REPUBLIQUE DU CAMEROUN
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MINSANTE

NORMS AND STANDARDS

OF THE EXPANDED PROGRAMME ON IMMUNIZATION

CAMEROON

May 2018

Expanded Program on Immunization

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EPI

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FOREWORD

The incidence of infectious diseases has dramatically declined mainly because of vaccination. Vaccination is a fundamental right of every child and is one of the greatest achievements of medicine. It has contributed drastically to the reduction of neonatal, infant and child morbidity and mortality. The control of a number of infectious diseases has significantly improved the health of the Cameroonian child.

Vaccination is in full development! Research is very active in the development of new vaccines against new infectious agents, and new technologies are being developed to improve their efficacy and safety.

This document "Norms and Standards of Expanded Program on Immunization in Cameroon" has been revised to answer the most salient questions posed by health professionals. It also presents the World Health Organization's official recommendations on routine immunization and surveillance of vaccine-preventable diseases.

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ACRONYMS AND ABBREVIATIONS

AAV	Adeno-Associated Virus
AEFI	Adverse Event Following Immunization
AFP	Acute Flaccid Paralysis
AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal care
ATS	Anti-Tetanus Serum
BCC	Behavior change communication
BCG	Bacillus Calmette and Guerin
BSRS	Biological sample reception station
CBO	Community based organisation
CC	Cold Chain
CENAME	Centrale Nationale d'Approvisionnement en Médicaments et Consommables Médicaux Essentiels
CFP	Communication focal point
CHW	Community health worker
CME/FCB	Centre mere et enfant/Foundation Chantal Biya
cMYP	Comprehensive Multi-Year Plan
CPDVS	Circulating Poliovirus Derived from a vaccine strain
CRS	Congenital Rubella Syndrome
CSO	Civil Society Organization
DFDEP	Department of diseases, Epidemics and Pandemics Control
DHS	District Health Service
DOTS	Directly observed treatment schedule
DQS	Data Quality Self-Assessment tool
DTP-HepB-Hib,	Combination Vaccine: Diphtheria, Tetanus, Pertussis, Hepatitis B And Haemophilus Influenza Type B (Penta)
DVDMT	District Vaccine Data Management Tool
EPD	Epidemic-Prone Diseases
EPI	Expanded Program on Immunization
EPI-CTG	EPI Central Technical Group
FEFO	First Expired, First-Out
GVAP	Global Vaccine Action Plan
HC	Health committee
HepB,	Hepatitis B
HA	Health Area
HF	Health Facility
HIU	Health Information Unit
HIV	Human Immuno-Deficiency Virus
HPV	Human Papilloma Virus
HV	Home visits
IACC	Inter-Agency Coordination Committee
IDSR	Integrated Disease Surveillance and Response

IEC	Information Education and Communication
IHC	Integrated Health Centre
IHR	International Health Regulations
IM	Intra-muscular
IMCI	Integrated Management of Childhood Illnesses
IPV	Inactivated Polio Vaccine
ISDR	Integrated Surveillance of Disease and Response
IU	International Unit
KB	Koch Bacillus
KPI	Key performance indicators
LID	Local Immunization days
LLIN	Long Lasting Insecticide Nets
LTF	Lost to follow-up
MAR	Monthly Activity Report
MenA	Meningococcal Group A Vaccine
MICS	Multiple Indicator Cluster Surveys
MNT	Maternal & Neonatal Tetanus
MPA	Minimum Packet of Activity
MR	Measles and Rubella vaccine
NHMIS	National Health Management Information System
NID	National Immunization Day
NNT	Neonatal Tetanus
NPHO	National Public Health Observatory
OCEAC	Organisation pour la Coordination de la Lutte Contre les Endémies en Afrique Centrale
OPV	Oral Polio Vaccine
ORS	Oral Rehydration Salt
PCV-13	Pneumococcal Conjugate Vaccine (13-Valent)
PSP	Problem Solving Plan
RDPH	Regional Delegation of Public Health
RED	Reach Every District
Rotarix	Rotavirus Vaccine
RSPI	Regional Strategic Plan For Immunization
SC	Subcutaneous
SCC	Social Change Communication
SIAs	Supplementary Immunization Activities
SLS	Self-locking Syringes
SLT	Supply Lead Time
SMT	Stock Management Tool
SOP	Standard Operating Procedure
Td	Tetanus Toxoid And Diphtheria vaccine
Vit.A	Vitamin A
VLP	Virus like particle
VPD	Vaccine Preventable Disease
VVMs	Vaccine Vial Monitors
WHO	World Health Organization
YFV	Yellow Fever Vaccine

