first sign of infection is a high fever which begins approximately 10–12 days after exposure and lasts several days. During this period, the patient may develop a runny nose, a cough, red and watery eyes, and small white spots inside his or her cheeks.

After several days, a slightly raised rash develops, usually on the face and upper neck. Over a period of about three days, the rash spreads to the body and then to the hands and feet. It lasts for five or six days and then fades. The incubation period from exposure to the onset of the rash averages 14 days, with a range of seven to 18 days.

## **9.4 What are the complications of measles?**

Unimmunized children under five years of age, and especially infants, are at highest risk for measles and its complications, including death. Infected infants may suffer from severe diarrhea, possibly causing dehydration. Children may also develop inflammation of the middle ear and severe respiratory tract infections.

Pneumonia is the most common cause of death associated with measles. This is usually because the measles virus weakens the immune system. The pneumonia may be caused by the measles virus itself or by secondary bacterial infection. Encephalitis, a dangerous inflammation of the brain, may also develop.

Severe measles is particularly likely in poorly nourished children, especially those who do not receive sufficient vitamin A, who live in crowded conditions, and whose immune systems have been weakened by HIV/AIDS or other diseases. Measles is a major cause of blindness among children in Africa and other areas of the world with endemic measles.

Children who recover from measles are immune for the rest of their lives.

## **2.5 What is the treatment for measles?**

No specific antiviral treatment exists for measles virus. Severe complications from measles can be avoided though supportive care that ensures good nutrition, adequate fluid intake and treatment of dehydration. Antibiotics should be prescribed to treat eye and ear infections, and pneumonia.

Two doses of vitamin A during treatment of measles have beneficial impact, a high dose of vitamin A given immediately on diagnosis and repeated the next day. The recommended age-specific daily doses are 50,000 IU for infants aged <6 months, 100,000 IU for infants aged 6–11 months, and 200,000 IU for children aged ≥12 months. If the child has clinical signs of vitamin A deficiency, a third dose should be given 4–6 weeks later.

### Vitamin a treatment dosage

Age	Immediately on diagnosis	Next day	Follow-up
Infants less than 6 months old	50 000 IU	50 000 IU	Third dose 2–4 weeks later if there are signs of xerophthalmia
Infants aged 6–11 months	100 000 IU	100 000 IU	
Children aged 12 months and over	200 000 IU	200 000 IU	

### 9.6 How is measles prevented?

Measles is prevented by immunization with measles vaccine. In Tanzania measles vaccine is provided within routine immunization schedule when a child has **completed 9 months and 18 months the other opportunities are provided through mass immunization campaigns conducted every 3 years.** The measles vaccine is safe, effective and inexpensive.

### 9.7 Global accelerated disease control issues

In May 2003, the World Health Assembly at its 56th session adopted a resolution to reduce measles deaths by 50% by 2005 compared to 1999 levels.

The strategies recommended for reducing measles deaths include the following:

- A dose of measles vaccine should be provided to all infants at nine months of age or shortly thereafter through routine immunization services. This is the foundation of the sustainable measles mortality reduction strategy.
- All children should be provided with a second opportunity for measles immunization. This will assure measles immunity in children who failed to receive a previous dose of measles vaccine, as well as in those who were vaccinated but failed to develop such immunity following vaccination. The second opportunity may be delivered either through routine immunization services or through periodic mass campaigns.
- Measles surveillance should be strengthened through the integration of epidemiological and laboratory information.
- The clinical management of measles should be improved.

#### Key points

Measles is highly infectious viral disease; it is among the vaccine preventable disease that kills more children.

The disease is spread from person to person through sneezing, coughing, and close personal contact.

The first sign of infection is a high fever lasting one to seven days and a generalized rash develops after onset/ exposure to the virus.

Pneumonia is the most common cause of death associated with measles.

Severe complications can be avoided through proper case management, including vitamin A supplementation.

Measles can be prevented by immunization. All children should have two opportunities for immunization **at 9 months and 18 months the second chance through nation-wide campaign, after every three years.**

## **10. Haemophilus influenzae type B (Hib)**

### **10.1 What is Haemophilus influenzae type B?**

*Haemophilus influenzae* type b (Hib) is one of six related types of bacterium causing severe form of pneumonia and meningitis. In 2008, WHO estimated the total number of children who died from Hib to be 199,000 deaths globally, dropping from an estimated number of around 371,000 in 2000, mainly due to meningitis and pneumonia.

### **10.2 How is Hib spread?**

The Hib bacterium is commonly present in the nose and throat. Bacteria are transmitted from person to person in droplets through sneezing, coughing. Infected children may carry Hib bacteria without showing any signs or symptoms of illness, but they can still infect others. The risk of disease is highest for children between six months and two years of age.

### **10.3 What are the signs and symptoms of Hib?**

Pneumonia and meningitis are the most important diseases caused by Hib bacteria. In developing countries, pneumonia is more common than meningitis in children with Hib disease. Hib disease should be suspected in the case of any child with signs and symptoms of meningitis or pneumonia.

### **10.4 What are the complications of Hib?**

Children who survive Hib meningitis may develop permanent neurological disability, including brain damage, hearing loss, and mental retardation. 15% to 30% of children who survive Hib disease are at risk for these disabilities. 5% to 10% cases of Hib meningitis are at risk of dying.

### **10.5 What is the treatment for Hib?**

Hib disease can be treated with specific antibiotics. However, the Hib has proved to resistant to almost all used antibiotics.

### **10.6 How is Hib prevented?**

Hib is can be prevented by vaccine which is available in the form of Pentavalent. This is given at 6 months, 10, and 14 months in combination with their vaccines in Tanzania

#### **Key points**

Hib disease can cause pneumonia and meningitis.

Hib disease's victims are mainly children younger than five years old.

Hib bacteria are commonly present in the nose and throat. The bacteria are transmitted h

The disease may cause death to 5% to 10% of infected children and up to 50% survivors are left with permanent disabilities.

Hib disease can be treated with antibiotics. But the organisms are resistant to majority of available antibiotics.

Hib disease can be prevented with vaccine given early in infancy.

## 12. Vitamin A deficiency (VAD)

### 11.1 Vitamin A and vitamin A deficiency

#### What is vitamin A?

Vitamin A is a substance that is required by the human body. Vitamin A:

- Strengthens resistance to infection;
- Increases a child's chances of surviving an infection;
- Promotes growth; and
- Protects the transparent part of the eye, called the *cornea*. If a person does not have enough vitamin A in his or her body, the person may have difficulty seeing in dim light.

The body cannot make vitamin A, so all of the vitamin A we need must come from the food we eat. Vitamin A is present in the following foods:

- Breast milk;
- Liver, eggs, meat, fish with liver;
- Milk, cheese, and other dairy products;
- Yellow and orange fruits, e.g. mangoes and papayas;
- Yellow and orange vegetables, e.g. pumpkins and carrots;
- Dark green, leafy vegetables;
- Red palm oil.

Vitamin A can be added to foods, such as sugar, vegetable oil, and wheat flour, during processing. This is called *food fortification*.

#### 11.2 What is vitamin A deficiency (VAD)?

Vitamin A deficiency occurs when a person does not eat enough food containing vitamin A or when it is used up too fast by the body. This often happens during an illness, during pregnancy and lactation, and when children's growth is most rapid, i.e. from age six months to five years.

#### 11.3 What are signs and symptoms of VAD?

Vitamin A deficiency (VAD) reduces resistance to infections, leading to more severe and prolonged illnesses and therefore increasing the risk of death. It can cause eye damage, such as corneal lesions, and when severe, can cause blindness. Generally, the first clinical sign of vitamin A deficiency is night blindness (impaired vision in dim light). However, because vitamin A deficiency reduces the body's resistance to infection, it is a threat even before any direct signs become apparent. Vitamin A deficiency can also cause anaemia. Vitamin A deficiency has been shown to increase a woman's risk of dying during pregnancy and the first three months after delivery.

Children suffering from vitamin A deficiency are more likely to get infections, such as measles, diarrhoea, and fevers; and their infections are more likely to be severe, sometimes resulting in death.

#### 11.4 How can Vitamin A deficiency be prevented?

[Type the document title]

---

When diets do not contain food with enough vitamin A, it is possible to increase vitamin A-levels in the body by periodically taking a concentrated dose or supplement in the form of a capsule. This is called supplementation. When given to children, vitamin A capsules are cut open and the drops of liquid inside are squeezed into the mouth. Vitamin A supplementation can be combined with immunization services for children and women when health officials know or suspect that vitamin A deficiency is present in an area or among a certain population. In addition, vitamin A supplements are also given for treatment of measles and eye damage (xerophthalmia).

## *New target diseases potential for immunization in Tanzania*

### **12. Human papilloma virus (HPV) infection**

#### **12.1 What is HPV infection?**

It is an infection caused by human papilloma virus (HPV). The most common is the genital human papillomavirus infection. This is the most common sexually transmitted infection (STI) affecting predominantly female with consequences such as warts and cervical cancer in a long run. More than 40 serotypes of HPV can infect the genital areas of males and females. These HPV types can also infect the mouth and throat.

#### **12.2 How is HPV transmitted?**

HPV is transmitted through genital contact, most often during vaginal and anal sex. HPV may also be passed on during oral sex and genital-to-genital contact. HPV can also be transmitted between straight and same-sex partners even when the infected person has no signs or symptoms. Vertical transmission from mothers to child during pregnancy and delivery can occur.

#### **12.3 What are the signs and symptoms of HPV related diseases?**

**12.3.1 Genital warts:** Warts occurs as a small bump or group of bumps-lesions in the genital area. They can be small or large, raised or flat, or shaped like a cauliflower. Healthcare providers can usually diagnose warts by looking at the genital area during physical examination. They appear within weeks or months after sexual contact with an infected partner. Genital warts might be self-limiting, remain unchanged, or increase in size or number depending of immunity.

**12.3.2 Cervical cancer:** Is caused by a different strain of HPV to the one causing warts. Usually does not cause symptoms until it is quite advanced. Screening tests can find early signs of disease so that problems can be treated early, before they ever turn into cancer.

**12.3.3 Other cancers resulted from HPV: Include** cancers of the vulva, vagina, penis, anus, and oropharynx. Symptoms and signs depend on type, anatomical location, stage, and related comorbidity.

**12.3.4 Recurrent respiratory papillomatosis (RRP)** is a condition in which warts grow in the throat, commonly among children. In children RRP is called juvenile-onset while in adults it is called adult-onset RRP. These growths can sometimes block the airway, causing a hoarse voice or trouble breathing.

#### **12.4 What is the treatment of HPV related diseases?**

There is no treatment for HPV infection but conditions resulted from infection. Genital warts can be surgically removed or removed with treatments applied by the provider or the person himself/herself. If left untreated, genital warts may go away, stay the same, or grow in size. Cervical cancer is treatable if diagnosed early. Other HPV-related cancers are also more treatable when diagnosed and treated early. Recurrent respiratory papillomatosis (RRP) can be treated with surgery or medicines. Curing RRP can sometimes require many treatments or surgeries over a period of years.

#### **12.5 How is HPV prevented?**

[Type the document title]

---

HPV infection can be prevented by the HPV vaccine. It is recommended for 11- or 12-year-old boys and girls. In Tanzania, HPV vaccines are recommended for girls and have been found to be safe and effective, and can protect them against the most common types of HPV that can lead to disease and cancer.

### **13. Rubella and Congenital Rubella Syndrome (CRS)**

#### **13.1 What is rubella?**

Rubella is an infection caused by a virus. The infection can lead into Congenital Rubella Syndrome (CRS): an important cause of severe birth defects. When a woman is infected with the rubella virus early in pregnancy, she has a 90% chance of passing the virus on to her fetus. This can cause the death of the fetus, or it may cause CRS. Even though it is a mild childhood illness CRS causes many birth defects. Deafness is the most common, but CRS can also cause defects in the eyes, heart, and brain. It is estimated that there are 700,000 deaths due to CRS each year.

#### **13.2 How is rubella spread?**

Rubella is spread in airborne droplets when infected people sneeze or cough. Once a person is infected, the virus spreads throughout the body in about five to seven days. During this time, pregnant women may pass the virus on to their fetuses. Infected people are most likely to pass on the virus when the rash is developing. But the virus may be spread from seven days before to about seven days after the rash appears. Infants with CRS can transmit the virus for a year or more.

#### **13.3 What are the signs and symptoms of rubella?**

The time between first contact with the virus and the first sign of rubella is about 14 days. Symptoms are often mild, and between 20% and 50% of infected people may notice no symptoms at all. In children, a rash is usually the first sign; other signs include low fever and swollen lymph nodes in the neck. The rash most often begins on the face and spreads from head to foot. It usually lasts for about three days. The rash is pink, and fainter than measles. Many rashes mimic rubella, and a rash should not be considered a sure sign of infection with the rubella virus. Infants who are born with CRS usually show symptoms such as cataracts and loss of hearing in infancy, but they may not show symptoms for two to four years.

#### **13.4 What are the complications of rubella?**

Complications tend to occur more often in adults than in children. About 70% of adult women who are infected may develop pain in their joints or arthritis, especially in the fingers, wrists, and knees. Encephalitis occurs in about one in 5000 cases and is most common in adult women. Problems with bleeding occur in about one in 3000 cases, usually among children. Complications from CRS include deafness, cataracts, heart defects, and mental retardation.

#### **13.5 What is the treatment for rubella?**

There is no specific treatment for rubella or for CRS. Patients with rubella should drink plenty of fluids and may take medication to reduce mild fever. Infants with CRS are treated for their specific problems.

#### **13.6 How is rubella prevented?**

Rubella vaccines are safe and effective and for infant immunization are usually given in combination with measles/mumps vaccine as MMR. In some countries, mostly in the industrialized world, rubella has been nearly eliminated through childhood immunization programmes. However, it is important to ensure that coverage in infants is sustained at over 80% to avoid shifting of rubella transmission to older age groups. For prevention of CRS, women of childbearing age are the primary target group for rubella immunization. Immunizing women between the ages of 15 and 40 will rapidly reduce the incidence of CRS

## [Type the document title]

---

without affecting childhood transmission of the rubella virus.

### Key points

- Rubella is an infection caused by a virus.
- Rubella is normally a mild childhood disease, but women who get rubella early in pregnancy can pass the virus on to their fetuses. This is called congenital rubella syndrome (CRS).
- A rash is the most prominent symptom of rubella, especially in children.
- Complications from rubella are rare. But complications from CRS are more serious and include deafness, cataracts, and mental retardation.
- Rubella vaccines are safe and effective but it is not in routine immunization in Tanzania.
- If countries immunize against rubella, they generally use a combination vaccine that also guards against measles (MR) or measles and mumps (MMR). It is important to ensure that coverage in infants is sustained at over 80% to avoid the shifting of rubella transmission to older age groups.

## 16. Mumps

### 16.1 What is mumps?

Mumps is an infection caused by a virus. It is sometimes called infectious parotitis, and it primarily affects the salivary glands. Mumps is mostly a mild childhood disease. It most often affects children between five and nine years old. But the mumps virus can infect adults as well. When it does, complications are more likely to be serious. As more children receive mumps vaccine, it is expected that cases will become more common in older children than in younger ones.

### 16.2 How is mumps spread?

Mumps virus is present throughout the world. It is spread by airborne droplets released when an infected person sneezes or coughs and by direct contact with an infected person.

### 16.3 What are the signs and symptoms of mumps?

About a third of children infected with the mumps virus have no symptoms. If symptoms do appear, they usually begin 14 to 21 days after a person is infected. Swelling in the salivary glands, just below and in front of the ears, is the most prominent symptom. The swelling may occur on one or both sides of the neck. Other symptoms include pain when chewing or swallowing, fever, weakness, and tenderness and swelling in the testicles. A person who has mumps can infect others from about six days before to about nine days after swelling in the neck appears.

### 16.4 What are the complications of mumps?

Complications from mumps are rare, but they can be serious. In men and teenage boys, an inflammatory condition called orchitis may cause swelling in one or both testicles. Orchitis is painful and sometimes can cause sterility. Encephalitis, meningitis, and hearing loss are other rare complications that can occur in people infected at any age.

### 16.5 What is the treatment for mumps?

There is no treatment for mumps.

### 16.6 How is mumps prevented?

People who get mumps and recover are thought to have lifelong protection against the virus. Mumps vaccines are also highly effective and safe. It is not yet under routine vaccination in Tanzania.

### Key points

- Mumps is transmitted in airborne droplets when infected people/children cough and sneeze
- About a third of people/children infected with mumps have no symptoms
- The most common symptom – if symptoms do develop – is swelling in the salivary glands
- Complications from mumps can be serious, but they are rare
- Mumps vaccine should be given in combination with measles and rubella vaccines (MMR)

## 14. Yellow fever

### 14.1 What is yellow fever?

Yellow fever is caused by the yellow fever virus, which is carried by mosquitoes. It is endemic in 33 countries in Africa and 11 countries in South America. In 2000 it is estimated that there were 200 000 cases of yellow fever, resulting in about 30 000 deaths worldwide.

### 14.2 How is yellow fever spread?

The yellow fever virus can be transmitted by mosquitoes, which feed on infected animals in forests, then pass the infection when the same mosquitoes feed on humans travelling through the forest. The greatest risk of an epidemic occurs when infected humans return to urban areas and are fed on by the domestic vector mosquito *Aedes aegypti*, which then transmits the virus to other humans.

### 14.3 What are the signs and symptoms of yellow fever?

The illness may be so mild that it is not noticed or diagnosed. Three to six days after a person is infected, he or she suddenly develops fever, chills, headache, backache, general muscle pain, upset stomach, and vomiting. As the disease progresses, the person becomes slow and weak. There may be bleeding from the gums and blood in the urine. Jaundice (yellowing in the white part of the eyes or yellowing of the skin and palms) and black vomiting may also occur. The diagnosis of yellow fever is difficult to make because its signs and symptoms are similar to other diseases, such as hepatitis, malaria, dengue, and typhoid fever. As a result, any person who develops jaundice within two weeks of the start of a fever should be considered to be a possible case of yellow fever. To confirm the diagnosis of yellow fever, a blood sample should be taken and sent to a laboratory for testing.

### 14.4 What are the complications of yellow fever?

If the illness is severe, the patient may experience convulsions or a coma. The disease usually lasts two weeks, after which the patient either recovers or dies. In areas where the disease is endemic mortality is about 5%. However, up to half of infected people may die during epidemics.

### 14.5 What is the treatment for yellow fever?

There is no specific treatment for yellow fever. Supportive treatment is indicated. Dehydration and fever can be treated with oral rehydration salts and medication. Any accompanying bacterial infection should be treated with an antibiotic. Intensive supportive care may improve the outcome for seriously ill patients.

### 14.6 How is yellow fever prevented?

Immunization is the single most important measure to control yellow fever. The main strategies to control yellow fever are based on a combination of immunization for protection against the disease and surveillance, and are outlined below.

#### Prevention

- Administering yellow fever vaccine as part of routine infant immunization \*
- Preventing outbreaks in high-risk areas through mass campaigns \*
- Control of *Aedes aegypti* in urban centers

[Type the document title]

---

\* Both these strategies should ensure a minimum coverage of at least 80%.

### **Control**

- Instituting a sensitive and reliable YF surveillance system including laboratory capacity to analyze samples and confirm suspected cases
- Emergency response to outbreaks through mass campaigns.

### **Key points**

- Yellow fever causes about 30 000 deaths annually.
- Mosquitoes transmit the yellow fever virus.
- 33 African countries and 11 South American countries are at highest risk for the disease.
- The symptoms of yellow fever are unspecific and can be confused with many other diseases.
- There is no specific treatment for yellow fever.
- There is a safe and effective vaccine against the disease.

## **15. Meningococcal meningitis**

### **15.1 What is meningococcal meningitis?**

Meningococcal meningitis is an infection of the brain and spinal cord. It is caused by the bacterium *Neisseria meningitidis* (the meningococcus). The disease is divided into several types. Types A, B, C, Y and W135 cause most cases of meningococcal meningitis. More recently types Y and W135 are gaining importance. The disease occurs globally, but in sub-Saharan Africa meningitis epidemics occur every two to three years. Since the 1980s the intervals between major epidemics have become shorter and more irregular. The disease is most common in young children, but it also can be found in children and young adults living in crowded conditions, such as institutions or barracks. In 2000 it is estimated that there were 300 000 cases and 25 000– 30 000 deaths from meningococcal meningitis.

### **15.2 How is meningococcal meningitis spread?**

Transmission of bacteria is from person to person through airborne droplets from the nose and throat of infected people.

### **15.3 What are the signs and symptoms of meningococcal meningitis?**

Meningococcal meningitis is marked by the sudden onset of intense headache, fever, nausea, vomiting, sensitivity to light, and stiff neck. Other signs include lethargy, delirium, coma, and convulsions. The appearance of a rash composed of small spots of bleeding into the skin is an important sign. Infants may have illness without a sudden onset and stiff neck. They may only appear to be slow or inactive, to be irritable, to vomit, or to be feeding poorly.

### **15.4 What are the complications of meningococcal meningitis?**

In children, if meningitis is not treated, mortality is 50%; with early treatment mortality is reduced to between 5% to 10%. Even with treatment early in the disease, between 5% and 10% of children who are infected die. About 10%–15% of those surviving meningococcal meningitis will suffer from complications, including mental disorders, deafness, palsies and seizures. A less common but more severe and often fatal form of meningococcal disease is meningococcal septicemia, which is characterized by rapid circulatory collapse and a haemorrhagic rash.

### **15.5 What is the treatment for meningococcal meningitis?**

Because meningococcal disease is often fatal, each case should always be considered a medical emergency and should be referred to a hospital. Several types of antibiotic are effective.

### **15.6 How is meningococcal meningitis prevented?**

Vaccines are available to protect against types A, C, Y, and W135. Epidemic control relies on good surveillance with early detection and treatment. A mass immunization campaign that reaches at least 80% of the entire population with types A & C vaccine can prevent an epidemic. These vaccines are not effective in young children and infants and only provide protection for a limited time, especially in children younger than two years old.

Key points

- Meningococcal meningitis is caused by bacteria
- The disease is most common in young children.
- Transmission is by contact with an infected person, including respiratory droplets from the nose and throat of the infected person.
- The symptoms of meningococcal meningitis include a sudden onset of an intense headache, fever, nausea, vomiting, sensitivity to light, and stiff neck.
- Meningococcal meningitis is potentially fatal and should always be viewed as a medical emergency.
- The recommended method of prevention is immunization.
- The vaccine is not effective in young children and infants and so may not be part of routine childhood immunization programmes.

## CHAPTER 3

### MODULE 2: Vaccines

This module explains about the vaccines used and introduced in Tanzania. This module is organized as follows: First, the vaccination schedule according to MoHSW-IVD in Tanzania will be explained. Secondly, each of the vaccine will be discussed briefly. Lastly Information about the non-routine vaccinations, general challenges pertinent to vaccination and storage will be discussed.

#### 2.1 Vaccines used and immunization schedule in Tanzania

A total of **7 vaccines** are common in Tanzania immunization system. These are provided either as mandatory vaccination in routine vaccination or non-routine and vaccination on special situation.

Vaccines included in the routine schedule include Tuberculosis (BCG) vaccine, OPV, Diphtheria vaccine, Tetanus toxoid, Pertussis vaccine, Hepatitis B vaccine, Haemophilus influenza type B vaccine, Pneumococcal vaccine, Rotavirus vaccine, vitamin A, and Measles vaccine. Non-routine vaccine in Tanzania is the Yellow fever vaccine.

The schedule for routine vaccination in Tanzania is presented in the following table.

AGE	Type of vaccine	Route	Dose
At birth	BCG	Intradermal right shoulder	0.05ml
	OPV 0	Oral	2 drops
6weeks	OPV1	Oral	2 drops
	Pentavalent 1	Intramuscular left thigh	0.5ml
	PCV 1	Intramuscular right thigh	0.5ml
	Rota1	Oral	Drops
10weeks	OPV 2	Oral	2drops
	Pentavalent 2	Intramuscular lateral to the left thigh	0.5ml
	PCV 2	Intramuscular lateral to the right thigh	0.5ml
	Rota2	Oral	Drops
14 weeks	OPV 3	Oral	2 drops
	Pentavalent 3	Intramuscular lateral to the left thigh	0.5ml
	PCV 3	Intramuscular right thigh lateral	0.5ml
9 months	Measles (Surua)	Subcutaneous lateral to the left shoulder	0.5ml
	Vitamin A-1st	Oral	*
15 months	Vitamin A-1st	Oral	*
18months	Measles 2nd dose	Subcutaneous left lateral shoulder	0.5ml
21months	Vitamin A	Oral	*
First contact	TT1	Intramuscular outer upper arm	0.5ml

[Type the document title]

---

1 months after 1st dose	TT2	Intramuscular outer upper arm	0.5ml
6 months after 2 <sup>nd</sup> dose	TT3	Intramuscular outer upper arm	0.5ml
1 year after 3 <sup>rd</sup> dose	TT4	Intramuscular outer upper arm	0.5ml
1 year after 3 <sup>rd</sup> dose	TT5	Intramuscular outer upper arm	0.5ml

\* Age specific; please see dosage in chapter 2

For each vaccine the description includes information on:

- What it is;
- How safe it is and what side-effects may occur;
- How it should be stored and transported;
- When it should be given;
- The number and size of doses; and
- Where and how it should be given.

## **3.2 Routine and non routine vaccines**

### **1. Tuberculosis vaccine (BCG)**

#### **1.1 What is BCG vaccine?**

BCG vaccine protects infants against tuberculosis. The letters B, C, G stand for Bacille Calmette-Guérin. Bacille describes the shape of a bacterium; Calmette and Guérin are the names of the people who developed the vaccine.

BCG vaccine is in a powder form and must be reconstituted with a diluent before use. It is essential that only the diluent supplied with the vaccine be used. BCG vaccine should be kept at  $2^{\circ}\text{C}$ – $8^{\circ}\text{C}$  after reconstitution. Any remaining reconstituted vaccine must be discarded after six hours or at the end of the immunization session, whichever comes first.

#### **1.2 How safe is BCG vaccine and what are its potential side effects?**

A local reaction at the site of injection almost always occurs. This is because; most children have a reaction at the site of injection that occurs as a small raised lump when BCG vaccine is injected. This usually disappears within 30 minutes. After about two weeks, a red sore forms that is about the size of the end of an unsharpened pencil. The sore remains for another two weeks and then heals. A small scar, about 5 mm across, remains. This is a sign that the child has been effectively immunized.

Few serious reactions can occur following BCG vaccine. Generalized infection due to BCG vaccination occurs at a rate of five per million doses of vaccine given, primarily in HIV-infected persons or those with severe immune deficiencies.

Other reactions include swelling or abscesses. Sometimes the glands in a child's armpit or near the elbow swell up after injection with BCG vaccine, or he or she may develop an abscess. Swollen glands or abscesses occur because an unsterile needle or syringe was used, too much vaccine was injected, or most commonly, the vaccine was injected incorrectly under the skin instead of in its top layer.

---

[Type the document title]

---

**Administration summary: BCG vaccine**

<b>Type of vaccine</b>	Live attenuated bacteria
<b>Number of doses</b>	One
<b>Schedule</b>	At or as soon as possible after birth
<b>Booster</b>	None
<b>Contraindications</b>	Symptomatic HIV infection
<b>Adverse reactions</b>	Local abscess, regional lymphadenitis; rarely, distant spread to osteomyelitis, disseminated disease
<b>Special precautions</b>	Correct intradermal administration is essential. A special syringe and needle is used for the administration of BCG vaccine
<b>Dosage</b>	0.05ml ( <b>For those with no scar if comes before 12months give 0.1ml.</b> )
<b>Injection site</b>	Right shoulder
<b>Injection route</b>	Intradermal
<b>Storage</b>	Store between 2°C–8°C (vaccine maybe frozen for long-term storage at National, Regional and District level. but not the diluent)

## 2. Oral polio vaccine (OPV)

### 2.1 What is OPV?

Oral polio vaccine (OPV) protects a child against the poliovirus. It is a liquid vaccine that is provided in two types of containers:

1. Small plastic dropper bottles
2. Glass vials with droppers in a separate plastic bag.

Intravenous polio vaccine (IPV) is not administered in Tanzania.

### 2.2 How safe is OPV and what are its potential side effects?

Side effects of OPV are almost non-existent and non-reported in Tanzania. Globally, less than 1% of the people who receive the vaccine may develop a headache, diarrhoea, or muscle pain.

There is a very small risk of vaccine-associated paralytic polio (VAPP), with approximately two to four cases having been reported for every one million children immunized.

#### Administration summary: OPV

<b>Type of vaccine</b>	Live oral polio vaccine (OPV)
<b>Number of doses</b>	Four doses (including birth dose)
<b>Schedule</b>	At birth, 6, 10, 14 weeks
<b>Booster</b>	Supplementary doses given during polio eradication activities
<b>Contraindications</b>	None
<b>Adverse reactions</b>	VAPP very rarely (approximately 2 to 4 cases per million children vaccinated)
<b>Special precautions</b>	None
<b>Dosage</b>	2 to 3 drops <b>depending on the manufacturer instructions</b>
<b>Injection site</b>	–
<b>Injection type</b>	–
<b>Storage</b>	Store between +2°C to +8°C (maybe frozen for long-term at National, regional and district levels).

### 2.3 What is supplementary immunization with OPV?

A key strategy for polio eradication is supplementary immunization with OPV. This is usually conducted in large-scale campaigns (National Immunization Days) where two doses of OPV, one month apart, are given to all children under five years of age regardless of how many doses they have received in the past. Many rounds of National immunization days maybe conducted in a country however there is no risk associated with receiving multiple doses of OPV.

### 3. Pentavalent vaccine (DTP-HepB-HiB vaccines)

Pentavalent vaccine is a combination vaccine aiming to protect five important diseases in children. These are Diphtheria, tetanus, pertussis, hepatitis B, and Haemophilus influenza.

#### 3.1 What is pentavalent vaccine?

Pentavalent vaccine (DTP-HepB-HiB vaccines) is made out of five different vaccines that target five different diseases such as diphtheria, tetanus, pertussis, hepatitis B, and Haemophilus influenza. It is in a liquid form in vials. It is advised to shake the vial to mix the vaccine and liquid before using it. The vaccine should never be frozen. The “shake test” (see Module 3) will determine if freezing has damaged the vaccine. If the vaccine fails the shake test you must discard it. Because of the DTP, the pentavalent vaccine should not be given to infants younger than six weeks old, and not used as a birth dose.

#### 3.2 How safe is pentavalent vaccine and what are its potential side effects?

Mild reactions to the vaccine include: Soreness. Some infants may develop mild soreness, redness, or swelling at the injection site, but this will usually goes away within one to three days. Some infants may develop a mild fever. Serious reactions to the vaccine may occur with pentavalent vaccine

#### Administration summary: Pentavalent vaccine

<b>Type of vaccine</b>	DTP-HepB-HiB vaccines
<b>Number of doses</b>	Three doses
<b>Schedule</b>	6, 10, 14 weeks
<b>Booster</b>	Not recommended
<b>Contraindications</b>	Anaphylaxis to previous dose
<b>Adverse reactions</b>	Mild local or systemic reactions are common
<b>Special precautions</b>	Do not use at birth and over six years
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Lateral to left thigh
<b>Injection type</b>	Intramuscular
<b>Storage</b>	Store between +2°C to +8°C never freeze.

## 4. Pneumococcal Vaccine

### 4.1 What is Pneumococcal Vaccine (PCV)?

PCV was introduced in Tanzania in 2013 to prevent against such strains of pneumococcus. The vaccine doubled as Pneumococcal conjugate 13 (PCV13) prevents severe form of 13 strains of Pneumococcus serotypes including pneumonia, bacteraemia, and meningitis.

### 4.2 Vaccination schedule

PCV13 is given by intramuscular injection in a dose of 0.5 ml. The primary series consists of three doses at minimum intervals of four weeks, starting at the age of 6 weeks, then 10 weeks and 14 weeks.

PCV13 is administered along with other EPI vaccines. The vaccine should not be mixed with other vaccines in the same syringe or given on the same site with other injectable vaccines. The vaccine will be given on the anterior lateral aspect of the right thigh.

### 4.3 Safety of pneumococcal vaccine

Pneumococcal conjugate vaccine has been proven to be safe and well tolerated even among children infected with HIV, malnutrition and sickle cell disease. Severe adverse reactions due to the vaccine are extremely rare. Mild side effects such as soreness and redness at the injection site and transient fever of  $\geq 39^{\circ}\text{C}$  have been reported in less than 5% of children vaccinated.

It is important to note that pentavalent will be given at the same visit as pneumococcal vaccine, thus the child may also be reacting to the pentavalent vaccine.

### 4.4 Contraindications to pneumococcal conjugate vaccine

Infants with moderate or severe illness (temperature  $\geq 39^{\circ}\text{C}$ ) should not be vaccinated until they improve. Mild illness such as upper respiratory tract infection is not a contraindication. PCV13 should not be given to anyone who has had severe allergic reactions to a previous dose.

### 4.5 Administration of the vaccine

#### PCV 13 packing

This section outlines general information on safety of vaccine administration with specific recommendations for the PCV13 single dose liquid vaccine presentation. PCV13 is a liquid vaccine in a single dose vial and is packed in boxes of 50 vials.



### Storage of PCV13 vaccine

Like most other vaccines, PCV13 should be stored and transported between +2 to +8 ° C at all levels. Do not freeze or place PCV13 vaccine on a frozen icepack. PCV13 vaccine loses potency and provides no protection if frozen. If there is doubt, the “shake test” should be performed to check whether the vaccine has been frozen.

To avoid exposure of the vaccine to freezing, cool water packs should be used. To condition an ice pack, leave the ice pack at room temperature until there is some liquid water in it.

### Administration summary: PCV 13

<b>Type of vaccine</b>	Conjugate Pneumococcal vaccine (PCV 13)
<b>Number of doses</b>	Three
<b>Schedule</b>	6, 10, 14 weeks of age
<b>Booster</b>	None
<b>Contraindications</b>	Severe allergic reaction to previous dose
<b>Adverse reactions</b>	Mild local and systemic reactions are common
<b>Special precautions</b>	Discard opened vial after six hours.
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Outer mid right-thigh
<b>Injection route</b>	Intramuscular
<b>Storage</b>	Store between +2°C to +8°C. Never freeze

## 5. Rotavirus Vaccines

### 5.1 What is Rotavirus vaccine?

This is live attenuated ready to use oral vaccine used to prevent against rotavirus gastroenteritis.

A rotavirus vaccine is registered vaccine in Tanzania. Currently, there are two commercially available vaccines, Rotarix and RotaTeq that are prequalified and recommended for global use by WHO. Rotarix has been registered in for use in Tanzania.



### Rotarix vaccine presentation in Tanzania

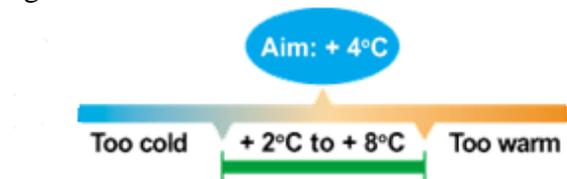
Rotarix vaccine is a solution for oral use. It comes in a tube specially designed for direct oral administration (1 tube = 1 dose; 1 tube has 1.5mL liquid).



Salma Kikwete, First Lady of Tanzania, administers the first dose of rotavirus vaccines to a Tanzanian baby, as Dr. Hussein Ali Mwinyi, Minister of Health and Social Welfare looks on at a ceremonial vaccine launch. Photo credit: Sala Lewis/GAVI/2012

### Vaccine storage

The rotavirus vaccine should be stored at temperature between +2°C to +8°C. It should not be frozen. If the vaccines are frozen, they lose their potency and no longer provide protection against the disease.



