**IMMUNIZATIONS AND VACCINES**

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| **A nurse administers an immunization to a baby at a Clinic** |

**Reaching every child with lifesaving vaccines**

**INTRODUCTION**

Immunization is the process of protecting an individual from a disease through introduction of a live, killed or partial component of the invading microorganism into the individual system.

Immunity is acquired after the administration of an antigen in the form of a vaccination by the production of antibodies within the body. The body is therefore immune to effects of the intended pathogens.

Immunization is one of the most cost effective method of health intervention method and one of the components of primary health care.

Immunity is defined as the body to recognize, destroy and eliminate the antigenic material foreign to its own.

A person is said to be immune if they possess specific protective antibodies as a result of previous exposure to an infection or immunization or is so conditioned by such previous specific experiences as they respond adequately with production of antibodies sufficient to prevent clinical illness following exposure to the specific agent of the disease.

**IMMUNE RESPONSE**

When an antigen is administered for the first time to an individual or an animal who has never been exposed to it before, there is latent period of induction of about 3 to 10 days before antibodies appear in the blood. This is entirely IgM type. The IgM titre rises steadily during the next 2 to 3 days or more, reaches a peak level and then declines almost as fast as developed. In the meantime if the antigenic stimulus was sufficient IgG reaches peak in 7 to 10 days and the gradually falls over a period of weeks or months. This is called the Primary Response

In this primary response the memory cells or prime cells are produced in the reticulo endothelial system and they occur in the lymphoid tissue and are responsible for the immunological memory which becomes established after immunization. The nature and extent of primary response to an antigen is determined by the: dose and nature of the antigen, route of administration, adjuvants, nutritional status of the host etc.

In the secondary response there is a brief production of IgM antibodies and much larger and more prolonged production of IgG antibodies. This accelerated response attributed to immunological memory is made use of by immunization programs by employing boosters.

**CLASSIFICATION OF IMMUNITY**

1. Innate---through genetic makeup.
2. 2. Acquired-----------a. Active--------------Humoral or cellular or a combination of both

 b. Passive-------------1. Administration of immune serum

 2. Transplacental or via colostrum

**NB:**

**Humoral immunity** is based on the production of specific antibodies following contact with foreign material such as viruses, bacteria or a toxin.

**Cellular immunity** is whereby the body cells rejects the foreign material when it enters. To project active immunity the combination of both humoral and cellular is needed.

**Interferons are** small glycoproteins that are able to inhibit the replication of a wide range of viruses, bacteria, protozoa rickettsia and microbial extracts.

**In passive immunity** antibodies produced in one body can be transferred to another to induce protection against disease.

**Herd immunity** is the level of immunity of a population to an infectious disease. It depends on previous infections and immunization procedures experienced by the herd. Herd immunity determines the behavior of an infectious disease introduced in a community with little or no immunity, attack and fatality rates tend to be very high .As the herd immunity rises as a result of epidemic, the epidemic waves decline.

**Immunization Agents**

 In community Health practice, the immunization agents may be classified as 1. **Vaccines**

2. **Immunoglobulins**

**Vaccine**

These are preparations of an antigen for preventive inoculation which when administered stimulates specific antibody formation in the body. Vaccines may be prepared from live (attenuated), organisms, inactivated or killed organisms, extracted cellular fractions toxoid or combination of these.

Vaccines can be in three state:

 A. Live (attenuated)

These are prepared from live organisms which have been made to loss the capacity to induce a full blown disease but retain their immunogenicity hence called attenuated.

Live vaccines are more potential than killed vaccines for the following reasons

* Live organisms multiply in the host and the resulting antigenic dose is more than what is injected
* Live vaccines have all the major and minor antigenic components

Live organisms engage certain tissue of the body for example the intestinal mucosa after administration of the oral polio vaccine

 B. Inactivated or killed Vaccines

 Killed either by heat or chemical when injected into the boy they stimulate active immunity. They are less effective than the live vaccines except inactivated polio vaccine. Killed vaccines are used I double or triple primary doses generally to increase antigenic potency e.g. cholera vaccine. Usually given through intramuscular route

C. Cellular Fractions

Some vaccines are prepared through cellular fractions e.g. meningococcal vaccine from the polysaccharide part of the cell wall, the pneumococcal vaccine from the polysaccharide contained in the capsule of the organism

D. Toxoids

Organisms produce exotoxins of diphtheria and tetanus bacilli. The toxins are detoxicated and used in preparation of the vaccines. The antibodies produced act to neutralize the toxic-moiety produced during infection rather than act upon the organism

NB: Vaccines can also be made from a combination of the immunizing agents .The aim of combined forms is to simplify administration, reduce the costs and minimize the number of contacts of the patient/client with the health facility. The well-known combinations are:

* Pentavalent (diphtheria, pertussis, tetanus, hepatitis and influenza )
* MMR(measles, mumps and rubella)

NB: Polyvalent vaccines are those that are prepared from culture of two or more strains of the same species e.g. polio and influenza vaccines

Autogenous vaccine is applied when the organism in the vaccine is obtained from the same patient

**Immunoglobulins**

These are proteins found in the blood serum that contain antibodies. In human beings there are 5 different types of immunoglobulins: IgG, IgM, IgE, IgD and IgA.

IgG- The main immunoglobulin in human blood. It is 2nd most abundant circulating protein and contains long term protective antibodies against main infectious agents. It is made up of subtypes IgG 1- 4.

IgM-It is produced by Beta cells and it is the largest antibody in human circulating system. It is normally the 1st antibody to appear in response to initiate a response to exposure to an antigen.

IgE-Produced by the immune system. In case of an allergy the immune system overreacts to an allergen by producing antibodies called IgE. These proteins travel to cells that release chemicals causing an allergic reaction. IgE has a role in type 1 hypersensitivity which manifests in various allergic diseases such as allergic asthma, allergic sinusitis, allergic rhinitis, food allergies, etc. It is the least abundant in circulation at only 0.05% compared to 75% of IgG. At 10 mg/ml.It is capable of triggering the most powerful reaction.

**IMMUNIZATION SYSTEMS AND OPERATIONS**

The Immunization system consists of the following:

* Immunization service
* Vaccine management
* Logistics
* Surveillance of vaccine preventable diseases
* Advocacy and social mobilization

**Immunization services**

Immunization services are offered in all licensed health institutions in the country so long as they meet certain criteria and conditions as set by Expanded Programme of Immunization (EPI).The immunizing centers are inspected and once found fit to offer the services then the EPI programme supplies all equipment and the vaccines and continues with monitoring and evaluation of the immunization services.

**Vaccine management**

The main aim of vaccine management is to:

* Maintain lower stock levels of vaccines.
* Reduce wastage.
* Accurately forecast vaccine requirements.
* Prevent equipment breakdown.

Effective Vaccines Management initiative provides materials and tools needed to monitor and assess vaccines supply chain and help to improve the supply chain performance.

**Vaccine management consists of:**

* Forecasting of vaccine needs through estimating vaccine needs on the basis of:
1. Target population
2. Previous vaccines consumption
3. Size of previous immunization sessions

This is made possible through availability of correct data received from the field. The data so received is necessary;

1. To control future orders as well as handling and use of vaccines.
2. Helps to determine the importance of the cold chain needs
3. Helps to evaluate needs in relation to the wastes to be eliminated.

**Advantages of an accurate forecasting vaccine needs**

* Efficient control of immunization programmers by managers
* Elimination of shortages or overstocking of vaccines
* Enhancing the capacity of sub counties to develop more accurate micro plans
* Increased efficiency of vaccine use and reduction of wastage
* Accurate estimation of financial resources when creating budget lines for purchasing vaccines
* Assisting to monitor the progress of immunization in relation the target population
* **Estimating vaccine needs on basis of target population**

To estimate vaccines needs on the basis of target population, a number of basic parameters for conducting immunization activities are necessary. These include:

* Target population
* Immunization coverage objective targets
* Immunization schedules
* Wastage Rate
* **Estimating vaccine needs on the basis of previous consumption**

This method is based on reliable stocks management data. The data required for estimating vaccines needs on the basis of previous assumption are:

* Stock available at the beginning of a given period e.g. month
* Vaccines received during the same period
* Stocks at the end of the given period
* Number of an opened vaccine vials lost(destroyed, frozen, or affected by high temperature or expired during the same period)
* **Estimating vaccines on the basis of size of immunization sessions**

The data required for estimating needs on the basis of the size of immunization sessions are:

* Number of immunization posts in the catchment population
* Number of weeks of operation in the year
* Number of immunization sessions in per week
* Number of vials opened per session
* Number of doses per vial

To estimate the frequency and adequacy of immunization sessions the following data could be used:

* Number of organized immunization sessions
* Number of children immunized per session
* **Ordering of vaccines by**
1. Defining a period of vaccine supply
2. Calculating reserve and minimum stock levels
3. Calculate critical stock levels
4. Define total quantity of vaccines to be ordered

Every order should take into account the following considerations;

* Avoid stock outs of vaccines
* Avoid overstocking
* Avoid vaccine expiry during their storage
* Ensure adequate cold chain storage facilities(both in capacity and temperature)
* Ensure that vaccines are received in conformity with standards recommended by national regulatory authority or WHO and UNICEF.Ensure that the other necessary inputs for the storage (diluents, syringes etc.) are ordered at the same time with the vaccines.
* Follow up on the WHO and UNICEF recommendations on the’ bundling ‘the supplies. The term bundling defines the concept of a bundle, which comprises the following items
1. A good quality vaccine and adequate diluent
2. A-D syringes
3. Safety boxes
* **Manage vaccine stocks**.
1. Control vaccine acceptance
2. Control the storage of vaccines and diluents and supplies
3. Control vaccine and diluents arrangement
4. Master the technique of shake test
5. Control vaccine and diluents distribution
6. Conduct a vaccine stock inventory.
* **Monitor vaccine use.**
1. Interpret vaccines control indicators (VVM)
2. Apply WHO Policy on the use of opened multi dose vials of vaccines in subsequent immunization sessions.
3. Calculate vaccines wastage.

**Vaccine Logistics**- A group of operations that include procurement, delivery of vaccines and consumables to the place of their use, management and maintenance of transport and cold chain equipment.

**IMMUNIZATION POLICIES, NORMS AND STANDARDS**

**POLICY**: It is a course of action adopted and pursued by the immunization programme as a source of reference and should be adopted and practiced by all

**STARDANDS:** Something established as a model, example or point of reference by the immunization programme

**NORMS:** This is an accepted standard or a way of behaving or doing things that the immunization programme has agreed upon.

The policy, norms and standards are articulated by the Expanded Programme of Immunization which is mandated with the responsibility of managing immunization activities in Kenya.

**IMMUNIZATION SERVICE DELIVERY AND INNOVATIVE**

What does it take for a life-saving vaccine to reach a child, adolescent or adult?

Many components must come together for effective and efficient service delivery -- detailed planning, skilled managers and vaccinators, continuous supplies and logistics, costing assessments and communication and advocacy of the benefits of vaccination.