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ACKNOWLEDGEMENTS

In 2005, Cameroon developed its first "EPI Norms and Standards" document which was revised in 2009 to take into account the new global guidelines as well as the introduction of new vaccines and new technologies in cold chain management. Meanwhile EPI disease surveillance as well as its communication system have evolved with time. All these changes required the development of a new EPI Norms and Standards document with the aim of building a high-performance vaccination system based on validated and up-to-date practices. The revision of this "EPI Norms and Standards" document is the result of a collaborative effort between all EPI partners.

We express our heartfelt thanks to the Bill and Melinda Gates Foundation, whose financial support has been crucial for the development and production of the "EPI Norms and Standards" in 2018.

Our gratitude also goes to CHAI for its technical support throughout this process, to WHO, UNICEF and CDC. We thank all those who contributed to the revision of this document for their time and effort.

1 GENERAL INFORMATION ON THE EPI AND VACCINATION IN CAMEROON

1.1. General Information on the Expanded Program on Immunization (EPI)

The Expanded Program on Immunization (EPI) in Cameroon began in 1976 as a coordinated pilot project of the Organization for the Coordination of Endemic Disease Control in Central Africa (OCEAC). This pilot project became an operational program throughout the country in 1982.

The EPI aims to prevent, control, eliminate or eradicate vaccine-preventable diseases. Following the Declaration of the Reorientation of Primary Health Care in 1993, EPI activities were integrated into the Minimum Package of Activities (MPA) of health facilities nationwide.

In May 2012, the World Health Assembly (WHA) adopted the Global Vaccine Action Plan (GVAP) 2011-2020. It is a strategic framework offering a vision for the current decade. The 2014-2020 Regional Strategic Plan for Immunization (RSPI) was developed from this global plan. These documents invite countries in the African sub region to develop the immunization component of their national Health sector strategies and plans, and to allocate sufficient resources to meet immunization targets.

Cameroon's 2015-2019 comprehensive Multi-Year plan (cMYP), revised for the period of 2018-2020 was developed taking into account:

i Global Vaccine Action Plan guidelines (GVAP 2011-2020);
ii Orientations of the Regional Strategic plan for Immunization (RSPI 2014-2020);
iii Findings of the 2013 EPI External Review;
iv Conclusions of the various independent evaluations and surveys conducted for the EPI;
v Strategic communication plan for the EPI, drawn up for the period of 2014-2020.

The general objective of the EPI is to contribute to the reduction of infant and child mortality and morbidity.

The specific objectives are as follow:

(i) Improve routine immunization coverage;
(ii) Ensure the supply of vaccines and optimize their management;
(iii) Ensure the availability of cold chain and transport equipment at all levels;
(iv) Strengthen surveillance of diseases targeted by new vaccines and Adverse Events Following Immunization (AEFIs);
(v) Achieve and maintain certification indicators for polio eradication, measles, maternal and neonatal tetanus elimination;
(vi) Strengthen communication, advocacy and social mobilization for immunization;
(vii) Organize high quality supplementary Immunization activities (SIAs);
(viii) Improve planning, monitoring and evaluation of the program at all levels;
(ix) Strengthen the capacity of managers and immunization service providers.

The **EPI missions** are carried out by the following two coordinating bodies of the program:

- The deliberative body: The Inter-Agency Coordination Committee (ICC);
- The executing body: the EPI Central Technical Group (EPI-CTG).

The EPI-CTG is placed under the authority of a Permanent Secretary, assisted by a Deputy Permanent Secretary who both oversee its Sections and Units. They also oversee ten Regional Technical Groups (EPI-RTG).

1.2. General information on Vaccination

1.2.1. Definition of Vaccination

Vaccination is the artificial introduction into the body of a healthy or sick individual, of a manufactured pathogenic agent which can trigger the production of specific antibodies against the development of that agent in the organism.