#### **Key messages:**

- *Store vaccines between +2°C to +8°C*
- *Do not freeze the vaccine*
- *Regularly monitor the temperature of the refrigerator*

### 5.2 How safe is the vaccine?

They are safe to use, do not cause serious adverse reaction. Irritability and loss of appetite are most common side effects. In Tanzania, Rotavirus vaccines are generally well tolerated. They do not appear to cause any serious adverse events. Rotavirus vaccine may be given with other vaccines in the infant routine immunization schedule without interfering with their effectiveness.

#### **Side effects**

Very common side effects: irritability, loss of appetite. Common side effects: fever, fatigue, diarrhea, vomiting, flatulence, abdominal pain, regurgitation of food. Severe reactions are very rare and may include slight increased risk of intussusception.



#### **Key messages:**

- *Rotavirus vaccine has a liquid formulation*
- *Vaccine comes in a squeezable plastic tube*
- *Irritability and loss of appetite are very common side effects of rotavirus vaccine*

[Type the document title]

---

### 5.3 Administration of rotavirus vaccine

<b>Type of vaccine</b>	Live attenuated oral vaccine
<b>Number of doses</b>	Two
<b>Schedule</b>	6 and 10weeks of age
<b>Booster</b>	None
<b>Contraindications</b>	Previous history of intussusception and hypersensitivity to previous dose
<b>Adverse reactions</b>	Irritability and loss of appetite
<b>Special precautions</b>	First dose should not be given after the age of 15 weeks and second dose should not be given after the age of 32 weeks
<b>Dosage</b>	1.5ml
<b>Vaccine administration</b>	Oral
<b>Storage</b>	Store between +2°C to +8°C. Never freeze

## 6. Measles vaccine

### 6.1 What is measles vaccine?

Measles vaccine is provided as a powder, with a diluent in a separate vial. Before it can be used, it must be reconstituted. It is essential that only the diluent supplied with the vaccine be used. After reconstitution measles vaccine should be kept at 2°C–8°C. Any remaining reconstituted vaccine must be discarded after six hours or at the end of the immunization session, whichever comes first.

Vitamin A supplements are also given at the same time as the vaccine.

### 6.2 How safe is measles vaccine and what are its potential side effects?

Mild reactions to the vaccine are not uncommon. These include:

- Soreness. Some children may experience pain and tenderness at the injection site within 24 hours of immunization. In most cases, these reactions will resolve within two or three days without any medical attention.
- Fever. About 5% of children develop a moderate fever five to 12 days after receiving the vaccine. It usually lasts a day or two.
- Rash. About one in 20 children develop a mild rash five to 12 days after receiving the vaccine. The rash usually lasts about two days.
- Severe reactions to measles vaccine are rare; anaphylaxis has been estimated to occur about once for every million doses administered, while a severe allergic reaction can occur once for every 100 000 doses and one case of thrombocytopenia for every 30 000 doses. Encephalitis has been reported to occur in no more than one per million doses administered and, even in such cases, there is no definite proof that the vaccine was the cause.

### 6.3 What is the “second opportunity” for measles immunization?

All children should have a second opportunity to receive measles vaccine. This increases the proportion of children who receive at least one dose and helps to assure measles immunity in previously vaccinated children who failed to develop such immunity. This opportunity may be delivered either through routine immunization services or through periodic mass campaigns.

#### **Rationale for introduction of measles second dose in routine immunization schedule-Tanzania**

##### **Key facts**

- In 2011, there were 158 000 measles deaths globally – about 430 deaths every day or 18 deaths every hour.
- More than 95% of measles deaths occur in low-income countries with weak health infrastructures.
- Measles vaccination resulted in a 71% drop in measles deaths between 2000 and 2011 worldwide.
- In 2011, about 84% of the world's children received one dose of measles vaccine by their first birthday through routine health services – up from 72% in 2000.

#### **MDG 4**

The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination coverage can be considered a marker of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards achieving MDG 4.

#### **Global Measles and Rubella Strategic Plan**

In April 2012, Global Measles and Rubella Strategic Plan was launched which covers the period 2012-2020. The Plan includes new global goals for 2015 and 2020:

#### **By the end of 2015**

- To reduce global measles deaths by at least 95% compared with 2000 levels.
- To achieve regional measles and rubella/congenital rubella syndrome (CRS) elimination goals.

#### **By the end of 2020**

- To achieve measles and rubella elimination in at least five WHO regions.

#### **New Routine Immunization schedule**

<b>Vaccine</b>	<b>Schedule</b>
BCG, OPV-0	At birth
Pentavalent, OPV, Rotarix and PCV 13 – 1 <sup>st</sup> dose	6weeks
Pentavalent, OPV, Rotarix and PCV 13 – 2 <sup>nd</sup> dose	10weeks
Pentavalent, OPV, and PCV 13 – 3 <sup>rd</sup> dose	14weeks
Measles 1 <sup>st</sup> dose and Vitamin A	9 months
<b>Measles 2<sup>nd</sup> dose and Vitamin A</b>	<b>18 months</b>

**Administration summary: measles vaccine**

<b>Type of vaccine</b>	Live attenuated viral
<b>Number of doses</b>	One dose. Second opportunity not less than one month after first dose
<b>Schedule</b>	At 9 months
<b>Booster</b>	A second opportunity for measles immunization is recommended (routine or campaign)
<b>Contraindications</b>	Severe reaction to previous dose; pregnancy; congenital or acquired immune disorders (not HIV infection)
<b>Adverse reactions</b>	Malaise, fever, rash 5–12 days later; idiopathic thrombocytopenic purpura; rarely, encephalitis, anaphylaxis
<b>Special precautions</b>	None
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Outer right mid-thigh
<b>Injection type</b>	Subcutaneous
<b>Storage</b>	Store between +2°C to +8°C (vaccine maybe frozen for long-term storage at National, Region and District level but not the diluent)

<sup>a</sup> Infants at high risk (HIV-infected, in closed communities such as refugee camps, or in the presence of an outbreak) may receive a dose at 6 months of age followed by an extra dose at 9 months.

## 7. Vitamin A supplementation

### 7.1 What is vitamin A supplementation?

When diets do not contain food with enough vitamin A, it is possible to increase vitamin A levels in the body by periodically taking a concentrated dose or supplement in the form of a capsule. This is called *supplementation*. When given to children, vitamin A capsules are cut open and the drops of liquid inside are squeezed into the mouth.

Vitamin A supplementation can be combined with immunization services for children and women when health officials know or suspect that vitamin A deficiency is present in an area or among a certain population.

In addition, vitamin A supplements are also given for treatment of measles and eye damage (xerophthalmia).

### 7.2 Are there any contraindications to vitamin A supplements?

There are no contraindications to vitamin A supplements for children and post-partum women if they are given according to the schedules provided in Section 14.7.

Vitamin A may be given at the same time as immunization.

### 7.3 Are there any side effects to vitamin supplements?

Usually, there are no side effects. However, on rare occasions a child may experience headache, loss of appetite, or vomiting. These symptoms will pass by themselves, and no treatment is necessary. Parents should be advised that this is normal. See Module 6 for information on vitamin A supplementation: screening, schedule, administration, handling and storage.

### 7.4 What are the opportunities to link vitamin A and routine immunization?

Target for vitamin A	Immunization contact	Vitamin A dose
<i>Mothers</i> within 6–8 weeks of delivery, if they have not received vitamin A at delivery <i>Infants benefit via breast milk</i>	1st contact BCG, OPV-o, DTP-1 contact up to 6–8 weeks after delivery	200 000 IU
Infants 6–11 months	Measles/Yellow fever Polio NIDs	100 000 IU
Children 12 months and older	Other EPI campaigns Boosters	200 000 IU
Children 12–59 months	Booster doses Delayed primary immunization	200 000 IU

Note: The optimal interval between doses is 4–6 months. The minimum recommended safe interval between doses is one month. The interval between doses can be reduced to treat clinical vitamin A deficiency and measles cases. Follow the appropriate measles treatment schedule.

Vitamin A Schedule to under 5 children is 6 month up to 5 years. The interval between optimal doses is 6 months. **Every child should get Vitamin A.**

## 8. Tetanus toxoid (TT) vaccine

### 8.1 What is TT vaccine?

Tetanus toxoid (TT) vaccine protects against tetanus. It is provided as a liquid in vials and also in prefilled auto-disable injection devices. It is available in a number of different formulations:

- TT vaccine protects only against tetanus and neonatal tetanus.
- Pentavalent (diphtheria, tetanus, pertussis, hepatitis B and haemophilus influenza type b) protects against diphtheria, tetanus, pertussis hepatitis b and haemophilus influenza.
- DT, or diphtheria-tetanus toxoids vaccine, protects against diphtheria and tetanus. Because it contains high levels of diphtheria toxoid, it should not be given to children older than six years old or adults.
- Td, or tetanus-diphtheria toxoids adult dose vaccine, is the same vaccine as DT, but with a lower diphtheria toxoid dose. It is suitable for children older than six years old and adults, including pregnant women. Td has the added advantage of protecting against diphtheria and tetanus.

When given to women of childbearing age, tetanus toxoid (TT) not only protects women against tetanus, but also prevent neonatal tetanus in their new-born baby. When TT vaccine is given to a woman who is or who becomes pregnant, the antibodies that form in her body are passed to her foetus. These antibodies protect the baby against tetanus during birth and for a few months afterwards.

A three-dose course of TT provides protection against maternal and neonatal tetanus for at least five years. A maximum of five doses will protect women throughout their childbearing years.

When tetanus toxoid stand for a long time, the vaccine separates from the liquid and looks like fine sand at the bottom of the vial. Shake the vial to mix the vaccine and liquid again before giving the vaccine (Shake test).

### 8.2 How safe is TT vaccine and what are its potential side effects?

Tetanus toxoid vaccine cause very few serious reactions but quite frequent mild reactions.

Mild reactions to TT vaccine include:

- Soreness. About one in ten people who receive the vaccines have mild pain, redness, warmth, and swelling at the injection site for about one to three days after the injection. This mild reaction is likely to be more common after later doses than earlier ones, and may affect between 50% and 85% of people who receive booster doses.
- Fever. About one in ten people may develop a mild fever after receiving the vaccines.

### 8.3 Tetanus toxoid immunization schedule for routine immunization of pregnant women

Dose of TT	When to give	Expected duration of protection
1	At first contact or as early as possible in pregnancy	None
2	At least 4 weeks after TT 1	1–3 years
3	At least 6 months after TT 2 or during subsequent pregnancy	At least 5 years
4	At least 1 year after TT 3 or during subsequent pregnancy	At least 10 years
5	At least 1 year after TT 4 or during subsequent pregnancy	For all childbearing years and possibly longer

Increasing numbers of women have documentation of prior receipt of vaccines containing tetanus toxoid in early childhood. As the women reach childbearing age the incidence of maternal and neonatal tetanus is expected to decline further. Three properly spaced doses of Pentavalent given in childhood are considered equivalent in protection to two doses of TT given in adulthood.

#### Administration summary: TT vaccine

<b>Type of vaccine</b>	Toxoid as TT
<b>Number of doses</b>	At least two primary doses
<b>Schedule</b>	See previous table
<b>Booster</b>	Every 10 years or during pregnancy
<b>Contraindications</b>	Anaphylactic reaction to previous dose
<b>Adverse reactions</b>	Mild local or systemic reactions are common and increase in frequency with increasing numbers of doses, and may constitute a contraindication to further doses
<b>Special precautions</b>	None
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Outer upper left arm
<b>Injection route</b>	Intramuscular
<b>Storage</b>	Store between +2°C to +8°C. Never freeze

[Type the document title]

---

## 9. Yellow fever vaccine (YF vaccine)

### 9.1 What is YF vaccine?

Yellow fever vaccine is recommended as part of the non-routine immunization in Tanzania. It is usually recommended before traveling to the areas where yellow fever is endemic.

The vaccine is a powder that must be reconstituted with diluent provided before use. It is essential that only the diluent supplied with the vaccine be used. Reconstituted vaccine must be kept at 2°C–8°C and discarded after six hours or at the end of the immunization session, whichever comes first.

### 9.2 How safe is YF vaccine and what are its potential side effects?

- Mild reactions to the vaccine include: Headache, muscle pain, or mild fever. Fewer than 5% of people who receive YF vaccine develop these symptoms.
- Serious side effects resulting from immunization are rare.

About 5–20 cases of anaphylaxis have been reported for every one million doses of YF vaccine; the rate of true anaphylaxis is likely to be much lower. Up to four cases of encephalitis per 100, 000 doses have been reported in infants less than six months old for whom the vaccine is not routinely recommended. If a serious reaction does occur, health workers should report the problem to supervisors immediately. Those who have a severe reaction should not receive additional doses.

### Administration summary: YF vaccine

<b>Type of vaccine</b>	Live viral
<b>Number of doses</b>	One dose
<b>Schedule</b>	Non-routine in Tanzania
<b>Booster</b>	Every 10 years
<b>Contraindications</b>	Egg allergy; Immune deficiency from medications; symptomatic HIV; Hypersensitivity to previous dose; and pregnancy
<b>Adverse reactions</b>	Hypersensitivity to egg; rarely encephalitis; hepatic failure; rare organ failure
<b>Special precautions</b>	Do not give before six months of age and avoid during pregnancy
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Upper left arm
<b>Injection route</b>	Subcutaneous
<b>Storage</b>	Store between +2°C to +8°C.

## 10. Rubella vaccine in (Measles-Rubella or Measles-Mumps-Rubella vaccine)

### 10.1 What are the MR and MMR vaccines?

Both Measles-Rubella (MR) and Measles-Mumps-Rubella (MMR) vaccines are not in the immunization schedule in Tanzania. However, some countries use combination of these vaccines for measles and rubella (MR) or for measles, mumps, and rubella (MMR). MR and MMR vaccines are provided in powder form with diluents and must be reconstituted before they can be used (see Module 6). It is essential that only the diluent supplied with the vaccine be used. MR and MMR vaccines should be kept at 2°C–8°C after reconstitution. Any remaining reconstituted vaccine must be discarded after six hours or at the end of the immunization session, whichever comes first.

### 10.2 How safe are the MR and MMR vaccines and what are their potential side effects?

Mild reactions to the vaccines include:

- **Fever-** As with the single-antigen measles vaccine, about 5% to 15% of children develop a mild fever within five to 12 days of receiving the vaccine.
- **Rash-** Again as with the measles vaccine, about one in 20 children develop a mild rash about five to 12 days after being immunized.

Severe reactions are rare and similar to that experienced after receipt of the measles vaccine. Although an association between MMR and autism has been suggested, there is absolutely no evidence of such an association. In addition rubella-containing vaccines may result in a temporary form of arthritis from one to three weeks after vaccination in up to one in four post-pubertal females. These reactions are very rare in young children. Mumps-containing vaccines may result in rare cases of parotitis and some cases of aseptic meningitis. Children recover without sequelae although some may need to be hospitalized. The risk of developing this complication varies depending on the vaccine strain used.

### Administration summary: MR and MMR vaccines

<b>Type of vaccine</b>	Live attenuated viral
<b>Number of doses</b>	One dose
<b>Schedule</b>	Generally 12–15 months
<b>Booster</b>	A second opportunity for immunization is recommended ( routine or campaign )
<b>Contraindications</b>	Severe reaction to previous dose; pregnancy; congenital or acquired immune disorders (not HIV infection). Although it is not recommended to administer the vaccine during pregnancy, there has never been any evidence of damage to the fetus from vaccinating the mother during pregnancy
<b>Adverse reactions</b>	Same as measles vaccine, plus cases of arthritis in adolescent females for rubella-containing vaccine and parotitis; rarely aseptic meningitis with mumps- containing vaccines may occur
<b>Special precautions</b>	None
<b>Dosage</b>	0.5ml
<b>Injection site</b>	Outer mid-thigh/upper arm depending on the age
<b>Injection type</b>	Subcutaneous
<b>Storage</b>	Store between 2°C–8°C (vaccine may be frozen for long-term storage but not the diluent)

## 11. Summary

### 11.1 Typical immunization schedule for children

**Table 2.1: Immunization schedule for infants recommended by the Expanded Programme on Immunization**

Vaccine	Age					
	Birth	6 weeks	10 weeks	14 weeks	9 months	18 months
BCG	X					
Oral polio	X	X	X	X		
DTP-HB-Hib (Pentavalent)		X	X	X		
Rotavirus		X	X			
PCV 10 (Pneumococcal vaccine)		X	X	X		
Measles first dose					X	
Measles second dose						X

### 10.2 Contraindications to immunization

There are not many contraindications to immunization. All infants should be immunized except in these three rare situations:

1. Anaphylaxis or a severe hypersensitivity reaction is an absolute contraindication to subsequent doses of a vaccine. Persons with a known allergy to a vaccine component should not be vaccinated.
2. Do not give BCG or yellow fever vaccine to an infant that exhibits the signs and symptoms of AIDS.
  - Note: an infant with known or suspected HIV infection and/or signs and symptoms of AIDS should receive measles vaccine at six months and then again at nine months (refer to Module 6, Section 2).
3. If a parent strongly objects to an immunization for a sick infant, do not give it. Ask the mother to come back when the infant is well.

**The following are not contraindications. Infants with these conditions should be immunized:**

- Allergy or asthma (except if there is a known allergy to a specific component of the vaccine mentioned above);
- Any minor illness, such as respiratory tract infections or diarrhea with temperature below 38.5°C;
- Family history of adverse events following immunization;
- Family history of convulsions, seizures, or fits;
- Treatment with antibiotics;
- Known or suspected HIV infection with no signs and symptoms of AIDS;
- Signs and symptoms of AIDS, except as noted above;
- Child being breastfed;
- Chronic illnesses such as chronic diseases of the heart, lung, kidney, or liver
- Stable neurological conditions, such as cerebral palsy or Down's Syndrome;
- Premature or low-birth weight (vaccination should not be postponed);
- Recent or imminent surgery;
- Malnutrition; and
- History of jaundice at birth.

If a reaction does occur, health workers should report the problem to supervisors immediately. Children who have a severe reaction to a vaccine should not receive additional doses of that vaccine.

If a child has diarrhoea when you give OPV, administer an extra dose — that is, a fifth dose — at least four weeks after he or she has received the last dose in the schedule.

### **10.3 Giving vaccines at the same time**

- If you are giving more than one vaccine, do not use the same syringe and do not use the same arm or leg for more than one injection.
- Do not give more than one dose of the same vaccine to a woman or child in one session.
- Give doses of the same vaccine at the correct intervals. Wait at least four weeks between doses of OPV, DTP, Hib, and HepB vaccines.

### 10.5 Summary of injection sites

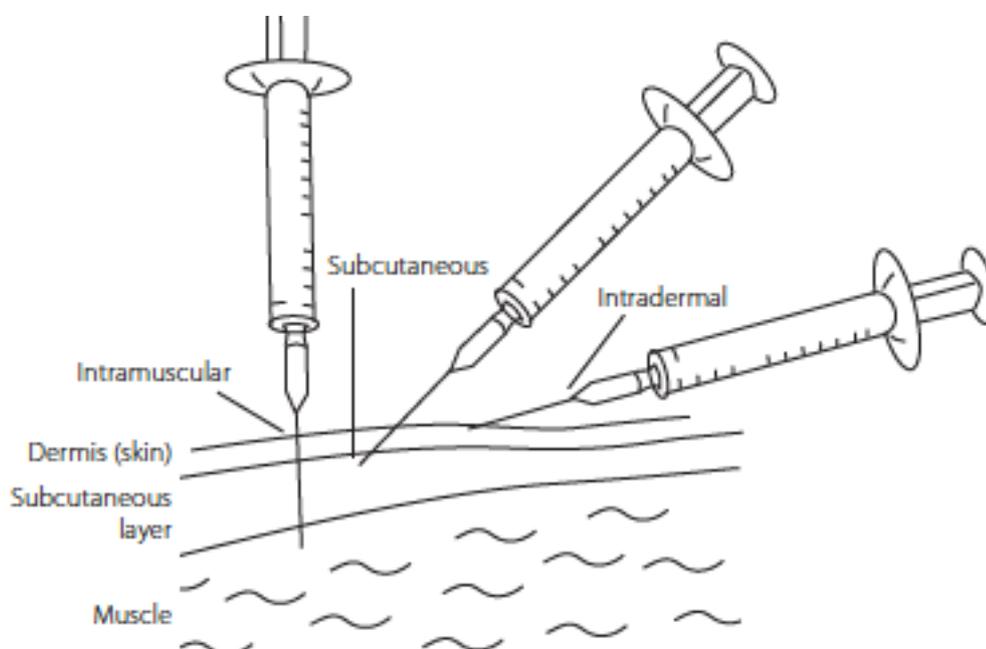
Vaccine	Route of administration	Injection site
BCG	Intradermal	Upper left arm
DTP	Intramuscular	Outer mid-thigh
OPV	Oral	Mouth
HepB	Intramuscular	Outer mid-thigh
Measles	Subcutaneous	Upper left arm
Yellow fever	Subcutaneous	Upper right arm
Tetanus toxoid	Intramuscular	Outer, upper arm
Hib	Intramuscular	Infants- Outer mid-thigh Older children -Upper arm
Meningococcal	Subcutaneous	Upper arm

**Intradermal = into the skin**

**Intramuscular = into a muscle**

**Subcutaneous = under the skin**

**Figure 2: Different needle positions**



## 12. Adverse Event Following Immunization (AEFI)

In very rare cases an “Adverse Event Following Immunization” (AEFI) may occur. An Adverse Event Following Immunization is defined as a medical event or incident that takes place after an immunization, but is not necessarily caused by immunization. Usually it occurs within 30 days period.

### 12.1 Generally an AEFI falls into one of five categories.

1. Vaccine reaction	Event caused or precipitated by the inherent properties of the vaccine (active component or one of the other components e.g. adjuvant, preservative, stabilizer) when given correctly.
2. Programme Errors	Event caused by an error in vaccine preparation, handling, or administration.
3. Coincidental	Event that happens after immunization but is not caused by the vaccine. This is due to a chance temporal association.
4. Injection reaction	Event arising from anxiety about or pain from, the injection itself rather than the vaccine.
5. Unknown	The cause of the event cannot be determined.

### 12.2 Reporting of AEFI

Each reported AEFI by community or health facilities staff shall be followed-up by Council Health Management Team (CHMT):

- Investigated to determine the cause
- Treated appropriately by clinical health staff
- Intervene the cause to prevent future occurrence
- Provide clear information given to the caretakers, community and other health workers about the AEFI

If the adverse event was determined to be due to programme error, appropriate refresher training and frequent, active supervision must solve operational problems.

## CHAPTER 4

### MODULE 3: The cold chain

This module aims to describe the meaning and uses of cold chain. It describes types of cold chains available and needed in health facilities, their use and maintenance to ensure sustainability of immunization activities.

#### 4.1 Introduction

The cold chain is a system used for keeping and distributing vaccines in good required cold temperature conditions. This ensures potency of vaccines from the time they are manufactured to the time they are used. This is because, vaccines are sensitive to heat and freezing and therefore, they must be kept at the correct temperature from the time they are manufactured. The cold chain consists of a series of storage and transport links, all designed to keep vaccines within an acceptable range until it reaches the user.

Maintenance of the cold chain requires vaccines and diluents to be:

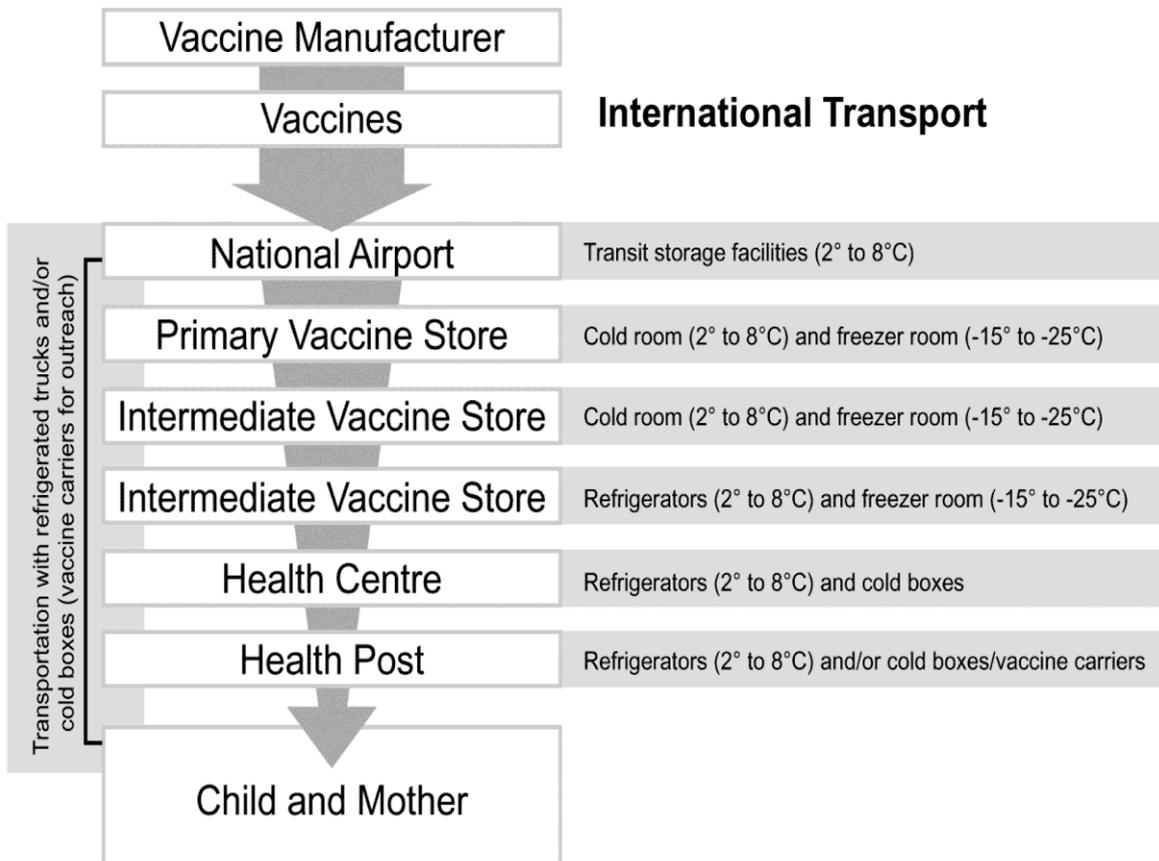
- Collected from the manufacturer or an airport as soon as they are available;
- Transported between +2°C and +8°C from the airport and from one store to another;
- Stored at the correct temperature (see **Figure 4A**) in central, regional and district vaccine stores and in health facilities;
- Transported between +2°C and +8°C to outreach sites and during mobile sessions;
- Kept between +2°C and +8°C range during immunization sessions; and
- Kept between +2°C and +8°C during return to health facilities from outreach sites.

NOTE: After vaccines reach the health facility they must be:

- Kept between +2°C and +8°C in health facility's refrigerator
- Carried to the immunization session in a vaccine carrier with cool water packs
- Kept cool using a foam pad in the vaccine carrier while immunizing the children

The figure below illustrates the general the cold chain.

**Figure 4A: The cold chain (adapted from the IIP module 3)**



## 4.2 Cold chain equipment used in health facilities

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

- **Central** vaccine stores need cold or freezer rooms, freezers, refrigerators, cold boxes, and sometimes refrigerated trucks for transportation.
- **Regional and District** vaccine stores, depending on their size/capacity, need cold and freezer rooms, and/or freezers, refrigerators, and cold boxes.
- **Health facilities** need refrigerators with freezing compartments, cold boxes and vaccine carriers.

The cold chain equipment used in health facilities includes the following:

### 4.2.1 Refrigerators

Health facility refrigerators may be powered by electricity, gas, kerosene, or solar energy. In Tanzania, we commonly use electricity and lp gas. Electric refrigerators are usually the least costly to run and the easiest to maintain, but they must have a reliable electricity supply. Figure 4B

Where electricity and fuel supply is not reliable, ice-lining chest refrigerators can maintain the appropriate temperature for about 16 hours without power. This type can have the vaccines frozen. Which is a contraindication to some vaccines.

Freezing temperature violations information can be easily accessible if one use a digital alarm gadget. This can notify a health worker when the temperature is very low and salvage the potency of the vaccines (**Figure 4C**)

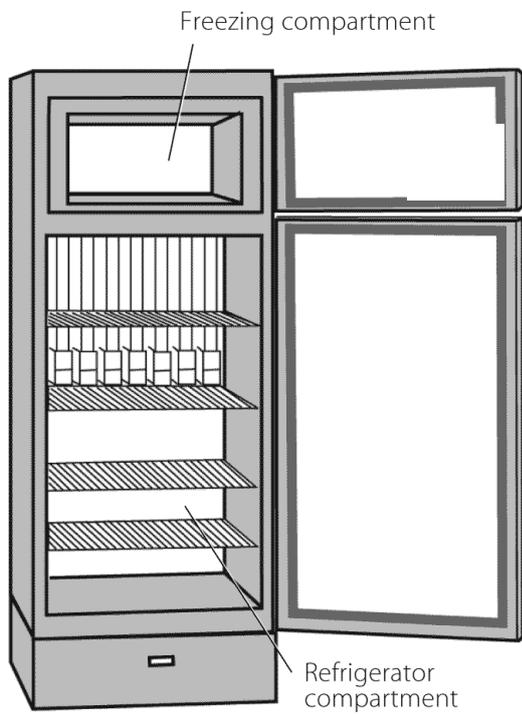
Liquefied Petroleum (LP) gas refrigerators keep vaccines at correct temperatures and are easy to maintain. Refrigerators have different capacities for storing vaccines and for freezing and storing cool water packs. A refrigerator in a health facility should be able to hold:

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

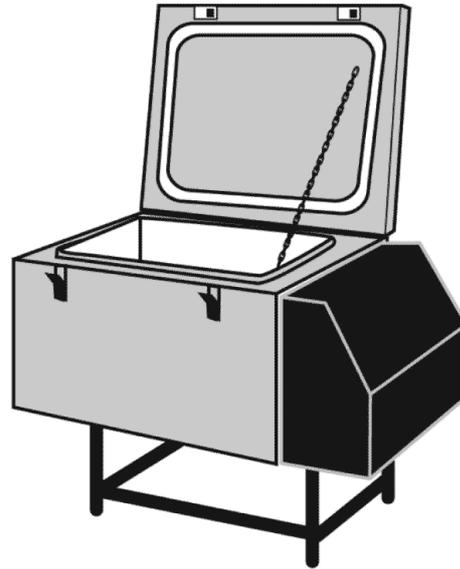
There should be space in the refrigerator left empty to allow air to circulate around the vaccines and diluents to keep them cool.

**Figure 4B: Two of the most common refrigerators**

Refrigerator and ice pack freezer,  
absorption, kerosene/electric



Compression (electric) refrigerator  
and ice-pack freezer



**Figure 4C : Fridge-tag gadget**



#### 4.2.2 Cold boxes

A cold box is an insulated container that can be lined with cool water-packs to keep vaccines and diluents cold during transportation and/or short period storage (from two to seven days).

**Figure 4D**

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

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

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

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

**Figure 4D: Vaccine cold box**



NOTE: The most suitable cold boxes for a particular health facility are determined by:

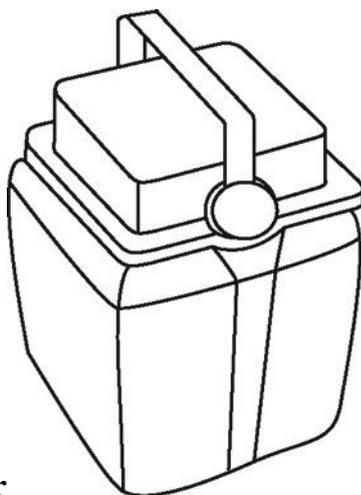
- The vaccine storage capacity needed;
- The cold life needed, that is, the longest time that vaccine will be stored in the box;
- The weight and the volume of the box, which depends on how you will transport it — by motor vehicle, bicycle, or hand; and
- Cool water packs compatible with size of the cold box.

### 4.2.3 Vaccine carriers

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

Vaccine carriers are used to transport vaccines and diluents to outreach sites and for temporary storage during health facility immunization sessions. In small health facilities they are used to bring monthly vaccine supplies from the district store. Vaccine carriers are also used to store vaccines when the refrigerator is out of order or is being defrosted.

Different models of vaccine carriers have different storage capacities.



**Figure 4E: Vaccine carrier**

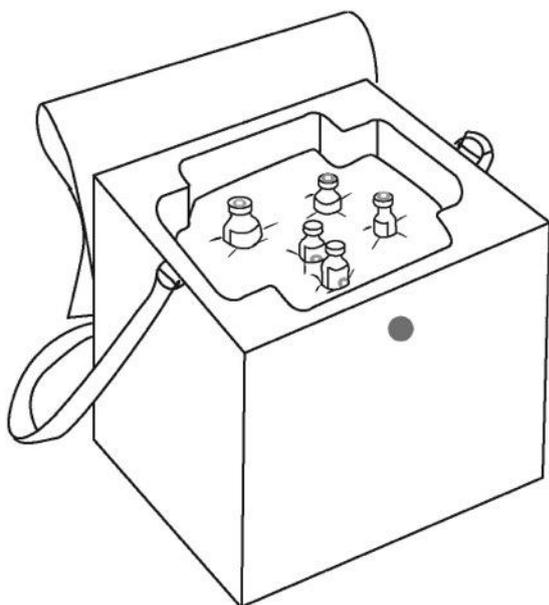
NOTE: The type of vaccine carrier a particular health facility needs depends on:

- The type of vaccines and diluents to be transported;
- The number of vaccines and diluent vials, and cool water-packs to be carried;
- The cold life required;
- Cool water-packs compatible with the size of vaccine carrier;
- The means of transport to be used.

### 4.2.4 Foam pads

A foam pad is a piece of soft foam that fits on top of the cool water-packs in a vaccine carrier. There are some incisions on it to allow vaccines to be inserted in the foam. During immunization sessions, the foam pad serves as a temporary lid to keep unopened vaccines inside the carrier cool while providing a surface to hold, protect and keep cool opened vaccine vials.

**Figure 4F: Foam pad in use**



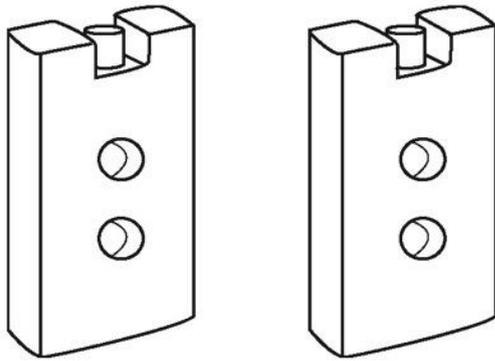
**NOTE:** During an immunization session, vials are protected from heat for a longer period of time if they are inserted in a foam pad.

#### **4.2.5 Cooled water-packs**

- Water packs are flat, square plastic bottles that are filled with water and cooled or frozen.
- Frozen water packs should always remain in the freezer compartment and act as a buffer to temperature changes, especially if there is a power failure. In emergency cases, when needed for use with the vaccine, **must be re-conditioned (allow the ice to melt inside the pack before being packed with the vaccine)**
- Cooled water packs are used to keep vaccines cool inside the vaccine carrier or cold box.
- The number of the water packs required for a cold box or vaccine carrier varies.