WHO is working with partners and Member States to improve access to immunization services for all communities? Provided here are resources and guidance to help ensure valuable and reliable vaccine service delivery.

**PLANNING TO REACH EVERY CHILD**

Global Routine Immunization Strategies and Practices (GRISP)

As a companion document to the Global Vaccine Action Plan (GVAP), the GRISP provides a cohesive delivery and advocacy platform to promote routine immunization through the articulation of nine transformative investments and a comprehensive framework of routine immunization strategies:

1. The RED Strategy: Reaching Every District’ (RED) is a strategy of capacity building to address common obstacles to increasing immunization coverage, with a focus on planning and monitoring.
2. Comprehensive multi-year planning and annual planning

Guidelines and tools to support countries in developing a comprehensive Multi-Year Plan (cMYP) for immunization.

1. Making a comprehensive annual national immunization plan and budget

Training module for mid-level managers (MLM) describing methods for making a comprehensive annual plan consistent with your country’s comprehensive multi-year plan (cMYP).

4.Vaccine supply and handling

5. VVM assignments for different WHO-prequalified vaccines and their proper handling DTwP-HepB-Hib (Pentavalent) vaccine available in a compact, pre-filled auto-disable injection technology (cPAD)

6. WHO Multi-dose Vial Policy, revision 2014

WHO guidance note: Vaccine diluents revision 2015 (English and French)

7. Aide-mémoire for prevention of freeze damage to vaccines

8. Cold chain, vaccines and safe-injection equipment management

Training module for mid-level managers (MLM) on estimating vaccine and safe-injection equipment needs, and managing storage, distribution and transport plans.

Introducing solar-powered vaccine refrigerator and freezer systems - A guide for managers in national immunization programmes

9. Immunization Safety

Global Vaccine Safety website

Adverse Events Following Immunization (AEFI): Causality Assessment

A guide to a systematic, standardized causality assessment process for serious adverse events following immunization (AEFI).

Global Vaccine Safety information sheets

E-learning course on Vaccine Safety Basics

An online course on vaccine safety basics covering the origin and nature of adverse events, the importance of pharmacovigilance, and risk and crisis communication.

10. Training and supervision

Immunization training resources

11. Data collection and monitoring

Immunization monitoring charts

Monitoring the Immunization System

Training module for mid-level managers on measuring the performance of the immunization system.

12.Social Mobilization and Advocacy

Partnering with the Community: Training module describing how to work closely with the community to understand their needs, and how to successfully engage community representatives to ensure involvement and participation in immunization service delivery.

Addressing vaccine hesitancy

Resources for countries on assessing and addressing vaccine hesitancy

**BENEFITS OF IMMUNIZATION**

The first diseases targeted by the EPI were diphtheria, whooping cough, tetanus, measles, poliomyelitis and tuberculosis. Global policies for immunization and establishment of the goal of providing universal immunization for all children by 1990 were established in 1977, this goal was considered an essential element of the WHO strategy to achieve health for all by 2000.

In 2010, an estimated 85% of children under one year of age globally had received at least three doses of DTP vaccine (DTP3). Additional vaccines have now been added to the original six recommended in 1974. Most countries, including the majority of low-income countries have added hepatitis B and Haemophilus influenzae type b (Hib) to their routine infant immunization schedules and an increasing number are in the process of adding pneumococcal conjugate vaccine and rotavirus vaccines to their schedules.

The Expanded Programme on Immunization remains committed to its goal of universal access to all relevant vaccines for all at risk. The programme aims to expand the targeted groups to include older children, adolescents and adults and work in synergy with other public health programmes in order to control disease and achieve better health for all populations, particularly the underserved populations.

Immunization is a proven tool for controlling and even eradicating infectious diseases. An immunization campaign carried out by the World Health Organization (WHO) from 1967 to 1977 resulted in the eradication of smallpox. When the programme began, the disease still threatened 60% of the world's population and killed every fourth victim. Eradication of poliomyelitis is now within reach. Since the launch by WHO and its partners of the Global Polio Eradication Initiative in 1988, infections have fallen by 99%, and some five million people have escaped paralysis. Between 2000 and 2008, measles deaths dropped worldwide by over 78%, and some regions have set a target of eliminating the disease. Maternal and neonatal tetanus has been eliminated in 20 of the 58 high-risk countries.

The Expanded Programme on Immunization (EPI) is a disease prevention activity aiming at reducing illness, disability and mortality from childhood diseases preventable by immunization.

These diseases are referred as 8 EPI target diseases and cause millions of ailments, disabilities & deaths each year

1. Poliomyelitis
2. Neonatal Tetanus
3. Measles

4. Diphtheria

5. Pertussis (Whooping Cough)

6.Hepatitis-B

7. Hib Pneumonia & Meningitis

8. Childhood Tuberculosis

The diseases are preventable and can be eradicated like Smallpox, as very safe & effective vaccines are available.

27 % of deaths in < 5 years age group are due to vaccine Preventable Diseases.

80% children of world are being protected against childhood TB.

3 million children & 19.5 million CBAs are being protected against eight vaccine preventable diseases and tetanus respectively.

1000 deaths in less than 5 year children will daily occur in Pakistan, if EPI is discontinued. Immunization is one of the most successful and cost effective health interventions. It has eradicated small pox, lowered the global incidence of polio so far by 99% and achieved dramatic reductions in illness, disability and death from diphtheria, tetanus, whooping cough and measles. It is a world-wide Programme being carried out in all countries assisted by WHO, UNICEF and other donor agencies.

The global target of the Programme is to immunize over 95% of infants and child-bearing-age females.

**Objectives**

The overall objective of the EPI is reduction of mortality and morbidity from the eight EPI diseases by offering immunization services.

Following are the EPI diseases

Poliomyelitis

Diphtheria

Pertussis (Whooping cough)

Tuberculosis

Tetanus

Measles

Hepatitis-B

Hib Meningitis & Pneumonia

With this objective, the Programme started in Pakistan in 1978 and is still continuing. The programme is evaluated at intervals of 2-3 years.

Specific objectives of the Programme are as follows:

* Achievement of 90/80 % immunization coverage by 2010
* Elimination of Neonatal Tetanus
* Elimination of Measles by 2010.
* Reduction of VPDs morbidity & mortality by 2/3rd by year 2015 as compared to 2000 as per MDG-4.
* Certification of Eradication of Poliomyelitis after being free for 3 years from polio
* Introduction of new vaccines in the EPI immunization Schedule i.e. Pneumococcal Vaccine in 2011 and Rota-virus Vaccine in 2013.

**Components of EPI**

1. Routine Immunization Children 0-23 months – immunization with 8 EPI and

 Pregnant ladies by TT.

1. Supplemental Immunization Activities Routine: immunization does not ensure 100% coverage of the mobile population i.e. nomads, NAs, hard to reach areas / missed areas. So SIAs are scheduled to ensure coverage of this population / areasNIDs / SNIDs: children < 5 years receive polio drops (3-days campaign)
2. Disease Surveillance To detect every case of target diseases, the suspected cases of seven VPDs are reported by health facilities to the district health authorities for immediate launching of the control measures.
3. Mopping up Special campaigns 5-8 km around the infected locality to localize the disease and stop its transmission.

**IMMUNISATION**

INTRODUCTION:

Infectious diseases cause much illness, death and may result in disabilities to a child. It is therefore important to protect the child against the common infections which affect young children.

In this Unit we shall look at how the body is assisted by immunization to form chemical substances called antibodies which protect it by increasing body immunity against infections. We shall discuss the six preventable childhood infections, the national immunization schedule and how to provide immunization services.

**DEFINITION OF TERMS**

**Definition**

Immunization: Immunization is the process of introducing weakened or killed germs (vaccines) into the body, which increase body immunity to protect one from a particular disease. These weakened or killed germs stimulate the body to produce antibodies that will fight or weaken any disease organism that attempts to enter the body.

Immunity: Immunity is derived from the word “immune” which means that the individual has enough defense mechanisms to fight and kill or weaken micro-organisms. Immunity is therefore the ability of the body to fight against certain disease organisms. An individual whose body has this ability is said to be immune to disease.

When micro-organisms (also known as immunogens) such as the measles virus enter the body for the first time, the body produces a special substance known as antibodies. These antibodies fight disease organisms and kill them.

If micro-organisms enter the body again the body will recognize them, having met them before, and quickly reproduces the same antibodies to kill them. Each kind of antibody that is produced matches with only one particular organism. This is why antibodies against one disease such as measles do not protect a person against another disease such as Tuberculosis (Tb).

Vaccines: Vaccines are substances prepared from micro-organisms (germs or viruses), which are live vaccines (weakened) or killed vaccines. When vaccines are given to someone, he/she develops immunity to particular diseases. There are particular vaccines made to protect against particular diseases, as you will come to learn later in this unit.

Examples of live vaccines are the BCG, measles and polio vaccines. While examples of killed vaccines are DPT, Hepatitis B (Hep-B) and Haemophilus Influenza Type B (Hib).

Cold chain: Cold chain is the system which keeps viable vaccines potent at the required cold temperatures right from the manufacturer up to the person who receives them (such as a child).

 The success of protecting our children against the six childhood immunisable diseases depends on maintenance of cold chain. If properly maintained, the cold chain system keeps vaccines potent and they are able to do their work properly. You will learn more about the cold chain system later in this unit.

**TYPES OF IMMUNITY**

There are two types of immunity:

**Active Immunity**

**Passive Immunity**

These are further sub-divided into Natural Immunity and Artificial Immunity.

1**) Active Immunity**: Active immunity occurs when a person makes his own antibodies against disease. This occurs in two ways.

**a. Natural Active Immunity:** Natural active immunity occurs when a person contracts a disease and the body makes its own antibodies against that particular disease-causing organism. For example, if a child contracts measles, the child’s body will produce antibodies against the measles virus, and will be immune against other attacks of measles. This is life long immunity.

This is called natural active immunity. It is natural because it occurs in normal course of life without any medical intervention. It is active because the body actively develops antibodies. This type of immunity is also commonly referred to as natural ACQUIRED active immunity.

**b. Artificial Active Immunity**: Another way to stimulate the body to produce antibodies is by administering either attenuated (weakened) or killed organisms or modified products of an organism. This occurs when a person is given certain types of vaccines.

Advantages of active immunity: Active immunity is the best kind of immunity because it lasts for many years, (such as tetanus) and in some diseases immunity lasts for life (such as measles).

Disadvantages of active immunity: In the case of natural active immunity, which evolves out of suffering from the disease, the disease may be so severe that it may kill the child. Because of the costs of caring for the sick child, natural immunity is expensive to the family health services and the nation at large.

There are two types of passive immunity.

a. Natural Passive Immunity: This type of immunity occurs when a baby receives antibodies from its mother during the time the baby is still in the mother’s womb.