Vaccination complies with the vision of primary healthcare which has the goal of promoting individual and community health.

1.2.2. Advantages of Vaccination

For the past 30 years, the incidence of vaccine preventable diseases has significantly decreased in Cameroon due to the EPI. Before vaccines were made available, a good number of Cameroonian children died from diseases such as diphtheria, tetanus, pertussis, measles and polio.

Worldwide, vaccination is one of the greatest public health achievements of the 20th century. Every year, it prevents around three million deaths worldwide. Thanks to it, small pox was eradicated in December 1979. Currently, efforts are focused on polio eradication, elimination of measles and maternal and neonatal tetanus by 2020.

Vaccination is important at all stages of life. However, infants and young children are particularly vulnerable to vaccine preventable diseases because their immune system is not well developed to fight infections. They must therefore be completely vaccinated according to the vaccination schedule. Thanks to collective immunity, vaccination can prevent the spread of several infections in communities and indirectly protect the following persons:

(i) Infants who are too young to be vaccinated;
(ii) Persons who cannot be vaccinated for medical reasons (e.g. certain persons with immune-depression);
(iii) Persons whose immune system does not respond optimally to vaccination (e.g. the elderly).

Families, health systems and society incur considerable costs on vaccine preventable diseases. These costs are related to visits to health facilities, hospitalizations and deaths. Parents may have to be absent from work to take care of their sick children, and the children may miss school.

1.2.3. Role of vaccination

Vaccination is currently the most effective means to fight against several infectious diseases (poliomyelitis, tetanus, measles, yellow fever, pertussis, meningitis, etc.). It is estimated that through vaccination, about 3 million deaths are avoided yearly. In addition, each year, it protects about 750,000 children from serious physical, mental or neurological disabilities.

1.2.4. Effects of vaccination

Immunity is the ability of the body to defend itself from the attack of infectious agents.

The immune system refers to all humoral and cellular factors that protect the body from attack.

Immunization is a process that provides immunity by the introduction of antigens in the body (active immunization), or by the introduction of specific antibodies (passive immunization).

We distinguish **two types of immunity: natural immunity and artificial immunity.**