**NOTE:** Every health facility should have minimum two sets of cool water-packs for each of their cold boxes and vaccine carriers:

- One in the freezer compartment, in the process of being frozen (act as a buffer to temperature changes, especially if there is a power failure)
- The other, the cooled water pack, for use in cold box or vaccine carrier.



**Figure 4G: cool water-packs**

NOTE: Taking cool water-packs out of the vaccine carrier will shorten its cold life. During sessions, it is not recommended to keep vaccines on cool water-packs or in cups filled with ice to keep vaccines cool. During sessions, stick the opened vaccine vials into the foam pad to keep them cool and to protect them.

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

#### **4. 3. Cold chain monitoring equipment used in health facilities**

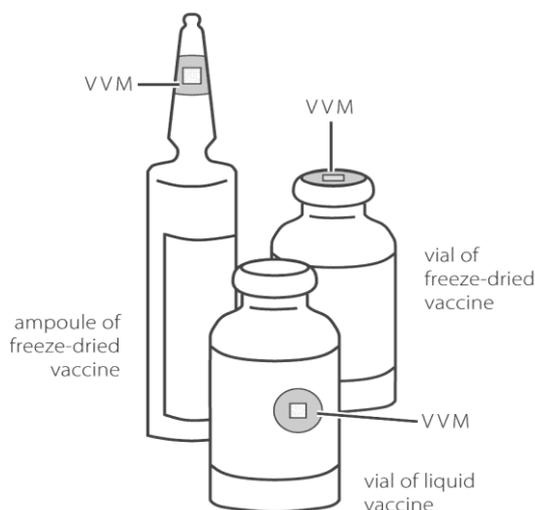
The purpose of cold chain monitoring equipment is to keep track of the temperature to which vaccines and diluents are exposed during transportation and storage.

##### **4.3.1 Vaccine vial monitors**

A vaccine vial monitor (VVM) is a label that changes colour when the vaccine vial has been exposed to heat over a period of time. Before opening a vial, the status of the VVM must be checked to see whether the vaccine has been damaged by heat.

Manufacturers attach VVMs to vials of most vaccines. The VVM is printed on the vial label or cap. It looks like a square inside a circle. As the vaccine vial is exposed to more heat, the square becomes darker.

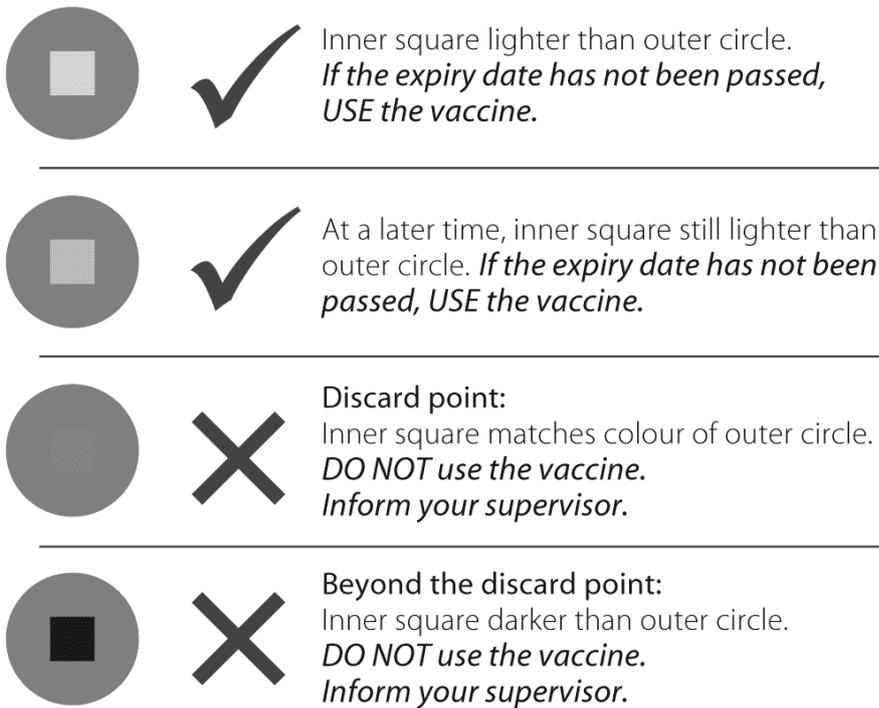
**Figure 4H: VVM on vial label or cap**



## NOTE

- Use only vials with inner squares that are lighter in colour than the outside circle.
- Vials with VVMs in which the inner square has begun to darken but is still lighter than the outer circle should be used before the vials with a lighter inner square.

**Figure 4I: How to read a vaccine vial monitor (VVM)**



**Important note:**

VVMs do not measure exposure to freezing temperatures (freeze-sensitive vaccines).

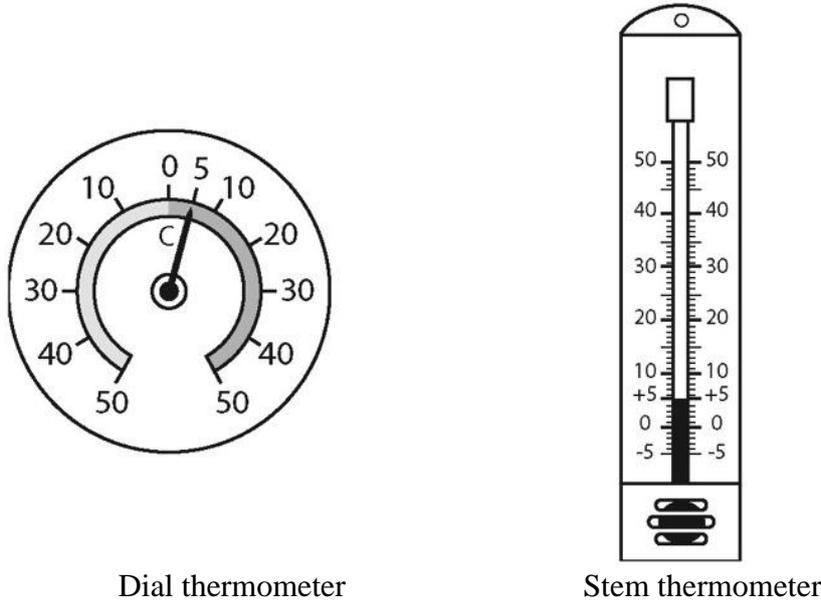
A VVM not at discard point does not exclude the possibility that the vaccine was frozen.

Before use, make sure that the freeze-sensitive vaccine with good VVM has not been frozen.

### 4.3.2 Thermometers

Health facility staff use stem thermometers to monitor the temperature of refrigerators. On a stem or bulb thermometer, coloured fluid in the bulb moves up the scale as it becomes warmer, and down the scale as it becomes colder.

**Figure 4K: Two types of thermometers**



Dial thermometer

Stem thermometer

### 4.3.4 Freeze indicators

#### Freeze-tag

Freeze-tag consists of an electronic temperature measuring circuit with associated LCD-display. If the indicator is exposed to a temperature below  $0^{\circ}\text{C} - 0.5^{\circ}\text{C} \pm 0.3^{\circ}\text{C}$  for more than 60 minutes  $\pm 3$  minutes the display will change from the “good” status into the “alarm” status as indicated on the picture below. The indicator is used to warn of freezing and is packed with DTP-HepB-Hib, PCV13 and TT vaccines. Shelf life is 5 years.

**Figure 4L: Fridge Tag**



Vaccines OK

Do shake test



**Fridge tag in Tanzania**

#### 4.4 How to load cold chain equipment

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

**Note:**

There should be one person in each health facility that has the main responsibility for the refrigerator. This person's responsibilities should include;

- Storing vaccines, diluents, and cool water-packs;
- Checking and recording the temperature twice daily, even on week-ends;
- Maintaining the facility's cold chain equipment.

All health workers in a health facility, however, should know how to monitor the cold chain and what action to take if the temperature is too high or too low.

##### 4.4.1 Vaccine refrigerators

Vaccines, diluents, and **cool water**-packs should be kept in a refrigerator that is used only to store them.

**Do not** put vaccines on the door shelves. The temperature is too warm to store vaccines, and when the door is opened shelves are instantly exposed to room temperature.

**Do not** keep expired vaccines, NOR vaccines with VVMs that have reached or are beyond their discard point, NOR reconstituted vaccines for more than six hours or until the end of an immunization session in the refrigerator. Discard them immediately and report to your supervisor.

Food and drinks should not be stored in a vaccine refrigerator.

**Do not** open the refrigerator door frequently since this raises the temperature inside the refrigerator.

##### Vaccine refrigerators have two compartments:

The main compartment (the refrigerator) for storing vaccines and diluents, in which the temperature should be kept between +2°C and +8°C. The thermostat is used to adjust the temperature.

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

Load a vaccine refrigerator as follows:

1. Freeze and store ice-packs in the freezer compartment.
2. Cool and keep water-packs in the refrigerator compartment for use with vaccines
3. All the vaccines and diluents have to be stored in the refrigerator compartment. If there is not enough space, diluents can be stored at ambient temperature. It is important, however, that put them in the refrigerator before using chill diluents.

4. Arrange the boxes of vaccine in stacks so air can move between them; keep boxes of freeze-sensitive vaccine away from the freezing compartment, refrigeration plates, side linings or bottom linings of refrigerators where freezing may occur.
5. Keep opened vials of **OPV, TT, Pentavalent vaccines** in the “use first” box for first use during the next session.

**Multi-dose vial policy:**

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

- The expiry date has not passed; the dose has not been used within 4 weeks after opening the vial
- Date of opening the vial is written in the label;
- The vaccines are stored under appropriate cold chain conditions at all times;
- The vaccine vial has not been submerged in water;
- Sterile technique has been used to withdraw all doses; and
- The VVM has not reached the discard point.

6. Keep vials with VVMs showing more heat exposure than others in the box labelled “use first.” Use these vials first in the next session.
7. Only keep vials that are good for use in the refrigerator. Do not include expired vaccines, reconstituted vials with doses remaining after an immunization session, and vials with VVMs that have reached or are beyond their discard point.
8. Keep water-packs filled with water on the bottom shelf of the refrigerator. They help to keep the temperature cool in case of a power cut.
9. Store vaccines in locations appropriate to the type of refrigerator you use. See recommendations below.

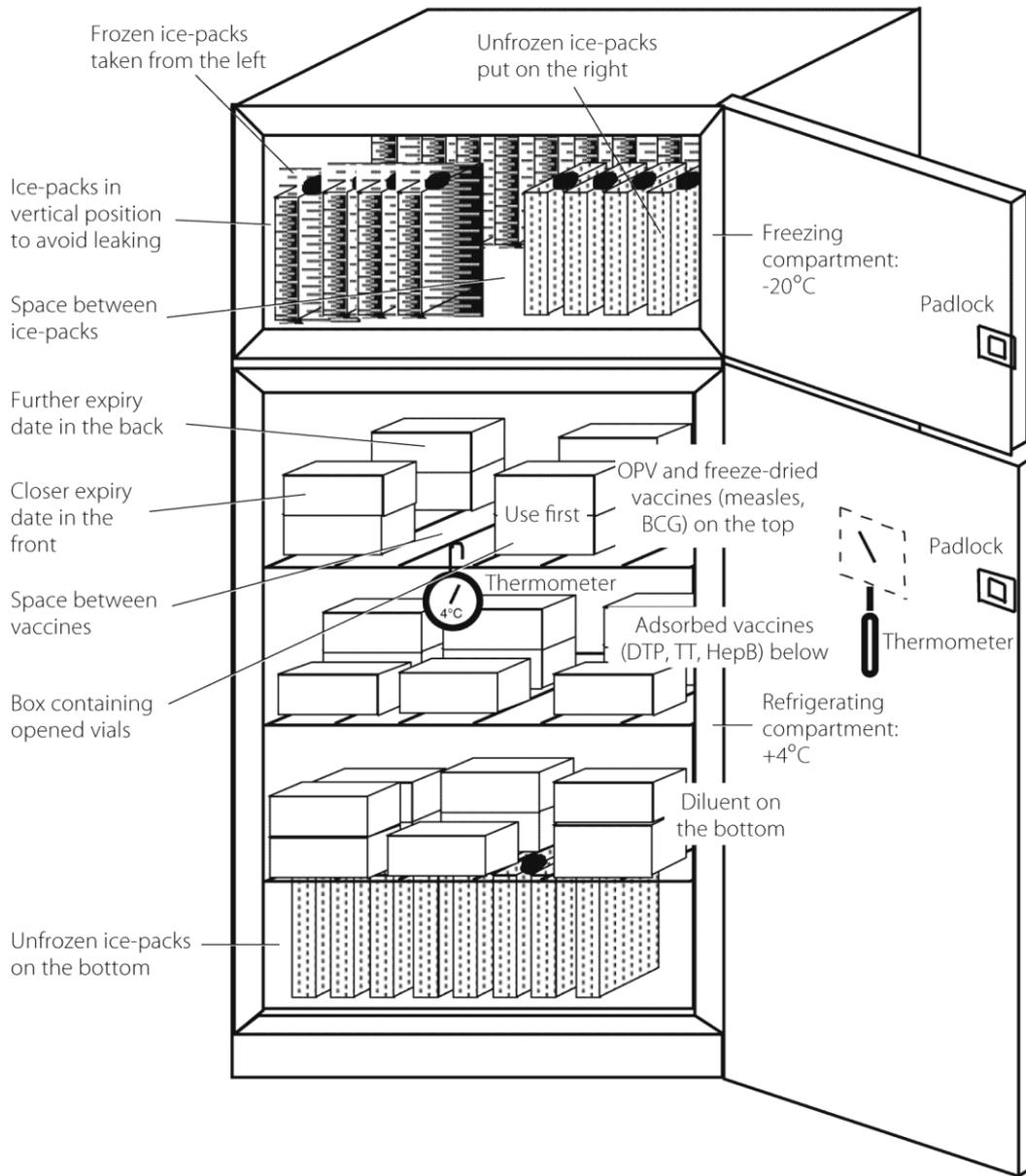
**Load front-loading refrigerator with freezer on top (Figure 3M) as follows:**

10. OPV, Measles and BCG on the top shelf;
11. TT, DTP-HepB-Hib, PCV13 and Rotavirus on the middle shelves; and
12. Diluents next to the vaccine with which they were supplied.

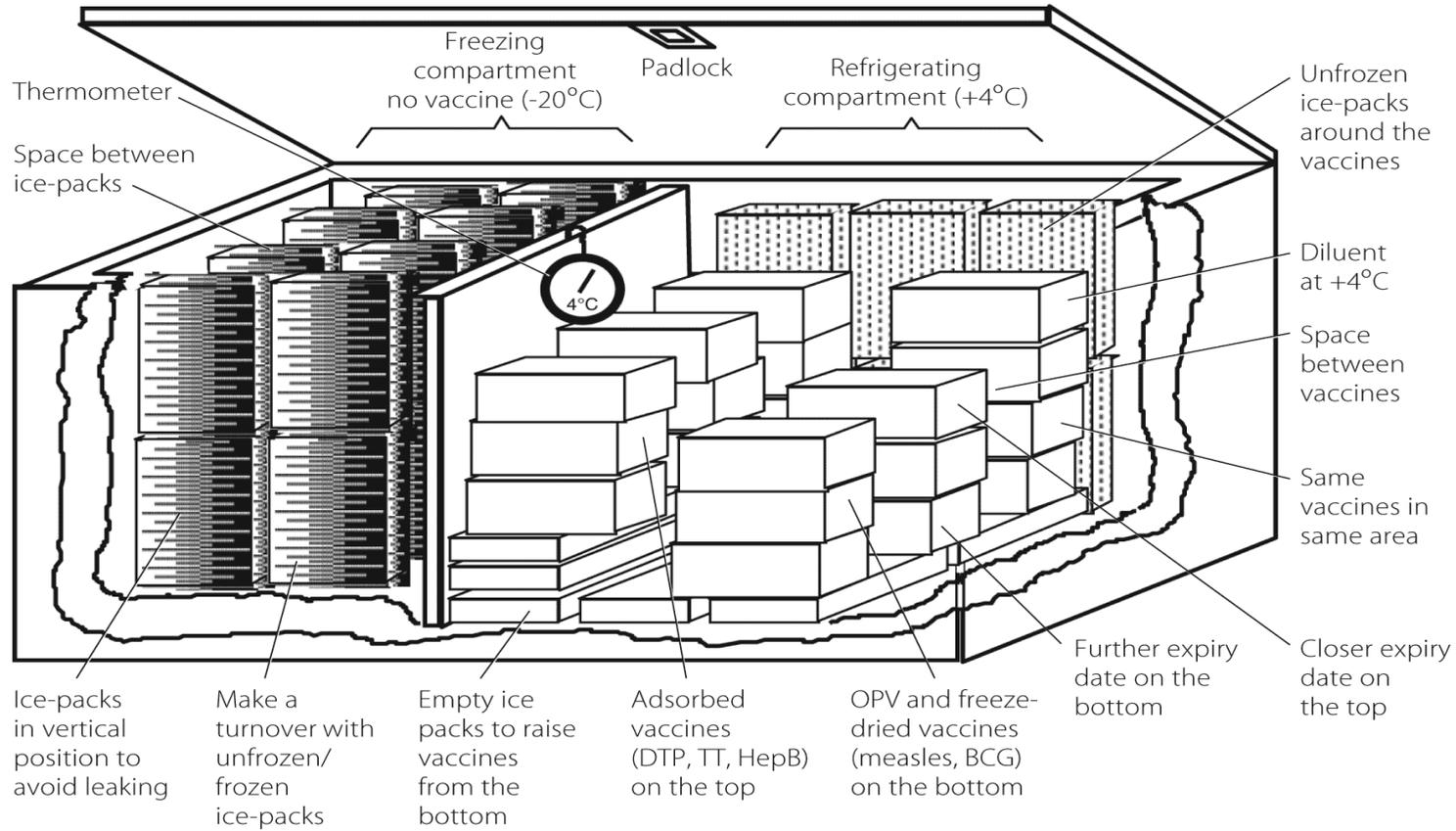
**Loading chest refrigerators (Top Opening)**

13. OPV, Measles and BCG in the bottom only; and
14. Freeze-sensitive vaccines (TT, DTP-HepB-Hib, PCV13 and Rotavirus) in the top only.

**Figure 4M: Loading a front loading vaccine refrigerator**



**Figure 4N: Loading top-opening (chest) refrigerators**



**CAUTION:** NEVER ENTER MORE THAN 6 BIG ICE PACKS OR 10 SMALL ICE PACKS PER DAY

#### **4.4.2 Cold boxes and vaccine carriers**

Load vaccines into cold boxes and vaccine carriers as follows:

**Step 1:** At the beginning of the day of the session, take all the frozen ice cool water-packs you need from the freezer refrigerator and close the door. If water-packs are already frozen:

**Step 2:** Condition frozen cool water-packs properly, by allowing cool water-packs to stay at room temperature until ice begins to move inside the ice pack and water starts to form. This will prevent freeze-sensitive vaccines from freezing.

**Step 3:** Put conditioned cool water-packs against each of the four sides of the cold box or vaccine carrier and on the bottom of the cold box if required.

**Step 4:** Put the vaccines and diluents in the middle of the cold box or carrier.

**Step 5:** In vaccine carriers, place a foam pad on top of the conditioned cool water-packs. In cold boxes, place conditioned cool water-packs on top of the vaccines.

**Step 6:** Close the cold box or carrier lid tightly.

#### 4.5 How to cool water packs

The proper use of cool water-packs is essential for good quality of the vaccines.

Make sure that the cool water-packs you have corresponds (sizes and number) to the cold boxes and carriers you are using.

To cool water-pack:

- Fill with water  $\frac{3}{4}$  full or up to the mark indicated on the cool water-pack and screw the cap on tightly.
- Hold each cool water-pack upside down and squeeze it to make sure it does not leak.
- Put the cool water-packs upright or on their sides in the freezing compartment so that the surface of each coolwater- pack is touching the evaporator plate, and close the door.
- LP Gas refrigerators or with a freezing compartment can freeze up to six large or 12 small cool water packs per day. More packs will take longer to freeze.
- Leave cool water-packs in the freezer for at least 24 hours to freeze solid.
- Before use condition the frozen water packs (see above)
- After the session put the cool water-packs back in the freezing compartment.

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

#### **Remember:**

You do not have to refill **water**-packs every time you use them.

Use the same water repeatedly.

Always, keep frozen water pack in the freezer compartment (for emergency purposes, as well as a buffer in temperature changes when there is power failure).

- You don't need to refill the water packs every time you use them.

- Use the same water repeatedly

- Make sure **frozen water**-packs are conditioned (allowed to start melting) before putting them in the cold box containing freeze-sensitive vaccines. This will prevent vaccines from freezing.

Note: It takes 24hours to freeze water packs

## 4.6 How to monitor and adjust the refrigerator temperature

### 4.6.1 Monitoring the temperature in vaccine refrigerators

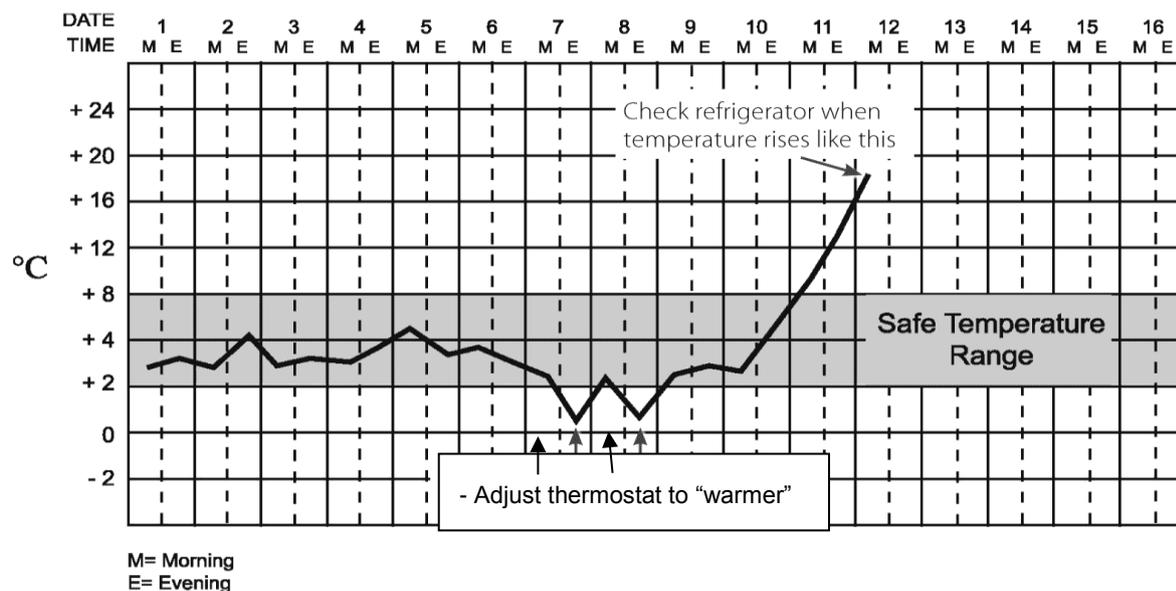
To monitor the temperature of the main section of a refrigerator you need:

- A thermometer and or fridge tag; and
- A temperature chart with graph, which you should tape to the outside of the door.

To monitor the temperature, proceed as follows:

- Set the refrigerator thermostat during the coldest part of the day to around +2°C to +4°C.
- Monitor temperatures first thing in the morning and before you leave the health facility in the afternoon. If the temperature is between +2°C to +8°C, do not adjust the thermostat.
- Continue to monitor the temperature first thing in the morning and before you leave the health facility in the afternoon, including workdays, weekends, and holidays.
- Record the temperature for the day and time on the refrigerator temperature chart, as shown below.

**Figure 4P: Refrigerator temperature chart**



- When a chart has been completed, replace it with a new one.
- Keep the completed charts in a record book for future reference.
- **Actions should be taken when the temperature goes out of range.**

**Figure 4Q: Tanzanian Daily Refrigerator temperature monitoring chart**



#### 4.6.2 How to adjust the temperature of vaccine refrigerators

If the temperature is too **LOW** (below +2°C):

- Turn the thermostat knob so that the arrow points to a lower number. This will make the refrigerator warmer.
- Check whether the door of the refrigerator closes properly. The gasket may be broken.
- Check freeze-sensitive vaccines (TT, DPT-HepB-Hib, PCV13 and Rotavirus vaccines) to see whether they have been damaged by freezing by conducting a shake test

**Remember:**

- Slight heat exposure is less damaging than freezing.
- To maintain Refrigerator temperature at +2°C to + 8°C is mandatory.

If the temperature is too **HIGH** (above +8°C):

- Make sure that the refrigerator is working. If not, check if gas or power supply is present.
- Check whether the door of the refrigerator or the freezing compartment closes properly. The gasket may be broken.
- Check whether frost is preventing cold air in the freezing compartment from entering the refrigerator compartment. Defrost if necessary.
- Turn the thermostat knob so that the arrow points to a higher number. This will make the refrigerator cooler.
- If the temperature cannot be maintained between +2°C and +8°C, store vaccines in another place until the refrigerator is repaired.

**Warning:**

Do **not** adjust thermostat to a higher (cooler) setting after a power cut. This could freeze the vaccines.

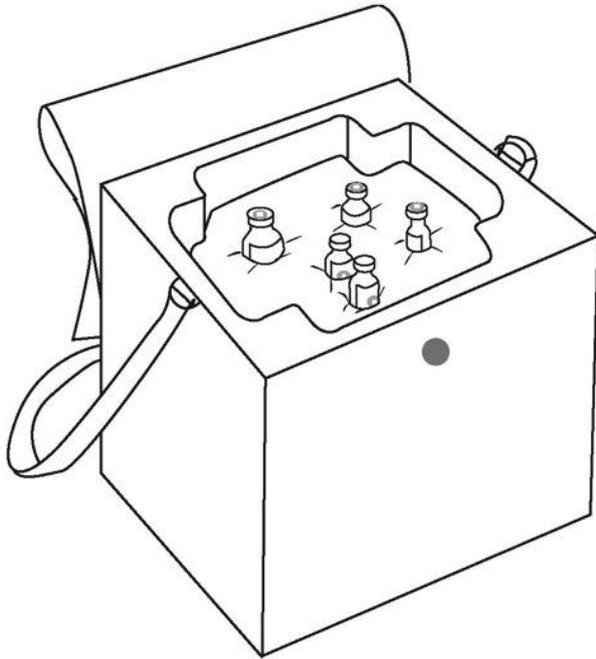
Do **not** adjust thermostat to a higher setting when vaccines arrive. This could freeze the vaccines.

#### 4.6.3 Maintaining the correct temperature in cold boxes and vaccine carriers

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

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

**Figure 4Q: Foam pad in use**



If the cool water-packs inside the cold box or vaccine carrier have completely melted are warm:

Check VVMs status and return the vaccines that can be used to a working refrigerator as soon as possible.

## 4.7 How to maintain cold chain equipment

### 4.7.1 Maintaining vaccine refrigerators

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

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

To defrost and clean a refrigerator:

- Take out all the heat sensitive vaccines (OPV, Measles, BCG, YF) and transfer them to a cold box lined with frozen cool water-packs
- Take out all the freeze sensitive vaccines (Pentavalent vaccine, TT, PCV 13) and transfer them to a cold box lined with conditioned cool water-packs.
- Turn off the power supply to the refrigerator.
- Leave the door open and wait for the ice to melt. Do not try to remove the ice with a knife or ice pick, since doing so can permanently damage the refrigerator. You can place a pan of boiling water inside and close the door.
- Clean the inside of the refrigerator and door seal with a clean wet cloth.
- Turn the refrigerator on again.
- When the temperature in the main section falls to +8°C or lower (but not less than +2°C), return the vaccines, diluents, and cool water-packs to their appropriate places.

If you need to defrost your refrigerator more than once a month, it could be because:

- You may be opening it too often (more than three times daily); or
- The door may not be closing properly; or
- The door seal may need to be replaced.

### 4.7.2 What to do when a vaccine refrigerator is out of order

If your vaccine refrigerator stops working, first protect the vaccines and then repair the refrigerator. Ensure that the cold box with cool water-packs is available for the transfer to a facility with working refrigerator.

#### Protecting the vaccines

Move the vaccines to another place until the refrigerator is repaired. If you think that the problem will last only a short time, you may use a cold box or vaccine carrier lined with conditioned water-packs for temporary storage. For a longer duration, use another refrigerator. Always keep a freezer indicator with the freeze-sensitive vaccines to monitor eventual freezing.

### **Restoring the refrigerator to working order**

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

If a lack of power or gas is not the problem, repair the refrigerator or report to your repair technician or supervisor.

Record the breakdown on the daily temperature-recording chart.

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

### **It is important to have an alternative power plan for areas with tendency of blackout like in Tanzania and in rural areas**

**Alternative and more stable sources to be considered for the future include solar energy. Solar panels can provide an adequate source of energy to run vaccine refrigeration.**

**Standby power generator though expensive to run, but can be used in cases of emergency power outage.**

### **4.7.3 Maintaining cold boxes and vaccine carriers**

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

Knocks and sunlight can cause cracks in the walls and lids of cold boxes and vaccine carriers. If this happens the vaccines inside will be exposed to heat.

## 4.8 The shake test

### *Shake Test*

The “Shake test” can help give an idea whether adsorbed vaccines (Pentavalent, PCV and TT) have been subjected to freezing temperatures likely to have damaged them. After freezing, the vaccine no longer has the appearance of a homogenous cloudy liquid, but tends to form flakes, which settle at the bottom of the vial after shaking.

**Sedimentation process is faster in a vial which has been frozen than in a vial, from the same manufacturer, which has not been frozen.**

The test should be conducted for all boxes where freeze indicators are found to be activated or temperature recordings show negative temperatures.

A health facility staff, whenever suspect a vaccine being frozen, should inform the district/Council supervisor immediately.

Shake test should be done by the district/council supervisors only.

### **Procedure:**

**Step 1** — *Prepare a frozen control sample:* Take a vial of vaccine of the same type and batch number as the vaccine you want to test, and from the same manufacturer. Freeze the vial until the contents are solid (at least 10 hours at -10°C) and then let it thaw. This vial is the **control sample**. Mark the vial clearly so that it is easily identifiable and will not be used by mistake.

**Step 2** — *Choose a test sample:* Take a vial (s) of vaccine from the batch (es) that you suspect has been frozen. This is the *test sample*.

**Step 3** — *Shake the control and test samples:* Hold the control sample and the test sample together in one hand and shake vigorously for 10–15 seconds.

**Step 4** — *Allow to rest:* Leave both vials to rest by placing the vials on a table and not moving them further.

**Step 5** — *Compare the vials:* View both vials against the light to compare the sedimentation rate. If the test sample shows a much slower sedimentation rate than the control sample, the test sample has most probably **not been frozen** and can be used. If the sedimentation rate is similar, the vial has probably been damaged by freezing and **should not be used**.

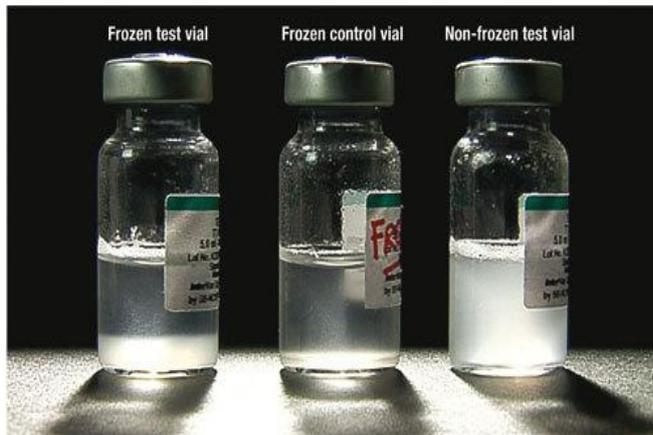
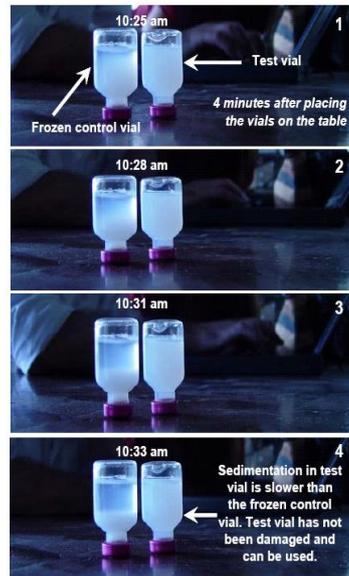
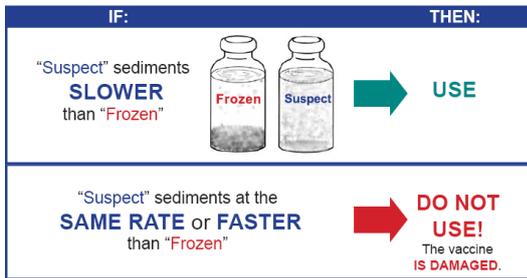
Note that some vials have large labels, which conceal the vial contents. This makes it difficult to see the sedimentation process. In such cases, turn the control and test vials upside down and observe sedimentation taking place in the neck of the vial.

If the shake test procedure indicates that freezing has damaged the test sample, you should notify your supervisor immediately. Identify and separate all vaccines that may have been frozen and ensure that none are distributed or used.

### **Note:**

Frozen samples can be used for shake tests only when testing the same vaccine from the same manufacturer and the same lot number. A new sample is needed for each manufacturer and lot number.
--

**Figure 4R: The shake test**



## 4.9 Summary

The tables below show the sensitivity of different vaccines to heat and freezing:

**Table 4.1: Heat sensitivity**

Range	Vaccine
 <p>most sensitive</p> <p>least sensitive</p>	OPV
	Measles
	Pentavalent, Rotavirus, PCV13
	BCG
	TT,

**Table 3.2: Freeze sensitivity**

Range	Vaccine
 <p>most sensitive</p> <p>least sensitive</p>	Pentavalent,
	PCV, Rota virus vaccine
	TT,

### Light sensitivity

Finally, some vaccines are very sensitive to strong light and their exposure to ultraviolet light causes loss of potency. Consequently, they must always be protected against sunlight or fluorescent (neon) light. BCG and Measles vaccines are equally sensitive to light (as well as to heat). Normally, these vaccines are supplied in vials made from dark brown glass, which gives them some protection against light damage, but care must still be taken to keep them covered and protected from strong light at all times.

## CHAPTER 5

### MODULE 4: Ensuring safe injections

This module aims to explain safe practices for vaccine injections. It describes what health workers should do to ensure that they deliver immunization in the safest manner.

#### NOTE

An injection is considered safe for:

- The *mother or child*, when a health worker uses a sterile syringe and a sterile needle and appropriate injection techniques;
- The *health worker*, when he or she avoids needle-stick injuries; and
- The *community*, when waste created by used injection equipment is disposed of correctly and does not cause harmful levels of pollution and injuries.

## 5.1 Using safe injection equipment and techniques

### 1.1 Types of injection equipment

The following equipments are available and can be used to administer injectable vaccines in Tanzania:

Equipment	Remarks
Auto-disable (AD) syringes	Used as the equipment of choice
Single use disposable (non AD) syringes and needles	Used for mixing purposes

NB. Reusable syringes and needles are not used in Tanzania to prevent cross infection and hygienic problems.