The mothers’ blood contains antibodies to some of the diseases she had during her life. The mother’s blood comes into close contact with the baby’s blood in the placenta. In the process, the mother’s antibodies are passed to the baby in a ready-made form, and will protect the child against these diseases. This immunity is not long lasting, as it disappears within a period of 6-9 months of life. It is therefore reinforced by active artificial immunity.

For example, the measles antibodies that a baby receives from the mother may be much reduced by the time the baby is 9 months old. This makes it necessary to immunise the baby at this age for measles to reinforce the immunity.

Another example: If a pregnant woman is immunised against tetanus with tetanus toxoid vaccine, she makes antibodies against tetanus bacilli which her baby receives as passive immunity against tetanus. These antibodies last for only a few months. That is why the baby is immunised by giving DPT vaccine to reinforce this immunity. You will learn more about vaccines later in this unit.

b. Artificial Passive Immunity: A person gets artificial passive immunity when he/she receives ready-made antibodies in the form of a serum that is injected into the body. Such antibodies are usually drawn from an animal. One example of such serum is the Anti Tetanus Serum (ATS), which is given to patients with tetanus. Another example is the anti-rabies serum that is given to protect against rabies after dog or other animal bites.

**Advantages of passive immunity**: Antibodies are ready made and a person does not have to wait for his/her body to produce them. This usually takes a relatively shorter period than active immunity, and a person gets immediate protection to fight against infection as the antibodies are ready made. For example, artificial passive immunity is used in treatment of neonatal tetanus when ATS is given to the neonate..

**Disadvantages of passive immunity:** Passive immunity is short lived. For example, children born to mothers with high antibody levels against polio disease are protected for the first several weeks of life. Since the child receiving the antibodies has not made them himself and there is no antigen (vaccine) to stimulate the body to produce more, the antibodies disappear in a few months of life, and protection is lost.

Also, allergic reactions can sometimes occur. For example, some people have an allergic reaction when they receive Anti Tetanus Serum (ATS). It is advisable to give a test dose of ATS before giving a full dose.

**HERD IMMUNITY:**

Herd immunity is used to refer to the level of immunity in a community as a whole.

A community is said to have a high level of herd immunity when a high percentage (70% - 80%) of its child population has been protected through immunisation. An infection introduced into a community with a high level of herd immunity will not spread, since most of children have immunity and very few are susceptible.

On the other hand, a community with a high percentage of its child population not immunised, is said to have a low level of herd immunity, and is susceptible to epidemics as the disease will spread quickly among children.

One of the intentions of the Kenyan Expanded Programme on Immunisation (KEPI) is to attain high levels of immunisation coverage of all children eligible for immunisation, so as to control and eradicate childhood immunisable diseases.

**CHILDHOOD IMMUNISABLE DISEASES:**

The Kenya Expanded Programme on Immunisation (KEPI) is the organisation that co-ordinates immunisation services in Kenya. It was established with the aim of preventing immunisable diseases that cause high mortality, morbidity and disability among our children.

The eight childhood immunisable diseases targeted by KEPI are:

1. Tuberculosis (TB)
2. Poliomyelitis (Polio)
3. Diphtheria
4. Pertussis (Whooping cough)
5. Tetanus
6. Measles
7. Influenza
8. Hepatitis type 2

It is now routine practice to immunize against Hepatitis B and hemophilic Influenza type B in Kenya.

The above diseases were selected because:

The vaccines for their immunization are available, cheap and effective and give long term immunity. In some cases, the immunity is life long.

These diseases are among the highest cause of death (mortality) and constant sickness (morbidity) among children below 9 years of age, the under-five children.

The diseases are immunisable and it is cheaper to immunise children than to treat them when they fall sick.

The diseases are highly transmitted (spread easily) among children hence leading to epidemics. Yet, if many are vaccinated a community may develop herd immunity thus reducing the spread of diseases.

**Target Groups for KEPI:**

**KEPI targets specific groups for immunization, namely:**

* Infants (under one year)
* Children 1 - 5 five years
* Women of child bearing age (15-49)
* Pregnant Women

We shall now look at each of eight diseases targeted by KEPI in turn. This will help you understand why they were selected and how to manage them. You will note that diseases such as TB, measles, and neonatal tetanus are discussed in great detail. This is because they are very common and cause a lot of ill health and death.

**1) TUBERCULOSIS**:

Tuberculosis, commonly abbreviated as TB, is a chronic infection that may affect any parts of the body, mainly the lungs and is caused by bacteria. It is a common cause of illness and death in children, if not properly treated. It spreads easily from one person to another through the infected person’s droplets (from coughing) that contain Mycobacterium Tuberculosis. It is important to note that because of HIV/11AIDS, TB incidence is on the increase.

Children catch TB from adults who are sick and who cough out TB bacilli into the air. When a child breathes in the bacilli, he/she slowly develops the disease.

Although TB bacilli are spread in droplets by adults, who cough them in their sputum, children are very rarely infectious. We say that adults have sputum positive or open tuberculosis when their sputum contains tubercle bacilli. When an infected adult holds a child, and coughs out the TB bacilli into the air, the chances of the child getting infected are very high. We know that overcrowding and poor house ventilation facilitate the spreading of this disease. We can therefore understand why infants can easily get infected because of the way they are held.

Since we know that children get TB from adults, it is important to find out which children are at risk of getting the disease, so as to prevent it. The first group at risk are those children whose mothers suffer from TB. The next group is comprised of those children who get frequent attacks of infection such as malaria, measles, diarrhoea and acute respiratory tract infections.

Other children likely to get TB are those who are malnourished or who are HIV positive, since these children already have lowered immunity. Children can also get TB from milk contaminated with bovine tubercle bacilli, though this is less common.

Now that we have learnt how TB is transmitted, let us discuss the signs and symptoms.

**Signs and symptoms of TB:**

When a child is brought to you in a clinic or Health unit, take a good history, examine the child and carry out the relevant investigations. We discussed how to do this in the first unit of this course. Once you have ruled out all other causes, you might suspect that he/she has TB if you find any of the following:

* Chronic cough (cough which lasts for more than 2 week in spite of treatment.
* Enlarged lymph nodes in the neck.
* Fever which comes and goes.
* Loss of weight (wasting), often with loss of appetite.
* When a child with Pneumonia or other type of acute cough does not get better after two weeks of treatment. This is especially true when there is fever and weight loss.

**Diagnosis and Treatment:** A child who presents with the above signs and symptoms should be suspected of having TB. If this child is in a rural health unit, you should REFER him/her to the hospital for further investigations and treatment.

Before you refer the child, however, you should give him/her some drugs to soothe the throat and reduce the cough. You should also explain clearly the purpose of the drugs given, then advise the caretaker to take the child to the hospital for further investigations as per IMCI guidelines. Remember to give the caretaker some referral notes about the child.

Explain clearly that it is for the child’s benefit that she/he be investigated, as the problem may be serious. Explain also that although TB is serious, it is also curable, especially when treated early. Let the caretaker know that the reason you are referring the child is because you do not have adequate facilities for treatment.

If during history taking you discover that there are others in the family with a persistent cough, explain the importance of all of them going for investigation. Reassure the caretaker that the child will be well if the problem is discovered early and treated adequately. Stress the importance of following instructions, feeding the child and taking him/her for immunization.

The diagnosis of pulmonary TB is difficult in an acutely ill marasmic child.

 If a child is acutely ill with marasmic signs, know that he/she may well die before the diagnosis is confirmed. This is because a tuberculosis test will likely be negative – in a marasmic child there is often no AFB in the sputum or gastric contents and the X-ray picture will be non-specific. Further tests will have to be done to confirm TB, and the child is already sick and weak. So, if you see an acutely ill marasmic child and you suspect TB, go ahead and start him/her on penicillin and chloramphenical and refer immediately. Remember that pulmonary TB can progress into pneumonia.

In a child whose natural immunity is compromised by malnutrition, the infection can spread into the pleura as tuberculosis pleurisy, and the pressure of hilar glands on bronchi may cause collapse of a part or whole of a lobe (atelectasis). Lymphogenous or Haematogenous spread miliary tuberculosis may occur, causing TB meningitis, abdominal TB or TB of the bones or renal TB. This is why the start of antibiotics will be helpful before you transfer the child.

As we have said, to confirm the diagnosis of TB, there are investigations that should be carried out. We said that you need to refer this child. In hospital, the following investigations can be done:

**Tuberculin test**. There are three:

1. Mantoux test which is done by introducing tuberculin (0.1 ml of 1: 1000 or 1:2000 through an intradermal infection.

Heat test, which is when tuberculin is introduced through a special heat gun.

In all cases a tuberculin reaction will indicate whether a child has TB infection. The test, however, cannot be used alone.

1. Sputum examination. Sputum is taken for microscopic examination. Gastric content aspirated early in the morning could also be used, as it contains sputum.

Blood test to check Hb. A check for erythrocyte sedimentation rate (ESR) can also be done. Hb will be low in an active TB and there will be high erythrocyte sedimentation rate.

1. The chest X-ray is another important investigation.

**Treatment:** If you recall, we said that a child gets TB from an adult, most likely the mother because of close contact. There is, therefore, more to be done than just treating the infected child. In the management of a child with TB, it is important to reassure the parent or adult who infected him/or her. It is equally important to check if other children in the family are also infected. This is called contact tracing.

Treatment of a child with Pulmonary TB is in two phases:

initial phase of 2-3 months on possibly 3 drugs, Isoniazid (H), Rifampicin (R), Ethambutol (E). Streptomycin (S) may be added for a period of two months.

 Continuous phase of 4-6 months.

A visibly ill child will often have pulmonary TB. If so, he/she should be put on streptomycin, isoniazid, Rifampicin and pyrazinamide or ethambutol (4 drugs) daily, if possible, or the streptomycin 2 x per week for 2 months. Then isoniazid and rifampicin, or if HIV is suspected ethambutol and pyrazinamide for 4 months.

TB meningitis or advanced miliary TB is treated like extrapulmonary TB, but this time the duration of treatment is 10 months, and prednisolone 2mg/kg/day is added. If the child is HIV positive, the treatment should continue for an additional 3 months, or 13 months total.

Now that we can see how just serious TB is, and we have seen some of the drugs needed to treat it. Let us turn to how it can be prevented.

**Prevention:**

You can prevent the spread of TB in your community by doing the following:

Immunizing all children at birth or first contact with BCG vaccine. Encouraging the community through IEC, which we discussed in Unit 3, to avoid overcrowding and to have houses properly ventilated.

Encouraging good nutrition in the community.

Identifying and referring all suspected TB patients to hospital for early diagnosis and treatment.

Early diagnosis and treatment of all TB patients

Investigation of family members and close contacts of a case.

**2) POLIOMYELITIS:**

Poliomyelitis, commonly referred to as polio, is a highly infectious disease that is caused by a virus that affects the motor neurons of the spinal cord and sometimes the brain, resulting in paralysis. It commonly affects the muscles of the limbs (arms and legs).