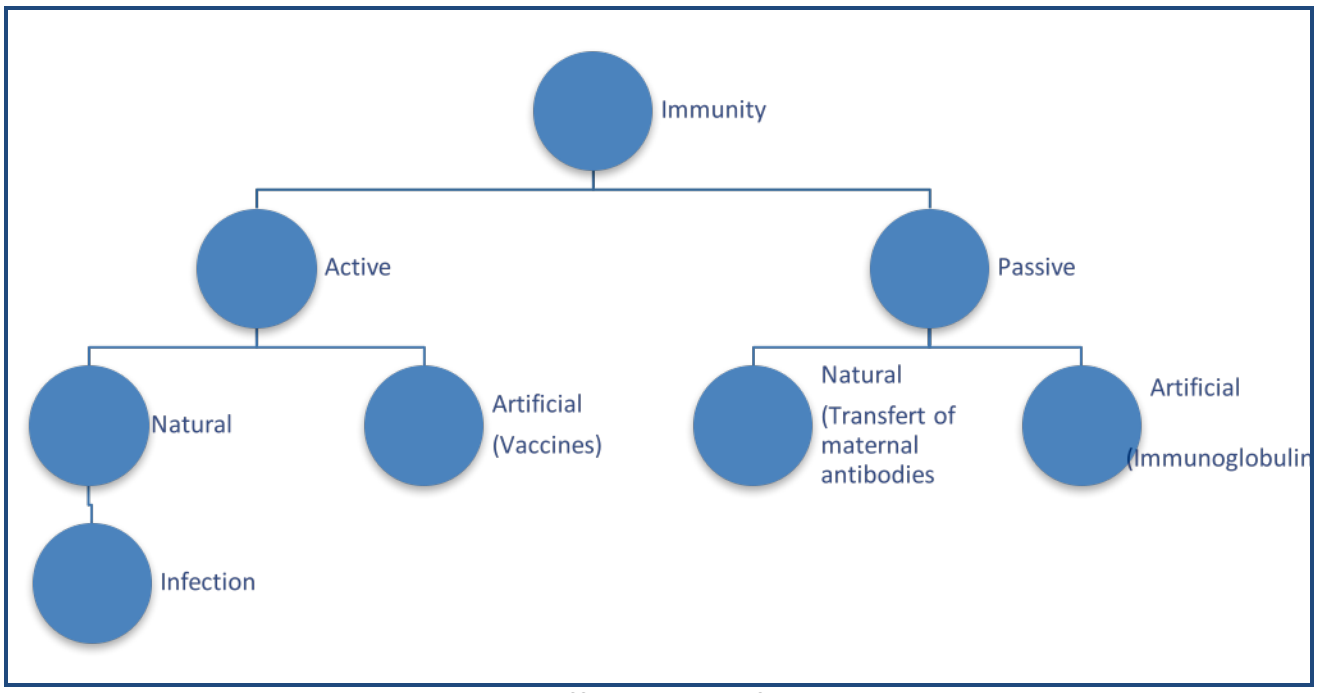

Figure 1: Different types of immunity

Vaccination provides individual and collective immunity:

- **Individual immunity**: vaccination protects the individual from preventable infectious diseases. This protection can be temporal or permanent.
- **Collective Immunity:** the transmission of diseases in the population reduces when the proportion of protected persons increases. Also, it is estimated that there is a considerable reduction in disease circulation when a significant proportion of the target population (about 90%) is protected due to vaccination.

2 EPI TARGET DISEASES

In 2018, EPI target diseases in Cameroon are fifteen (15) in number.

2.1. Tuberculosis

2.1.1. Definition

Tuberculosis is a contagious disease caused by *Mycobacterium tuberculosis*. It attacks generally the lungs but can also infect other parts of the organism, especially the bones, the joints and the brain. Tuberculosis is transmitted through tiny **droplets** of fluid produced when a patient with sputum containing bacillus coughs and sneezes. The first contact with *Mycobacterium tuberculosis* (primary infection) can go unnoticed but the disease manifests in one out of ten cases. Generally, full-blown tuberculosis comes secondary after the reactivation of a primary infection. Nutrition, alcoholism, smoking, diabetes and especially HIV/AIDS infection, are the main risk factors for tuberculosis.

2.1.2. Incubation Period

The incubation period is from 4 to 12 weeks, but it may last for months or even years before the disease develops. The infected person is able to infect others within several weeks. Children below the age of three and older people have a higher risk of developing the disease. People with weak immune system (infected with HIV) are more vulnerable to tuberculosis.

2.1.3. Clinical Manifestations

Symptoms of pulmonary tuberculosis are persistent cough that lasts for at least 4 weeks, accompanied by general signs (weight loss, asthenia, fever and night sweats) for more than 15 days and sometimes hemoptysis (coughing out blood) and chest pain.

The signs may vary depending on the location of the disease (meningeal, bone, genital, urinary, abdominal, etc.). The symptoms of tuberculous meningitis are fever, chills, nausea, vomiting, sensitivity to light (photophobia), severe headaches, stiff neck and neurological disorders (easily irritated, agitation, convulsion etc.).

2.1.4. Treatment

Treatment under Directly Observed Therapy Short course (DOTS) with appropriate antibiotics.

2.1.5. Prevention

The best way of preventing serious forms of tuberculosis in children is BCG vaccination. The improvement of sanitary conditions is also important.

BCG vaccine is contraindicated for adults.

2.2. Diphtheria

2.2.1. Definition

Diphtheria is an infectious disease caused by *Corynebacterium diphtheria*. There are two forms of this disease (cutaneous and nasal). It affects people of all ages and is transmitted when a sick person or healthy carrier infects a healthy person through close physical contact or by air (coughing and sneezing). Nasal form may be mild but chronic carriers are common. Patients develop infection of the throat or cutaneous ulcers.

2.2.2. Incubation period

It takes 2 to 5 days or more. Human beings are the reservoir for this disease and children below the age of 15 who are unvaccinated are most likely to be infected.

2.2.3. Clinical Manifestations

Fever, nasal discharge and painful pseudo membranous tonsillitis (tonsils are swollen and covered with a greyish membrane that can invade the vocal cords and the trachea, causing suffocation which can lead to death in one out of ten cases). Diphtheria toxin can attack the heart and the kidney.