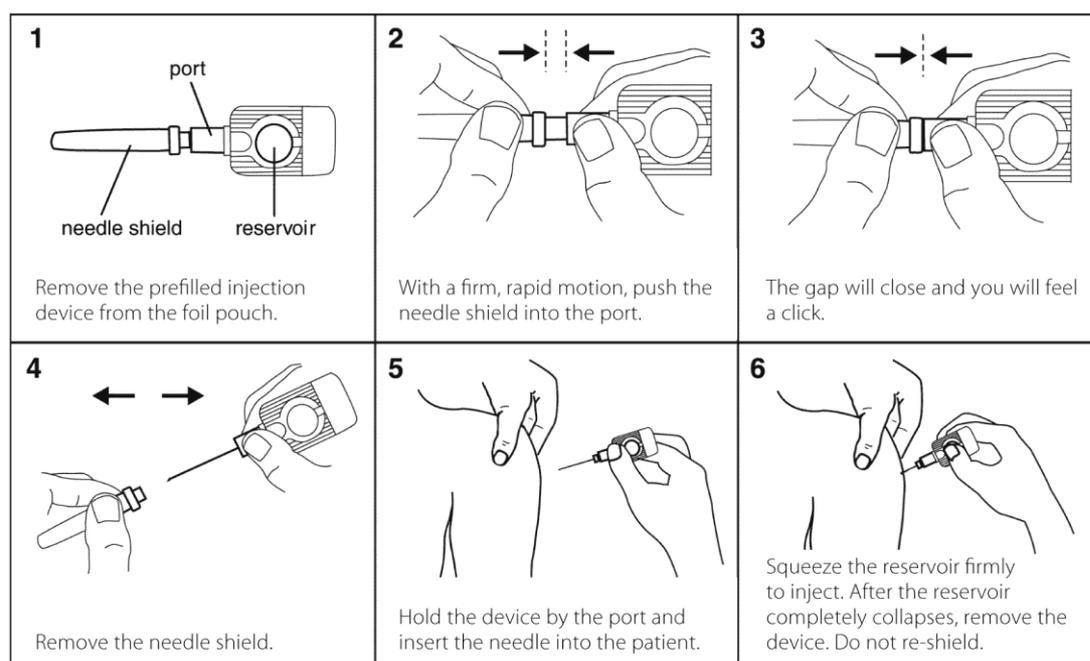
#### 5.1.1 Auto-disable (AD) syringes

AD syringes are self-locking syringes and can only be used once. AD syringes are the preferred equipment for all types of immunization sessions and are important in Tanzania due to the burden of infectious diseases and challenged infrastructures.

Every AD syringe is sterilized and sealed by the manufacturer. There are several different types of AD syringes. Most AD syringes have fixed needles. Others have detachable needles that fit only the specific AD syringe they accompany. These special needles cannot be used with a standard syringe. All AD syringes have plastic caps to keep the needle sterile, and some also have caps on the plungers.

Different types of AD syringes are available for BCG as well as other vaccines. Each type of AD syringe requires health workers to use a specific technique to give injections. For the use of AD syringes, please refer to the manufacturers' instructions.

**Figure 1: Activation and use of prefilled auto-disable device**



## General steps for using AD syringes

**General** steps to follow when using AD syringes are enumerated hereunder. These steps must be refined depending on the specific AD syringe you are using.

**Step 1:** Remove the syringe and needle from plastic wrapping (peel open the syringe plunger end of the package) or detach the plastic caps.

### Step 2:

- Fix the needle to the syringe if it is not already in place.
- Take off the needle cap without touching the needle.

The plunger can go back and forth only once, so health workers should not move the plunger unnecessarily and should not try to inject air into the vial, as this will disable the syringe.

**Step 3:** Insert the needle in the vaccine vial and bring the tip of the needle to the lowest part of the bottom of the vial.

**Step 4:** Pull the plunger back to fill the syringe. The plunger will automatically stop just past the 0.05 ml/0.50 ml mark and you will hear a “click.”

**Step 5:** Keep the needle tip in the fluid at all times, making sure to empty the full contents of the vial. Remove the needle from the vial. To remove air bubbles, hold the syringe upright and tap the barrel. Then carefully push to the close mark.

**Step 6:** Locate the injection site.

**Step 7:** Push the plunger forward and inject the vaccine. After injection, the plunger will automatically lock and the syringe cannot be reused. **Do not** re-cap the needle after use.

**Step 8:** Dispose of the needle and syringe in a safety box: a leak-proof, puncture-resistant container for sharps waste.

### *Advantages of AD syringes:*

- They can only be used **once**.
- They eliminate the patient-to-patient disease transmission caused by the use of contaminated needles and syringes.
- They save time for health workers from the heavy work of sterilization.

## 5.1.2 Disposable syringes and needles

Disposable single-use syringes and needles are **not recommended** for injections in immunization programmes. Because reuse of disposable syringes and needles carries a high risk of infections

Vaccines that must be reconstituted, such as measles vaccine, require a large syringe to mix the diluent with the vaccine. If this is the case, you may use disposable syringes and needles to reconstitute vaccine. Do not reuse the disposable syringe and needle for reconstitution.

## 5.1.2 Estimating AD syringes needs

It is important to ensure that you have a sufficient stock of AD syringes to conduct planned fixed and outreach sessions.

### 5.1.3 Giving the right vaccine safely

It is important to ensure safety of injection equipment safely while conducting immunization. Moreover, it is equally important to give the right vaccine, which has been kept properly in the cold chain, appropriately reconstituted, and safely administered (Please see the next module for more explanation on safe vaccination).

**Table 4.1: Examples of incorrect immunization practices and possible severe reactions following immunization**

<b>Incorrect practice</b>	<b>Possible severe reactions following immunization</b>
<b>Non-sterile injection</b> <ul style="list-style-type: none"> <li>• Reuse of disposable syringe or needle</li> <li>• Unsterile syringe or needle</li> <li>• Contaminated vaccine or diluent</li> </ul>	<ul style="list-style-type: none"> <li>• Infection such as local abscess at injection site, sepsis, toxic shock syndrome, or death</li> <li>• Blood-borne infection transmitted such as hepatitis, HIV</li> </ul>
<b>Reconstitution error</b> <ul style="list-style-type: none"> <li>• Inadequate shaking of vaccine</li> <li>• Reconstitution with incorrect diluent</li> <li>• Drug substituted for vaccine or diluent</li> <li>• Reuse of reconstituted vaccine at subsequent session</li> </ul>	<ul style="list-style-type: none"> <li>• Local abscess</li> <li>• Vaccine in-effectiveness <sup>a</sup></li> <li>• Negative effect of drug, e.g. insulin, oxytocin, muscle relaxants</li> <li>• Death</li> </ul>
<b>Injection at incorrect site</b> <ul style="list-style-type: none"> <li>• BCG given subcutaneously</li> <li>• Pentavent/PCV10/TT too superficial</li> <li>• Injections into buttocks</li> </ul>	<ul style="list-style-type: none"> <li>• Local reaction or abscess</li> <li>• Local reaction or abscess</li> <li>• Sciatic nerve damage</li> </ul>
<b>Vaccine transportation/storage incorrect</b> <ul style="list-style-type: none"> <li>• VVM changed colour</li> <li>• Clumping of adsorbed vaccine</li> </ul>	<ul style="list-style-type: none"> <li>• Local reaction from frozen vaccine</li> <li>• Vaccine ineffectiveness <sup>a</sup></li> </ul>
<b>Contraindications ignored</b>	<b>Avoidable severe reaction</b>
<sup>a</sup> vaccine being ineffective is an “effect”, it is not strictly an adverse event	

#### **5.1.4 Simple ways to improve injection safety**

1. Prepare injections in a clean designated area where blood and body fluid is unlikely. Prepare each dose immediately before administering; do not prepare several syringes in advance.
2. Never leave the needle in the top of the vaccine vial.
3. Follow product-specific recommendations for use, storage and handling of vaccines.
4. Follow safe procedures to reconstitute vaccines.
  - a) Make sure you have the **CORRECT** diluent for each freeze-dried vaccine — check that the same manufacturer produces both diluent and vaccine.
  - b) When reconstituting, both the freeze-dried vaccine and the diluent must be at the same temperature (between 2°C and 8°C).
  - c) Use a sterile syringe and needle to reconstitute each unit of vaccines. Use all the diluent provided for the vial. After use, place the syringe into a safety box.
  - d) All reconstituted vaccines should be discarded at the end of the session or after six hours, whichever is the sooner.
5. Use a new syringe and needle for every child — preferably an auto-disable (AD) syringe.
  - a) Use a new, quality controlled auto-disable syringe and needle.
  - b) Inspect the packaging very carefully. Discard a needle or syringe if the package has been punctured, torn or damaged in any way.
  - c) Do not touch any part of the needle. Discard a needle that has touched any non-sterile surface.
6. Hold the child firmly. Anticipate sudden movement during and after injection.

## Summary of unsafe immunization practices- pictorial illustration



**Do not overfill the safety box**



**Do not recap the needle**



**Do not leave the needle attached to or inside the vial**



**Do not touch the needle**



**Do not dispose of used needles in an open cardboard box**

## 5.2. Preventing needle-stick injuries and infections

### Needles can be dangerous

Health workers frequently succumb needles injuries. Small amounts of blood but dangerously infected with hepatitis B, hepatitis C, HIV, or other viruses can be transmitted by needle-stick injuries. These can be fatal to health workers. Therefore prevention is critical.

#### *Needle-sticks may occur:*

- When health workers recap needles or walk while carrying used syringes and needles;
- If patients — especially children — are not positioned securely while they receive injections;
- If unsafe disposal practices leave people or animals exposed to used syringes and needles.

Needle-stick injuries can be prevented by:

- Minimizing the need to handle needles and syringes;
- Handling syringes and needles safely;
- Setting up the immunization work area to reduce the risk of injury;
- Positioning children correctly for injections; and
- Practising safe disposal of all medical sharps waste.

## 5.3 WASTE MANAGEMENT

### Disposing of used syringes and needles

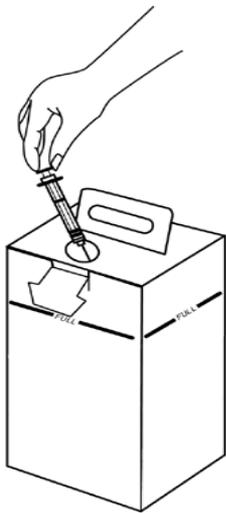
For safety of health workers, patients, and populations at large, used syringes and needles should be discarded immediately and properly after use. Sharps waste can cause serious health and environmental problems. Unsafe disposal can spread some of the very same diseases you are working so hard to prevent.

Several methods are used in Tanzania for such disposal

#### 5.3.1 Using a safety box

All used syringes and needles should be placed inside a **safety box** (see Figure 5E) immediately after use. These containers are waterproof and tamper-proof and needles cannot easily pierce them.

**Figure 4B: Safety box**

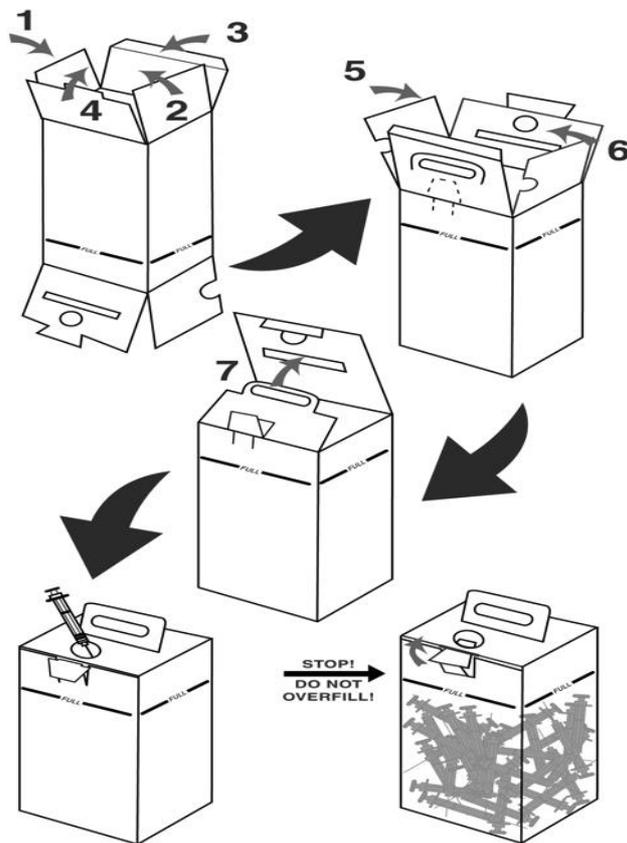


Safety box comes un-assembled to ease its packing and transportation to the end user.

### 5.3.2 How to assemble the safety box

Safety boxes require proper assembly before use. Many come with picture instructions printed on the side. Figure 5C shows such instructions.

**Figure 4C: Safety box assembly and use**



#### **When the box is not in use, close the opening on the top.**

To ensure safe handling of the safety box:

- Don't handle or shake the safety box more than necessary. Never squeeze, sit or stand on safety boxes.
- Take extra care when you are carrying the box to the disposal site. Hold the box by the top (by the handle provided) above the level of the needles and syringes.
- Keep safety boxes in a dry, safe place out of the reach of children and the general public, until they have been safely disposed of.
- Everyone at every health facility should be trained on how to handle the safety box safely.

### 5.3.3 Procedures for final disposal of sharps, syringes and needles.

All safety boxes with used sharps, syringes and needles must be disposed by burning and burring or incineration methods.

#### Burn and Bury

Where there is no incinerators the burn and bury method can be used. This involves burning at low temperature in pits one meter deep. The remains/ashes and vaccine glass vials are then covered with soil/sand.



Figure 5D Burning safety box

#### Advantages

- Relatively inexpensive
- Minimum training is required
- Reduction in wastes volume
- Reduction in infectious materials

#### Disadvantages

- Pollution toxic emissions i.e. dioxins and furans
- May not completely burn

**CAUTION:** Do not put the following material in a safety box.

Discard the following with other medical waste:

-Empty vials;

-Discarded vaccine vials;

-Gloves or any kind of plastic materials or waste products.

**-Fence the Pit site used for burn and bury, and should not be an open space, accessible to children.**

## Incineration Method

This involves burning at high temperatures using Small Scale Incinerators (SSI) which can attain 800°C and above. All sharps will be completely burned and the remaining ashes and vaccine vials are buried in pits designed for this purpose. This method is common in most hospitals and health centers in Tanzania.

### Advantages

- Complete combustion of syringes and needles
- Reduce risks of toxic emissions
- Reduce volume of wastes

### Disadvantages

- Building materials not readily available e.g. firebricks
- Relatively expensive to build, operate and maintain
- Require trained personnel to operate
- May require fuel or dry wastes to start the burning



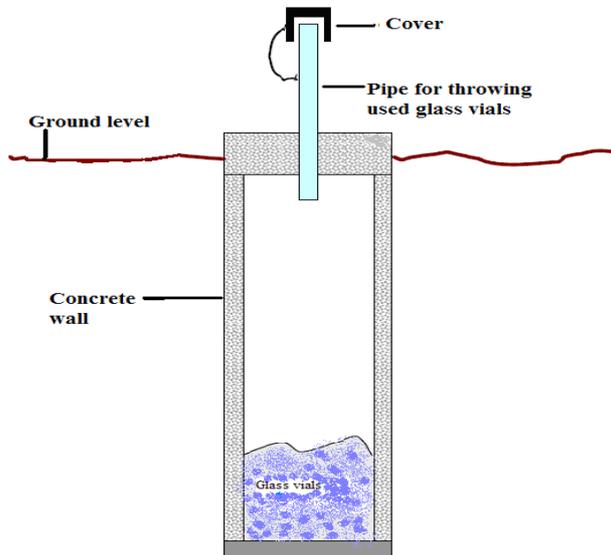
**Figure 5E: Incinerator**

### Disposal pits

Disposal pit can be used in all long-term measures. This type of pit is specifically designed for the disposal of vaccine glass vials. This pit will not allow for excavation of the glass vials. This method is being applied in Zanzibar and some of the region in Tanzania mainland eg Kigoma whereby circular pits with a depth of 4 meters and diameter of 5 meters are constructed using concrete and covered at the top with a small opening enough to allow for depositing glass vials.

Empty or expired vials if not recycled for glass manufacturing should be crushed into a pit for volume reduction. Glass should never be incinerated as it may clog an incinerator or may explode. If recycled vial should be disinfected before using chlorine or by boiling

**Figure 5E: Disposal pit**



**NOTE:**

**Used syringes and needles must NEVER be dumped in open areas where people might step on them or children might find them.**

**Remember**

In the case of a needle stick injury:

- Immediately bleed and wash wound.
- Immediately report and record the incident.
- Get details of its source for identification of possible infection.
- Seek additional medical attention.
- Initiate post exposure prophylaxis, if available and appropriate.
- Get blood tests or other tests and counseling, if indicated.
- Investigate the incident and implement steps to prevent future incidents.

**Protective clothing to health care waste handler is crucial i.e. overalls, rubber gloves, boots or closed-toe shoes, rubber aprons, goggles**

**IMPORTANT: The remains of the needles and safety box should be buried after burning, whether burning is done in a metal drum or in an open pit. Bury them deeply in a disposal pit, controlled landfill, or a similar location where people do not have access to them.**

## CHAPTER 6

### MODULE 5: PLANNING IMMUNIZATION SESSIONS TO REACH TARGET POPULATION

#### 1. Planning at district level involving all health facilities

The key to improving immunization services is a district plan aiming to provide immunization and reach every infant and woman in the district. Such a plan needs teamwork with close collaboration between district and health facility staff. In this section, we describe the steps leading to a good quality district plan.

##### Stage 1 – Initial planning by district

The first stage is for the district staff to make an operational map of the whole district and prepare a draft district plan to provide sessions to reach the whole population.

##### Stage 2 – Joint planning by district and health facility staff

Ideally this stage can be carried out during a meeting between the district staff and staff from all health facilities, during which:

- The district and health facility staff work together to make individual maps and session plans for each health facility catchment area.
- The district and health facility staff put all information together and revises the draft of district session plan based upon the practical details provided by the session plans of each health facility.
- Every health facility makes a work plan based upon its session plan.
- Finally all the health facility work plans are consolidated into a single district work plan showing when and where each health facility session will be held.

##### Stage 3 – Regular review of plans

Once the district work plan has been consolidated it can be used to plan supervisory visits, to take corrective action and to adjust session plans according to need.

#### 1.1 Stage 1: Initial planning by district

##### 1.1.1 Creating an operational map of your district

To plan sufficient sessions to reach all infants and women in your district, you will have to know your area well. The best way to start is to draw a map of the area served by your district. This will help you determine which populations will be served by fixed sessions and which ones will require outreach and/or other strategies such as mobile sessions. A map is a simple tool that will help you plan how to reach all the infants and women in your area.

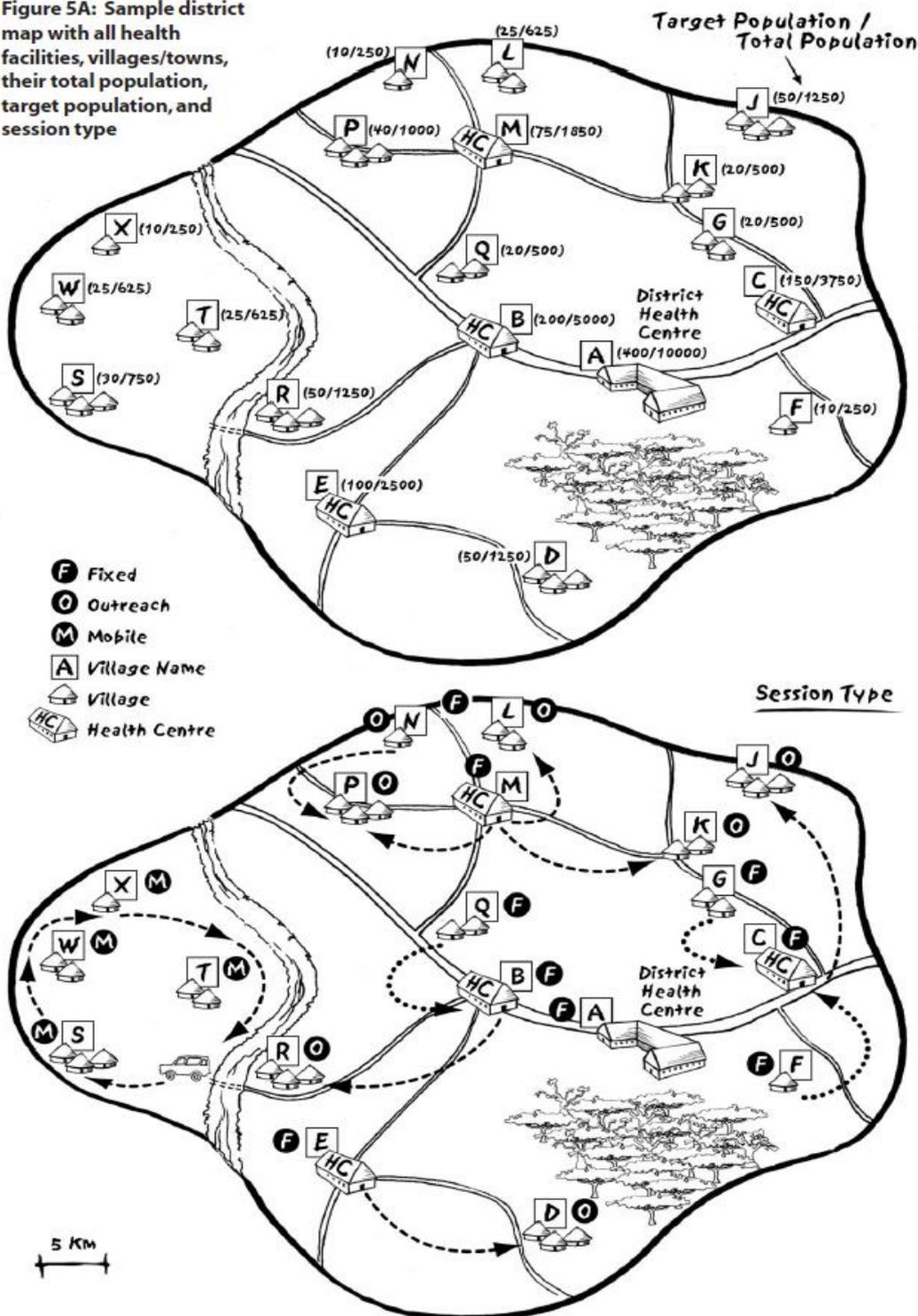
- **Draw a simple map of your district. It does not have to be to scale, but it should contain all the important features of the district. Mark the following information on the map:**
  - Each village, town and health facility;
  - The total population and target population<sup>1</sup> of each village and town;
  - All known high risk or priority areas;
  - Roads;
  - Geographical landmarks (rivers, streams, mountains).
- **Using the district map, decide the type of session suitable for each village/town in your district (fixed, outreach, mobile).**

On the map, mark what kind of session will be used to reach each village or town using the

letters F (fixed), O (outreach), M (mobile). For outreach and mobile, use arrows to show how they will be reached. Figure 5A shows an example of a district map drawn in two stages for the purpose of this module. In real situations you will need one map, which shows all the information together – populations, features and session types. Figure 5A shows a rural area. For an urban area however it is still useful to have a map showing population distribution and location of health facilities.

**FIGURE 5A: Sample district map with all health facilities, villages/towns, target population, and session types: Adapted from IIP module 5**

**Figure 5A: Sample district map with all health facilities, villages/towns, their total population, target population, and session type**



### 1.1.2 Making a district session plan including all health facilities and populations in the district

➤ **1. In Table 5.1, complete columns I, II, III, IV, V from the data on the map**

Create a table listing each village and town, its population and target population (see Table 5.1). On the table and map, against each village/town, write down the type of session needed and which health facility will serve that village/town, following the map (Figure 5A).

This example has been drawn in two stages, the first showing population and major features, the second showing session types needed to reach the population. In a real situation all the information should be displayed on one map.

➤ **2 Calculate number of injections needed per year (column VI)**

In this module we use number of injections as a measure of the workload during an immunization session. First, decide how many injections are needed to fully immunize an infant in your district. At a minimum an infant will need five injections (BCG, pentavalent multiplied by three, measles). In addition, two TT doses are needed to immunize pregnant women. This makes a total of five infant injections, plus two injections of TT for pregnant women, which makes up seven injections in all for full immunization of an infant and pregnant woman.

*To calculate the minimum number of injections per year multiply the annual target population by seven.*

➤ **3. Calculate number of injections needed per month (column VII)**

*To calculate the monthly total, divide the yearly total by 12.*

➤ **4. Calculate number of sessions needed per month at each fixed and outreach site (column VIII).**

You now need to decide how many injections health staff can reasonably give during one fixed session and one outreach session. For this module, we assume that a fixed session in a health facility can reasonably deliver at least 70 injections per session, and an outreach session at least 35 injections per session. However this number may vary depending on your local conditions, i.e. number of staff, availability of vaccines and other supplies etc. As a general rule at least four sessions per year will be needed at each outreach or mobile team site to fully immunize all infants.

*To calculate the number of sessions per month:*

*Divide number of injections needed per month by 70 for a fixed site.*

*Divide number of injections needed per month by 35 for an outreach site.*

If the result of these calculations is not practical then you can increase or decrease the workload accordingly. For example, four sessions per month (one per week) is easier to manage than five.

### 1.1.3 Making a session plan for each health facility based on district session plan

Once the draft district plan is ready, the district should provide each health facility with a session plan for their catchment area (extracted from the district plan). Table 5.2 shows an example of a session plan for health facility M.

Table 5.1: Example of district session plan

Village/ town	Total pop.	Target pop. (4% of total population for this exercise)	Health facility providing service	Session type: Fixed/outreach/mobile	Injections / year (target population X 7)	Injections / month (injections per year divided by 12)	Sessions / month (divide by 70 for fixed and 35 for outreach)	Sessions / month (rounded) Fixed >=70 injections per session, or Outreach >=35 injections per session
I	II	III	IV	V	VI	VII	VIII	IX
A	10,000	400	DISTRICT HC	Fixed	2800	233	3.33	4
B	5000	200	HC	Fixed	1400	117+12=129	1.84	2
C	3750	150	HC	Fixed	1050	88+6+12=106	1.51	2
D	1250	50	outreach from E	Outreach	350	29	0.82	1
E	2500	100	HC	Fixed	700	58	0.83	1
F	250	10	can reach C	Fixed at C	70	6 (add to C)	-	-
G	500	20	can reach C	Fixed at C	140	12 (add to C)	-	-
J	1250	50	outreach from C	Outreach	350	29	0.82	1
K	500	20	outreach from M	Outreach	140	12	0.34	1
L	625	25	outreach from M	Outreach	175	15	0.43	1
M	1875	75	HC	Fixed	525	44	0.63	1
N	250	10	share outreach at P	Outreach at P	70	6 (add to P)	-	-
P	1000	40	outreach from M	Outreach	280	23 + 6 = 29	0.82	1
Q	500	20	can reach B	Fixed at B	140	12 (add to B)	-	-
R	1250	50	outreach from B	Outreach	350	29	0.82	1
S	750	30	river passable in dry season	Mobile	210	<b>At least four mobile team visits per year in dry season to serve villages S, T, W and X.</b>		
T	625	25	river passable in dry season	Mobile	175	Workload (no. of injections) per mobile team visit = (Annual workload S, T, W, X) / 4 i.e. 158 injections per mobile team visit.		
W	625	25	river passable in dry season	Mobile	175			
X	250	10	river passable in dry season	Mobile	70			
<b>TOTAL</b>	<b>35 250</b>	<b>1 410</b>			<b>9870</b>			

- If population data are unknown, use recent polio NIDs results. Divide the number of under 5 children by five to get the approximate number of infants.
- Fixed site if health facility is within easy reach, maximum five km.
- Outreach: beyond reach of fixed, but can be reached by health facility staff using existing resources.
- Mobile team if population cannot be reached by regular outreach. Will need extra resources for transport and supplies. Minimum four times per year.

**Table 5.2: Example of session plan for health facility M**

Village/ town	Total pop.	Target pop. (4% of total population for this exercise)	Session type: Fixed/outreach/mobile	Injections / year (target population X 7)	Injections / month (injections per year divided by 12)	Sessions / month (Fixed $\geq 70$ injections per session, or Outreach $\geq 35$ injections per session)	Transport for outreach	Person(s) responsible
M	1875	75	HC	525	43	1	None	
K	500	20	outreach from M	140	12	1	motorbike	
L	625	25	outreach from M	175	15	1	bicycle	
P and N <sup>a</sup>	1000+250	40+10	outreach from M	280+70	23+6	1	motorbike	

<sup>a</sup> according to the map, village N shares outreach with village P

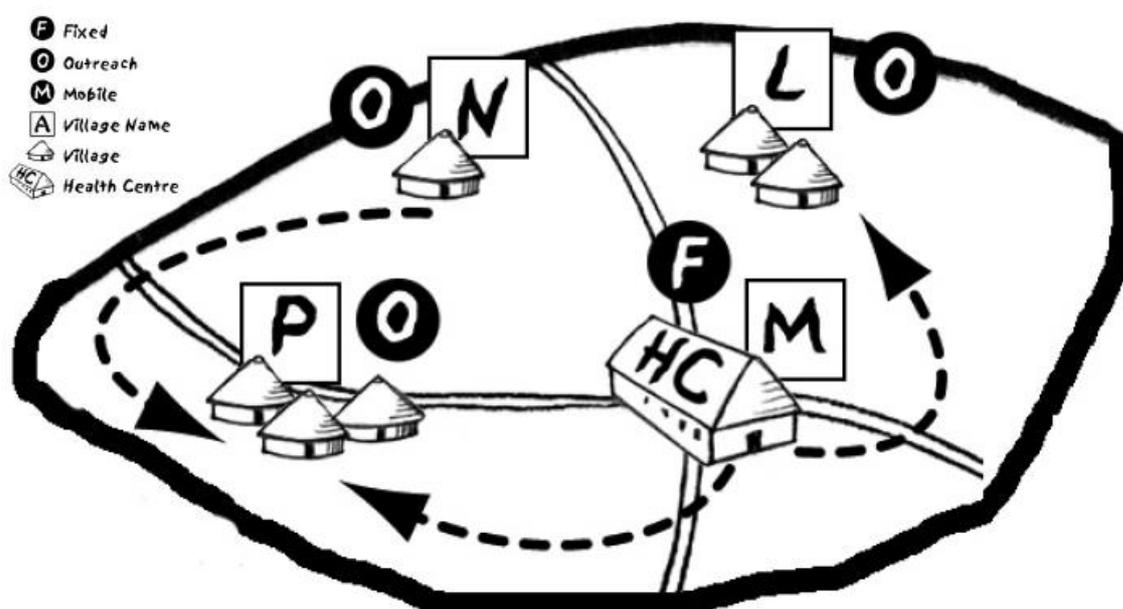
## 1.2 Stage 2: Joint planning for district and health facility staff

Once the district has an operational map and a draft session plan (Stage 1), the next stage will be to make maps and session plans with each health facility during a planning meeting. The district map and session plan will provide the basis for this process, but each health facility should provide its own information, even if this differs from the district plan. After this has been done, the differences can be discussed and incorporated into a revised district session plan and work plan.

### 1.2.1 Creating an operational map of each health facility catchment area

Every health facility should have a map that shows the distribution of population in its catchment area, in the same way as the district map. Having established the catchment area for each health facility, the district level should help health facility staff draw up a map of their catchment area. Here is a simple example of a health facility map extracted from the district map. Figure 5B shows how health facility M provides a fixed site service (F) and outreach sessions to villages L and P. Village N joins the outreach session held at P.

**Figure 5B: Example of map for health facility M**



### 1.2.2 Discussing and revising district session plan based on feedback from each health

## **facility**

The district staff should individually discuss with health facility staff and their specific session plans. Health facility staff may be able to provide important changes to the session plan based on their local knowledge of the community (for example the health facility may not be able to provide a regular outreach session for a particular village because the distance had been underestimated by the district). The district session plan may need to be amended based on discussions with health facility staff. Once the district session plan has been finalized, each health facility can prepare a work plan to show how the sessions will be conducted.

### **1.2.3 Making a work plan for each health facility**

Every health facility should make its own work plan showing how every village or community will receive immunization services throughout the year. The immunization work plan should be integrated with other health activities provided by the health facility. The work plan should not be considered as something, which is fixed at the beginning of the year. It will need updating and changing based upon data obtained through regular monitoring and problem-solving activities (as discussed in Module 7). Table 5.3 shows a quarterly work plan, which can be updated with new activities each quarter.

#### **Steps to prepare a work plan for a health facility**

1. In the first column write the names of the villages served by the health facility.
2. In the second column write how often it is planned to reach each village and what strategy will be used. This is based upon your revised “district session plan” (Table 5.1) and your own session plan (Table 5.2) which shows the number of sessions per month, and whether these will be fixed, outreach or mobile, and where they will be held.
3. In the “month” columns write the date scheduled, and the date held, for each session, and the transport required for the outreach sessions.
4. Under each month write down what other activities you plan to carry out, for example community meetings, training sessions, monthly meetings, scheduled campaigns.
5. At least every quarter, review and analyze the data you are collecting, and modify the work plan by adding activities needed to solve problems encountered (see Module 7). Add these new activities to the next quarter work plan.
6. In the last row, monitor the completeness of the monthly sessions planned by totalling sessions held and sessions planned.

### **1.2.4 Consolidating health facility work plans into a comprehensive district work plan**

The district work plan is compiled from all the separate health facility work plans (Table 5.3). This way it is possible to see in one table the immunization sessions being held in your district on a day-by-day basis. It is best to update the district work plan every three months.

**Table 5.3: Example of immunization workplan for first quarter 2003: Health facility M conducting outreach at K, L, P**

Village	Session plan	Jan	Feb	Mar
<b>M</b>	Fixed session 1st Wednesday	Date scheduled <u>1 Jan</u> Date held _____	Date scheduled <u>5 Feb</u> Date held _____	Date scheduled <u>5 Mar</u> Date held _____
<b>K</b>	Outreach every 2nd Wednesday at community facility	Date scheduled <u>16 Jan</u> Date held _____ Transport: motorbike	Date scheduled <u>12 Feb</u> Date held _____ Transport: motorbike	Date scheduled <u>12 Mar</u> Date held _____ Transport: motorbike
<b>L</b>	Outreach every 3rd Wednesday at community facility	Date scheduled <u>22 Jan</u> Date held _____ Transport: bicycle	Date scheduled <u>19 Feb</u> Date held _____ Transport: bicycle	Date scheduled <u>26 Feb</u> Date held _____ Transport: bicycle
<b>P and N</b>	Outreach every 4th Wednesday at community centre at village P	Date scheduled <u>29 Jan</u> Date held _____ Transport: motorbike	Date scheduled <u>26 Feb</u> Date held _____ Transport: motorbike	Date scheduled <u>26 Mar</u> Date held _____ Transport: motorbike
<b>Activities planned for this quarter</b>				
<b>New activities to solve problems (based on data analysis and monitoring)</b>		1. Training in AD syringe use 2. Meet community leaders monthly	1. Supply safety boxes for every session 2. Ensure pregnant women get TT at outreach	1. Quarterly meeting 28 March 2. Training in VVM use
<b>Monitoring of session implementation</b>		1. Report staff shortages, request help from district 2. Visit migrant community Number of sessions held in Jan: _____ Number of sessions planned in Jan: _____	1. Reschedule outreach at K 2. Request extra resources for migrant community Number of sessions held in Feb: _____ Number of sessions planned in Feb: _____	1. Plan outreach for migrants 2. Follow up defaulters in village M Number of sessions held in Mar: _____ Number of sessions planned in Mar, same in previous two cells

## Check the quality of your planning

- Are all villages covered by the session plan and work plan with at least four sessions per year?
- Are all temporary settlements, minorities, underserved groups covered by the session and work plan with at least four sessions per year?
- Is there any overlap/double booking (e.g. mobile team scheduled to be at two places at the same time)?
- Is there enough staff time to implement all the planned sessions? If not where can the sessions be combined?
- Is it clear who will consult with communities and inform them of the date/place of next sessions?