There are three related types of polio virus. These are Types 1, 2 and 3. All three types cause paralysis, but the most frequent cause of epidemic polio is polio Type 1.

Almost all the under-five children in Kenya who have not been immunized have a risk of getting polio infection. However, only in a small proportion of these children can the infection result in paralysis. The disabilities it causes vary and can sometimes cause death.

The polio virus is highly communicable. An infected child will probably infect all other non-immune children, especially where sanitation is poor.

**Mode of transmission**: Polio Virus is mainly spread through faeces and by droplet infection. The latter is a rare route of transmission.

When an infected child passes the virus in stools, it spreads from child to child through contaminated water, food, utensils and hands. After being swallowed, the virus multiplies in the throat and intestines and may spread to the child’s nerves through the blood stream. However, polio virus does not affect the sensory nerves.

Weakness and paralysis of one or more limbs.

There is no sensory loss. The sense of pain and touch remain normal.

The paralysis only affects the muscles (Flaccid paralysis).

Although the above are the key signs and symptoms of polio, the disease may start out with the following signs, which are common with other diseases.

Fever and general malaise

Nausea and vomiting

Headache

Abdominal pain

The incubation period for polio is 10 - 21 days.

If you come across a child presenting with the above signs and symptoms you should refer to the hospital for further assessment, management and rehabilitation. You should also inform the Sub County Medical Officer immediately. Currently there is polio eradication initiative which requires that every child with Flaccid Paralysis (AFP), have his or her stool collected and investigated for polio virus. Make sure you report any AFP cases to your surveillance team

**Treatment**

No specific treatment is available. However, the following are principles of management that are a general guide.

The patient is strictly advised to rest in bed.

Avoid any injections as these pave the way to (Precipitate) paralysis.

**Prevention:** The good news is that polio can be prevented. Poliomyelitis is mainly prevented by immunization using Oral Polio Vaccine. OPV effectively prevents polio. Since the polio virus is highly communicable, especially where sanitation is poor, it is important to advise the community to improve general hygiene and sanitation in their homes as a preventive measure against poliomyelitis.

**The case definition for suspected polio is**: ANY CASE OF FLOPPINESS( PARALYSIS) IN A CHILD LESS THAN 5 YEARS NOT DUE TO TRAUMA AND CAN AFFECT A CHILD UP TO 15 YEARS

**Polio Eradication**: The polio virus can be eradicated from the face of the earth like smallpox. Experience in the Americas, where polio has been eliminated since August 1991, demonstrates the possibility of eradication.

Currently there is a global and national effort to combat the virus and Kenya has joined this struggle with the support of WHO, UNICEF and Rotary International.

You will learn more details about this eradication initiative later in this unit.

 Before continuing with the reading, complete the activity below.

**3. DIPHTHERIA:**

Diphtheria is an acute infectious disease of the throat and tonsils, caused by bacteria. These bacteria produce typical lesions on the mucous membrane of the upper respiratory tract. Toxins released from the lesions cause severe general symptoms that can damage the heart and peripheral nerves. The incubation period is 2 - 9 days. It is spread by droplet infection, but contaminated milk and dust can also carry the disease.

Diphtheria is a rare disease in Kenya, but due to its severity and high cause of death it should be prevented.

**Key signs and symptoms of diphtheria**

1. The child has fever and is acutely sick and toxic.
2. The neck is enormously swollen – more swollen than you see in tonsillitis (Bullneck).
3. Sore throat with hoarseness and difficulty in swallowing.
4. Grey membrane at the back of the throat that spreads past the tonsils. The membrane looks like small piece of a dirty cloth stuck to the child's throat.

**Complications**:

1. Myocarditis - the local lesion’s toxins attack the heart muscle, causing signs of cardiac failure.
2. Respiratory paralysis.
3. Nerve involvement, causing paralysis of the limbs.
4. A child with diphtheria is very ill. This child should be referred to hospital for admission and careful nursing.

**Prevention:**

Immunization using the Pentavalent vaccine which is given as described later in the section on the immunization schedule.

**Health advice**:

Take the child to hospital for careful nursing.

Bring all other children under age five for checkup and immunization.

Give the child bed rest for four weeks or until the child feels well.

**4) Whooping Cough (pertussis):**

Whooping cough, which is also known as pertussis, is an acute respiratory tract infection commonly found in children. There is no protection against pertussis from maternal antibodies.

Whooping cough is caused by a bacterium called Bordetella pertussis. Coughing spells ending in a whoop is characteristic of the disease. Sometimes vomiting follows the whoop. The whoop may be absent in children who are under 6 months of age.

Whooping cough is transmitted by droplet infection. The incubation period is 7-10 days. A child with whooping cough will often lose weight or fail to gain weight due to decreased appetite and vomiting.

**Signs and symptoms of whooping cough**: The signs and symptoms of whooping cough vary with the age of the child. Most children under 6 months of age may have a cough that does not end with a whoop.

If a child is **under 6 months** of age, he/she will present with:

 Fever and a cough that lasts more than three weeks.

If a child is **six months of age or more**, he/she will present with:

Fever, Sneezing, watering of eyes and irritation of the throat.

Paroxysms of coughing followed by a whooping sound at the end of long coughing spells. This whooping sound begins within one to two weeks of the start of the chronic cough. Talking, coughing or crying can precipitate the paroxysms of cough.

The under side of the tongue may become sore and ulcerate.

Attacks are more frequent at night and the cough can last several weeks.

**COMPLICATIONS:** Like any other diseases, whooping cough has complications. These include the following:

Pneumonia

Convulsions and brain damage

Malnutrition due to vomiting and loss of appetite

Management of a child with whooping cough:

In managing a child with whooping cough you need to do the following:

Encourage the mother to give nutritious food to prevent malnutrition.

Encourage breastfeeding or the drinking of plenty of oral fluids immediately after a coughing attack to prevent dehydration.

Avoid giving sedatives or cough suppressants because they may make the illness worse.

Refer the child to hospital immediately for further management.

**Prevention:** Whooping cough in your community can be prevented by:

Giving Pentavalent vaccine (immunisation) to all children below 9 years of age according to the immunisation schedule described earlier..

Healthy children should avoid contact with children who are suffering from whooping cough.

Sending all suspected cases of whooping cough for treatment in the hospital.

Key messages to mothers of children with whooping cough

Give small and frequent feeds to the child to avoid vomiting and thus prevent malnutrition.

Take children who have not been immunised for immunisation.

**5) NEONATAL TETANUS:**

Neonatal Tetanus is tetanus infection of the newborn (less than one-month-old infant) acquired after delivery. Tetanus is caused by a spore-forming bacterium known as clostridium tetanae.

In the newborn it enters the body through the umbilical stump which may be contaminated during cutting, tying and dressing, or through other cuts. The disease usually presents with muscle spasms and a failure to breastfeed in a baby who was otherwise born healthy. Nearly all cases of neonatal tetanus occur within 4-10 days after birth. Most newborns with this disease unfortunately die.

It is thus very important that the disease be prevented.

**Mode of transmission of Neonatal Tetanus**

Tetanus bacteria live in the intestines of grass eating animals such as cattle, sheep, goats and donkeys. The ground where they pass their faeces becomes heavily infected for a long time. In Kenya, the umbilical cord is the commonest site of bacterial entry in the newborn. The infection occurs when the umbilical cord is either cut with a contaminated instrument such as a knife or razor blade, or when the wound is treated with cow dung or soil (as it is done in some communities). Delivery in a dirty environment can also lead to infection with tetanus.

Once the bacteria gain entry in the baby’s body, they multiply and cause signs and symptoms of the disease.

A baby with neonatal tetanus presents with the following key signs and symptoms:

The baby stops sucking the breast.

Muscle rigidity and spasms occur with the head bent backwards, known as opisthotonus posture.

False smile. The baby looks as if he/she is smiling, yet he/she is not (Risus sardonicus). This is due to muscle spasms.

**Complications:**

A child with Neonatal Tetanus may develop the following conditions if not treated early.

Fracture of the vertebrae due to spasms.

Brain damage due to lack of oxygen supply to the brain which occurs during spasms

Failure to breathe, which leads to death.

Management of a baby with neonatal tetanus:

A baby with this disease is likely to die if not managed properly and quickly. The moment you diagnose neonatal tetanus, do the following:

Give a dose of rectal diazepam.

Clean the infected umbilicus with diluted 0.09% chlorohexidine solution (Hibitane).

Refer to hospital for further management having explained to the mother the need for such referral as per IMCI guidelines.

**Prevention:**

You can prevent neonatal tetanus in the community by doing the following:

Immunizing women of childbearing age (19-49yrs) and pregnant women with Tetanus Toxoid vaccine.

Delivering mothers in clean environment.

Avoiding putting anything on the umbilical stump except antiseptic methylated spirit.

Cutting the cord with sterile equipment such as sterile scissors or sterile razor blade.

Tying the cord with sterile ligature, cloth, or clean thread.

Tetanus toxoid schedule for pregnant women.

**NEONATAL TETANUS CAN BE PREVENTED**

 by immunization of mothers, proper umbilical cord care, and a clean delivery.

**6) MEASLES:**

Measles is a very infectious and dangerous disease caused by a virus. Its incubation is 10-14 days. It commonly occurs in children and has high morbidity and mortality among children under 1 year of age.

Mode of transmission of measles: Measles is spread very rapidly by droplets. This means that a child infected with measles spreads the virus by releasing very fine droplets into the air through coughing, sneezing, or crying.

Measles usually occurs in epidemics among children 7 to 9 months old. Before that age the young baby is fairly well protected by the antibodies from the mother. By the age of 9 years almost all children have been in contact with measles virus.

The mortality is high, particularly in malnourished children, due to complications such as those of the respiratory tract. If the child survives the infection, there will be life long immunity and he/she will not get measles again. Remember that is called natural active immunity.

Signs and symptoms of measles: As a Health worker you may have seen a child with measles. You can attempt to answer this question.

**The key signs and symptoms of measles are:**

High fever, usually above 38.9 degrees centigrade before the rash appears.

Cough, possibly with running nose before the rash appears.

Rash all over the body, lasting about seven days;

Conjunctivitis (red eyes)

Apart from the above key signs and symptoms you might also see:

Rash starting from the head and neck

Koplik spots – white spots on a red background on the mucous membranes of the mouth, inside the child’s cheeks.

Diarrhoea and vomiting.

Refusal to feed

**Measles and nutrition:**

Measles interferes with the nutrition of the child.

When a child has measles his/her food intake is reduced, particularly when the child has sore mouth or is too sick to take enough food and fluids and has loss of appetite.

Because of the diarrhoea that accompanies measles, the child loses a lot of protein leading to protein energy malnutrition. This can progress to kwashiorkor or marasmus.

Specific deficiencies of Vitamin A may occur during measles, leading to the damage of the corneal epithelium and blindness.

High fever increases breakdown of food and body protein, ending in malnutrition.