The most serious complications of diphtheria are swollen neck and obstruction of the airways which can lead to death.

2.2.4. Treatment

Diphtheria toxoid inoculation and antibiotics administration.

2.2.5. Prevention

The most effective way is the vaccination of children less than one-year-old.

2.3. Tetanus

2.3.1. Definition

Tetanus is a non-contagious infectious disease caused by strict anaerobic spore forming bacillus called *Clostridium tetani* or *Nicolaier bacillus*. It primarily affects newborns (neonatal tetanus) and postpartum women (maternal tetanus). The disease is manifested as a result of the effect of neurotoxin secreted by bacteria that develop in necrotic infected tissues (infected umbilical cord, if the birth took place under poor hygienic conditions). If the mother is not vaccinated against tetanus, both mother and child are at risk of developing tetanus.

WHO and UNICEF set a target to eliminate neonatal tetanus (NNT) at the World Health Assembly in 1989. As a result, Cameroon prepared a national strategic plan in 2000 that led to the elimination of NNT (Less than 1 case/1000 live births in every health district in the country each year) since 2012. Also, to maintain the elimination status of NNT, long term sustainable control measures need to be strengthened as foreseen in the 2014-2020 strategic plan.

2.3.2. Incubation period

The incubation period is usually between 3 to 21 days. The shorter the incubation period, the greater the risk of death. Symptoms usually appear on the 14th day after contact with the bacteria.

2.3.3. Clinical Manifestations

The first sign of tetanus is lockjaw (contracture of the jaw muscles), which first limits speech, then chewing, and lastly mouth opening. This period is marked by generalized contractures with painful paroxysms.

The neonatal tetanus is fatal in over 90% of cases. In adults and older children, death usually occurs in one out of two cases.

2.3.4. Treatment

It is based on the administration of anti-tetanus serum (ATS), appropriate antibiotics, sedatives, and the isolation of patient to prevent sensory stimuli (light, sounds, contacts).

2.3.5. Prevention

It is essentially, through vaccination of pregnant women, women of childbearing age and infants. In addition to vaccination, improved hygiene during childbirth, cord care after delivery and wound disinfection in general can significantly reduce the incidence of tetanus.

2.4. Whooping cough

2.4.1. Definition

Pertussis or whooping cough is an infection of the respiratory tract (tracheobronchial) due to *Bordetella pertussis* or *Bordet-Gengou Bacillus*. Transmission is via droplets projected during coughing (hacking cough) or sneezing.

Humans are the reservoir for the bacillus. A single episode of whooping cough provides an almost permanent immunity. Young age and overcrowding are major risk factors.

2.4.2. Incubation period

The incubation period is 7 to 10 days, but may go up to 21 days.

2.4.3. Clinical manifestations

Whooping cough is manifested by persistent cough that last for 4 to 8 weeks, before progressing to the severe stage of the disease (a high-pitch "whoop" sound after episode of severe cough). The cough is accompanied by cyanosis and vomiting. In infants, the cough could develop to apnea attacks which could lead to death. Complications include pneumonia, malnutrition and convulsions.

2.4.4. Treatment

Treatment is by administration of appropriate antibiotics.

2.4.5. Prevention

It is principally by vaccinating children below the age of one.

2.5. Poliomyelitis

2.5.1. Definition

Poliomyelitis is a highly contagious disease caused by a virus that invades the nervous system and may lead to total paralysis within hours. It affects mostly children under five. Poliovirus multiplies in the intestines, goes into the bloodstream and can damage specific nerve cells resulting in paralysis. Paralysis of the respiratory muscles can lead to death of the patient.

Poliovirus is found in the feces of infected people and water contaminated by feces. It is transmitted through fecal-oral route. Poor hygienic condition is a risk factor.

There are three types of polioviruses: types 1, 2 and 3. The most common cause of polio epidemic is the type 1 wild poliovirus. Type 2 wild poliovirus has been eradicated (WHO declaration, September 2015) and type 3 has not been seen since 2012.

The disease confers permanent immunity against the type of virus concerned.