### 1.3 Stage 3: Regular review of plans

#### 1.3.1 Adding supervisory visits to the district work plan

You can use the district work plan, to plan supervisory visits. These should be scheduled to coincide with immunization activities in each health facility.

You should make at least one supervisory visit to one site each week and plan to supervise both fixed and outreach immunization sessions.

#### 1.3.2 Taking corrective action every quarter based on data analysis

Planning immunization sessions is one step in a cycle that includes regular monitoring, analysis and problem solving to improve the service. Module 7 shows how to collect, monitor and analyse data.

In addition to revising your session plans regularly, you should also revise your work plan. This is often done during a district meeting of health facility staff. Module 7 discusses how to identify problems and solutions and how to take corrective action based upon that information. The corrective activities by month can be added to the health facility work plan.

At district level too, new activities can be added to the work plan, based upon regular analysis of data. Activities can be planned to correct problems, such as including training in specific areas during supervisory visits.

#### 1.3.3 Reviewing and adjusting session plans

You must regularly (i.e. every three to six months) review the plan for sessions (fixed/outreach/mobile, frequency and quality) in your area.

You should look at how the quality of the sessions can be improved, for example by making sure people know the dates and sessions happen on scheduled dates, ensuring there are enough vaccines and supplies (Section 4) and safe injection practices are observed (Module 4).

Also see if the current sessions are sufficiently used by the community. If sessions in some areas have very low attendance, see if better communication is needed, or if it is better to change the time or location of a session, or make it less frequent and/or add another session elsewhere. Module 7, provides guidelines on obtaining feedback from the community.

**Any change in the session plan (frequency, change of date or location) should be done in consultation with the community, and mothers should be informed well in advance about the changes.**

## 2. Special planning issues

### 2.1 Special planning for mobile teams in hard-to-reach areas

In almost every country there are areas that cannot be reached regularly throughout the year. This may be due to many factors, including remoteness, and seasonal factors such as flooding in the rainy season. Under these circumstances, using mobile teams may be the best way to provide immunization services (see Annex 1).

Mobile teams provide outreach services but work like a small regular campaign. They can visit several sites over the course of one or more days during the dry season. Since mobile teams will only have a few days in which to do their work, careful planning is needed.

Mobile teams will need extra resources. Therefore, planning should be carried out in consultation between health facility, district and other levels.

#### 1. **Decide which areas need mobile teams.**

Refer to the map and session plan in Section 1. When making the plan indicate which areas need mobile teams

#### 2. **Decide how many times per year the mobile team should visit these areas.**

A minimum of four visits will be needed to fully immunize infants and pregnant women

#### 3. **Consider what other interventions can be added to immunization when the area is infrequently visited, e.g. malaria control, vitamin A supplementation, antiparasitic control.**

Annex 1 describes the special function of mobile teams in contrast to fixed site and outreach sessions. A mobile team session offers a special opportunity to add other interventions to the immunization service. These may include vitamin A and other nutritional supplementation, provision of insecticide-treated mosquito nets (ITNs), and antihelminthiasis treatment etc. according to local need and operational feasibility.

#### 4. **Estimate resources needed and submit the plan to the next administrative level.**

These include vehicle, driver, fuel, extra staff, and extra supplies for other interventions.

#### 5. **Request vaccine and supplies for mobile teams.**

Request the province level for vaccine, cold box and other immunization supplies. It is easier to bring these from the province with the mobile team vehicle than to use district supplies.

#### 6. **Carefully plan the route and notify the communities in advance.**

Mobilization of the communities is vital when mobile team visits are infrequent. Ideally, plan the visits well in advance and communicate the time and place of each site to each community well in advance.

#### 7. **Look for opportunities for joint planning and pooling of resources with other teams, to deliver various interventions.**

The opportunity to deliver other interventions with immunization to underserved areas will be welcomed by other teams (malaria, nutrition etc). Planning and implementing together will ensure efficient use of resources.

#### 8. **Make a schedule for mobile team visits.**

Table 5.4 shows an example of a schedule for mobile team visits. You should decide first what other interventions are needed and how these will be provided. The schedule for mobile teams needs to be discussed with the various other teams (malaria, nutrition etc.) and be

approved by the appropriate level, since additional resources, e.g. vehicle, driver etc, are required.

**9. Use polio plans, data, and results of NIDs to make detailed mobile team plans.**

Mobile teams do not usually work “house-to-house” as in some polio NIDs. However the information on population size and distribution from polio NIDs done in the area will be very useful for planning.

**10. Consider increasing the target group to under 24 months, since four contacts may not be sufficient to fully immunize the whole birth cohort.**

Table 5.4 shows an annual schedule for reaching all four villages S, T, W, X four times a year

**Table 5.4: Sample mobile team schedule for the year (taken from Table 5.1)**

Villages	Target population	Injections per year (target population X 7)	Workload per session	Other interventions planned	Planned dates	Vehicle needs	Staff needs
S, T, W, X	90	630	158 injections per mobile team visit	1. Vit. A 2. Malaria bednets	6 Jan. 5 Mar. 4 May 6 Oct.	Province car	Health Workers + driver

**2.2 Special planning issues for urban immunization services**

High population density, poor sanitation and poor nutrition often found in urban areas, lead to higher transmission of diseases, infection of younger children and higher mortality.

Providing immunization services in crowded urban areas differs from rural areas for many reasons, including the following:

- Poor primary health care infrastructure in some urban areas.
- High mobility of the resident population.
- The existence of “illegal” settlements that are not officially recognized by the government.
- The existence of marginalized populations (religious or ethnic minorities, refugees).
- Absence of information on the size of the population living in “slum” areas.
- Inadequate government planning and budget to provide primary health care services to these areas.

The key to provision of adequate immunization facilities to the urban areas is regular, high quality, uninterrupted service at accessible delivery points.

Urban immunization services may be operationalized in the following way:

1. Fixed site, fixed time provision of services. This should include:
  - All fixed sites including dispensaries, clinics and maternity homes in the public sector.
  - All NGOs engaged in providing health care in urban areas.
  - Any private practitioner willing and able to be part of this network.
2. Communication through health workers, NGOs active in the area, print media, television, radio about the following:
  - The timing of local immunization services;
  - Local service delivery points;
  - The vaccines and schedule of immunization;
  - The benefits of immunization.

3. Urban outreach: expanding the network of urban service provision points from the health facility:
- Establish contact with the local leader and obtain support.
  - Estimate size of population and frequency of sessions (same as with rural areas).
  - Set up a site in every urban slum, with a team of two trained vaccinators, to provide immunization services on a regular (weekly or monthly) basis.
  - Use the same principles for creating a session plan and work plan (described in previous section) for the expanded network of urban outreach.
  - Plan location of sites, frequency, and timing of service, to suit the local population.
  - Communicate time and dates of sessions to the community (using existing channels in the community like loudspeakers, religious or mothers' groups etc.).
  - Ensure a regular uninterrupted service to gain the trust and cooperation of the community.

Careful planning is absolutely necessary to achieve high immunization coverage rates. Planning ensures that adequate supplies, vaccines, staff etc. can be made available. But good planning also entails that recipients know in advance when the next immunization session will be held.

Remember: Do not blame the community for low attendance at sessions. Poor planning and/or poor communication by service providers often cause low attendance.

### **3. Estimating vaccine and supply needs**

At each session – whether fixed, outreach, or mobile – it is essential to have sufficient supplies immediately available. Remember that mothers may be making great efforts to attend immunization sessions with their infants. If there are not enough vaccines or syringes at the session and mothers have to return home with their children not immunized, the community will lose confidence in the service.

This section deals with how you can make sure that, at the district and health facility level, you have sufficient vaccine and supplies available for each session on your monthly work plan.

#### **3.1 Estimating the vaccine and supply needs for a session**

##### **Fixed session**

Table 5.5 shows the minimum level of vaccine and supplies, which should be available at the time of a fixed session of 70 injections, plus OPV and including TT for pregnant women. Note that these calculations do not need any allowance for wastage, since the session is being conducted at a fixed site (in a health facility by definition), where there is access to additional vials and supplies in the health facility. You should have access to at least one extra vial of each vaccine plus diluent, and 10% extra syringes during the fixed session.

##### **Outreach session**

Table 5.6 shows the minimum level of vaccine and supplies, which should be available for an outreach session of 35 injections, plus OPV and including TT for pregnant women. These figures can help when deciding how much vaccine and supplies to take before leaving the health facility to do an outreach session. In addition to this minimal supply it is safer to take an extra vial of each vaccine and some extra syringes as a safeguard against running out of vaccine. If you think there will be more than 35 injections to be given at a single outreach session, it is easiest just to double the supplies you take. As previously stated, these are assumptions used for this module; you may need to increase or decrease the number of injections, and therefore the supplies needed, according to your circumstances.

##### **Estimating vaccine needs for routine tetanus toxoid for women**

Some countries provide TT for pregnant women only, others provide TT for all women of childbearing age as well. The number of women requiring TT immunization during any given session can vary greatly. Therefore it is better to ensure that at every infant immunization session there are additional TT vaccine vials and syringes to immunize all eligible women. A simple rule to follow is to initially assume a maximum of 20 TT injections are included in every 70-injection session, and 10 TT injections in every 35-injection session, and add sufficient supplies accordingly.

These are simple operational calculations that can help you to ensure a minimum level of vaccine and supplies for any session. However they are not meant to be an alternative means of calculating national vaccine supply needs since this is done on a population basis.

**Table 5.5: Vaccines and supplies needs for a 70 injections session for infants and TT for pregnant women (and the option of HepB monovalent)**

Fixed session	BCG (20 dose vials)	OPV (10 dose vials)	DTP or DTP-HepB (10 dose vials)	(HepB) (10 dose vials)	Measles (10 dose vials)	TT (women, 10 dose vial)	AD syringes for BCG	AD syringes for other vaccines	Mixing syringes 5ml: 1 BCG, 1 measles	Safety boxes
Number of injections	10	30	30	(30)	10	20				
Session needs	1 vial + 1 diluent ampoule	3 vials	3 vials	(3 vials)	1 vial + diluent ampoule	2 vials	20	60 (+30)	2	1

**Table 5.6: Vaccine and supply needs for a 35 injections session for infants and TT for pregnant women**

Outreach session	BCG (20 dose vials)	OPV (10 dose vials)	DTP or DTP-HepB (10 dose vials)	(HepB) (10 dose vials)	Measles (10 dose vials)	TT (women, 10 dose vial)	AD syringes for BCG	AD syringes for other vaccines	Mixing syringes 5ml: 1 BCG, 1 measles	Safety boxes
Number of injections (vials/syringes)	5	15	15	(15)	5	10				
Session needs (vials/syringes)	1 vial + diluent ampoule	2 vials	2 vials	(2 vials)	1 vial + diluent ampoule	1 vial	20	40 (+20)	2	1

**Assumptions about sessions:**

- If seven injections are needed to fully immunize an infant and pregnant women: BCG will be one seventh (1/7), measles one seventh (1/7), DTP or DTP/HepB three sevenths (3/7), and TT two sevenths (2/7), making seven in all. Of course other non-injectable antigens (OPV) and interventions (vitamin A) will also be given.
- This table shows the minimum requirements for a session of 70 injections for a fixed session or 35 injections for an outreach session (only an estimate).
- If monovalent HepB is provided the number of injections will increase from seven to 10 (70 to 100 injections per session). In yellow fever-endemic countries, yellow fever vaccine will need to be added. The session needs for yellow fever vaccine are the same as for measles vaccine.
- Note that the needs at service delivery level are shown as number of vials, not number of doses.
- Always take sufficient AD syringes to match the number of doses in each vial.

### **3.2 Estimating the vaccine and supply needs for each health facility and for the entire district for one month**

At the district level you will receive vaccine on a monthly basis from the province level. The amount of vaccine you receive will be based upon the doses needed for the population you serve, with a wastage multiplication factor. It is the district's job to distribute the vaccine and other supplies to every health facility to enable it to conduct its planned fixed and outreach sessions.

The best way to provide vaccine from district to health facility level is according to the number of vials required for each session, rather than doses required. This is because the exact number of infants attending each session will not be known in advance, and opened vials often have to be discarded at the end of a session (this applies to all reconstituted freeze-dried vaccine vials, and other vaccines where the multi-dose vial policy is not feasible).

The following steps describe a simple operational method of estimating first how much vaccine and supplies are needed by each health facility and secondly how much are needed for the whole district.

#### **3.2.1 Making an operational estimate of the needs for one health facility for a month**

1. Refer to Tables 5.5 and 5.6 to make operational estimates of vaccine vials and supplies needed for a single fixed and outreach session.
2. Refer to the district session plan (Table 5.1 and Table 5.2), which shows the total planned sessions by health facility according to type of session – fixed and outreach.
3. Calculate the needs for each health facility by multiplying the needs for each type of session by the number of sessions planned.

Table 5.7 shows how this is done for health facility M. This operational estimate will be accurate enough for most sessions according to the estimated workload (70 injections for fixed site, 35 injections for outreach). If some sessions are expected to be larger, add one or more extra vials and the equivalent numbers of syringes.

#### **3.2.2 Making an operational estimate of the needs for all health facilities in your district for one month**

To make an operational estimate of monthly supplies needed for distribution to all health facilities, multiply the individual session needs by the total number of sessions of each type (fixed and outreach), and then add all session needs to get monthly needs, as in Table 5.8.

The operational estimate of district monthly supplies in Table 5.8 will tell you the approximate amount of vaccine vials and supplies you will need to have in your district store to meet the requirements for distribution to all the health facilities for their planned fixed and outreach sessions.

You should ensure that the monthly level of supplies received into the district – which is based upon population numbers and doses with a standard wastage rate – is not lower than this operational estimate. If there is a considerable difference between the amounts you consume and the amounts you receive, discuss the issue with the higher level to identify the causes (difference in population estimates, higher wastage rates than anticipated, non-adherence to MDVP etc.) to find a solution. Annex 3 discusses this in more detail. You should also avoid over-stocking vaccines by adjusting your monthly order according to the existing stock balance.

#### Special issues for AD syringes supply

The AD syringes' supply must match the supply of vaccine available at every session. AD syringes are usually ordered with a 10% wastage factor. This wastage factor takes into account normal handling problems, but it is very important to ensure that the AD syringes supply intended for immunization is not used for other purposes.

#### **3.2.3 Making the best use of vaccine and supply stocks**

Vaccines and AD syringes should be used as well as possible. Here are some tips to help ensure that optimal levels of supplies are available, while reducing wastage.

1. When ordering vaccine and supplies always adjust for the amount in stock.
2. Use multi-dose vial policy whenever applicable.
3. Try to maximize attendance at every session: Follow up on defaulters; good communication of session dates, times and locations; reliable sessions according to the plan; monitor attendance and combine small sessions where feasible.
4. Use the most accurate population estimates to avoid shortage of supplies.

**Table 5.7: Operational method of estimating needs of health facility M**

	Needed for one fixed session (Refer to example in Table 5.5)	Number of fixed sessions (Refer to example in Table 5.2)	Total	Number needed for one outreach session (Refer to example in Table 5.6)	Number of outreach sessions (Refer to example in Table 5.2)	Total	Grand total
	A	B	$C=A*B$	D	E	$F=D*E$	$G=C+F$
<b>Vaccine vials</b>							
<b>BCG</b>	1	1	1	1	3	3	4
20 dose vials plus diluent							
<b>DTP/HepB</b>	3	1	3	2	3	6	9
10 dose vials							
<b>OPV</b>	3	1	3	2	3	6	9
10 dose vials							
<b>Measles</b>	1	1	1	1	3	3	4
10 dose vials plus diluent							
<b>TT</b>	2	1	2	1	3	3	5
10 dose vials							
<b>BCG AD syringes</b>	20	1	20	20	3	60	80
<b>Standard AD syringes</b>	$30+10+20=60$	1	60	$20+10+10=40$	3	120	180
<b>Mixing syringes</b>	$1+1=2$	1	2	$1+1=2$	3	6	8
<b>Safety boxes (100 per box)</b>			1			2	3

**Table 5.8: Operational estimate of district monthly vaccine and supply needs**

	Needed for one fixed session (Refer to example in Table 5.5)	Number of fixed sessions (Refer to example in Table 5.1)	Total	Number needed for one outreach session (Refer to example in Table 5.6)	Number of outreach sessions (Refer to example in Table 5.1)	Total	Grand total
	A	B	C=A*B	D	E	F=D*E	G=C+F
<b>Vaccine vials</b>							
<b>BCG</b>	1	10	10	1	6	6	16
20 dose vials plus diluent							
<b>DTP/HepB</b>	3	10	30	2	6	12	42
10 dose vials							
<b>OPV</b>	3	10	30	2	6	12	42
10 dose vials							
<b>Measles</b>	1	10	10	1	6	6	16
10 dose vials plus diluent							
<b>TT</b>	2	10	20	1	6	6	26
10 dose vials							
<b>BCG AD syringes</b>	20	10	200	20	6	120	320
<b>Standard AD syringes</b>	30+10+20 = 60	10	600	20+10+10 = 40	6	240	840
<b>Mixing syringes</b>	1+1=2	10	20	1+1=2	6	12	32
<b>Safety boxes (100 per box)</b>			8			3	11

## 4. Stock management

### 4.1 Stock management at district level and health facility level

Wherever vaccines are stored, a system of stock management must be in place to record vaccines received, and vaccines dispatched or used. This will make sure that vaccines are used before their expiry date, that the status of VVM is recorded at receipt and issue, and that there are no stock-outs, or over-stocking.

Two simple and practical methods are described below. These methods take into account that different batches of vaccine and supplies will be received on a regular basis and dispatched to the network of health facilities, or issued to health workers for immunization sessions.

It is important to distinguish between different batches of vaccine because they may have different expiry dates and should be used accordingly. Also, in the rare situation that there is a serious adverse event, it will be useful to know the exact description of the vaccine (manufacturer, batch number etc).

#### Method 1: Using a simple exercise book for stock management each year (see Figure 5D)

1. Divide the book into separate sections of several pages for each type of vaccine (or other supplies/equipment) used.
2. Prepare tables for each vaccine and label columns as shown in Table 5.9. Facing pages of the exercise book are used to record the details of each vaccine or AD syringes or diluents or other supplies/equipment.
3. For each supply of vaccine received or issued, all details including batch number, date of expiry, VVM status, quantity etc. should be recorded. Quantities of other supplies should be recorded in the same way.
4. After each receipt or issue, the balance in stock should be calculated and recorded. The balance recorded should be physically checked and verified at periodic intervals

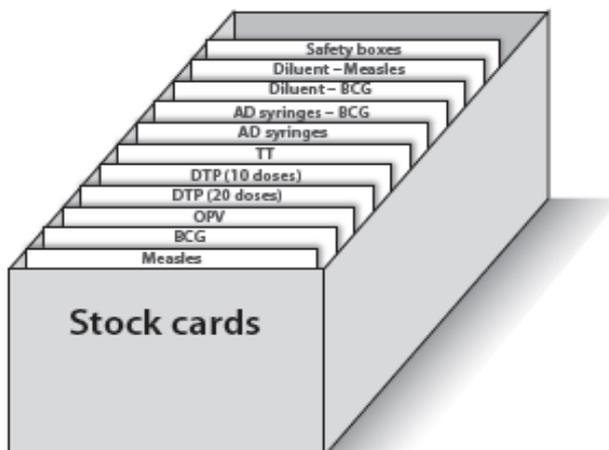
**Figure 5D: Simple exercise book to keep records of stock received and issued**



#### Method 2: Using stock cards (see Figure 5E).

1. Take a box (this should preferably be of durable material like aluminum sheet or plastic, but a good shoebox can work temporarily) and divide it into separate sections, which can take several stock cards for each type of vaccine (or other supplies/ equipment) used.
2. Prepare a card for each vaccine and label columns as shown in Table 5.9. A separate card is used to record the details of each type of vaccine or AD syringes (including a different card for different vial sizes) or diluents or other supplies/equipment.
3. Between each bunch of stock cards (for each type of vaccine or other equipment) a separator should be placed which is slightly bigger than the stock cards and indicates the vaccine or other material whose stock cards are immediately behind it. As shown in Figure 5E.
4. For each supply received or issued, all details including batch number, date of expiry, VVM status, quantity etc. should be noted.
5. After each receipt or issue, the balance in stock should be calculated and recorded. The balance recorded should be physically checked and verified at periodic intervals (e.g. once every quarter).

**Figure 5E: Simple box to keep stock cards**





## **5. Involving the community in planning**

To make sure that your plan will be effective you will need to involve the community you serve. For detailed information, see Module 8 on building links with the community.

### **5.1 Spend time with local government officials and community leaders**

Local officials and community leaders can help you decide:

- When to hold immunization sessions;
- Where to hold outreach sessions;
- Who can help you mobilize the community; and
- Who can help you during sessions.

Local leaders play an important role in their communities. They can help you reduce resistance, deal with rumors, and handle other situations that may affect the success of immunization sessions. They should be well informed about your activities. In some areas they maintain a complete register of the community. Ask them to help you reach people who do not normally use immunization services.

### **5.2 Identify a local contact person**

A local contact person is someone who can help you:

- Remind mothers when to bring their children for vaccines;
- Alert mothers that the vaccination session will take place on the following day;
- Spread the word in the village that the outreach team has arrived;
- Encourage women to obtain their tetanus toxoid injections;
- Organize sessions beyond the health facility, and
- Help set up an immunization session and, in some countries, administer oral polio vaccine (OPV) and vitamin A supplements after being trained to do these tasks.

### **5.3 Train local people**

Local persons should be trained on the following:

- To follow up on clients who do not return for second or third doses;
- To follow up on newborns who have not begun their immunization;
- To organize patient flow;
- To complete immunization cards;
- To administer OPV and vitamin A supplements;
- To provide health education;
- To distribute written information.

Local volunteers are critical in identifying newborns and reaching mothers who have not immunized their children. Consider recognizing the contributions of your volunteers by giving them a hat or a badge.

### **5.4 Give feedback to people in the community**

Keep people informed and involved by continually sharing with them information on:

- Whether the incidence of disease is going down because of immunization services;
- The number of children fully immunized against diseases;
- The number of newborns protected from neonatal tetanus;
- Immunization coverage in percentage terms, and
- How close your health facility is to reaching your immunization goals;
- Any outbreaks of diseases nearby for which they need to be vigilant (and encourage people to get vaccinated).

Feedback encourages people to become involved in identifying their own problems and finding solutions.

## ANNEX 1: Guidelines to determine the immunization strategy

**Table 5.10: Guidelines to determine the immunization delivery strategy**

Type	Definition	Area served	Advantages	Disadvantages
Fixed site	<ul style="list-style-type: none"> <li>delivery of vaccination services <b>in</b> a health facility on a regular basis</li> </ul>	<ul style="list-style-type: none"> <li>distance which mothers are prepared to travel to reach service</li> </ul>	<ul style="list-style-type: none"> <li>reliable regular service, minimum one staff, low cost, no transport problems</li> </ul>	<ul style="list-style-type: none"> <li>cannot reach much of the population in rural areas</li> </ul>
Outreach	<ul style="list-style-type: none"> <li>delivery of vaccination services <b>from</b> a health facility on a regular basis.</li> <li>sites are usually not fully equipped</li> <li>health facility staff carries the needed equipment to the "outreach site"</li> </ul>	<ul style="list-style-type: none"> <li>approx. five km</li> <li>area around the Health facility (catchment area) that Health facility staff can easily visit in a day</li> <li>approx. 15 to 20 km depending on geographic barriers</li> </ul>	<ul style="list-style-type: none"> <li>regular service</li> <li>can reach populations beyond the fixed range</li> </ul>	<ul style="list-style-type: none"> <li>needs good communication with communities</li> <li>higher costs (transport, more than one person per site)</li> </ul>
Mobile team	<ul style="list-style-type: none"> <li>delivery of vaccination services in areas beyond the "outreach area" (normal catchment area of a Health facility) on less frequent basis.</li> <li>more than one site visited per session</li> <li>health facility staff carries all the needed equipment to the "mobile site"</li> </ul>	<ul style="list-style-type: none"> <li>area beyond the outreach area</li> <li>especially for difficult to reach areas/populations</li> <li>may be conducted over several days</li> </ul>	<ul style="list-style-type: none"> <li>can reach difficult to reach areas/populations, previously unreached populations</li> <li>If transport adequate, can include other interventions e.g. Malaria</li> </ul>	<ul style="list-style-type: none"> <li>high costs (transport, fuel, per diem)</li> <li>less reliable</li> <li>subject to availability of extra resources</li> </ul>

## ANNEX 3: Reducing vaccine wastage

Some degree of vaccine wastage is expected in any immunization service. Wastage can occur at any stage. It can occur in the cold store at central level, at various intermediate levels, at the point of use at an immunization session and during transportation. Reducing wastage depends upon better management at all levels. The factors associated with vaccine wastage can be classified as unavoidable and avoidable.

### 1. Unavoidable vaccine wastage factors

The most important unavoidable wastage factors involve:

- The use of reconstituted vaccines that have to be discarded at the end of the session.
- Other vaccines used in situations under which conditions for the multi-dose vial policy cannot be met.

### 2. Avoidable vaccine wastage factors

The following are some factors that can be controlled by improving vaccine management:

- Poor stock management resulting in over-supply and vaccines reaching expiry before use
- Cold chain failure that exposes vaccines to unacceptably high or low extremes of temperature.
- Incorrect dosage, e.g. the administration of three drops of OPV instead of two, or the injection of 0.6 ml of vaccine instead of 0.5 ml.
- Failure to comply with the multi-dose vial policy.
- Vials lost, broken or stolen.

### 3. Reducing vaccine wastage

In many countries where outreach is needed to reach all infants, vaccine wastage rates will need to remain at relatively high levels, especially for freeze-dried vaccines, in order to maintain and increase immunization coverage. Many factors influencing wastage are not associated with the point of use, therefore a change in existing policies for immunization staff is not needed.

However, at all levels measures to control and reduce avoidable vaccine wastage are very important. These include:

- At district level and above, regular reporting on stock levels, improved estimation of requirements and effective stock management.
- Improving district planning, with special regard to reliability of services.
- Planning sessions efficiently to balance session size and convenient opportunities.
- Using the multi-dose vial policy when appropriate.
- Establishing systems to monitor and regularly report vaccine wastage at all levels.

The corrective measures, however, should not be introduced at the expense of coverage (see Module 7).

### 4. Example of unavoidable wastage at outreach session

The following example (Table 5.12) shows the expected level of wastage when a single outreach session of 35 injections is conducted. Note that the wastage for freeze-dried vaccines is very high. Wastage for other vaccines can be greatly reduced by using the multi-dose vial policy provided the cold chain is maintained throughout, from point of use back to the health center refrigerator. However careful management of stocks, the session plan and work plan can help reduce wastage.

**Table 5.12: Vaccines required and wastage for one session of 35 injections including OPV and TT for pregnant women**

Vaccine	Vial size	Vials used	Doses wasted	Wastage rate
DTP (3/7 of 35) = 15 doses	10 doses	2	(2 x 10) – 15 = 5 wasted	5/20 = 25% <sup>a</sup>
Measles (1/7 of 35) = 5 doses	10 doses	1	10 – 5 = 5 wasted	5/10 = 50%
BCG (1/7 of 35) = 5 doses)	20 doses	1	20 – 5 = 15 wasted	15/20 = 75%
OPV (21 doses)	20 doses	1	20 – 15 = 5 wasted	5/20 = 25% <sup>a</sup>
3/7 of 35 = 15 doses				
TT (2/7 of 35) = 10 doses	10 doses	1	none	none

<sup>a</sup> Multi dose vial policy applicable

**Remember:**

The goal is to immunize the maximum number of infants and women. Reducing wastage should not be allowed to compromise this goal. The opportunity to immunize may be more valuable than a dose of vaccine.

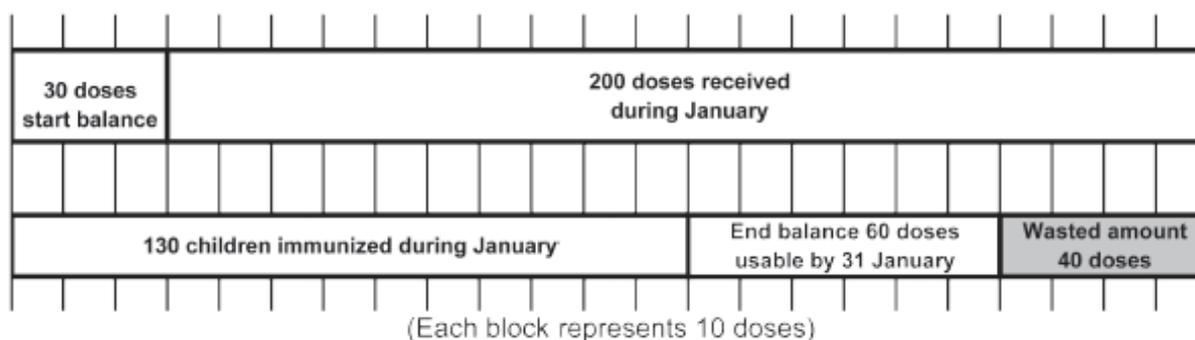
## ANNEX 4: Vaccine wastage calculations at health facility level

$$\text{Vaccine wastage rate} = 100 \text{ minus vaccine usage rate}$$

$$\text{Vaccine usage (rate)} = \frac{\text{Number of infants immunized during the period}}{\left\{ \text{Number of usable doses at beginning of period} \right\} + \left\{ \text{Number of doses received during period} \right\} - \left\{ \text{Number of usable doses in stock at end of period} \right\}} \times 100$$

The example below explains how to calculate vaccine usage and wastage step by step:

Yenice district received 200 doses of DTP vaccine in 10 dose vials in January. During monthly reporting, 130 children were found to be recorded as immunized. They had 30 doses as a start balance on 1 January and by 31 January their stock level was 60 doses.



### 1. Calculate the number of doses used during the month

In the beginning of the month the facility had 30 doses and had received 200 doses during the month. This makes a total of 230 doses available for use. End balance showed 60 doses at the end of the month. Subtracting the end balance from available doses gives us the number of doses used during the month, which 230 minus 60 is 170 doses.

### 2. Calculate your vaccine usage during the month

Divide number of children immunized with number of doses used during the month, which is 130 divided by 170 = 0.764. Multiply this with 100, which gives you 76.4%. We can round this up as 76%.

### 3. Calculate your vaccine wastage

As indicated in the above formula 100 minus vaccine usage (100 minus 76) = 24% vaccine wastage.

## **6. PLANNING IMMUNIZATION IN TANZANIA: ADAPTATION OF IIP ON RED and REC STRATEGIES**

### **6.1 Reach Every District (RED) strategy**

In 2002 Tanzania became one of the first countries to introduce Reach Every District (RED) strategy. The strategy makes the district a focus in the assessment and problem solving, planning, budgeting, implementation, monitoring of routine immunization services. Based on most common barriers to achieving immunization goals, the RED approach had the following five operational components needed for planning to Reach Every District.

#### **1. Re-establishing outreach vaccination – regular outreach for communities that are under-served**

Outreach is an essential strategy of routine immunization in all areas where populations are under-served, whether urban or rural, near or remote. The basis for successful outreach implementation is the existence of a fully operational health facility equipped with a functional refrigerator, supplied with potent vaccines and injection equipment, and manned with an adequately trained, paid and supervised health worker, who has either a functional means of transportation or funds to pay for transportation to outreach sites.

#### **2. Supportive supervision – on-site training by supervisors**

Supportive supervision should build the capacity to carry out safe, good quality immunization services in the district, including communication activities, by providing regular on site training and assistance. It also offers the opportunity to integrate supervision of other health interventions, e.g., IMCI, Malaria, etc.

#### **3. Links between community and service– regular meetings between community and health staff**

Immunization services need to integrate better into community structures in an environment of consultation between the community and health managers. Communication for immunization should be considered as a key component as it helps to promote the adoption and the maintaining of positive behaviours

#### **4. Monitoring for action – chart doses, map populations for each health facility**

Countries should conduct a critical review of their data systems and improve their data quality (GAVI Data Quality Audit) at all levels. Monitoring systems must be strengthened to direct planning and managerial action at the district level and be interpreted and used at health facility level.

#### **5. Planning and management of resources – better management of human and financial resources**

Planning and management of resources is usually weakest at the district level. Tanzania is no exception. All countries are required to aim for sustainable financing based upon a Financial

Sustainability Plan which includes diagnosis of the current financial situation, future funding prospects and a strategic plan for moving towards financial sustainability as defined by GAVI. At each level, plans should contain details of the human and financial resources required to reach every district in a sustainable manner.

**Figure 6A: RED framework—essential building blocks of RED approach**

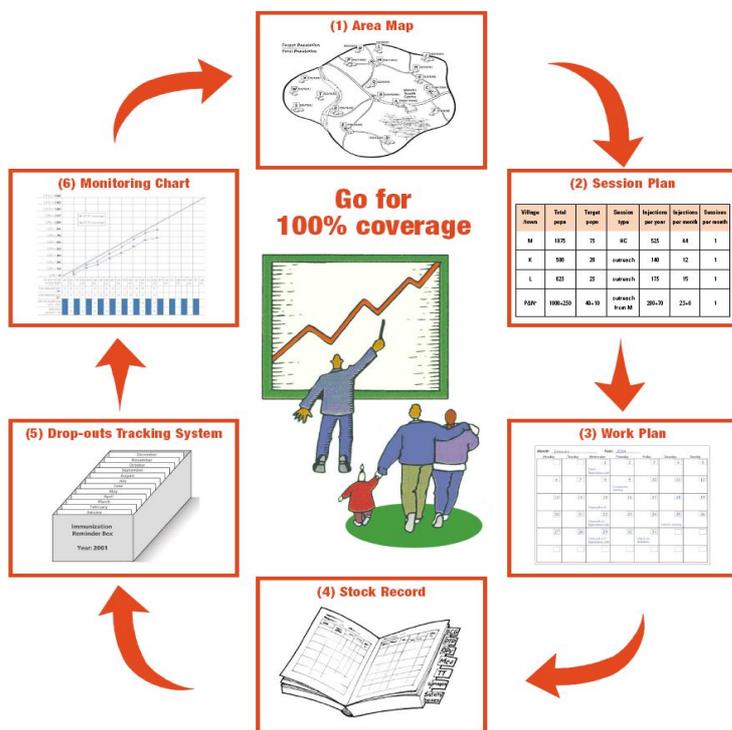
## Reaching Every District (RED) Approach Framework



Essential Building blocks (Components) of 'RED' Approach

**Figure 6B: RED in action**

## Put these R.E.D tools into action



## 6.2 Reaching every child (REC) strategy in Tanzania

### Reaching every child

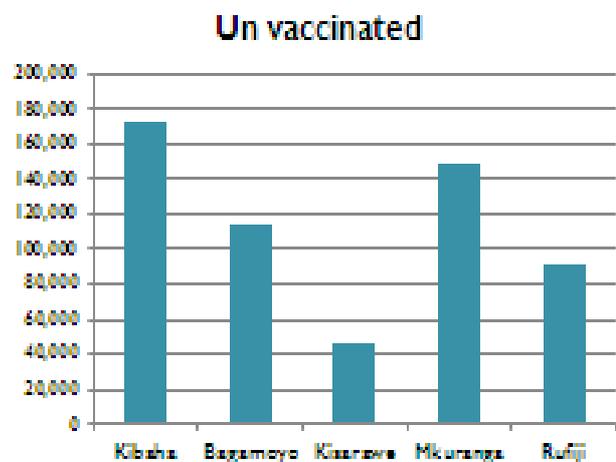
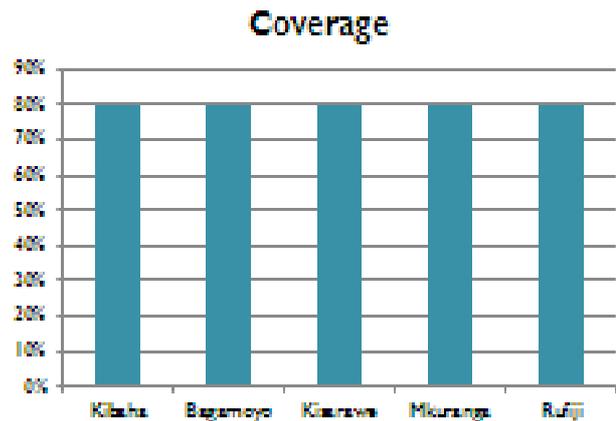
Every child has a right to be vaccinated. Even if the regions reports that their districts or health facilities reports the coverage of 80% and above, it still leaves the 20% of children as unvaccinated. These are still susceptible to infectious diseases and even a threat to the rest. The following section will show where there is a problem within Tanzania.