Traditional beliefs can interfere with the nutrition of the child. One dangerous traditional belief is that a child with measles should not eat eggs, meat, fish, or drink milk. This denies the child of proteins and energy.

Measles is more severe in children with malnutrition and in whom complications occur more frequently causing death.

A child presenting with measles. Measles interrupts nutrition and reduces the immune status of a child. A child with measles develops sores and is sometimes too sick to take enough food. A child also develops persistent diarrhoea and will experience inadequate food absorption due to the disease and its complications. In the above circumstances a child ends up developing malnutrition.

When a child already has malnutrition, his/her resistance to infection is lowered. When exposed to the measles virus, the disease is severe. The interaction of measles infection and malnutrition in this case becomes a vicious cycle.

**Complications**: If measles is not diagnosed and managed early the child may develop the following:

Underweight with other signs of malnutrition.

Severe diarrhoea leading to dehydration.

Otitis media (inflammation of the middle part of the ear).

Stomatitis (sores in the mouth).

Infection of the conjunctiva.. This is a complication if there is eye pus discharge.

Pneumonia.

Laryngo-tracheo-bronchitis (LTB).

Acute bronchitis.

Management of a child with measles Complete the following activity before continuing with the reading.

There are no drugs that can be used to treat or cure the measles virus. All treatment is for symptoms. When managing a child with measles in your health facility, you should do the following:

Lower the body temperature by tepid sponging.

Give plenty of fluids such as fruit juice, ORS, or soup to prevent dehydration.

Clean the eyes and apply tetracycline eye ointment 1% at six-hour intervals for seven days to prevent conjunctivitis.

Give Vitamin A supplement, 100 000 iu capsules once daily for three days.

Give frequent nutritious feeds to prevent malnutrition.

If a child presents with the following conditions you should refer to hospital immediately. These include:

Severe dehydration

Laryngo-trachea-bronchitis

Severe pneumonia

Severe malnutrition

Prevention of measles: Measles can be prevented by:

immunization: immunization at 9 months of age or at any visit of an un-immunized child under five years of age will protect them against measles,

unless the child has already suffered from measles.

Giving nutritious food. This will boost the immunity of the children.

Exclusive breastfeeding of infants up to 6 months.

Encourage good weaning practices

Health advice to parents of children infected with measles: Mothers of children who have measles should be given the following advice. Parents should:

Maintain the hygiene of the child by cleaning the eyes and mouth.

Provide plenty of fluids.

Provide nutritious foods.

Take the child to the hospital if the child develops complications.

**PNEUMOCOCAL DISEASES**. These are the diseases prevented by the pneumococcal vaccine normally called PCV10. PCV 10 vaccine contains 10 serotypes and is available in the EPI IN an ampoule of 2 doses preservative free liquid.

It is administered as I.M injection into the right upper thigh to infants less than 1 year old. The dose is 0.5 ml. There are 3 doses at 6, 10 and 14 weeks. It does not have a booster dose.

Contra indication: A child with a moderate to severe illness (temp 39 and above delay vaccination until child improves

Adverse reaction: Local reactions include redness, pain and swelling and fever.

**SUMMARY:** We have looked at the causes of six immunisable diseases, transmission, key signs and symptoms, complications, management and how they can be prevented. I hope you are now conversant with this topic and you can provide appropriate advice and services to parents in your community.

**9.3: NATIONAL IMMUNISATION SCHEDULE:**

Kenya Expanded Programme on immunization (KEPI) has a plan it follows to administer vaccines. This plan clearly shows the vaccines that are given, the dosage, the time interval between doses and the site of administration. This is called the National immunization Schedule. This standard plan provides a guide to all health workers in the country involved in immunization. The immunization schedule varies from country to country and can change from time to time, depending on scientific discoveries.

As a health worker who participates in the immunization of children, you should carefully study the National immunization schedule and always use it as a reference guide whenever you are providing this service. Let us now discuss the vaccines used by KEPI and how to administer them.

1**) BCG (Bacillus Calmette-Guerin) Vaccine:**

This is a live attenuated (weakened) bacterial vaccine. It is used in the immunization programme to protect the child against Tuberculosis (Tb). BCG vaccine is given in a single dose at birth or first contact. The vaccine is very sensitive to light and loses much of its potency when exposed to light. It is given by injecting the child intradermal (in the skin) at the right upper arm. The amount of 0.09mls is recommended for children up to eleven months of age, and 0.1 ml for children after eleven months of age.

**2) Polio Vaccine:**

Polio vaccine is a live attenuated (weakened) virus, used in the immunization programme to protect children against poliomyelitis. The Sabin type is given orally (by mouth) in Kenya. Some countries use another type, called Salk vaccine, which is given by injection.Oral polio vaccine is given four times beginning at birth (polio 0); at 6 weeks (polio 1); at 10 weeks (polio 2); and at 14 weeks (polio 3); respectively. Two drops in the mouth are recommended for each dose. It should be noted that booster doses are sometimes given to all children below five years of age in the entire country regardless of immunisation status. This is done during National Immunisation Days (NIDs), whose primary objective is to eradicate poliomyelitis. You will learn more about NIDs later in this unit.

Polio Immunization Schedule:

Polio 0: Birth or first contact within 2 weeks

Polio 1: 6 weeks

Polio 2: 10 weeks

Polio 3: 14 weeks

**3) Pentavalent Vaccine:**

Pentavalent has five vaccines which include DPT and HepB and Hib. The DPT vaccine is commonly referred to as Triple Vaccine because it is used to prevent three diseases: namely, diphtheria, pertussis and tetanus. The diphtheria and tetanus parts of the vaccine are made from the respective toxins, while the pertussis vaccine is made of a killed bacterial antigen. It has become necessary to add Hepatitis B (Hep B) and Haemophilus Influenza type b (Hib) vaccines to DPT to form what is now known as pentavalent vaccine (five vaccines)

The Pentavalent vaccine is given by injecting the child intramuscularly (in the muscle) at the left upper thigh. It is given three times, beginning at 6 weeks), at 10 weeks and 14 weeks respectively. A dose of 0.9 ml is recommended at each time it is given.

Pentavalent Immunization Schedule:

Pentavalent 1-------at 6 weeks

Pentavalent 2-------at 10 weeks

Pentavalent 3-------14 weeks

**4) Tetanus Toxoid Vaccine:**

This is a toxoid vaccine used in the immunization programme to prevent children against neonatal tetanus. KEPI targets all women of childbearing age (19-49 years) and pregnant mothers for Tetanus Toxoid (TT) vaccination.

It is better and safe to give two doses of Tetanus Toxoid (TT) vaccine to any pregnant woman if you are not sure she has had TT in a previous pregnancy.

The aim is to use the TT Vaccine to provide passive immunity for unborn babies, through transfer of the mother’s antibodies (natural passive immunity). This type of immunity reduces with time and is normally boosted by giving the child Pentavalent at six weeks after birth.

Tetanus Toxoid Vaccination Schedule: Every woman of child bearing age (19-49years), including pregnant women, should get 9 doses of Tetanus Toxoid (TT) vaccine. The schedule is as follows:

First dose (TT1): At first contact or as early as possible during pregnancy.

Second dose (TT2): At least 4 weeks after first dose.

Third dose (TT3): At least 6 months after second dose.

Fourth dose (TT4): At least 1 year after third dose.

Fifth dose (TT9): At least 1 year after fourth dose.

Now that we have looked at the vaccines used by KEPI and briefly discussed the schedule of each vaccine, you should carefully study the national immunization schedule illustrated in Table 1 below so as to understand more about this topic.

**Table 1: National Immunization Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Age** | **Antigen** | **Dose** | **Route** | **Site** |
| At Birth or any contact there after  | BCGBirth OPV(within 14 days) | 0.05ml2 drops | Intradermalorally | Lt outer armoral |
| At 6 weeks | Pentavalent - 1OPV- 1PCV 10-1Rotarix-1 | 0.5ml2 drops0.5 ml2-3 drops | I.MOrallyI.Morally | Upper outerthigh0rallyUpper outer thigorally |
| At 10 weeks | Pentavalent 2OPV2PCV 10 2Rotari-2 | 0.5ML2drops0.5ml2-3 drops | I.MOrallyI.Morally | Upper outer thigOrallyUpper outer thigorally |
| At 14 weeks | Pentavalent 3OPV 3PCV 10 3 | As above | As above | As above |
| At 9 Months | Measles | 0.5ml | S.C | RT. Deltoid muscle |
| At 18 months | Measles | 0.5mls | S.C | RT.Deltoid muscle |
|  |  |  |  |  |

NB: HIV+ babies are given measles vaccine at 6 months.

 Let us now discuss the administration of these vaccines in more detail.

Killed vaccine or the Pentavalent vaccine. Killed vaccines are given three times because they do not stimulate the body to produce antibodies as well as the live vaccines. When the second and the third doses are given, the body’s memory of the earlier dose quickly leads into production of more antibodies.

It is important to remember that Polio vaccine is made up of three polio viruses and the oral polio vaccine is given three times to enable each of the three viruses to stimulate the production of antibodies.

Immunization coverage should be high to reduce disease transmission. As health workers we should aim to achieve an Immunization coverage of over 80%. All children should be immunized at every opportunity. There is no contraindication for immunization. If immunization is done daily, this improves immunization coverage. Children with minor illnesses should be immunized. Misconception that sick children should not be immunized should be discarded. Very seriously sick children admitted to hospital should be immunized on discharge. Malnourished children should also be immunized. The danger of a vaccine of any given type to the malnourished child is much less than the infection itself.

**Administering Vaccines:** Vaccines used in the immunization programme (KEPI) are in different forms. Some vaccines are in powder form and must be dissolved in the diluent supplied with them, while others come in liquid form and will not need a diluent. Therefore, there is a need to prepare some vaccines before immunization. Here is the way to prepare each vaccine:

**Polio Vaccine**.

 Preparing Polio Vaccine: To prepare this vaccine you should do the following.

If a dropper is separate, attach it securely to the vial (bottle).

Keep polio vaccine shaded from sunlight during the immunization session.

Place the vial on the hole of the sponge placed at the mouth of a vaccine carrier, which is provided for this purpose to maintain the temperature.

 **BCG and Measles Vaccines:**

Use the diluent provided for each vaccine. Diluent should be cold: +4 - +8 degrees centigrade. Use different 9ml syringes for mixing measles and BCG vaccines. Draw up the full, required amount of the diluent provided as per instruction on the vial.

Inject diluent into vial.

Draw and expel mixture back into the bottle three times or until the vaccine is mixed.

Do not shake the vial.

Measles and BCG vials should be placed on a frozen ice pack or use the sponge in the vaccine carrier for maintaining the correct temperature.

Draw 0.9ml of measles vaccine (recommended dosage).

Draw 0.09ml of BCG vaccine for babies up to 11 months old, and 0.1ml for babies above 11 months (recommended dosage)

Preparing DPT and TT vaccines: DPT and TT vaccines come in liquid form. You will not need to dissolve or mix them.