2.5.2. Incubation period

It varies between 3 to 35 days. Confirmation of diagnosis is made by stool examination in the laboratory.

2.5.3. Clinical Manifestations

Initial symptoms are fever, vomiting, fatigue, headaches, stiff neck and limb pains. An irreversible paralysis (of the lower limbs in general) occurs in 1 out of 200 infected persons.

2.5.4. Treatment

There is no etiological treatment of the disease. The treatment is symptomatic.

2.5.5. Prevention

Vaccination and hygiene compliance remain an effective preventive measure against polio. There are two types of vaccines against polio. Oral Polio Vaccine (OPV) which uses live attenuated virus strains and Inactivated Polio Vaccine (IPV) which is the injectable form. The administration of several doses of vaccines against polio, confers protection for life on the child. It is estimated that a child must take at least 4 to 6 doses of vaccine against polio to be protected.

2.6. Measles

2.6.1. Definition

Measles is an acute viral infection caused by an extremely contagious virus, causing outbreaks. It is transmitted through the respiratory route and is a major cause of infant mortality. It is vaccine preventable. Human beings are the only reservoir for this virus. It always affects children below five years especially those not vaccinated.

2.6.2. Mode of Transmission

Transmission occurs via the respiratory track through tiny respiratory droplets after coughing or sneezing. It occurs most often, in the dry season and can give rise to large outbreaks. The person infected is contagious in 3 to 5 days before the appearance of rashes and remain contagious until 4 days after the rashes.

2.6.3. Incubation Period

It varies from 7 to 18 days.

2.6.4. Clinical Manifestation

Measles has several signs and symptoms such as fever, cough, red and watery eyes and small white spots on the inside of the cheek (Koplick sign) and maculopapular rash that develops on the face and the upper part of the neck before spreading to the rest of the body. In the secondary stage, it could be complicated by infections such as pneumonia, gastrointestinal infections (diarrhea), encephalitis, meningitis and blindness. These complications are frequent and are responsible for the death of many children.

2.6.5. Treatment

- Administer the Oral Rehydration Solution (ORS) and zinc is very important;
- Encourage the patient to drink and eat;
- Administer two doses of vitamin A in 24 hours' intervals helps to prevent blindness and reduce 50% of measles deaths.

2.6.6. Prevention

Vaccinating children aged 9 months and above protects them against measles. The measles vaccine (administered at 09 months) confers immunity in 85% of cases. This disease also confers immunity. Administration of vitamin A reduces the number of deaths from measles.

2.7. Viral hepatitis B

2.7.1. Definition

Viral hepatitis B is an infectious disease caused by hepatitis B virus. The virus is found in the blood, and other body fluids. Hepatitis B virus is transmitted through contact with infected blood, through unprotected sexual intercourse. Vertical transmission from mother to child during birth and transmission through biting or scratching, etc., is also possible. The transmission period for a healthy chronic carrier may extend to over thirty years. If the disease does not develop, the infection confers immunity for life. However, the infected person may remain a carrier of the virus all his life and is contagious to those around him.

2.7.2. Incubation period

The incubation period is about 6 weeks and can go up to 6 months.

2.7.3. Clinical Manifestation

Persons infected may show signs and symptoms such as fever, jaundice, fatigue, dark urine and pale stool. Chronic infections such as chronic hepatitis, cirrhosis, liver failure and cancer of the liver may occur. Many infants born to infected mothers become carriers of the hepatitis B virus.

2.7.4. Treatment

There is no treatment for acute hepatitis B virus. In case of chronic infection, drug treatment sometimes stops the progression of the disease.

2.7.5. Prevention

It consists of vaccination, protected sex and respect of universal safety precautions by health personnel.

2.8. Yellow fever

2.8.1. Definition

Yellow fever is caused by a virus whose vector is *Aedes aegypti* mosquito found in urban areas and *Aedes africanus* in forest areas. It is a hemorrhagic fever in tropical areas of Africa and South America. The disease has highly re-emerged, particularly in Africa where many cities are threatened by epidemics. It usually last for two weeks after which the patient heals spontaneously or dies. Non-human primates (monkeys in general) and infected humans are the host of yellow fever virus in the African region.