### Where is high number of unvaccinated population?

Coverage of the area does not indicate the exact number of children unvaccinated or under vaccinated. To know where high number of unvaccinated or under vaccinated children is you need to have the target population of each specified area and children vaccinated with certain dose in the specified period. Areas can have the same coverage of 80% however those with high target population will have the high number of unvaccinated children or under vaccinated.

# Unvaccinated children by districts

District	Target population	Coverage	Un vaccinated
Kibaha	867,500	80%	173,500
Bagamoyo	567,456	80%	113,491
Kisarawe	234,157	80%	46,831
Mkuranga	745,987	80%	149,197
Rufiji	453,213	80%	90,643



The use of coverage can mislead the focus to provide resources to reach unvaccinated or under vaccinated children.

## Use of coverage mislead the focus

District	Target population	Coverage	Un vaccinated
Kibaha	867,500	80%	173,500
Bagamoyo	567,456	80%	113,491
Kisarawe	234,157	80%	46,831
Mkuranga	745,987	80%	149,197
Rufiji	453,213	80%	90,643

District	Target population	Coverage	Un vaccinated
Kibaha	867,500	80%	173,500
Bagamoyo	567,456	70%	170,237
Kisarawe	234,157	26%	173,276
Mkuranga	745,987	77%	171,577
Rufiji	453,213	62%	172,221

## Where are the unvaccinated children in the council?

To be able to know where the high number of unvaccinated or under vaccinated children is you must do the following;

- Select the data to be used. If the exercise is done before in the first half of the year the previous annual data will be the ideal but if it is done in second half of the year then data starting from January to June or more of the same year will be ideal. It is advisable to use the recent available data.
- List all the health facilities providing routine immunization services with the target population in the districts
- Get the absolute figure of children vaccinated either 1<sup>st</sup> or 3<sup>rd</sup> dose of pentavalent or measles.
- Get the absolute figure of unvaccinated or under vaccinated children per health facility

Problem Identification and Priority Setting															
Regions: _____										Council: _____					
No.	Health Facilities	Compile data on population, doses of vaccine administered. Calculate immunization coverage in the current year							Analyse problem						
		Target Pop.	Children vaccinated			Immunization coverage (%)			Un-vaccinated (No.)		Dropout rate (%)		Identify problems*		Category problems**
		<1yr	Penta 1	Penta 3	Measles	Penta 1	Penta 3	Measles	Penta 3	Measles	Penta 1 - Penta 3	Penta 1 - Measles	Access	Utilisation	Category 1,2,3,4
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2															
3															
4															

## Limitation of using problem categorization in *reaching every child*

The two indicators of access and utilization do not show exactly which district or health facility is having high number of unvaccinated or under vaccinated children. Using problem categorization indicators the focus will be on the category 4 because of poor access and poor utilization leaving behind health facilities with high number of unvaccinated or under vaccinated children.

Health Facility	Target Pop	Vaccin Penta 1	Vaccin Penta 3	% Penta 1	% Penta 3	Unvaccinated	Drop out	Access	Utilisation	Category 1,2,3,4
Kizumbi	358	287	254	80.2%	70.9%	104	11%	good	poor	Cat 2
Utinta	644	544	514	84.5%	79.8%	130	6%	good	good	Cat 1
Kazovu	359	259	240	72.1%	66.9%	119	7%	poor	good	Cat 3
Namansi	326	258	232	79.1%	71.2%	94	10%	poor	poor	Cat 4
Mandake	150	98	73	65.3%	48.7%	77	26%	poor	poor	Cat 4

The table above shows that even if the health facility have good access and good utilization still it can have a high number of unvaccinated or under vaccinated children.

## Where to focus and prioritize during the intervention?

Due to scarcity of the resources both human and financial the RHMT or CHMT need to make decision where to focus first or give priority. They need to ask themselves in advance where and what can we invest to reach the high number of unvaccinated or under vaccinated children. It is not realistic to involve all the health facilities in the council at once with the limited resources.

It is appropriate to start with health facilities with high number of unvaccinated or under vaccinated children. Experience has shown that at least 10 health facilities will have more than 50% of unvaccinated children in the council. To avoid overstretching the little resources available the focus need to be on few health facilities maximum 10.

### Where to focus

District	Target population	Coverage	Un vaccinated	
Kibaha	867,500	80%	173,500	30%
Mkuranga	745,987	80%	149,197	26%
Bagamoyo	567,456	80%	113,491	20%
Rufiji	453,213	80%	90,643	16%
Kisarawe	234,157	80%	46,831	8%
	2,868,313		573,662	

### Way forward

To build the capacity of the district to able to do the analysis to identify areas with high number of unvaccinated or under vaccinated children. This process must be done frequently as the situation allows change on the ground. Experience shows doing it twice a year help to focus the supportive supervision and get great impact to reduce the number of unvaccinated children.

### Management process of REC

Basic principles of management cycle need to be followed in the process of implementation of Reaching Every Child

Planning			Implementation	Monitoring and Evaluation
COMPILE (population and coverage data)	ANALYZE (problems, causes and solutions)	PRIORITIZE (Where First, What First)	IMPLEMENTATION (Service delivery)	MONITOR, REVIEW AND ACT (Progress, Issues and Next Steps)

## Council micro plan cycle

If we really intend to reach every child the process will basically need two levels of Council and Health Facility to be fully involved. Health facility is an important pivot in the process of reaching every child.

Council will start with the process by compiling, analyzing and prioritizing health facilities to be focused. Health facilities identified will compile, analyze, prioritize and plan how to reach every child than the council will collate the planned activities and develop the council micro planning.



## **6.3 DISTRICT PRIORITIZATION OF HEALTH FACILITIES**

### **Step 1: Review of routine immunization data**

Council Health Management Team starts to review the available routine immunization administrative data – preferable one-year data.

Identify and line list all health facilities, which are providing vaccination services in the council and show the following;

- a. Routine immunization target population of each health facility
- b. Children vaccinated with Pentavalent 1, Pentavalent 3 and Measles in each health facility in that specified period
- c. Calculate children unvaccinated with Pentavalent 1, under vaccinated with Pentavalent 3 and unvaccinated with Measles for the specified period.

### **Step 2: Council map with health facilities**

Get council map showing the health facilities services area with all villages and major settlements. Indicate on the spreadsheet the target population of each village.

### **Step 3: Prioritize health facilities contributing to unvaccinated and under-vaccinated children**

Identify health facilities that are contributing more than 75% of unvaccinated and under-vaccinated children in the council.

For effective supportive implementation identify maximum 10 priority health facilities to be involved in the reach every child approach in the council.

*Note: This process must be repeated at least every six months by the CHMT and priority of facilities will change depending with situation on the field.*

### **Step 4: Working session with priority health facilities**

After identifying the priority health facilities (max 10), invite one health worker from each health facility who is fully involved in the immunization activities to attend the three days working session in collaboration with CHMT.

Give them clear instruction to bring Routine Immunization data, vaccine ledger, health facility map showing the village and major settlement indicating target population of each village or settlement, and any relevant data to help in the micro planning process.

Three days working workshop objective are to assist the health facilities to

- Compile and analyze their data
- Identify the problems
- Identify the solutions
- Develop a health facility work plan

## 6.4 MICRO PLANNING SESSION FOR HEALTH FACILITIES

### Step 1: Compile and analyze data (quantitative analysis)

Support the health workers to review health facility immunization administrative data either one year or six months of the agreed period by using the table.

Problem Identification and Priority Setting															
Regions: _____										Council: _____					
No.	Health Facilities	Compile data on population, doses of vaccine administered. Calculate immunization coverage in the current year							Analyse problem						
		Target Pop.	Children vaccinated			Immunization coverage (%)			Un-vaccinated (No.)		Dropout rate (%)		Identify problems*		Categories problems **
		<1yr	Penta 1	Penta 3	Measles	Penta 1	Penta 3	Measles	Penta 3	Measles	Penta 1 - Penta 3	Penta 1 - Measles	Access	Utilisation	Category 1,2,3,4
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2															
3															
4															

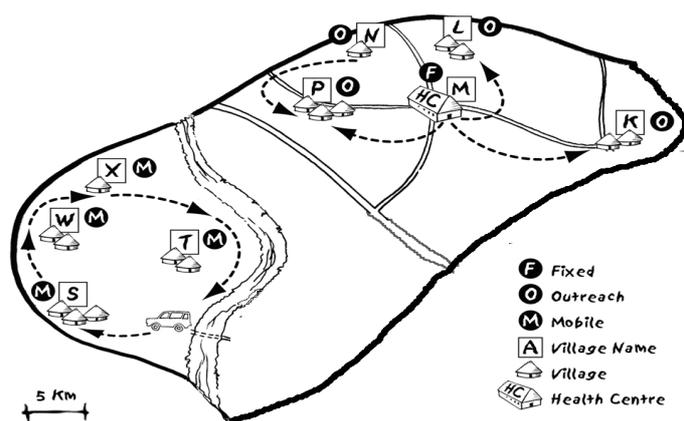
Note: Very few health facilities have routine immunization data per village. The table will help the health worker to realize the number of unvaccinated or under vaccinated children in the service area.

### Step 2: Health facility service area map showing type sessions

To be able to reach every child we need to have a health facility map showing all villages with target population, settlements with distance from the health facility. Knowing the target population of the areas and distance will determine which communities will be served by fixed sessions and which ones require outreach or other strategies such as mobile sessions.

A simple map with important features of the area such as road, rivers, and mountains without scales will help to plan how to reach every child in health facility service area.

On the map, mark what kind of session will be used to reach each village or settlements using the letters F (fixed), O (outreach), M (mobile). For outreach and mobile, use arrows to show how they will be reached. Figure 1: Example of a Health facility map with villages S, W, X, T can be reached by car only in the dry season.



### Step 3: Session plans

To avoid missed opportunity and using effectively the “open vial policy” all fixed post must vaccinate daily.

The workload during the outreach/mobile immunization session is determined by number of injections. A fully immunized infant needs minimum five injections (BCG, Pentavalent 3 times and Measles) plus four doses of oral OPV. Pregnant women will need minimum two tetanus toxoid (TT) doses. This makes up seven injections in all for full immunization of an infant and pregnant woman.

To calculate minimum number of injections per year multiplies the annual target population by seven you get number of injections per year. To get number of injection per month divide the yearly total by 12.

Health worker can give 40 injections during the outreach/mobile session however; this number may vary depending on your local conditions, i.e. the number of staff, availability of vaccines and other supplies, and the need to provide other health services at the same time. As a general rule, at least four sessions per year will be needed at each outreach or mobile team site to fully immunize all infants.

Decision must be made on the number of the session to done in each outreach and mobile services depending on the availability of staff and distance from the health facility.

### Step 4: Problem identification and prioritization of problems of health facilities

Brainstorm with each health worker to identify problems leading to children not reached/vaccinated in the area. Avoid prescription from CHMT or Facilitators. The questions below may help identify problems. The list is not exhaustive and should only be used as a guide.

#### 1. Service delivery

- Are you able to conduct all sessions as planned?
- If not, why not done?

- Are there areas that are very far away from the session point where mothers cannot easily access the services
- Are there scattered populations with few children that may be reached a few times a year instead of every month?

**2. Linking services with the community**

- Is the community aware of the immunization sessions?
- Is the community involved in providing immunization services?
- Does the community accept the immunization services offered?

**3. Vaccine supply, quality and logistics**

- Did you have stock out for any vaccine?
- Did you have cold chain problems?
- Did you have transport problems to conduct outreach or mobile sessions?

**4. Monitoring and surveillance**

- Are you able to send all reports on time?
- Did you receive any supervisory visit this year?
- Do you have population figures for every village?
- Do you have and use the monitoring chart

**5. Programme management**

- Are all staff positions filled?
- Did you receive money and supplies on time to conduct planned activities?

Use the tool as guide, prioritize the problems and identify maximum 5 key (major) problems.  
*If resources allows involve the community*

**Step 5: Identify and prioritize solutions**

Brainstorm the solutions of identified problems. Categorize the solutions in the short and long term. Identify solutions that can be **solved at health facility**, that need to be solved at Council level and those need to be solved at higher level. Next step is to identify activities to address those solutions.

Health facilities should first try to find solutions that do not require additional resources for example they could commit to putting the RED tools into action, map, session plan, work plan, monitoring chart, new born and defaulter tracking system and stock management system.

Problem solving for reach every child using immunization system components

<b>System components</b>	<b>Problems</b>	<b>Activities to be conducted at Health facility level</b>	<b>Activities to be conducted at District level</b>
Service delivery			

Vaccine supply, quality and logistics			
Linking services with the community			
Surveillance and monitoring			
<b>Programme management</b>			

### Step 6: Develop Health Facility micro plan/work plan

The objective is to Reaching Every Child immediately with vaccines. Identify solutions to be implemented immediately to reach every child – unvaccinated. Prioritize the solutions those can bring impact to be implemented at health facility

CHMT and health facility worker jointly review the work plan and discuss if the health facility can conduct all the planned sessions and activities or do they need council support.

Following main issues need to be discussed:

1. **Capacity:** Is there sufficient capacity to conduct all planned sessions or activities?
2. **Timing:** Does the worker have any annual leave, meetings, trainings etc. planned that will conflict with session dates?
3. **Transport:** Sessions for which transport is required from the council level consider the following issues: Will the district be able to provide the transport? Will the district be able to provide the transport on the dates shown by the health facility staff?
4. **Feasibility:** are there some sessions which the health facility will have difficulty in carrying out even with existing resources, for a variety of reasons. These sessions should be circled on the work plan and discussed.

## 6.5 DISTRICT WORK PLAN

### District level: Develop work plan, activities and budget

- Analyze the health facility problems and solution with CHMT
- Identify problems at District level
  - Based on priorities in relation with identified problems
- Prioritize the problems
- Discuss the solutions
- Prioritize solutions
  - Implementable solutions to bring change immediate
- Review the CHMT Health Budget
  - To identify areas which can be funded in the CHMT plan and those that need high level support

### District level: Develop work plan, activities and budget

- Develop the work plan with clear objective and indicators
- Develop time line and budget
- Develop realistic and implementable plans and avoid wishful plans

- Give priority to **short term solutions** which can be implemented immediately

### **Support for implementation**

- Provide supportive supervision
  - During advocacy, sensitization and community dialogue
  - During the vaccination session (fixed and outreach)

### **Monitor implementation**

- Compile baseline data (before implementation)
- Monitor the progress
- Provide feedback
- Review progress
- Plan next actions

## CHAPTER 7

### Module 6: Holding an immunization session

In Tanzania immunization sessions are conducted on routine basis or on non-routine basis. Routine immunization sessions are the commonest and well explained in the previous sections of this module. They include the EPI schedule with mandatory vaccinations given to children. The non-routine sessions are less common and mostly conducted as a precaution for travellers.

This module describes the tasks that the health worker must perform on a day of immunization session, to ensure the intended outcomes. It is organized according to the entire procedure, such as preparation needed before the clients arrive, to the actual vaccination of a child or client. It discusses the correct techniques for giving each vaccine. It also describes how to communicate with parents during and after the immunization session and how to conclude the session.

#### 7.1 Setting up an immunization session

Before the infants come for the immunization session you need to complete certain tasks as explained below.

##### 7.1.1 Condition the cool water-packs

Conditioning cool water-packs before the session is very important especially to prevent freeze sensitive vaccines from freezing and destroy the vaccine. To do this properly, you will need to remove frozen ice-packs from the freezing compartment at least 30 minutes before the session begin and allow the cool water-packs to keep at room temperature until the ice begins to melt and water starts to form inside. You should check if an cool water-packs has been conditioned by shaking it and listening for water inside.

##### 7.1.2 Take the vaccines and diluents out of the refrigerator

Before you open the refrigerator door or icebox, decide how many vials of each vaccine you will need for the session. The first time you open the fridge in the morning, record the temperature inside the refrigerator. You must minimize the number of times you open the refrigerator door and the time the refrigerator door is left open.

*From the refrigerator, select and use vaccines in this order:*

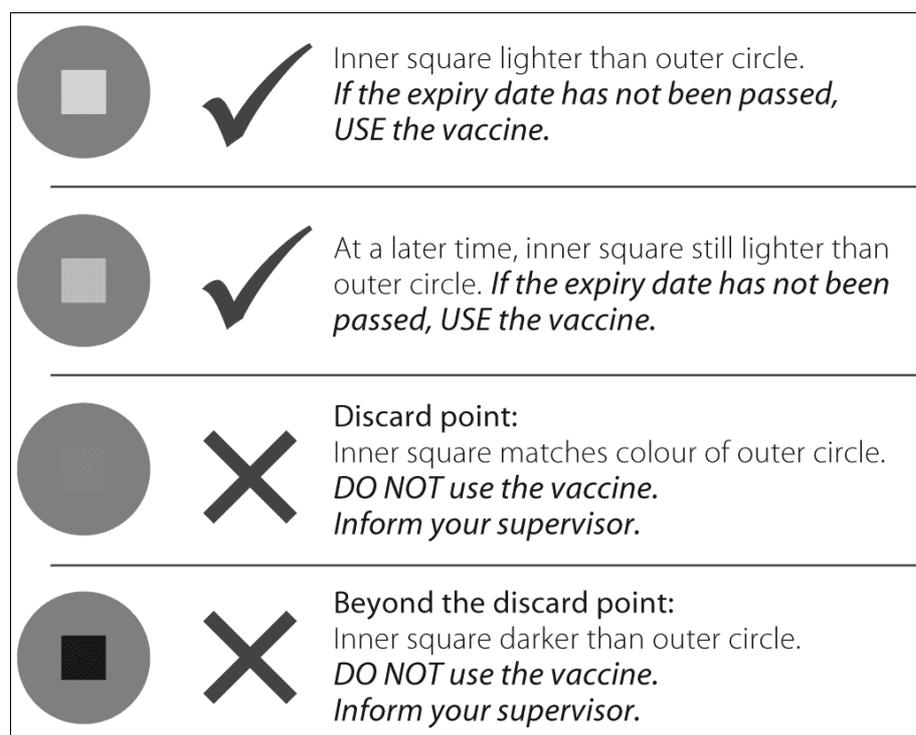
1. Opened vials kept in the “use first” box in the refrigerator.
2. Unopened vaccine ampoules/vials that have been taken to outreach sessions and have been outside of the refrigerator, and then returned (but not opened) to the refrigerator.
3. Vaccines with VVMs that have started to change.
4. The oldest vaccines that have not yet passed their expiry dates.

### 7.1.3 Check if vaccines are safe to use

Before you use any vaccine you must:

1. Check the labels of the vaccine and diluent. If the label is not attached, discard the vial or diluent.
2. Check the expiry date. You must discard vials and diluents if the expiry date has already passed.
3. Check the vaccine vial monitor (VVM). If it indicates the vaccine has passed the discard point, you must discard it immediately (**Figure 7A**).

**Figure 7A: Vaccine vial monitors showing different stages**

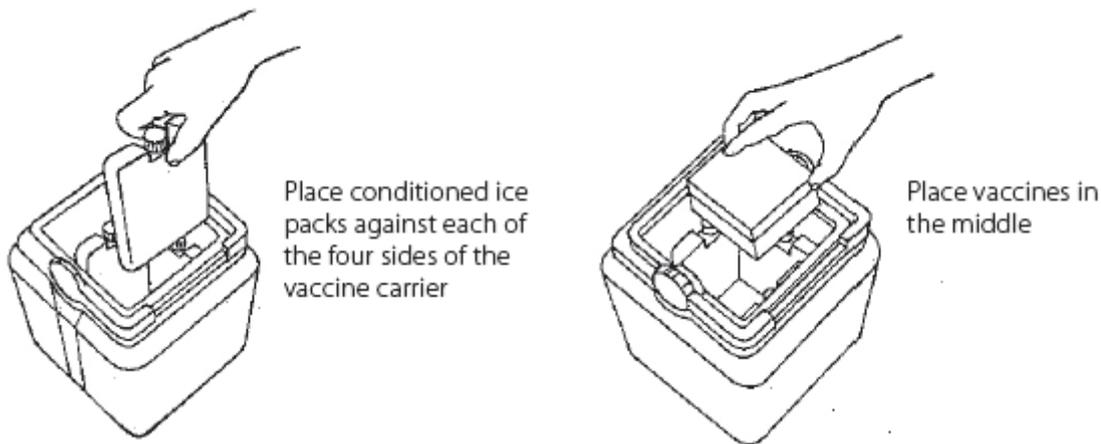


4. Check the freeze indicator in the refrigerator. If it warns of freezing or you suspect that a freeze-sensitive vaccine (eg. Pentavalent vaccine) has been frozen, you should perform the **shake test**

### 7.1.4 Prepare the vaccine carrier

Place conditioned cool water-packs in the vaccine carrier as shown in **Figure 7B**. Place the vaccines and diluents into the vaccine carrier and close the lid tightly. If you use ice instead of cool water-packs, you must always put ice cubes in a sealed plastic bag. The bag prevents water from collecting in the bottom of the carrier when the ice melts. During immunization sessions, keep opened vials inserted through the foam pad of your vaccine carrier. The foam pad keeps vaccines inside the carrier cool while providing a place to hold and protect vials in use. Do not cover the vials with ice.

**Figure 7B**



### **7.1.5 Prepare the work place**

#### **7.1.5.1 Arranging space in fixed health facilities for immunization sessions**

The arrangement of the space in your health facility will affect how you work and how quickly women and infants finish the immunization process. The space that you set up for immunization should be:

- Easily accessible to women and infants, but arranged so that they are not crowding the immunization area
- In a clean area not directly exposed to sunlight, rain, or dust
- Convenient for the health worker who is preparing and giving doses of vaccines;
- Quiet enough for you to be able to explain what you are doing and to give advice

**Put up a sign saying “immunization clinic” to show people where to come and wait.**

The fixed health facility should have:

- Space in the shade where women and infants can sit before receiving doses of vaccine;
- Space and equipment for screening, registration, immunizing, and recording;
- A table for vaccines and injection equipment;
- A chair on which a mother can sit while holding a child for immunization; and
- A chair for the health worker.

If you provide other services during immunization sessions, you need space and equipment for them as well. Set up a separate station for each of these services, which may include:

- Weighing babies and charting their growth;
- Treatment;
- Antenatal care;
- Health education.

### *Planning patient movement through the immunization facility to increase safety*

Part of setting up a safe immunization site involves planning patient flow to reduce the risk of accidental needle stick injury to the health worker or member of the community. For a safe clinic, keep the following guidelines in mind:

- If possible a room with two doors should be used (see Figure 7C). The patients should enter through one door and exit through another so that health workers are able to move people from the table where their names are checked to the immunization table, then over to the health information table, then finally the exit.
- If the facility only has one door the health worker should allow the person or child being immunized and the parent(s) to enter, receive their vaccination and then leave before allowing another person into the immunization clinic area.
- If possible, separate the registration tables from injection tables to help keep children calm.
- If other health care services are being provided, they should be incorporated into the flow, for example infant weighing table, nutrition table, and antenatal care.
- Whenever possible women and infants to be immunized should be separated from those who have just been immunized so the people waiting are not distressed by babies and children crying.
- A community member or another health worker should tell the community how they would move through the immunization facility. This person should also monitor the movement during the immunization session to ensure the patient flow is safe and efficient.

#### **7.1.5.2 Gather equipment for the immunization session**

The amount of equipment you need for the session depends on the estimated number of women and infants who will be immunized. Basic estimates for vaccines, AD syringes, mixing syringes, needles and safety boxes are provided.

Basic list of other equipment and supplies needed for fixed and outreach sessions:

- Soap for hand washing
- Metal file to open ampoules
- Immunization register
- New immunization cards for women and infants
- Safety box
- Cotton
- Container for rubbish
- Immunization tally sheets
- Table(s)
- Stool(s) / chair(s) for sitting.
- Paper, pencils, and pens

Figure 7C: Set up for an immunization session at a fixed site

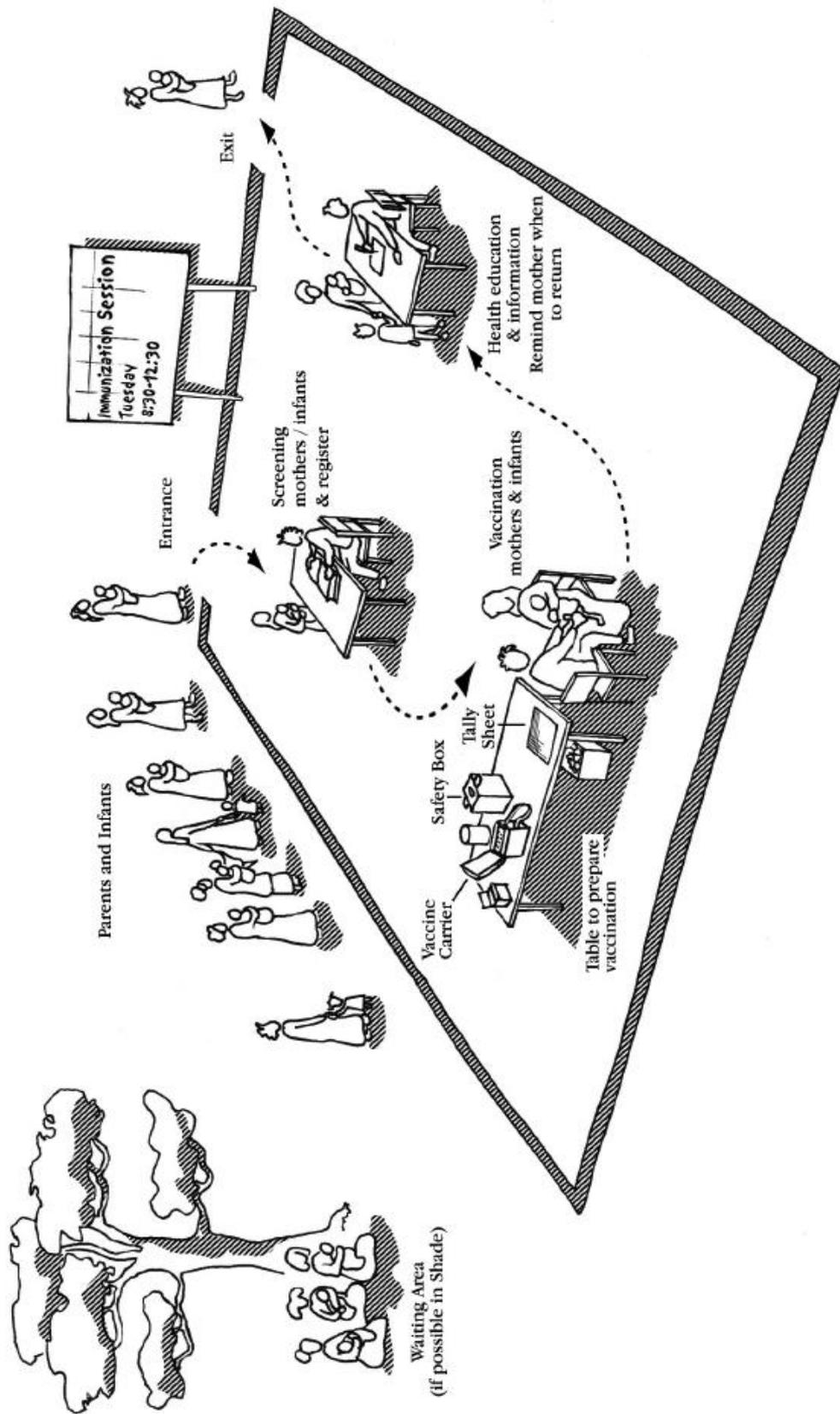
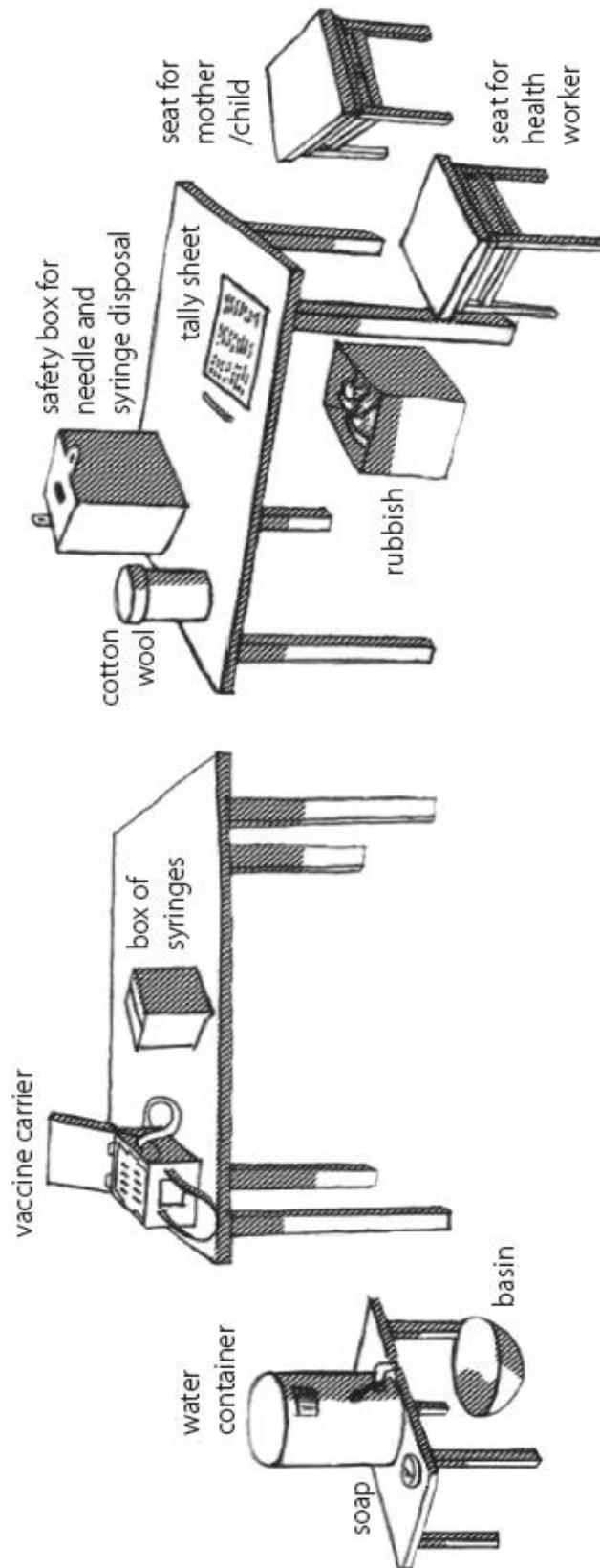


Figure 7D: Layout of the immunization work place



Health workers should plan the layout (see **Figure 7D**) of the immunization work space such that:

- Where possible there is a separate table for immunization and another for health checks if these are taking place at the same time as vaccination.
- The health worker is between the infant and all needles or sharp objects.
- Each person giving injections has her/his own safety box at busy sites.
- The health worker can dispose of used needles without setting them down or moving around with them.
- Only one child with a parent (or person to be vaccinated) at a time is near the workspace.
- The hand-washing equipment is placed next to the immunization table. Health workers must wash their hands prior to giving the first immunization and when in contact with dirt or blood.
- The health worker can tally the vaccine given soon after the vaccine is administered.

### 7. 1.5.3 Setting up an outreach site

The place where you give immunizations during an outreach visit may be in a building or in the open air. If in a building it should be well lighted and well ventilated. If in the open air and in a hot climate it should be in the shade.

In arranging the immunization site, make sure that:

- There is a separate entrance and exit so that people may move in and out of the session more quickly and easily;
- The waiting area is clean, comfortable, and, in a hot climate, out of the sun;
- People are effectively guided to the entrance, the stations and the exit by means of signs or the arrangement of chairs, tables, ropes or other items;
- The number of people at the immunization and other stations are limited, so there is no crowding;
- Everything you need is within reach on or near your immunization table.

**Figure 7E: Outreach immunization site in the open air**



## 7.2 Assessing infants and women and completing the register

### 7.2.1 How to assess whether an infant is eligible for vaccines?

Whenever infants visit the health center they should be screened for immunization and given all of the vaccines they are eligible to receive. When an infant is brought to the health center, you must determine his/her age and previous immunization status before deciding which vaccine doses to provide and whether the infant is eligible to receive vitamin A supplementation.

#### 1. Determine the infant's age

- Look at the infant's immunization card to determine the infant's age.
- If the infant does not have an immunization card, ask the mother how old the infant is.
- If the mother does not know the infant's age, estimate it by asking if the infant was born during a notable community event, for example during a certain season or celebration. This will give you a better idea of the infant's age. Infants above 1 year of age and who are not fully vaccinated, should still receive the missing doses. Such doses should be tallied separately (see Module 7).

#### 2. Determine which vaccines the infant has received

- Look at the infant's immunization card to see which vaccines he/she has already received.
- If the infant does not have an immunization card, ask the mother which vaccine she/she has already received.
- Check the register where you may find records of the infant's earlier doses of vaccines.
- If the mother does not know if the infant has been immunized or there is no record in the immunization register, give doses of all eligible vaccines.
- A scar on the infant's left arm or shoulder indicates he/she has received BCG vaccine. If the infant does not have a scar and you cannot determine whether a dose of BCG has been given, immunize the infant with BCG vaccine.

#### 3. Determine all vaccines for which the infant is eligible

Decide which vaccines the infant is eligible to receive according to Tanzanian schedule (see Module 2 for the **EPI-Tanzania** recommended schedule).

Follow the general guidelines given below:

1. If the infant is eligible for more than one type of vaccine, the vaccines may all be given at the same session, but at different injection sites.
2. Never give more than one dose of the same vaccine at one time.
3. If the delay between doses exceeds the minimum delay, do not restart the schedule. Simply provide the next needed dose in the series. For example, an 18 month old who has received only BCG, OPV1, and pentavalent 1 should receive OPV2, Polyvalent 2, measles, and yellow fever vaccines. Inform the mother of the importance of bringing the infant back to the health facility in four weeks to receive OPV3 and Polyvalent vaccines.
4. If there is a delay in starting primary vaccination, immunize the infant while maintaining the recommended dosage intervals.