Remove metal top from the vial

Draw 0.9ml into the sterile syringe

Remove bubbles

Keep the vaccines shaded from light.

**Important points to remember:**

Never take two vials of the same vaccine out of the vaccine carrier at the same time.

Do not mix vaccines until mothers and children are present.

Mix one vial of a particular vaccine at a time

Keep opened vials of polio, measles, and BCG vaccines on a frozen ice pack or use the sponge in the vaccine carrier. Their temperature must be carefully maintained.

Do not keep vials of DPT and TT vaccines directly on the frozen ice pack.

Open the vaccine carrier only when necessary.

**NEVER SHAKE VACCINE VIALS!!!**

After preparing vaccines, the next step is to administer them. Before administering vaccines you should always remember the following important points.

Use one sterile syringe and needle per vaccine (antigen) per child or mother.

**REMEMBER:** Avoid holding loaded syringes in your hands for long so as not to expose vaccine to heat or direct sunlight.

Inform each parent what type of vaccine you are giving the child, the possible reactions to it, what to do about the reactions, and when to bring the child back for more immunization.

Listen to parents and encourage questions.

Remove any child’s clothes that are in your way when vaccinating

Icon activity.jpg

 **During immunization you should:**

Ask the mother to hold the child firmly to restrict his/her movement during immunization.

Administer the vaccine.

Give specific health information about each vaccine.

**Now let us discuss how each vaccine is administered.**

1) Administering BCG vaccine:

Explain how to administer the BCG vaccine to a child:

 Follow these steps when administering BCG:

1. Clean the skin with cotton wool soaked in clean water and let it dry.

2. Hold the middle of the child's upper right arm firmly with your left hand.

3. Hold the syringe by the barrel with the millilitre scale upward and the needle pointing in the direction of the child's shoulder. Do not touch the plunger.

4. Point the needle against the skin, barrel turned up, about 3cm above your thumb. Gently insert its tip into the upper layer of the skin.

5. Make sure that the needle is in the skin (intradermal) and not under the skin, as shown in Fig. 9.4. If the needle goes under the skin, take it out and insert it again. If you bend the needle, replace it with another sterile one.

6. Holding the barrel with your index and middle finger, put your thumb on the plunger.

7. Holding the syringe flat, that is, parallel to the surface of the skin, inject the vaccine intradermal. For children above 11 months of age, inject 0.1 ml. For children under 11 months of age, inject 0.05 ml.

8. If the vaccine is injected correctly into the skin, a wheal, with the surface pitted like an orange peel, will appear at the injection site. An indication that the vaccine has been injected incorrectly is that the plunger will move much more easily when the needle is injected under the skin than when it is injected in the skin.

9. If there is no local reaction, re-immunize the child.

10. Give the mother health information about BCG. This is what you should say:

In 9 to 7 days a small sore will appear at the place where the injection was given.

The sore might ooze a bit and will last for 6 to 8 weeks.

Keep the baby's arm clean with soap and water.

Do not put medicine or dressing on the sore.

The sore will not hurt, and it will heal by itself.

11. Change the syringe and needle after each antigen (vaccine) and each child.

12. Fill in the Immunization Tally Sheet in BCG section.

13. Administer the next antigen.

**2) Administering pentavalent vaccine**

1. Ask the mother to hold the child across her lap so that the front of the child’s thigh is facing upwards. Then ask her to hold his/her legs to keep him/her from moving.

2. Clean the site to be injected with a cotton swab moistened with clean water, and let it dry.

3 .Place your thumb and index finger on each side of the place you intend to inject. Stretch the skin slightly.

4. Quickly push the needle deeply into the muscle, as shown in Fig. 9.4 (intramuscular). Pull the plunger back. If there is blood in the syringe, withdraw the needle and discard the vaccine. DO NOT use that syringe and needle again until they have been sterilized. Obtain a sterile syringe and needle and new vaccine.

5. If no blood appears in the syringe, inject 0.9 ml. of vaccine.

6. Withdraw the needle.

7. Rub the injection spot quickly with a clean piece of cotton swab.

8. Give health advice about DPT. Tell the mother that: DPT may cause some tenderness at the place the injection was given.

This tenderness will go away after a few days.

DPT may cause fever but the fever will subside in 24 hours.

Teach the mother how to care for a child with fever.

Fill in the Immunization Tally Sheet appropriately.

**3) Administering Oral Polio Vaccine:**

When administering Oral Polio vaccine these are the steps to follow:

1. Ask the child's mother whether the child has diarrhea. If "yes" vote this on the child's card and tell the mother that this dose of polio needs to be repeated after one month.

2. This child (with diarrhea) should have a total of 4 to 9 doses of Polio vaccine, depending on whether the child got Birth Polio or not.

3. Use the dropper or device supplied with the vaccine.

4. If the child will not open his mouth, gently squeeze his cheeks to open his mouth.

5. Put 2 drops of vaccine on the child's tongue.

6. Fill in the immunization Tally Sheet appropriately.

**Note:** Every child below 9 years of age should receive an extra 2 doses of Oral Polio Vaccine (OPV) each year during National immunization Days (NIDS) whether he/she was immunized before or not.

**4) Administering Measles Vaccine**

1. Use a sterile syringe and needle for each injection. Use a sterile syringe to draw 0.9 ml dose of the mixed measles vaccine.

2. Ask the mother to expose the child's left upper arm and hold the child firmly to restrict his movement

3. Clean the injection site with a cotton swab moistened with clean water, and let it dry.

4. With the fingers of one hand, pinch the skin on the outer side of the upper arm.

5. Hold the syringe at an acute angle to the child's arm.

6. Inject the vaccine subcutaneously.

7. To avoid injecting vaccine into a vein, pull the plunger back slightly before injecting the vaccine. If blood is drawn into the syringe, withdraw the needle and discard the vaccine. DO #NOT use the syringe and needle again until they have been sterilized. Obtain another sterile syringe, needle and vaccine. Press the plunger gently; inject 0.9 ml. of vaccine.

8. Withdraw the needle. If a drop of blood appears, wipe it off with a cotton swab.

9. Fill in the immunization Tally Sheet appropriately.

10. Give the mother health advice about measles. Tell her that some children have a mild rash after 7 to 10 days of getting measles vaccine.

This rash is mild and it will show that the vaccine is working very well.

11. Use another sterile needle and syringe to vaccinate the next child.

**5) Administering Tetanus Toxoid Vaccine (TT):**

:

1. Give TT injection intramuscularly on the outer side of the upper arm or outer aspect of the thigh, whichever of the two sites the woman prefers.

2 .Fill in the immunization Tally Sheet appropriately.

3. Give health advice about TT to women. Tell them that Tetanus Toxoid can cause some fever for a few hours and some tenderness at the site where the injection was given for a few days.

**NOTE:** Do not use detergents to clean injection sites during immunizations because detergents can destroy the vaccines.

**Advice during immunizations**: It is important that parents or guardians are given health advice when they bring children for immunization.

The name of the vaccine you are giving the child. In case of a pregnant or non-pregnant woman, you should tell her the name of the vaccine you are administering.

The name of the disease the vaccine prevents.

The possible side effects and what to do about them. For example, a child may develop fever and a sore leg or arm. Tell the caretaker that if this happens, to give the child a tepid sponge bath and extra fluids to lower the temperature. The parent can give Paracetamol if the temperature is still high after tepid sponging, to lower the temperature and reduce pain.

The return date for additional vaccines.

 **STRATEGIES FOR ERADICATION OF CHILDHOOD IMMUNISABLE DISEASES.**

In this section we shall discuss the globally recommended strategies for eradication of childhood immunizable diseases. We shall look at the Global and National Polio Eradication initiative and the role of health workers in National immunization Days (NIDS) for polio eradication.

"Eradication" means to get rid of something. It has been proven that the six childhood immunisable diseases can be drastically reduced and that some of them can completely be wiped out of the globe. You should remember that small pox was completely eradicated from the globe following effective immunization.

To achieve this, there are certain strategies that have been recommended by WHO. The following are some of these strategies:

1. Strengthening of routine immunization activities to achieve and maintain the highest levels of coverage for all antigens.

2. Mass vaccination of children within the shortest possible time through National immunization Days (NIDS)

3. Strengthening EPI target disease surveillance system such that every case of any of these diseases is reported, fully investigated and contacts of positive cases protected.

4. Conducting "mopping-up" immunization when the diseases are reduced to focal transmission. Although Kenya has been carrying out immunization to prevent the six childhood diseases with over 79% immunization coverage for some antigens, there is yet a number of children who are still infected because they were not immunized. There is therefore a need to improve on our immunization coverage and eradicate these diseases..

Routine immunization needs to be strengthened so as to achieve over 99% coverage, and other strategies like mass immunization should be adapted to supplement routine immunization.

**Global and National Initiative for Polio Eradication:**

The polio eradication initiative (PEI) is a global collaborative effort. WHO, UNICEF, Rotary International, the U.S. Center for Disease Control (CDC), prevention governments and non-governmental organizations (NGOs) are strongly committed to the initiate. Their generous financial and technical support has been critical in achieving the tremendous progress made to date.

Kenya has joined the rest of the world to wipe out poliomyelitis from the face of the earth. In addition to encouraging routine immunization, Kenya has adapted the National immunization Days (NIDs) as a supplementary activity to achieve this goal.

National Immunization Days are special days when Oral Polio Vaccine (OPV) is given to all children up to 99 months (below 9 years) of age in the entire country, regardless of their immunization status. NIDs occur as two rounds, four to six weeks apart, during the low season of polio virus transmission.

The doses of OPV during NIDs are considered EXTRA doses that supplement and do NOT replace doses given during routine immunization services. Children must continue to receive their routine immunizations.

The Primary objective of NIDs is to interrupt the transmission of and thereby eradicate the wild polio virus. You have already learned that polio is caused by a wild virus. You can refer to the section on the six childhood immunisable diseases.

Why polio eradication?

Poliomyelitis still remains a major crippling affliction in children throughout the developing world, including Kenya. It is estimated that it affects over 100,000 children annually.

The global initiative, support, and wild polio epidemiology makes polio eradication more feasible than eradication of other, more common diseases (like malaria, respiratory tract infections, diarrhoea and measles) in Kenya.

**Why should fully immunized children receive OPV during NIDs?**

There are two main reasons:

1. Waning intestinal immunity: Fully immunized children with serologic immunity may have reduced intestinal immunity against polio. Therefore, extra doses will boost this intestinal immunity and decrease the likelihood of these children of being exposed to the polio virus.

2. Primary vaccine failure: OPV is approximately 89% effective. Therefore, even fully immunized children may experience primary vaccine failure, and in the absence of natural exposure may not be immune to all three types of polio virus.

**When are NIDs conducted?**

The first two rounds of NIDs in Kenya were successfully conducted on 14-19 December 1996 and 18-19 January 1997. The second two rounds of NIDs were conducted on 2-3 August and 13-14 September 1997.