### 7.2.2 Assessing infants and mothers for vitamin A supplementation

You must screen mothers and children younger than 5-years-old for vitamin A supplementation at every immunization contact. In Tanzania Vitamin A supplementation is a routine immunization.

1. Determine the infant's age (see Section 2.1, step 1 of this module) and/or whether the mother gave birth 6–8 weeks ago.
2. Check the infant's immunization card to see if he or she has received a vitamin A supplement and, if so, determine the interval since the last dose.

Ideally, infants and children should receive vitamin A doses of 100 000 IU (6–11 months) or 200 000 IU (12–59 months) every 4–6 months. Repeat supplementary doses should never be less than 4 weeks apart unless the child is being treated for measles or eye signs of VAD.

If vitamin A was distributed during NIDs in your program area within the past four months:

- Assume that all infants and children 6–59 months of age have received a dose (or 12–59 months in countries where infants under 12 months are not given vitamin A with NIDs).
- Do not give another dose unless the caretaker says the child did not participate in NIDs.
- Do not look for records as vitamin A doses given at NIDs are not meant to be recorded due to the difficulty of recording at mass campaigns.

### 7.2.3 Assessing women for TT immunization

At any immunization session, especially outreach, you should offer routine TT immunization to pregnant women. Some countries also have a policy of providing TT immunization to non-pregnant or recently pregnant women during routine infant immunization sessions.

To assess a woman's eligibility for TT immunization:

- First ask if the woman has a TT vaccination card. If she has, give the dose required according to the national TT schedule. If the woman does not have a record, ask her if she has ever had a dose of TT in the past:
  - If she says NO: give the first dose of TT and an appointment for the second dose one month later, and give her an immunization card.
  - If she says YES: ask how many doses she has received in the past and give the next doses in series (refer to Module 2 Section 5). Take into account any dose given in SIAs.
  - If she cannot remember or does not know, you should give her a dose of TT and a follow-up appointment for the next dose (refer to Module 2 Section 5).

## Recording TT doses

Ideally the TT doses given to women should be kept in a separate register. The register can be used at antenatal clinics or other opportunities to vaccinate women. In some countries, the infant register is used to keep record of maternal TT doses (see **Module 7**).

Use every opportunity to offer TT immunization to women. Any TT dose given should be recorded on an immunization card that is kept by the women.

At all antenatal clinics, outreach, fixed and mobile sites, make sure women especially pregnant women are screened for TT eligibility and offered TT immunization and TT cards if needed.

### 7.2.4 Contraindications to immunization

There are not many contraindications to immunization. All infants should be immunized except in these three rare situations:

1. Anaphylaxis or a severe hypersensitivity reaction is an absolute contraindication to subsequent doses of a vaccine. Persons with a known allergy to a vaccine component should not be vaccinated.
2. Do not give BCG or yellow fever vaccine to an infant who exhibits the signs and symptoms of AIDS (see **Table 7.1**). Other vaccines should be given.
3. If a parent strongly objects to an immunization for a sick infant, do not give it. Ask the mother to come back when the infant is well.

**Table 7.1: Recommendations for immunization of HIV-infected children and women of childbearing age**

Vaccine	Asymptomatic HIV infection	Symptomatic HIV infection
<b>BCG</b>	Vaccinate	Do not vaccinate
<b>DTP</b>	Vaccinate	Vaccinate
<b>OPV</b>	Vaccinate	Vaccinate
<b>Measles</b>	Vaccinate	Vaccinate
<b>H. influenza type b</b>	Vaccinate	Vaccinate
<b>Hepatitis B</b>	Vaccinate	Vaccinate
<b>Yellow fever</b>	Vaccinate	Do not vaccinate *
<b>Tetanus toxoid</b>	Vaccinate	Vaccinate

\* Pending further studies

**The following are not contraindications. Infants with these conditions should be immunized:**

- Allergy or asthma (with the exception of a known allergy to a specific component of the vaccine mentioned above);
- Any minor illness, such as respiratory tract infections or diarrhea with temperature below 38.5°C
- Family history of adverse events following immunization
- Family history of convulsions, seizures, or fits;
- Treatment with antibiotics;
- Known or suspected HIV infection with no signs and symptoms of AIDS;
- Signs and symptoms of AIDS, except as noted in Table 6.1;
- Child being breast fed;
- Chronic illnesses such as chronic
- Diseases of the heart, lung, kidney, or liver
- Stable neurological conditions, such as cerebral palsy or Down's Syndrome;
- Premature or low-birth weight (vaccination should not be postponed);
- Recent or imminent surgery;
- Malnutrition; and history of jaundice at birth.

If a reaction does occur, health workers should report the problem to supervisors immediately. Children who have a severe reaction to a vaccine should not receive additional doses of that vaccine.

There is no evidence of risk to the fetus from immunizing pregnant women with tetanus toxoid.

#### **7.2.4.1 Immunizing sick infants**

Many health workers do not like to immunize an infant who is ill. Young infants have many illnesses, and immunization is often delayed. Many infants catch one of the target diseases because they missed being immunized due to illness. However, we now know that it is safe to immunize infants even if they are ill.

##### **Children with a mild illness**

Immunize them as usual.

##### **Children with a fever**

Immunize them as usual. You can give any vaccine, including Pentavalent – there is no danger from adding the reaction to vaccine to a moderate fever.

##### **Very ill infants who need to go to hospital, or infants who have a very high fever**

Immunize them if possible. A senior health worker must decide for each individual infant. Remember that sick infants need protection against diseases that they may catch in hospital, especially measles.

##### **Malnourished infants**

You must immunize them – they can develop good immunity although they are malnourished.

They are more likely than other infants to die from the diseases (especially from measles).

#### **7.2.5 Completing the register**

Most health centers keep an immunization register. This helps health workers keep track of the immunization services they give to each infant and pregnant woman.

You must register pregnant women and infants as soon as they arrive at the health center or outreach site. Fill in all blanks except the space for services provided. This space should be completed after the services are provided (**see Module 7 for more details**).

##### **What to do when children attend outside normal session times?**

Many infants and women eligible for immunization have contact with health services and could be immunized if vaccines were offered. Furthermore, the increased risk for children of contracting measles in health facilities has been documented both in developing and industrialized countries, highlighting the importance of protecting them through immunization at every health service contact. Routine screening for immunization status should occur for all infants and women of childbearing age who visit health services for any reason. Ideally, eligible infants and women should be immunized immediately, but at a minimum, they should be given an appointment for immunization.

## 7.3 Giving the right vaccine safely

### 7.3.1 Reconstituting vaccines

Reconstituting vaccines means mixing a powdered form of a vaccine with a fluid called a diluent so that the vaccine can be injected.

The table below lists the vaccines that need to be mixed with diluent before use.

Vaccines that need to be reconstituted	Powder		Diluent
BCG	freeze-dried	vial	liquid provided with vaccine
Measles	freeze-dried	vial	liquid provided with vaccine
Measles-mumps-rubella (MMR)	freeze-dried	vial	liquid provided with vaccine
Measles-rubella	freeze-dried	vial	liquid provided with vaccine
Yellow fever	freeze-dried	vial	liquid provided with vaccine
Japanese encephalitis	freeze-dried	vial	liquid provided with vaccine
Hib <sup>a</sup>	freeze-dried	vial	liquid provided with vaccine
DTP-HepB+Hib	freeze-dried Hib	vial	liquid DTP-HepB vaccine

Follow the steps indicated below to mix most powder vaccines with a fluid so that the vaccine can be used. **Pentavalent vaccine** requires a slightly different reconstitution process, explained in this module.

#### Remember:

Diluent are not interchangeable, different vaccines have different diluents; mixing and administering the wrong diluent has led to serious adverse events including death. Always use diluent from the same manufacturer as the vaccine. Diluents should be cooled before being mixed with the vaccine. Do not reconstitute vaccines until you are ready to immunize. You must discard reconstituted vaccine after six hours or at the end of the immunization session, whichever comes first.

### 7.3.2 Reconstituting BCG, measles, and Yellow fever

- Wash your hands

Wash your hands with clean water and soap before reconstituting vaccines.

- Inspect the vaccine vial or ampoule

Most vaccines come in vials, except for BCG vaccine, which comes in ampoules. A vial is a glass bottle with a rubber stopper held in place by a metal or plastic cap.

- Check the vaccine vial monitor (if there is any) to ensure that the vaccine has not passed the discard point.
- Read the expiry date on the label to make sure that you can still use the vaccine. If the date has passed, discard the vaccine.
- Flick the vial or ampoule

Make sure that all of the vaccine powder is at the bottom of the vial. Flick or tap the vial with your finger.

➤ Open the vaccine vial or ampoule

The center of the metal cap is pre-cut so that it can easily be removed. Lift the center of the metal cap and bend it back, using a metal file. Some vials have colored plastic caps instead of metal caps. Flip off the plastic cap with your thumb.

➤ Inspect the diluent ampoule or vial

The diluent for reconstituting vaccines is usually held in ampoules, which are glass or plastic bottles that you open by breaking off their pointed tops. Make sure the ampoule is not cracked.

➤ Read the label on the diluent ampoule or vial

Make sure that you are using the diluent the manufacturer sent with the vaccine and the expiry date has not passed.

Use only the ampoule or vial sent by the manufacturer for the specific powder vaccine.

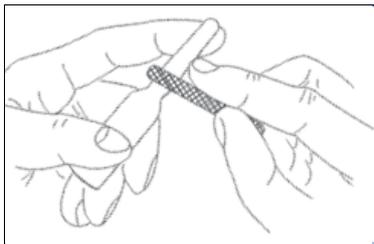
Do not use sterile water or saline provided for other purposes as a diluent. Each vaccine has its own diluent and must not be reconstituted with anything else.

➤ Open the glass ampoule

Hold the ampoule between your thumb and middle finger.

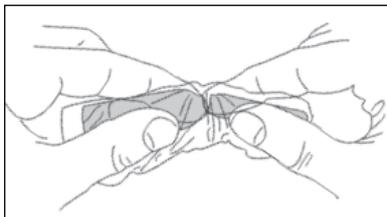
Use your index finger to support the top.

Take the metal file that is packed with the ampoules and scratch hard around the neck of the ampoule you wish to open.



Hold the top of the ampoule in a piece of clean cotton wool and gently break off the top. It breaks where you made the scratch.

In case of injury while breaking the ampoule, discard the ampoule as the content may have been contaminated. Cover the wound/cut before opening a new ampoule.

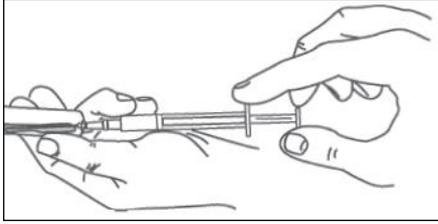


➤ Draw diluent into a mixing syringe

Use a new disposable mixing syringe (5 ml) and a mixing needle (76 mm, 18 gauge) to reconstitute each supply. Put the needle in the open top of the ampoule.

Pull back the plunger to draw all the diluent from the ampoule into the syringe.

Do not reuse disposable mixing syringes.

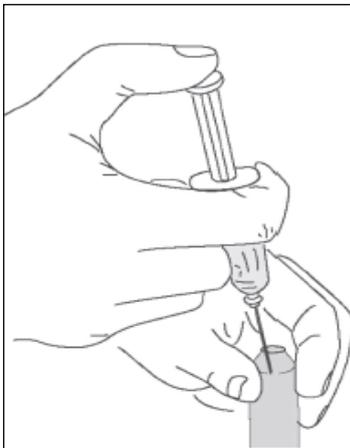


➤ Reconstitute the vaccine

Insert the mixing syringe that is filled with diluents into the vaccine vial or ampoule.

Hold the plunger end of the mixing syringe between your index and middle fingers and push the plunger in with your thumb. This empties the diluent into the vaccine vial or ampoule.

- To mix the diluent and vaccine, draw them up slowly into the syringe and inject them slowly back into the vial or ampoule. Repeat several times.
- Put the mixing syringe and needle in a safety box after use.



➤ Handling reconstituted vaccines

Put the reconstituted vaccine on the foam pad of your vaccine carrier.

### 7.3.3 Reconstituting DTP-HepB-Hib (Pentavalent) vaccine

Pentavalent vaccine is reconstituted differently from other vaccines. It is reconstituted using liquid DTP-HepB vaccine to reconstitute the powdered Hib vaccine.

- Open the powder Hib vaccine vial
- Draw liquid DTP-HepB vaccine into a mixing syringe

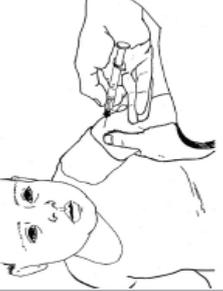
Draw up all the liquid DTP-HepB vaccine from the vial into a 5 ml mixing syringe.

➤ Reconstitute the DTP-HepB+Hib vaccine

Inject all 1.3 ml of the DTP-HepB liquid vaccine from the 5 ml mixing syringe into the vial containing the powder Hib vaccine.

➤ **Discard all DTP-HepB+Hib reconstituted vaccine after six hours or at the end of the immunization session, whichever comes first.**

## Administering vaccine for infants

Name of vaccine	BCG	DTP or DTP-HepB, HepB	Measles/ yellow fever	OPV
Where given	Outer upper left arm or shoulder	Outer mid-thigh in infants/ outer upper arm if older	Outer mid-thigh/upper arm depending on the age	Oral
How given	Intradermal injection	Intramuscular injection	Subcutaneous injection	Oral dropper
Dose	0.05 ml	0.5 ml	0.5 ml	2 drops
Needle size	10mm, 26 gauge	25mm, 23 gauge	25mm, 23 gauge	
Type	Powder + Diluent	Ready-to-use	Powder + Diluent	Vial with oral dropper
Appearance	White, cloudy liquid with sediment that suspends when shaken (see shake test Module 3)	White, cloudy liquid with sediment that suspends when shaken (see shake test Module 3)	Clear, slightly yellow liquid	Clear, pink or orange liquid
				

### 7.3.5 How to give an injection using AD syringes

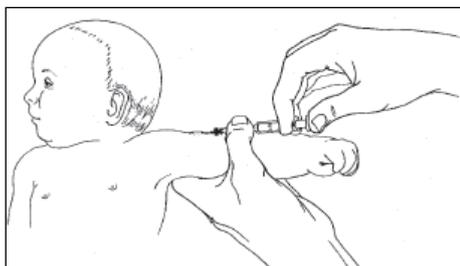
1. Wash skin that looks dirty with water. It is not necessary to swab clean skin.
2. Hold syringe barrel between thumb, index and middle fingers. Do not touch the needle. The plunger can go back and forth only once, so health workers should not draw up air to inject into the vial as this will disable the syringe.
3. Insert needle with a smooth action.
4. It is not necessary to aspirate first.
5. Use thumb to push the plunger without moving the syringe around.
6. Pull needle out quickly and smoothly (less painful than doing it slowly).
7. Ask the parent to press the site gently with a clean swab for a few seconds (to stop bleeding and relieve pain).
8. Do not rub the area where the injection was given.

### 7.3.6 BCG vaccine: intradermal (ID) injection in arm

The injection is given into the skin in the **right upper arm**. The dose of BCG is very small (0.05 ml). To measure and inject such a small dose accurately you must use a special small syringe and needle.

BCG is the only childhood vaccine that is injected into the layers of skin for slow absorption (intradermally). To give an intradermal injection correctly you must use a short, very fine needle (10 mm, 26 gauge).

1. Position infant sideways on mother's lap and remove clothing from the arm and shoulder.
2. The mother should hold the infant close to her body, supporting his or her head and holding the arms close to the body.
3. Hold the syringe in your right hand with the bevel of the needle facing upwards.
4. Stretch the skin out flat with your left thumb and forefinger.
5. Lay the syringe and needle almost flat along the infant's skin.
6. Insert the tip of the needle just under the surface but in the thickness of the skin –just past the bevel (the hole in the end of the needle).
7. Keep the needle FLAT along the skin, so that it goes into the top layer of the skin only. Keep the bevel of the needle facing up.
8. Do not push too far and do not point down or the needle will go under the skin. Then it will be subcutaneous instead of an intradermal injection.
9. To hold the needle in position, put your left thumb on the lower end of the syringe near the needle, but do not touch the needle.
10. Hold the plunger end of the syringe between the index and middle fingers of your right hand. Press the plunger in with your right thumb.
11. Inject 0.05 ml of vaccine and remove the needle.



**Note.** When an intradermal injection is given correctly the plunger is hard to push. If the vaccine goes in easily you may be injecting too deeply. Stop injecting immediately, correct the position of the needle, and give the remainder of the dose, but no more.

If the whole dose has already gone under the skin, count the infant as having received a dose of vaccine. Do not repeat the dose. Ask the parent to return with the child if he or she shows any side effects, such as abscesses or enlarged glands.

If you have injected BCG correctly, a flat-topped swelling appears on the skin. The swelling may look pale with very small pits, like an orange peel. If the technique is incorrect, the vaccine will go in easily and no swelling will be visible.

### **7.3.7 Pentavalent vaccine: intramuscular (IM) injection in right thigh**

1. Position the infant sideways on the mother's lap with the infant's whole leg bare.
2. The parent should hold the infant's legs.
3. Gently stretch the skin flat between your thumb and forefinger.
4. Insert the needle at a 90° angle.
5. Quickly push the entire needle straight down through the skin and into the muscle. Inject slowly to reduce pain.



### 7.3.8 Measles vaccine, yellow fever: subcutaneous (SC) injection

1. Position infant sideways on mother's lap with the whole arm bare.
2. The parent should hold the infant's legs.
3. Reach your fingers around and pinch up the skin.
4. Quickly push the needle into the pinched up skin – the needle should point towards the shoulder.
5. To control the needle, support the end of the syringe with your thumb and forefinger but do not touch the needle.



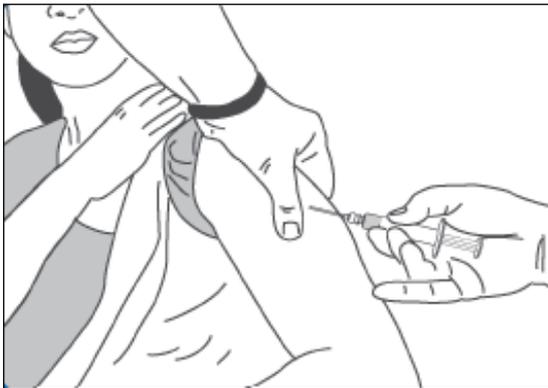
### 7.3.9 OPV administration

1. Ask the parent to hold the infant with the head supported and tilted slightly back.
2. The chin and cheeks should be dry: OPV is less likely to spill out.
3. Open the infant's mouth gently, either with your thumb on the chin (for small infants) or by squeezing the infant's cheeks gently between your fingers.
4. Let 2 drops of vaccine fall from the dropper onto the tongue. Do not let the dropper touch the infant.



### 7.3.10 TT vaccine (for women): intramuscular (IM) injection in the left arm

1. Ask the woman to sit down.
2. Tell her to drop her shoulder and place her left hand behind her back or resting on the hip. This relaxes the muscle in the arm and makes the injection nearly painless.
3. Put your finger and thumb on the OUTER part of the upper arm.
4. Use your left hand to squeeze up the muscle of the arm.
5. Quickly push the needle straight down through the skin between your fingers. Go deep into the muscle.
6. Press the plunger with your thumb to inject the vaccine.
7. Pull out the needle quickly and smoothly and ask the woman to press the site gently with a cotton pad in case of bleeding.



### 7.3.11 Vitamin A supplementation

1. Check the expiry date on the label. If the expiry date has been reached, discard the bottle.
2. Open the bottle and write the current date on the label so that you will know when to stop using it. Opened bottles of vitamin A capsules are good for one year.
3. Open a capsule by cutting the tip or nipple off with a clean pair of scissors or a clean nail clipper.
4. Squeeze the capsule firmly so that the drops fall into the mouth of the client. For a young child, you may need to pinch his or her cheeks gently to open the mouth.

#### **Give the correct amount of vitamin A supplement: too much can cause harmful side effects.**

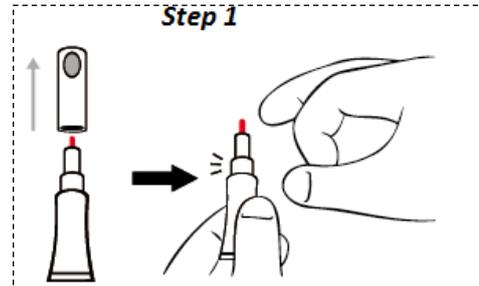
If you are giving vitamin A to children ages 6 through 11 months and you have only 200 000 IU dose capsules, you need to know the number of drops in this size of capsule in order to be able to give a half dose (100 000 IU). To do that:

- Open one 200 000 IU capsule, and squeeze out the contents while counting the number of drops that are contained in it.
- Divide the total number of drops by two – this is the number of drop equal to a half-dose or 100 000 IU. It is safe to assume that all capsules in a batch contain the same number of drops.

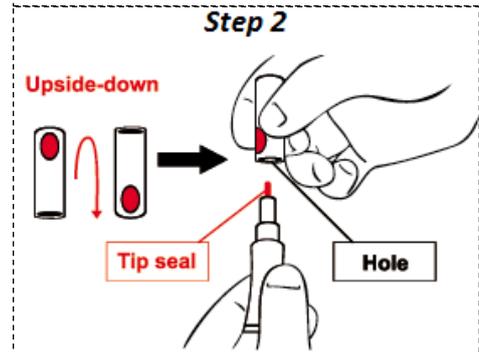
### 7.3.12 Rotavirus vaccine

#### Steps for preparing the vaccine

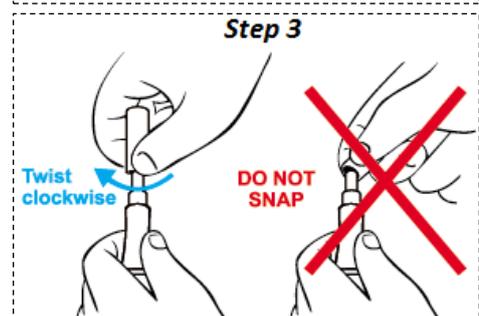
Step 1: Pull off the cap from the tube. Clear the fluid from the upper part of the tube by tapping the tube.



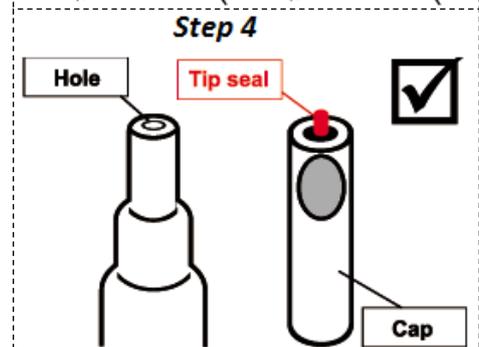
Step 2: Turn the cap upside-down and place the cap vertically onto the tip seal. Insert the tip seal into the small hole in the top of the cap.



Step 3: Twist the cap in the direction of the arrow (clockwise) to remove the tip seal. Do not snap off tip seal: It may fall into tube.



Step 4: Ensure that a hole clearly appears at the top of the tube and that the detached tip seal is inside the top of the cap. If the tip seal of the vial falls into the tube discard the vaccine.



#### Key messages:

- Do not snap off tip seal: It may fall into tube
- The vaccine must be discarded if the tip seal falls into the tube

## How to position the child for rotavirus vaccination

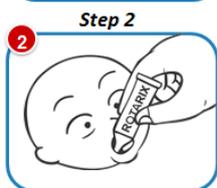
The child should be seated in a semi-reclining position (i.e. normal feeding position).



## Administration of the vaccine



Step 1: Gently squeeze the child's cheeks to open the mouth.



Step 2: Put the tube towards the inner cheek.



Step 3: Make every effort to aim the tube containing the vaccine down one side and toward the back of the child's mouth. Do not put the tube too far back in the mouth. Never place the tube into the center of the mouth to prevent the risk of choking. Administer the entire content of the tube by gently squeezing it several times. Make sure the child is swallowing the vaccine to prevent buildup in the mouth.



Step 4: Gently hold the cheeks together and stroke the child under the chin to help with swallowing.



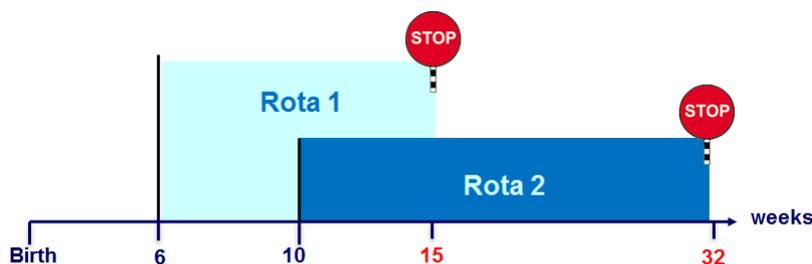
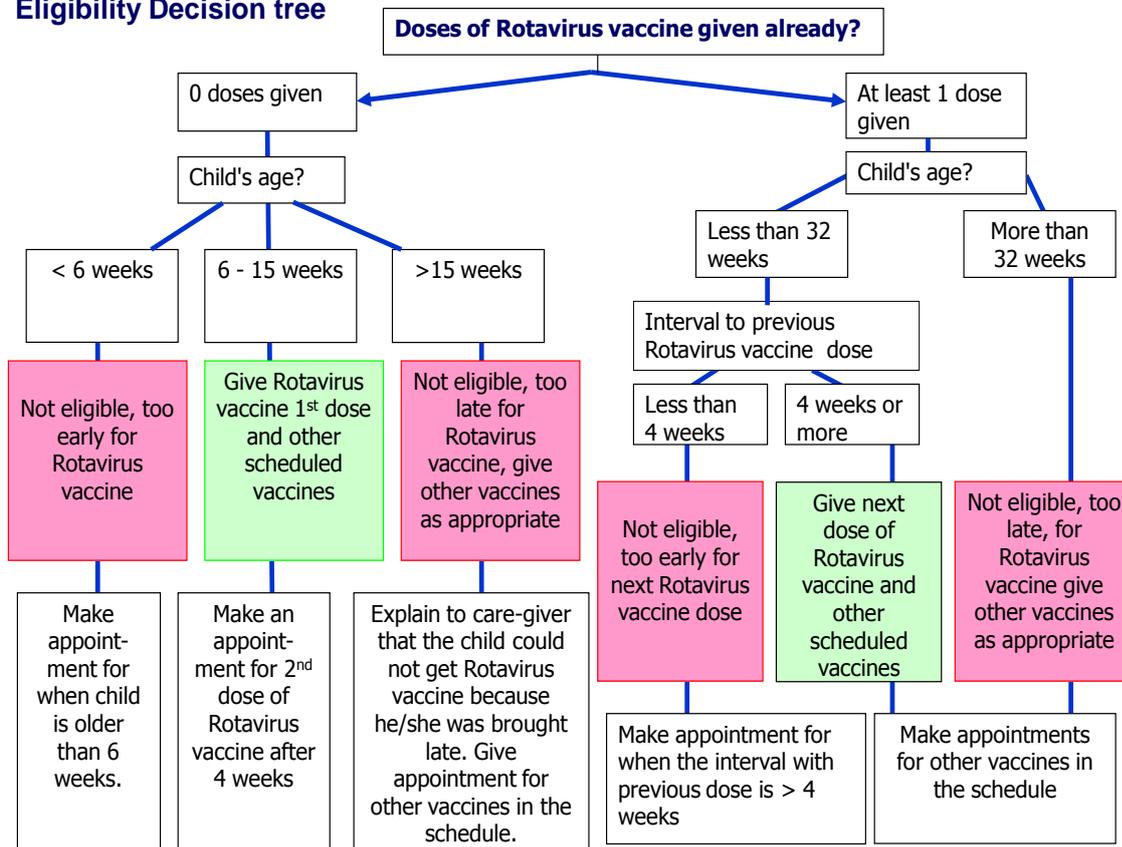
### **Key messages:**

- *The rotavirus vaccine dose quantity is larger than that of oral polio vaccine (Rotarix™1.5 ml) and infants might not take the full dose all at once*
- *To prevent spitting, slowly administer the vaccine in small amounts and properly place the tip of the tube towards the inside of the child's cheek*

## Rotavirus vaccine schedule

Rotavirus vaccine is given in a 2-dose schedule: first dose at 6 weeks and second/last dose at 10 weeks of age. Remember that the first dose of vaccine must be given by 15 weeks and second dose by 32 weeks. Maintain the minimum interval of 4 weeks between doses. Infants coming later than 15 weeks for first time will not be given the Rota vaccine, however, they will get other vaccines in the schedule.

### Eligibility Decision tree



### Key messages:

- First dose of rotavirus must be given between 6 to 15 weeks only,
- Second dose should be given between 10 to 32 weeks,
- Do not start the rotavirus vaccination to children older than 15 weeks
- Do not give the second dose of rotavirus vaccine to children older than 32 weeks of age.
- Rotavirus vaccine doses can be given at the same time as first and second dose of OPV and DTP-HepB-Hib (i.e. OPV1, and OPV2, Penta1 and Penta2)

## Contraindications

- Hypersensitivity after previous administration of rotavirus vaccines
- Previous history of intussusceptions
- The administration of rotavirus vaccine should be postponed in children suffering from diarrhea or vomiting and in need of rehydration therapy
- Note that mild illness such as an upper respiratory tract infection is not a contraindication.

## Communication for Rotavirus vaccine

Healthcare workers should establish an open, friendly dialogue with parents at an early stage and provide easily comprehensible answers about known vaccine adverse events and provide accurate information about vaccination.

## Triple A communication

Triple A communication is a mnemonic system that allows health workers to remember the three ways of communicating with parents.

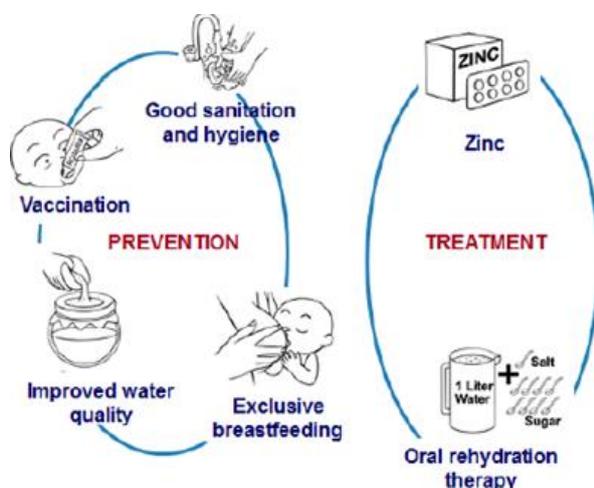
- **Advice** parents on what is given (disease prevented, vaccine used, etc.)
- **Alert** on side effects after immunization and how to respond to that possible side effects
- **Arrange** and fix with parents the next appointment for administering the second dose of the vaccine

## What to communicate about the disease

- Rotavirus is a virus that causes diarrhea, sometimes severe, mostly in babies and young children. It is often accompanied by vomiting and fever and can lead to dehydration.
- Rotavirus is not the only cause of diarrhea, but it is one of the most serious. Almost every child in the world will suffer from at least one infection by the time he or she is three years old.
- The primary mode of transmission of rotavirus is the passage of the virus in stool to the mouth of another child.

## Messages on diarrhea prevention and treatment

Prevention methods against rotavirus disease include breastfeeding, improvements in nutrition, hygiene, and water quality; they can reduce diarrheal disease and child mortality where diarrheal disease is a serious burden. But enhancing sanitation and hygiene is not enough to prevent the disease and stop the spread. Currently, vaccination is the most effective way to prevent the severe episodes of rehydration therapy.



*Key messages:*

- *Rotavirus infection is highly contagious*
- *Vaccination is the only way to prevent the severe episodes of rotavirus infection.*

**7.3.13 Administration of Pneumococcal Conjugate Vaccine 13**

- Instruct the mother on how to hold the baby for vaccine administration.
- Shake the vaccine well and only use if the vaccine is a homogenous white suspension
- Draw up 0.5 ml with a new sterile needle.
- Administer the vaccine on the right anterior lateral aspect of the mid-thigh intramuscularly (syringe at 90<sup>0</sup>).
- In case of bleeding Press the injection site firmly using dry cotton wool for a few seconds. Do not massage



*Key messages:*

- *PCV13 should be given on the anterior lateral aspect of the right mid- thigh and Pentavalent on the anterior lateral aspect of the left mid-thigh.*
- *Frozen PCV 13 should be discarded*

## **7.4 Completing the tally sheet and infant's immunization card**

### **7.4.1 Recording the vaccines and vitamin A supplement given on the tally sheet**

Soon after you finish immunizing the infant and woman, record a mark for each vaccine and vitamin A supplement given on the tally sheet (more information in Module 7).

### **7.4.2 Completing the infant immunization card**

- Complete the immunization card by writing down the date for each vaccine administered or vitamin A supplement given and return the card to the parent. If there is no special place on the card for recording vitamin A supplementation, write "Vit. A" and the date in the margin or any blank space on the card.

Immunization cards should be kept by the parents and not by the health staff.

- Mark the next immunization date on the card after every dose, and tell the parent when and where to return for the next dose of vaccine.
- Tell the parent that the card must be kept in good condition. Explain that it is an important document because it keeps track of her infant's health and immunization status and will help health workers understand how to treat her infant in the future.
- Tell the parent that the card should be brought along every time the infant comes to the health center, whether or not the infant is coming in for services or not.
- Ask to see immunization cards for both mothers and infants every time they come to your health facility. Assess whether they are eligible for any vaccine or vitamin A supplementation. Do not miss an opportunity to immunize.

### **Updating the reminder cards**

If you have a system of using reminder cards to track defaulters (see Module 7, Section 1.4), refer to the reminder card at each visit and update it at the same time as the immunization card.

### **7.4.3 Immunization cards for women**

Women may have routine or supplementary TT doses recorded in three ways (see Module 8 for details):

- On the antenatal card (Common in Tanzania)
- On a life-long immunization card (most preferred)
- On the infant's immunization card (for additional recording)

When screening women for TT immunization, always ask if the woman has a card. If she does not, ask if she can remember receiving TT immunization during this pregnancy if she is pregnant, and previous pregnancies if she is not, or during SIAs. We know from surveys that have compared women's response to the TT antibodies in her blood, that women are likely to remember TT doses accurately. You can then give the appropriate TT dose according to her history and tally accordingly. Also give her a card if she does not have one.

## **7.5 Communication with parents during and after the immunization sessions**

Here are some guidelines on how to communicate with people about immunization. These should be adjusted depending on the time available, the number of people waiting, and weather conditions.

The most essential elements of every encounter are:

- That you treat the person with respect;
- That you advise him or her of possible side-effects and what to do about them; and
- That you explain when and where the next immunization session will be held.

### **7.5.1 Here is a step-by-step guide to talking about immunization with parents at a session**

1. Thank the parent for coming to the immunization session and for their patience if they had to wait.
2. Explain in simple terms the diseases the vaccines protect against.
3. Describe the side effects of immunization and what to do about them (see Module 2). Advise the parent on how to tell when they need to bring the infant to the health center or hospital in case of a rare, serious side effect.
4. If the immunization is one dose of vaccine in a series, explain that the infant must complete the series in order to be fully protected. Use the chart on the immunization card as a guide, and congratulate the mother if the infant has completed the series.
5. Write the date for the next immunization on the card, and tell the parent the date as clearly as possible. Try to associate the date with a holiday or local event, which will help them remember when to return.
6. Tell the parent when and where to go to receive the infant's next immunization and vitamin A supplement.
7. If the parent and infant cannot come on that date, explain the alternative dates and times.
8. Tell women how many more times, when and where they must return to be fully protected against tetanus.
9. Remind the parent always to bring their immunization cards to the health center or outreach session.
10. If the infant (or women) has missed some doses, do not scold the parents (women), but explain why it is important that an infant (women) needs to be fully immunized and that you will be giving (as much as possible) any missing doses during this session. Also request to come timely for the next immunizations that are due (also give an appointment).
11. Inform the parent of any upcoming campaigns for TT, measles, or vitamin A, and of any National Immunization Days for polio.
12. Ask the parent if they have any questions.