NIDS are conducted during the low season of polio transmission

There are many benefits of conducting NIDs. Conducting NIDs in Kenya will:

1. Increase the community's awareness about immunization and health in general.

2. Involve community and national leaders, which sets a precedent for their active participation in important health initiatives.

3. Give health workers extra training and supervision that can increase motivation and improve skills.

4 .Strengthen the management of the cold chain.

**What is the role of health workers in NIDs?**

All health workers are expected to be involved in this noble cause of polio eradication by actively participating in National immunization Days. In particular, health workers should:

1. Mobilize parents and caretakers! Health workers should inform parents and caretakers of the polio eradication initiative and the need for all children 0-99 months of age to receive a dose of OPV during both rounds of NIDs, regardless of their prior immunization status.

2 .Advocate and sensitize the community on the importance of NIDs through meetings, day to day work, social gatherings, etc.

3. Provide immunization services in their clinics during NIDs. Health workers with clinics should encourage their clients to bring children below 9 years of age for immunization during NIDs.

4. Ensure that the community in which they reside or work is completely covered during NIDs.

5. Respond to public concerns by providing adequate information on questions raised by the public, such as the many misconceptions about NIDs and HIV.

6. Have their own children immunized. Health workers are influential (especially in matters pertaining to health) within their communities. It is very important that they provide a good example to the community by taking their children or relatives who are below 9 years of age for immunization. This is not only during NIDs, but also during routine immunization.

**STORAGE OF VACCINES**

**COLD CHAIN IN IMMUNIZATIONS**

“Cold chain” refers to the process used to maintain optimal conditions during the transport, storage, and handling of vaccines, starting at the manufacturer and ending with the administration of the vaccine to the client. The optimum temperature for refrigerated vaccines is between +2°C and +8°C.

Bottom of FormCold Chain Equipment are the lifeline for heat-sensitive vaccines and it is essential for safe transportation of these vaccines from the place of manufacturing to the place of field storage and final carriage to the place of immunization. Thus, Cold Chain equipment ensures a pre-determined safe temperature range for a particular period known as cold life of the product. The cold life period varies according to the product classifications made by WHO i.e. for large equipment like cold boxes, the cold life is high whereas for small equipment like vaccine carriers box the cold life requirement is less.

Sub-Category



Vaccine Carrier short range



Vaccine Carrier long range



Cold Box short range



Cold Box long range

“Cold chain” refers to the process used to maintain optimal conditions during the transport, storage, and handling of vaccines, starting at the manufacturer and ending with the administration of the vaccine to the client. The optimum temperature for refrigerated vaccines is between +2°C and +8°C.

Components of the cold chain

The cold chain has three main components, each of which must combine to ensure safe vaccine transport and storage:

•transport and storage equipment

•trained personnel

•efficient management procedures.

This study session is about the first of these components. You can see the cold chain equipment in Figure 6.1, together with the storage temperatures required at each storage place, from arrival in the country to the storage in your Health Post. Next we will describe the common cold chain equipment you will use when you collect vaccines from the health centre and in your practice at the Health Post and in the community.

[Skip to main content](http://www.open.edu/openlearnworks/mod/oucontent/view.php?id=53354&section=1.4.1#maincontent)

**6.2.1  Refrigerators**

A **refrigerator** is a cooling apparatus. Health facility refrigerators may be powered by electricity, kerosene, paraffin, bottled gas or solar energy. Electric refrigerators are usually the least costly to run and the easiest to maintain, but they must have a reliable electricity supply, which is not often possible in rural Health Posts in Ethiopia. Different refrigerators have different capacities for storing vaccines and for freezing and storing ice-packs (Figure 6.2).



  A Health Extension Worker with a kerosene-powered refrigerator in a rural Health Post in SNNPR, Ethiopia. This refrigerator has a freezer compartment on top, and plenty of space for the vaccines, diluents and other supplies that must be kept cold. (Photos: Janet Haresnape)

A refrigerator in a Health Post should be able to hold:

* One month’s supply of vaccines and diluents in the refrigerator compartment.
* A minimum stock of one to two weeks’ supply of vaccines and diluents (i.e. an additional 25% of the standard stock).
* Frozen ice-packs (strong, specially made plastic bottles containing frozen water) standing in the freezer compartment for at least 24 hours to become fully frozen.
* Do not put *frozen* ice-packs into the main refrigerator compartment! They could cause the temperature to drop too low and destroy the freeze-sensitive vaccines.
* Unfrozen chilled ice-packs in the refrigerator compartment (Figure 6.3); they help to keep the refrigerator cold for a while if there is a power failure. You can also keep ordinary plastic bottles filled with chilled water in the refrigerator for the same purpose.



These unfrozen (chilled water) ice-packs help to keep the refrigerator cold during a power failure. They should always be stored vertically to avoid possible leaks. (Photo: Basiro Davey)

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**Vaccine vial monitors (VVM)**

A **vaccine vial monitor (VVM**) is a label that changes colour when the vaccine vial or ampoule has been exposed to temperatures above 8ºC over a period of time. Before opening a vaccine container, the status of the VVM must be checked to see whether the vaccine has been damaged by heat. Manufacturers attach VVMs to vials and ampoules of most vaccines. The VVM is printed on the label or cap, or the neck of ampoules of freeze-dried vaccines (Figure 6.7). It looks like a square inside a circle. As the vaccine vial is exposed to more heat, the square becomes darker.



Figure 6.7 (a) Vaccine Vial Monitors (VVMs) on the neck of an ampoule, or on the label or cap of a vaccine vial (Source: WHO, 2004, as in Figure 6.1, p.10). (b) A vial of liquid PCV10 vaccine (Synflorix) with the VVM on the cap (Photo: WHO).

Do not use vaccines that have reached the discard point, even if they have not passed their expiry date!

You should only use vaccines where the inner square in the VVM is *lighter* in colour than the outside circle (Figure 6.8, top row). Vials with VVMs in which the inner square has begun to darken, but is still lighter than the outer circle (Figure 6.8, second row), should be used *first*, i.e. *before* vials where the VVM square has not begun to darken. Vials with VVMs in which the inner square matches the colour of the outer square, or in which the inner square is darker than the outer circle, have reached or gone beyond the **discard point** and should not be

How to read a vaccine vial monitor (VVM). **VVMs respond to heat — but not to freezing!**

VVMs respond to heat — **they do not measure exposure to freezing temperatures**. A vaccine may have been frozen and have lost its potency, but the VVM cannot tell you this. So even if the VVM indicates that the vaccine has not been exposed to heat, the vaccine may still have been frozen. Therefore, for freeze-sensitive vaccines, it is important to establish that they have not been frozen before using them. Inspect the freeze indicator, as described next.

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**Freeze indicators**

**Freeze indicators** are devices used to monitor the exposure of vaccines to freezing. Freeze indicators are packed with batches of freeze-sensitive EPI vaccines (pentavalent, PCV10 and TT), as well as with other freeze-sensitive vaccines such as HepB, which may be used to protect healthcare workers. The most commonly used type of freeze indicator is the **freeze-tag** (Figure 6.9). This is an irreversible temperature indicator that shows if a product, such as a vaccine, has been exposed to freezing. It consists of an electronic temperature measuring circuit with a liquid crystal display (LCD). A small blinking dot of light in the corner of the display shows that the freeze-tag is functioning correctly.



Freeze-tags showing: (a) ‘good status’ display; (b) ‘alarm status’ display. (If the freeze-tag is exposed to a temperature below 0oC (with a range between + 0.3  o C and –0.3 o C) for more than 60 minutes (with a range of between 57 to 63 minutes), the display will change from the ‘good status’ (Figure 6.9a) to the ‘alarm status’ (Figure 6.9b).

Vaccines that have been exposed to freezing may have been damaged and should be checked by using the shake test

**Expanded Program on Immunization**

**History**

The World Health Organization (WHO) initiated the Expanded Program on Immunization (EPI) in May 1974 with the objective to vaccinate children throughout the world.

Ten years later, in 1984, the WHO established a standardized [vaccination schedule](https://en.wikipedia.org/wiki/Vaccination_schedule) for the original EPI vaccines: [Bacillus Calmette-Guérin](https://en.wikipedia.org/wiki/Bacillus_Calmette-Gu%C3%A9rin) (BCG), [diphtheria-tetanus-pertussis](https://en.wikipedia.org/wiki/DTP_vaccine) (DTP), oral [polio](https://en.wikipedia.org/wiki/Polio_vaccine), and [measles](https://en.wikipedia.org/wiki/Measles). Increased knowledge of the immunologic factors of disease led to new vaccines being developed and added to the EPI’s list of recommended vaccines: Hepatitis B (HepB), yellow fever in countries endemic for the disease, and Haemophilus influenzae meningitis (Hib) conjugate vaccine in countries with high burden of disease.

 In 1999, the [Global Alliance for Vaccines and Immunization](https://en.wikipedia.org/wiki/Global_Alliance_for_Vaccines_and_Immunization) (GAVI) was created with the sole purpose of improving child health in the poorest countries by extending the reach of the EPI. The GAVI brought together a grand coalition, including the UN agencies and institutions (WHO, [UNICEF](https://en.wikipedia.org/wiki/UNICEF), the [World Bank](https://en.wikipedia.org/wiki/World_Bank)), public health institutes, donor and implementing countries, the [Bill and Melinda Gates Foundation](https://en.wikipedia.org/wiki/Bill_and_Melinda_Gates_Foundation) and [The Rockefeller Foundation](https://en.wikipedia.org/wiki/The_Rockefeller_Foundation), the vaccine industry, [non-governmental organizations](https://en.wikipedia.org/wiki/Non-governmental_organizations) (NGOs) and many more. The creation of the GAVI has helped to renew interest and maintain the importance of immunizations in battling the world’s large burden of infectious diseases.

 **The current goals of the EPI are**

1. To ensure full immunization of children under one year of age in every district,
2. To globally eradicate poliomyelitis,
3. To reduce maternal and neonatal to an incidence rate of less than one case per 1,000 births by 2005,
4. To cut in half the number of measles-related deaths that occurred in 1999, and
5. To extend all new vaccine and preventive health interventions to children in all districts in the world.

**THE IMMUNIZATION SYSTEM COMPONENTS**

**1 Service Delivery**

In the next five years, the programme will endeavour to sustain and improve on the gains made over the years by providing quality immunization services. In Kenya, a significant proportion of immunizations take place in outreach clinics and the programme will ensure that the outreach strategy is not only sustained, but re-energized within the RED strategy framework. In hard to reach areas, catch up campaigns will be implemented locally. Immunization coverage will be increased from current administrative coverage of 68% to 90% for the fully immunized child. However, special attention will be given to improving the routine immunization coverage of populations of low access or utilization of immunization services. These include those in the urban slums, the internally displaced, refugees, and those residing in geographically remote areas. A mixture of strategies will be used. Table 8.1 contains details of the activities to be covered.