Make sure you repeat each of these messages more than once if it seems necessary. Parents under stress – for example, in a busy clinic – may not remember well, so make sure they understand you. The likelihood parents will remember your messages increase if they hear the messages more than once.

### **7.5.2 Advising on potential side-effects**

When advising a parent of the potential side-effects of any vaccine:

- Explain which disease or diseases the vaccine prevents.
- Reassure the parent that reactions are common and not a threat to the infant; they show that the infant is responding to the vaccine.
- If the infant suffers fever, pain, or swelling at the injection site, or is irritable, loses his or her appetite, or is “off color”
- Give extra fluids that is, more breastfeeds or clean water.
- Paracetamol may be given according to the IMCI guideline
- Give extra hugs and attention – but keep the pressure off the injection site(s).
- Place a cloth dampened with cold, clean water on the injection site.
- Tell the parent to bring the infant to the health center if the infant’s condition gets worse or the reaction continues for more than a day or two.
- More details on side effects can be found in Module 2.

#### **Potential side effects, after giving BCG vaccine:**

Explain to the parent that the flat-topped swelling on the infant’s arm is normal and indicates that the vaccine is working.

Ask the parent to return with the infant if he or she develops any side effects, such as abscesses or enlarged glands.

#### **Potential side effects, after measles vaccine:**

A rash or fever may develop after 6–12 days. Other people will not catch the rash and it goes away. Give extra fluids and keep child cool.

More details on side effects can be found in Module 2.

## **7.6 Concluding the session**

### **7.6.1 Completing an immunization tally sheet**

Health workers should keep a tally of each immunization they give (see Module 7 for detailed instructions). At the end of an immunization session count the number of doses of each type of vaccine you have given, and use your daily tally sheets to prepare monthly reports to supervisors.

### **7.6.2 Taking care of the vaccines**

- Opened vials may be used in the subsequent immunization sessions.
- Opened vials of measles, yellow fever and BCG vaccines **MUST** be discarded at the end of each immunization session or after 6 hours whichever comes first.
- Opened vials that can be used for the subsequent session should be kept in the refrigerator in a box marked “use first ” so they can be used first in the next session.

### **7.6.3 Taking care of vitamin A capsules**

#### **Storing vitamin A capsules**

Vitamin A capsules do not need to be stored in a refrigerator and may be kept out of the cold chain but, like vaccines, they must be handled with care.

- They must be kept dry.
- They must be kept out of direct sunlight.
- They must not be frozen.

Store the 100 000 IU and 200 000 IU capsules in separate, labeled bottles to avoid mixing up the two doses.

When you open a new bottle, put the date on it. An opened bottle can be used no longer than a year or till the expiry date, or whichever comes first.

### **7.6.4 Disposing of used equipment**

- Used needles and syringes must be disposed of safely (see Module 4 for detailed instructions).
- Vials and rubbish should be wrapped in newspaper or other paper. If your local government does not collect them, either bury or burn them.

### **7.6.5 Special tasks on completing an outreach session**

In addition to the tasks you have after a session at a fixed site, you must complete these tasks after an outreach session.

#### **1. Pack the vaccine carrier**

- Check the cool water-packs to make sure that the ice has not melted. If the cool water-packs have completely melted and/or the thermometer in the vaccine carrier shows temperature above 8°C, the vaccine should be discarded unless it has a VVM which shows it is still safe to use.
- Pack unopened vaccines and an open vial for which the multi-dose vials policy is applicable (see Module 3).
- Put empty vials and opened vials of reconstituted vaccines in a separate container to carry them to a disposal site.

2. Leave the outreach site tidy
  - Do not leave anything behind that might be a health threat to the community.
  - Collect safety boxes containing AD syringes and other rubbish, and bury or burn them at the site if possible (see Module 4). If not, take the safety boxes and other rubbish back to the health center.
  - Do not leave empty or opened vials at the site.
  - Do not leave any syringes or needles at the site.
  - Return tables, chairs, and other equipment to their owners.
  - Thank the local people who have helped to organize the session and remind them when you will return.
3. Return vaccines to the refrigerator
  - If the cool water-packs in your vaccine carrier have melted during your trip back to the health center, discard all of the vaccines except those whose vaccine vial monitor indicates that the vaccine is safe to use. Return these vaccines to the refrigerator and place in the “use first” box so they will be used first during the next session.
  - If the ice-packs are still frozen, put unopened vials in the “use first” box in there refrigerator.
  - Put the cool water-packs from the carrier into the freezer, and check and record the temperature of the refrigerator.
4. Clean the vaccine carrier
  - Wipe the carrier with a damp cloth and check it for cracks. Repair any cracks with adhesive tape and leave the carrier open to dry.

## CHAPTER 8

### Module 7: Monitoring and using your data

Data collection is an important aspect of monitoring and evaluation of the program for the future improvement. Quality data can help to show how a district is performing as far as immunization is concerned.

The aim of this module is to discuss how to collect and report data, and how to monitor performance based on the collected data. It also shows how to improve immunization service by identifying and solving problems, and incorporating the solutions as activities in a work plan. Many of the topics covered in monitoring relate closely to planning topics in Module 5.

This module covers the following topics:

- Basic recording tools: village record tools, immunization registers, immunization card, tally sheet, and systems for tracking defaulters.
- Making summary reports: monthly reporting at health facility level.
- Monitoring your performance
  - Making and using a monitoring chart
  - Compiling your immunization data and
  - Analyzing your data

#### 8.1 Basic recording tools

Every health facility needs a system of recording immunization data. Making records systematically and regularly after each session will help you to follow up on defaulters and solve other problems.

The main recording tools that each health facility must use are:

1. Immunization register
2. Vaccination card
3. Tally sheets
4. Reminder files or another system for tracking defaulters.

##### 8.1.1 Immunization register

The immunization register helps health workers keep track of the immunization services they offer to each infant and to pregnant women. A health facility should have two separate registers, one for recording infant immunizations (HMIS Book 7) and another for recording TT given to women (HMIS Book 6).

##### How to use the register

Registration of infants and pregnant women should be done as soon as they arrive at the health facility or outreach site at the first visit. There should be separation of pages for children being registered and vaccinated by **village/mtaa** at the static area and various outreach service areas. Fill in all information in the space provided. Registers should be updated immediately after child received the service.

### 8.1.2 The immunization card

The infant immunization card contains the immunization history and status. The immunization card is important for many reasons:

- It serves as a reminder for parents to return to the clinic for the next dose.
- It helps the health worker to determine an infant’s immunization and vitamin A status.
- It is useful when conducting coverage surveys and any related assessments.

The card may be the only record of immunization history and status available for health workers if immunization registers are not well maintained or if clients move from one health facility to another.

Each infant should have a card with immunizations marked correctly. Similarly, a separate card should be given to each woman having received TT vaccine.

#### How to use the infant immunization card

Complete the card by writing down the date for each vaccine administered or vitamin A supplement given. Include doses of TT given to the pregnant woman and woman of childbearing age.

Write the next appointment date on the card and tell the mother when to return for the next dose of the vaccine.

*Remember to write on the immunization card the next appointment date. Make sure that the appointment corresponds to a planned immunization session. Remind the mother verbally as well as by writing on the card. Always return the card to the mother.*

### 8.1.3 Tally sheets

Health worker should mark soon after administering a vaccine to the appropriate vaccine on the tally sheet. Use a new tally sheet every month

#### Record doses of tetanus toxoid given to women

After immunizing any woman, pregnant or not, record the immunization in the register and on the woman’s immunization card and mark in the correct column of the tally sheet.

At the end of each immunization session, total the number of marks recorded during the session. This tells you the number of immunizations you have given with each vaccine and each dose. You will use this information to monitor your performance and prepare a monthly report.

The health facility should keep the tally sheet for records for at least two years. At the end of the month a copy of the tally sheet should accompany the monthly report to the district.

**Table 8.1: “Common mistakes to be avoided in tallying”**

<b>Mistake in tallying</b>	<b>Possible problem that may occur</b>	<b>Correct practice</b>
Tallying before the vaccine is administered	The child may not receive the vaccine	Give the dose first then tally using the tally sheet

Tallying at the end of a session according to number of doses contained in the used vials	“Wasted” doses may be counted	Tally each dose given (as above)
Tallying all vaccines under one age group (to include those outside the targeted age)	Will result in inaccurate coverage data	Separate tally for under 1 and over 1 year old

## 8.2. Making monthly reports

The immunization data collected needs to be consolidated into a monthly report manually for health facility use and transmission to the district. The district compiles data electronically for use and transmission to the region and eventually to national. At each level the data should be charted, analysed and used to improve the programme.

You need to send a copy of the report with date and signatures to the next level but also store a copy of the report for use at the health facility.

### 8.2.1 Preparing reports

Health workers should ensure that the reports prepared are:

- **Complete:** All the sections of the reports have been completed; no parts have been left blank and all reports due from reporting sites have been received.
- **Timely:** Check the deadline for report submission. Reports should be submitted to the next level before the deadline. When reports are sent and received on time, the possibility of a prompt and effective response is greater.
- **Accurate:** Before sending the reports, double-check entries, totals and all calculations. Make sure that the reported figures correspond to the actual figures.

The district, regional, national levels should keep track of the completeness and timeliness of reporting by the lowest level, and remind those levels of missing or late reports.

### 8.2.2 What to include in the monthly report of the health facility?

#### 1. Reporting on vaccinations given to infants and women and vitamin A

Data collected on the tally sheets needs to be consolidated into a monthly report, manually for use by the health facility and transmission to the district.

#### 2. Reporting on Priority vaccine-preventable diseases. (Measles, NNT and AFP)

Write the number of cases of each vaccine-preventable disease.

#### 3. Reporting on any adverse event following immunization (AEFI)

If there have been any adverse event during the month, details must be provided to the district. Serious events should be reported immediately. Serious events are defined as:

- Those that are **life threatening** and
- Those that result in **hospitalization** (or prolonged hospitalization)
- Those that result in **disability** (or have the potential to result in disability)
- Or those that result in death.

#### 4. Reporting vaccine usage and wastage patterns

The usage and wastage of vaccine will vary greatly from one session to another. However it is useful to monitor wastage and usage patterns regularly at all immunization points to improve supply and avoid stock outs. This is done by recording vaccine vial start and end balances, and vials received each month, as in Table 8.2. This information should be compiled at the facility level, where the following calculation can be made.

Number of infants immunized during the period

$$\text{Vaccine usage (rate)} = \frac{\left\{ \begin{array}{l} \text{Number of} \\ \text{usable doses} \\ \text{at beginning} \\ \text{of period} \end{array} \right\} + \left\{ \begin{array}{l} \text{Number of doses} \\ \text{received during} \\ \text{period} \end{array} \right\} - \left\{ \begin{array}{l} \text{Number of usable} \\ \text{doses in stock at} \\ \text{end of period} \end{array} \right\}}{\text{Number of infants immunized during the period}} \times 100$$

Vaccine wastage rate = 100 *minus* vaccine usage rate

#### 5. Any specific problems encountered during the reporting period (e.g. stock-outs, transportation problems, cold chain failure etc.)

This is an opportunity to report supply problems and record supervisory visits.

#### 6. Additional information for example:

- The sex of infants immunized (M/F) and the sex of disease cases;
- Campaign activities during the reporting period

### 8.2.3 Storing data and reports

For purposes of verification and also retrieval whenever needed, data must be stored at all the different levels. Storage of data should be done in hard copies or electronically. At the health facility, tally sheets, registers and reports should be stored for at least three years. Higher administrative levels use computers, however it is important that back-ups (hard copies and/or electronic copies) be available to avoid the loss of data in the case of system failure.

The following types of data should be stored at each health facility for a period of **at least three years**:

1. Immunization registers
2. Tally sheets
3. Copies of monthly reports
4. Target population data
5. Immunization monitoring charts
6. Case/outbreak charts and reports(case investigation form)
7. Supervisory visit reports
8. Daily temperature records forms
9. Cold chain maintenance records.
10. Village register
11. Ledger book
12. Line list form

#### **Important note:**

Data collection is only useful if the data are regularly analyzed and the result of the analysis is used to improve service delivery. Data analysis is the responsibility not only of supervisory levels, but also that of health workers at all levels.

The following sections will guide you through the most common ways to analyze the data at health facility and higher administrative levels.

### **8.3. Monitoring performance**

Data collected (Section 8.1) and compiled (Section 8.2) are only useful if they are used to improve the programme performance.

This section will provide guidance through some common ways to use the data at all levels.

#### **8.3.1 Making and using charts to monitor vaccination coverage**

A performance-monitoring chart shows trend of vaccination performance over a period of time for every antigen. The monitoring chart graphically shows doses given compared to the number of infants eligible to receive them.

Every health facility should display a current year monitoring chart on the wall, where it can be seen by all staff every day and past 3 years must be well filled and stored. This chart is used at all levels and the principles are the same.

##### **8.3.1.1 How to prepare the chart for monitoring doses administered in infants less than one year of age**

This chart has been developed to track the monthly progress you are making towards immunizing infants under one year of age each month and throughout the year. It also helps you to determine whether your target population is completing the series of vaccines.

1. Calculate the annual and monthly target population to receive immunization services
  - a) Annual target population

You should aim to reach every infant in your catchment area, especially those who are hard to reach. Use existing population figures for infants under one year of age obtained from official census data or your own community census. If you do not have these numbers, obtain an estimate by multiplying the total population times 4%. This document uses 4% as the estimated percentage of infants less than one year of age and of pregnant women in a population. If you have a more precise percentage for your country or region, use this number instead (If the total population is 3900 then infants under one year would be  $3900 \times 4/100 = 156$ ).

- b) Monthly target

To get a monthly target population, divide the number of infants under one year of age by 12 (If annual target under one year is 156, monthly target is  $156/12 = 13$ ).

2. Label the chart
3. Draw a diagonal line from zero to the top right-hand corner to show the ideal rate of progress if every infant is immunized on time.
4. Plot immunization data on the chart.
5. Calculate the total number of dropouts between subsequent vaccinations
6. Calculate the cumulative drop outs as a percentage of point 5 over a total cumulative

#### **8.3.2 Compiling coverage data**

In order to analyse data, it is necessary to compile data properly by area.

1. List each geographic area or community that you serve.
2. List the target population numbers for infants <1 year.

3. Enter the number of doses of vaccine administered to the target age group during the preceding month period, for example for Penta1, Penta3, Measles.

### 8.3.2.1 Calculate Immunization coverage

Calculate immunization coverage in the preceding month period, for example for Penta1, Penta3, and Measles. You can also add coverage for other vaccines administered including TT1, TT2+ etc.

To calculate immunization coverage, divide the total number of immunizations given over the preceding month period by the target population.

Use the formula below:

<b>Annual coverage for childhood immunizations (BCG, Penta3, OPV3, measles) and vitamin A</b>	
Percentage coverage With the vaccine or vitamin A =	$\frac{\text{Number of infants under one year of age receiving all required doses for selected vaccine or vitamin A during the last months}}{\text{Target population of infants under one year of age or live births}} \times 100$

### 8.3.2.2 Calculate number of unimmunized infants

Calculate the number of unimmunized infants for a specific vaccine or pregnant women for TT 2+, for example: number of infants who have not received Measles vaccine

<p>Unimmunized infants with measles vaccine = target population - infants who received measles vaccines</p>
---

### 8.3.2.3 Calculate dropout rate

Calculate annual dropout rates, for example: Penta1–Penta3, Penta1–Measles, or for any other combination of vaccines you have selected.

<p>Penta1–Penta3 dropout rate:</p>
------------------------------------

$\frac{\text{Doses of Penta1 administered} - \text{doses of Penta3 administered}}{\text{Doses of Penta1 administered}} \times 100$
--

<p>Penta1–measles dropout rate:</p>
-------------------------------------

$\frac{\text{Doses of Penta1 administered} - \text{doses of measles vaccine administered}}{\text{Doses of Penta1 administered}} \times 100$
---

### 8.3.2.4 Identify and categorize problem for each area you serve

Specify in the quality of access (good or poor) depending on the Penta1 coverage (“good” is defined in this exercise as Penta1 coverage  $\geq$  80% in the target age group, and “poor”

corresponds to a Pentavalent coverage in the target age group of  $< 80\%$  ; however, you may decide to use lower or higher cut-off coverage rates).

Specify in the quality of “utilization” (good or poor) depending on the dropout rates (“good” is defined in this exercise as a dropout rate in the target age group  $< 10\%$ , and “poor” corresponds to a dropout rate in the target age group  $\geq 10\%$ ; however, you may decide to use lower or higher cut-off dropout rates).

#### **8.3.2.5 Use your data to prioritize areas**

Assign the highest priority to the area that has the most unimmunized infants, and not necessarily the lowest coverage. Refer to REC strategy.

## **8.4. Taking corrective action**

In this section, you will identify problems and plan corrective action in your area.

### **8.4.1 Identification of problems**

Problems can be broadly associated either with access or with utilization. A problem may be related to one or more villages/areas or may apply to the entire district.

#### **8.4.1.1 Problems related to poor access to service**

Infants and pregnant women do not attend immunization sessions. The reasons may be:

- Sessions not conducted as planned
- Session site and times inconvenient or not advertised
- Cultural, financial, racial, gender or other barriers preventing use of immunization services.

#### **8.4.1.2 Problems related to poor utilization of services**

Parents do not bring infants back to complete the full series of immunizations. The reasons maybe:

- Parents lack information about the complete immunization schedule
- Supply shortage
- Incorrect contraindications applied
- Problems of relationship between health workers and community
- Tetanus toxoid not available for women at all sessions (according to national policy).

### **8.4.2 Finding solutions and adding corrective actions to your work plan**

The purpose of this section is to help you decide what corrective action is needed. Follow the steps given below to list corrective actions that can be added to the work plan as part of your coverage improvement plan.

#### **Step 1: Health facility level: Review your health facility work plan**

- Look at your work plan for the last quarter and identify the sessions that were not held.
- Identify the problem that led to each of these sessions not being held. List these problems.
- Suggest appropriate solution(s) for each problem

#### **Step 2: District level: Discuss the problems and possible solutions at a meeting**

- Discuss the problems faced in the last quarter and suggested solutions. Together with district staff decide corrective action(s) to address each problem.
- Categorise the problems according to whether they affect all areas or only some areas.

#### **Step 3 Prioritization of activities**

- Solutions for those problems that impact the whole district should be implemented before area-specific solutions.
- Using the area priority developed in Table 8.3 (based on number of unimmunized infants), prioritize the order in which you will implement the area-specific solutions.

#### **Step 4 Adding corrective actions to the work plan**

After developing a list of solutions and prioritizing them, the next step is to add these to the work plan for the next quarter

Some problems will result in all work plans (district and all health facilities) to be modified, while others will be specific to work plans of one or more health facilities and/or the district

- Include at least one priority solution per month in the work plan and implement it during that month.
- The problems that cannot be realistically addressed during one quarter should be addressed in the following quarter.

#### **4.3 Ensure quality of sessions**

Sessions should be completed as planned but they must also be of good quality. Decide what corrective action is needed to ensure the quality of every session. The following chapters provide further guidance on:

- Adequate safety measures regarding immunization practices
- Adequate safety measures for safe waste disposal
- Community involvement in providing immunization services.

<p><b>Remember: All solutions should be activities that can be done with existing resources. These can be added to the work plan. The work plan needs to be reviewed every quarter.</b></p>
---

**Table 8.6: Common problems associated with high dropout and poor access and their solutions**

	<b>Examples of common problems</b>	<b>Examples of solutions: activities to be included in work plan</b>
Supply quantity	Stock-outs of vaccine(s), AD syringes, diluents, safety boxes; immunization cards	<ul style="list-style-type: none"> <li>• Request immediate supplies from district level.</li> <li>• Review stock recording system.</li> <li>• Review vaccine usage and wastage rates and take action.</li> <li>• Review method of estimating needs.</li> </ul>
Supply quality	<ul style="list-style-type: none"> <li>• Expired vaccine(s) in stock</li> <li>• VVMs show that vaccine has reached the discard point</li> <li>• Frozen Penta vaccines in refrigerator</li> </ul>	<ul style="list-style-type: none"> <li>• Review stock recording system.</li> <li>• Review method of estimating needs.</li> <li>• Review management of cold chain equipment.</li> </ul>
Staffing quality	Some staff have not had recent training	Inform supervisor and select subjects for “on-the-job” training/supportive supervision, for example: <ul style="list-style-type: none"> <li>• Using AD syringes</li> <li>• New vaccines</li> <li>• Reading Vaccine Vial Monitors (VVM)</li> <li>• Implementing Multi dose vial policy (MDVP)</li> </ul>
	Irregular supervisory visits	<ul style="list-style-type: none"> <li>• Include supervisory visits’ schedule in district work plan</li> </ul>
Staffing quantity	Vacant position of health worker, general staff shortage	<ul style="list-style-type: none"> <li>• Inform supervisor and district authorities and take steps for recruitment.</li> <li>• Request temporary assignment from district level and consider volunteers for some duties.</li> <li>• Ensure staff available for each session.</li> </ul>

	<b>Examples of common problems</b>	<b>Examples of solutions: activities to be included in work plan</b>
Service quality and demand	Poor attendance at sessions and poor utilization in some areas	<ul style="list-style-type: none"> <li>• Meet with the community to discuss possible reasons for low attendance and suggested solutions.</li> <li>• Consult the community and change work plan to make sessions more convenient for the community.</li> <li>• Check whether all planned sessions have been held, aim to improve reliability by holding all planned sessions.</li> <li>• Screen all infants for immunization whenever they visit the health facility and give all of the vaccines they are eligible to receive</li> <li>• Review use of true contraindications to ensure that infants are not missed</li> </ul>
	Mothers lose or do not bring the immunization cards	<ul style="list-style-type: none"> <li>• Set up a defaulter tracking system to keep complete records (register, reminder cards) at the health facility and take these along during outreach sessions. Provide new cards and update from other records. (Do not restart schedule because of lost cards)</li> </ul>
	Parents fear side-effects and there are rumours that Injection practices are not 100% safe	<ul style="list-style-type: none"> <li>• Inform parents about benefits of immunization and reassure about side effects.</li> <li>• Review safe injection practices: ensure AD syringes supply, use safety boxes, use safe disposal practices.(Module 4)</li> <li>• Meet community to discuss rumours</li> <li>• Review information on AEFI and how to report AEFI cases</li> </ul>
Service quantity and demand	Unreliable information about catchment population	<ul style="list-style-type: none"> <li>• Request community to list of all households, families, new-borns (Module 8)</li> <li>• Map your catchment area to include all populations (Module 5, Section 1)</li> <li>• Compare population data from various sources including data from National Immunization Days (use the NID &lt;5 population and divide by 5 for infant target).</li> </ul>
	Inaccurate coverage data	<ul style="list-style-type: none"> <li>• Check record keeping and reporting systems for completeness (Module 7, Section 1 and 2)</li> <li>• Review all tally sheets and reports (Module 7, Section 1), does numerator include all areas?</li> </ul>

	<b>Examples of common problems</b>	<b>Examples of solutions: activities to be included in work plan</b>
	Some areas distant and underserved	<ul style="list-style-type: none"> <li>• Discuss with supervisor and organize mobile team approach from district/province, minimum 4 sessions per year. (Module 5, Section 2)</li> <li>• Discuss service with the communities and arrange adequate sessions, dates and timings.(Module 8)</li> </ul>
	Transport not available for some outreach sessions	<ul style="list-style-type: none"> <li>• Identify which sessions were not held due to lack of transport</li> <li>• Look for alternative transport e.g. public transport, sharing with other programs</li> <li>• Request next level for vehicle for outreach/mobile</li> </ul>
	Poor attendance at antenatal care (ANC) clinics and/or poor TT2+ coverage	<ul style="list-style-type: none"> <li>• Promote value of antenatal care including TT immunization during any contact with pregnant women.</li> <li>• Inform the community about dates of ANC clinics. Find out if session timing or venue is inconvenient, if so make appropriate changes in next quarter's work-plan.</li> <li>• Use all opportunities to give TT immunization including when mothers accompany infants for childhood immunizations.</li> </ul>

## Chapter 9

### Module 8: Building community support for immunization services

#### Introduction

Communication is a key component of the overall immunization programme. An effective communication plan will help to:

- Ensure communities and families are well informed and motivated to access immunization services;
- Improve inter-personal communication skills of health workers, which can improve quality and raise demand for services;
- Mobilize organizations and media around common immunization activities and goals;
- Increase political commitment to and resources needed to sustain financing of immunization programmes.

#### Building community support for immunization services

A successful immunization programme depends upon effective vaccine supply and logistics, but it is just as important that the community has confidence in, and supports and demands, safe and effective immunization services. Immunization services must meet the needs of communities and work with them to ensure their involvement and participation.

This module describes how to work closely with the community to understand their needs, what roles community representatives can successfully undertake, and how they can help you manage the service better and solve problems related to immunization services.

#### Involve CHWs for immunization services

Trained mobilizers can participate in increasing awareness of preventive services like immunization. They can also assist with tracking individual children and women, participate in outreach, and mobilize households for health sessions. The following is a typical list of tasks carried out by community mobilizers.

- Identify target populations in the catchment area.
- Share lists of names with health workers to include in vaccination registers.
- Make home visits to encourage participation in fixed and outreach sessions.
- Help mothers to interpret immunization cards (infant cards and women's TT doses).
- Cooperate with the health worker to keep a track of infants and mothers who need to complete the immunization series.
- Follow up on defaulters.
- Provide information on the session dates and times and vaccination schedules.

## **Meeting with Primary Health Committee (PHC)**

PHC should be convened to orient members on the situation of immunization services and challenges in order to solicit

- Support needed and Resource mobilization
- Advocate for increased allocation of resources
- Approval of plans
- Resolve conflict among communities which impact immunization services

It is very important to meet with the community to build strong support for immunization services.

### **9.1.1 Meeting with district Primary Health Care Committee members**

PHC should be convened to orient members on the situation of immunization services and challenges in order to solicit

- Support needed and resources allocation
- Advocate for increased allocation of resources
- Approval of plans
- Resolve conflicts among communities which may impact immunization services

### **9.1.2 Meeting with community leaders**

Community leader meeting should be arranged to find out the following:

- What they already know about immunization;
- Any concerns the leaders may have about immunization;
- Any concerns families in their community may have;
- Any traditional beliefs about disease or vaccination;
- What barriers their people may face in accessing services (e.g. distance, seasonal work commitments, traditional festivals or customs, lack of money for transport, unsuitable session days or times);
- Number of families or households in the community;
- Number of new births, special groups etc within the community;
- Appropriate times and locations for sessions;
- If they already motivate parents to attend immunizations sessions and how;
- Ideas on how to immunize more children in their community.

### **9.1.3 Meeting with religious leaders**

Religious leaders are similar to community leaders in many ways, but there are some important differences. Their position can make them the most effective influences of all. They may, however, hold strong views on some issues and, in a minority of cases, they may have religious concerns about immunization. Building good relationships with the religious leaders of every group in community in advance is essential and will bring the programme many benefits for years to come.

In addition to the questions for community leaders in general (listed above) find out the following from religious leaders:

- Specific religious beliefs about disease or vaccination;
- Any religious customs that may be a barrier to immunization;
- What special efforts can be made to provide immunization services to this religious group;
- If they will promote vaccination sessions regularly at religious gatherings;
- If there are any volunteer groups willing to help with immunization efforts.

#### **9.1.4 Meeting with parents/guardians**

One of the most effective ways to get a range of opinions in a short space of time is to arrange small “focus” or discussion groups, each of around ten people. Try to include a good cross-section of the community: especially include those you think may not regularly benefit from immunization. You may need to schedule separate sessions for men and women as in some communities women may not talk freely in front of men.

First meet with the parents who visit the centre and find out about their experiences (good and bad) with the services provided. Note, however, that these parents will by and large be already convinced about immunization and have some trust in the services offered in the centre. You should therefore plan to reach those parents in the community who for one reason or another do not attend the health centre. Interview the mothers attending the centre first since they are readily accessible and are often willing to talk about the services. In addition they may suggest ways of reaching those who do not use the centre.

When meeting with parents, find out:

- What they already know about immunization;
- What concerns they themselves may have about immunization;
- About traditional beliefs about disease or vaccination;
- About any constraints to accessing existing services;
- If the times and locations of sessions are appropriate;
- What they think about the quality of the service;
- How the service could be improved;
- If they already motivate friends, relatives and neighbours to have immunizations and how.

**Figure 8A: Meeting with mothers to promote immunization services**



### **9.1.5 Meeting with teachers and other groups eg NGOs, private health practitioners**

Teachers can be very useful allies. They can educate their students about immunization and encourage them to take this learning home to their parents. Older children will shortly be starting their own families, so it is vital they have good knowledge and skills about immunization. Many teachers may already serve as volunteers during national immunization days.

When meeting with teachers, find out:

- What immunization activities they have already been involved in;
- Any concerns they themselves may have about immunization;
- If they already include health education sessions on diseases and immunization;
- If so, what they teach and to what age groups; if not, how this could be achieved;
- If students could be encouraged to remind parents about immunization when there are new babies in the family;
- Any ideas about how they could contribute further to improving immunization rates in the community.

### **9.1.6 Meetings with special groups**

In your community there may be some special groups who have been largely unreached by immunization services, or choose not to participate in them. In all cases you should include them in your meetings and planning process right from the start.

Some examples of special groups:

- Nomadic groups
- Migrant workers
- Pet traders
- Ethnic or other minority groups
- Families that fear contact with government, for example if they lack proper documents
- Groups with difficult physical/geographical access
- Children living in orphanage
- Religious or traditional sects that refuse vaccination
- Refugees
- Homeless families or families in dense urban areas
- Street children.

### **9.1.7 Orienting / Involving community Health workers on immunization services**

Trained mobilizers can participate in increasing awareness of preventive services like immunization. They can also assist with tracking individual children and women, participate in outreach, and mobilize households for health sessions.

The following is a typical list of tasks carried out by community mobilizers.

- Increase community awareness on immunization services
- Make home visits to encourage participation in fixed and outreach sessions.
- Home follow up to identify and report priority VPD (Measles, AFP, NNT)

- Help mothers to interpret immunization cards (infant cards and women's TT doses).
- Cooperate with the health worker to keep a track of infants and mothers who need to complete the immunization series & Follow up on defaulters.
- Provide information on the session dates and times and vaccination schedules.
- Make visit to identify and report home delivery and deaths

## **9.2. Planning suitable sessions**

You must involve the community to plan when and where to hold immunization sessions and who can help.

### **9.2.1 When to hold immunization sessions**

- Try to schedule sessions at a convenient time for caretakers.
- If possible, organize an immunization session to coincide with market day when mothers are coming to the village centre anyway.
- Avoid any session clashes with religious services or important events such as sporting events. At the same time, a major event in the community can be an opportunity to inform people about immunization.

### **9.2.2 Where to hold outreach sessions**

- Hold sessions in a place that is most convenient and accessible for the parents.
- It is also desirable to hold sessions at the same time and location each time to make it easier for people to remember.

### **9.2.3 Who can help you**

You need helpers to encourage parents to come for immunization, to educate them while they are waiting, and generally to help out during the sessions.

These helpers can include:

- Older school children, as part of school project
- Local youth groups, e.g. scouts, young leaders or political youth organizations
- Local businessmen's clubs
- Community volunteers.

**When immunization services are reliable, they are well attended. If a change in session plan is needed, inform the community in advance.**

### 9.3. Mobilizing your community using suitable message and methods

There are many ways to mobilize your community. Decide on the mixed approach.

#### 9.3.1 Use clear, simple and accurate messages

Creating effective messages is not easy; you need to give truthful, technical, practical and motivational information in a way that can be easily understood by the different audiences at different times. You must be very clear so that you cannot easily be misinterpreted.

Below are some generic messages about immunization for parents. It is essential that each message is adapted to your own setting. Therefore the messages below should be considered **suggestions** as to the content but not to the actual wording of messages.

#### Routine immunization

- Immunization protects your infant from certain diseases like polio and measles.
- Know when and where to take your child for his or her next immunization. Check your baby's immunization card or ask your health worker.
- To get good protection against some diseases, infants need to have some vaccines repeated three times. Ensure that your infant completes the basic series of immunizations by his or her first birthday.
- Ask your health worker if you and your children need additional vaccinations.
- Pregnant women need protection from tetanus for themselves and their babies.
- Some injections may cause mild side-effects such as light fever, soreness and redness. If this happens, ask your health worker for advice about what to do.

#### New vaccines

- The national immunization service now offers protection against an additional disease(s): (name of disease[s]). This is free of charge and can be had at (location) (date, time).
- Hepatitis B vaccine protects against serious diseases of the liver. The vaccine prevents infections in children that can cause death when they reach adulthood many years later.
- Hib vaccine protects against pneumonia and meningitis — two diseases that kill many, many children.
- Your children will receive the new vaccine at the same time they already receive protection against other diseases (diphtheria, tetanus, and whooping cough). Therefore, the new vaccine is like a bonus for your children — more protection with no more effort.
- The new vaccine is extremely safe and causes no new side-effects.

## **AD Syringes**

- These new syringes and needles can only be used once and are the safest type of syringe available.

### **9.3.2 Using suitable methods to mobilize the community**

#### **Methods to use when you have limited resources**

For district and health facilities staff with limited resources, the best method of communication is by personal interaction with the community. Sometimes it is helpful to have some prepared messages in written form, but it is always good to spend time discussing immunization face to face in order to make sure that the service meets the community needs.

#### **Methods to use when you have extra resources available**

With the help of district/province staff you could organize:

- Community meetings
- The diffusion of messages in religious places
- Loudspeaker messages for the community
- Discussion sessions at farmers' meetings, in the market place and other places
- The distribution of material such as posters and leaflets
- Radio and TV spots
- Newspaper articles and drama shows.

## 9.4 Dealing with rumours and misinformation

Rumours and misinformation about immunization are amongst the most serious threats to the success of your immunization programme. Once rumours start they can be very hard to stop.

Some examples of rumours:

- “Vaccines are a contraceptive to control population or to limit the size of a certain ethnic group.”
- “Vaccines are contaminated by the AIDS virus or mad cow disease.”
- “Children are dying after receiving vaccines.”

Unless the rumor can very easily be contained and addressed you must refer the matter to your supervisors **as quickly as possible**. You will need to work under their direction - action may even need to be taken at the national level. The consequences of rumors can be serious and, if unchecked, they can travel quickly beyond your local area.

### 9.4.1 What you can do at the health facility?

Under the direction of your supervisor:

- Meet with key opinion leaders (politicians, traditional and religious leaders, community leaders, other health workers).
- Organize meetings at sites where the individuals/groups are comfortable and feel at ease to ask questions.
- If there is a national mass media response, encourage your community members to watch and talk about it.

### Words of advice

- React swiftly and adapt your ongoing activities to give a quick response.
- Develop strong relationships and trust with your community in advance (religious, social and media groups).
- Give clear and consistent messages.
- Take the time to deal with rumors.