**2 Vaccine Supply, Quality and Logistics**

The EPI programme will ensure that adequate vaccines bundled with injection materials are procured through WHO/UNICEF approved mechanisms. Through the Child Health ICC, procurement of vaccines and other logistics will be prioritised to avoid disruption of the services. The current storage capacities for both vaccines and dry store materials at central and regional vaccine stores will be expanded in tandem with the growing population. The National Regulatory Authority will be strengthened through the support of the Pharmacy and Poisons board and by external technical assistance, so as to ensure that vaccine quality is guaranteed. DVI internal quality assurance mechanisms will in-turn ascertain vaccine quality is maintained to the point of utilization thus minimizing AEFIs’. In addition, AEFI surveillance will be improved through production of guidelines, adequate tools and specific AEFI training which will require extra resources from the current allocation. Introduction of a computerised stock management system is planned for the regional vaccine store rooms so as to improve management of vaccines and injection materials. This will require procurement of computers and accessories. The programme through the Ministry of Health will identify land for the construction of a larger Central Store and administration offices.

At district and health centre levels, trainings will be conducted to improve stock keeping. Adherence to vaccine management guidelines and target settings will be monitored during the period. Transport availability for distribution of the programmes critical logistics will be improved at all levels through procurement of appropriate types of transport during the plan period. This will be accompanied with resources for maintenance and other operational costs of the vehicles. In addition to increasing the total numbers of cold-chain equipment, there will also be replacement of unserviceable and CFC

Kenya DVI Comprehensive Multi-Year Plan 2006-2010 34refrigerators in the 2006-2010 plan. The programme will therefore advocate for adequate resources to achieve this obligation.

Injection safety and waste management will be strengthened through ensuring continued use of AD syringes in both routine and supplemental immunization services and proper disposal of injection materials. Immunization waste management guidelines will be developed in line with the National Health Care Waste Management Policy. Health workers will from time to time receive training on safe injection and waste management practices. Since health care waste management has to be tackled in a broader perspective, the EPI will compliment efforts made by the MOH and other stakeholders by providing support for the construction of incinerators to cover the remaining District Hospitals to achieve 100% coverage during the planned period. Details for activities are contained in Table 8.2.

**3 Disease Surveillance**

Disease surveillance activities were be transferred to the Division of Disease Surveillance and Response (DDSR). DDSR fall’s under the same department of Preventive and Promotive health within the Ministry of Health with DVI. Even though DDSR will be responsible for disease surveillance activities, DVI will endeavour to work closely with DDSR and also to offer support as need arises. Disease surveillance activities are outlined below. Trainings for health workers will continue to be conducted to improve their knowledge and skills in EPI disease surveillance in line with the Integrated Disease Surveillance and Response approach. The National Reference Laboratory capacity will be further improve through procurement of adequate supplies of laboratory reagents and specialized training of its staff. Laboratory networks locally will be supported for the monitoring of trends of occurrence and actual burden of vaccine preventable diseases. In addition, collaboration with laboratories in neighbouring countries will be enhanced. Vaccine preventable disease surveillance data (Polio, measles, PBM, Rota virus) will be monitored so as to address gaps in immunization coverage in a timely manner as appropriate. In this multiyear plan, we hope to maintain or improve the tempo of detection and notification of AFP, measles, and NNT at current levels, but being more efficient through utilizing the same current resources. However, additional resources will be required for Hepatitis B and Peadiatric bacterial meningitis surveillance. Details for activities are contained in 4 **Advocacy, social Mobilization and Communication**

 Advocacy, social mobilization and communication are very crucial in EPI services. Through the Child Health ICC and the health SWAp, the programme will lobby for more resources for effective implementation of the planned activities. Of priority, will be the development and dissemination of the EPI Advocacy Guidelines, in conjunction with the Division of Child Health, which will be aligned to the National Health Promotion Policy. As part of the dissemination, health workers will be trained

Kenya DVI Comprehensive Multi-Year Plan 2006-2010 35on the new guidelines. Advocacy meetings will be conducted with District Health Management Teams and District Health Stakeholders for more EPI specific resource mobilization. Key EPI messages will be developed and disseminated through print media and electronic media both nationally and at local levels where this capacity is available. Other channels such as drama and community meetings will be encouraged and strengthened, spearheaded by the CORPs in conjunction with their respective CHEWs. The quarterly EPI newsletter will continue to be published and distributed to all health facilities and pre-service health institutions. In addition, posters, leaflets and fact sheets will also be developed.

**5 Programme Management**

**1 Planning Management** of the Division of Vaccines and Immunization will be aligned to the new principles of management of health services as outlined in the Kenya Essential Package for Health. Annual planning guidelines will be developed and disseminated to the districts and provinces in order to provide programme direction in terms of objectives and targets. The development of the annual objectives, targets and indicators will refer to this cMYP which takes into account NHSSP II, the respective AOP, global immunization guidelines and the deliberations of the Child Health ICC. Beginning with the AOP III, all health planning process will be decentralized to the district and provincial levels, from which the national plan will be derived. Further details pertaining to activities under programme management are contained in Table 8.5.

1. **2 Financing** DVI will endeavour to mobilize adequate resources for implementation of all its activities. It will ensure that all gaps and challenges noted in the past years are addressed. Since DVI activities are supported through multiple funding sources, both programme planning and resource mobilization will take into consideration the comparative interests of the different funding sources. The main sources of support for this cMYP are  The Government of Kenya – personnel emoluments, commodity support and main operational costs  World Health Organization - Technical assistance for routine and supplemental immunization activities, operational costs of disease surveillance activities  United Nation’s Children’s Fund – Technical Assistance for routine and supplemental immunization activities especially regarding advocacy and social mobilization, procurement agent services, emergency response  Global Alliance for Vaccines & Immunization – national commodity support (Pentavalent, yellow fever and new vaccines/initiatives) and health systems strengthening.

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 African Development Bank –III Project – this is a three-year loan facility limited to 7 districts and primarily for health facility infrastructure improvement, but also addressing human resource skills improvement  British Department for International Development – a new five-year project for health systems strengthening, with special emphasis on (but not limited to) improving M&E However, even with the above support, gaps are anticipated in the funding of this cMYP as identified in the costing tool. The Child Health ICC will therefore play a critical role in advocating for the needed resources. Details of financing and sustainability were update following Kenya’s application for the introduction of the Pneumococcal vaccine and are covered under section 9 and the attached updated cMYP Costing tool.

**3 Coordination and Integration** The Coordination framework will be adopted from NHSSP II, where coordination levels fall under Child Health ICC, and the district health sector stakeholders’ forum for the National and District levels respectively. The various cross-cutting challenges in the Health Sector are best addressed through an integrated approach. In addition integration will ensure sustainability of services. This plan will adopt the framework outlined in the NHSSP II were planning, human and overall financial resources, and logistics at all levels are integrated. In addition, the Child Health Strategic Plan will be developed in order to articulate other issues beyond immunization in an integrated manner. Broad programmatic concerns such as surveillance, monitoring and evaluation, and social mobilization will continually be integrated.

4 **Human Resource Management** Three thousand additional health workers are required within the planned period. However, the funding for only 1500 has been secured, leaving a gap of another 1500. In service training of both the current and in-coming health workers will be conducted throughout this planned period. In addition, CORPs training will be incorporated as part of the implementation of the community strategy under NHSSP II.

**5** **Supportive Supervision** The programme will ensure that supportive supervision is conducted regularly and that district microplans are followed up. It will also ensure that EPI policies are reviewed to incorporate any new developments in the EPI.

**6 Monitoring and Evaluation**

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Monitoring and Evaluation will be strengthened at all levels of programme implementation through the development of tools and facilitating skills improvement at all levels. District and Rural Health Facilities will continue to analyze the immunization and disease surveillance data on monthly basis and take action on identified gaps. Monitoring activities will be aligned to both the GoK financial year cycle and calendar year. Activities to be monitored are those related to performance of immunization coverage and cost-effectiveness of the different immunization strategies. Routine immunization and IDSR monitoring tools will continue to be standardised nationally to ensure that data from peripheral levels can be easily merged with the national database. Annual review meetings will be conducted with districts and provincial EPI staff to assess the immunization data and status of implementation of activities. Periodic surveys and operational research will be conducted in collaboration with partners. Evaluation of this cMYP will be conducted in January 2011.

7 **Innovations** The planning/resource mobilization for major innovations and any new vaccines introduction during the plan period will be considered through a wide consolatory forum, with initial inputs from the

**NATIONAL PRIORITIES** **BASED ON THE SITUATIONAL ANALYSIS**

1. Attain and sustaining high routine immunisation coverage in respect to the fully immunized child.

2. Availability of adequate vaccines , supplies and appropriate cold chain logistics 3. Procurement and rehabilitation of existing National and Regional cold rooms and the replacement of cold chain equipment at the district level;

 4. Procurement of appropriate types of transport, replacement and maintenance of transport equipment

5. Improved documentation and data management

6. Integrated implementation of child health interventions

7. Sustaining high quality surveillance on AFP, Measles, Yellow fever, Hib and Neo Natal Tetanus (NNT)

 8. Strengthening advocacy and social mobilization activities; strengthening of partnerships in health and improved community participation; improving Radio/TV messages and print media coverage

9. Continued training of staff at all levels

 10. Improved monitoring, supervision and feedback on performance to lower health facilities

11. Strengthening safe injection practices and waste management

 12. Establish burden of disease for other vaccine preventable diseases of public health importance (e.g. Rotavirus, Streptococcus pneumonia) through sentinel surveillance, and prepare for introduction for vaccine.

13. Construction of a new KEPI headquarters with adequate furniture and equipment

MOH / AMREF DISTANCE EDUCATION COURSE: CHILD HEALTH

UNIT 9: IMMUNISATIONS

Answer all the questions. When you have finished, mail it. It will be sent back to you with comments and the next units.

 1. Answer the following questions about immunity:

 a. What is likely to happen in a community with a low level of herd immunity?

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b. Mrs. Mbatia's 10 weeks baby was brought to an immunisation session and it was given polio and DPT vaccines. What type of immunity did this baby get?

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2. A mother brings her nine month old baby to your clinic. She tells you that she delivered the baby at the hospital where it was given two vaccines at birth.

a. What were these two vaccines?

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b. What disease is the baby fully protected against?

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 3. A child is now 4 years (48 months) of age. How many doses of oral polio vaccine (OPV) remain for him/her to get so as to be fully protected against polio?

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4. A mother brings a baby of eight months old who is sick to your health facility for treatment. You take a history from the mother, carry out a thorough physical examination, and come to a conclusion that the baby is suffering from measles.

a. What has made you conclude that the baby has measles?

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b. Explain how you would manage such a child:

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5. Answer these questions about NIDs:

a. What is the primary objective of National Immunisation Days (NIDs)?

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b. Explain why fully immunised children should receive oral polio vaccine (OPV) during NIDs.

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c. List three benefits of carrying out NIDs in Kenya:

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