2.8.2. Mode of Transmission

In the jungle transmission cycle (sylvatic), the primary host is the monkey and human beings can get infected when in contact with an infected monkey. In the urban transmission cycle, human beings are the primary host contrary to jungle transmission. The virus can be transmitted from person to person when bitten by the *Aedes* mosquito that reproduces in stagnant water. Poor environmental hygiene contributes to its transmission.

2.8.3. Incubation Period

Its incubation period occurs between 3 to 6 days.

2.8.4. Clinical Manifestations

The disease has a rapid onset. The infected person presents a high fever of 39°C with chills. The patient could also show signs of jaundice, headache, muscle pains, neurological disorders and hemorrhagic syndromes. Renal and hepatic complications can lead to the death in one out of two cases.

2.8.5. Treatment

There is no specific treatment of the disease. Treatment is symptomatic.

2.8.6. Prevention

The disease can be prevented with the yellow fever vaccine and the eradication of vectors (avoiding stagnant waters). The vaccine for yellow fever is reliable with an efficacy of approximately 95%. A single dose of the vaccine provides immunity against the disease for life. Also, the disease provides permanent immunity for survivors.

2.9. Haemophilus Influenza Type b (Hib) Disease

2.9.1. Definition

Haemophilus influenza type b is a bacterium that causes numerous infections which mostly affects children below 5 years. It is transmitted from person to person through infected respiratory droplets when an infected person coughs or sneezes. The transmission is more important when children have close and lengthy contact with a sick person in overcrowded environments.

There are six serotypes of *Haemophilus influenza*: a, b, c, d, e and f. Type b is responsible for more than 90% of severe infections among children under 5 years.

2.9.2. Incubation Period

It has a short incubation period that varies between 2 to 4 days.

2.9.3. Clinical Manifestation

Haemophilus influenza type b causes severe diseases like meningitis, pneumonia, epiglottitis, obstructive laryngitis, arthritis, cellulitis, osteomyelitis, pericarditis, and septicemia. In the case of meningitis, the onset is often rapid characterized by fever, vomiting, lethargy, meningeal irritation (bulging fontanel, neck stiffness). Without proper medical intervention, the disease could lead progressively to a coma. The mortality rate is between 2 to 5%.

2.9.4. Treatment

Treatment of Haemophilus influenza type b disease relies solely on the administration of appropriate antibiotics.

2.9.5. Prevention

Prevention is through vaccination against *Haemophilus influenza type b*.

2.10. Pneumococcal Infections

2.10.1. Definition

Pneumococcal infections are caused by *Streptococcus pneumonia* also known as pneumococcus. It is a bacterium that resides in the nose, throat and trachea capable of causing diseases such as pneumonia, sinuses, and otitis media. It is transmitted from person to person through infected respiratory droplets released when an infected person coughs or sneezes. Children less than 5 years, elderly persons, individuals who are immunocompromised are the most susceptible to the infection. Serious pneumococcal infections include pneumonia, meningitis, and febrile bacteremia.

2.10.2. Incubation Period

It has a short incubation period of 2 to 5 days.

2.10.3. Clinical Manifestation

Pneumococcal pneumonia is marked by a rapid onset with fever, difficulty in breathing, and sometimes with shivers and side chest pains.

2.10.4. Treatment

It is by the administration of appropriate antibiotics.

2.10.5. Prevention

Prevention is through vaccination against pneumococcal infections.

2.11. Meningococcal Infections

2.11.1. Definition

Meningococcal infections are caused by the bacteria called *Neisseria meningitidis***.** The infection is transmitted through direct contact with infected nasopharyngeal secretions from an infected person. Meningococcal meningitis is considered a medical emergency. The disease mostly affects children and young people who live in over-crowded settings.

2.11.2. Incubation Period

It has a short incubation period which is usually less than 4 days.

2.11.3. Clinical Manifestation

It is characterized by sudden headache, fever, neck stiffness, nausea, vomiting, discomfort in bright light (photophobia), confusion, drowsiness, irritability, bulging fontanel, and convulsions.

2.11.4. Treatment

Early treatment with of a combination of appropriate antibiotics could reduce mortality rate between 5 and10%. In the absence of treatment of meningitis in children the mortality rate can increase up to 50%.

2.11.5. Prevention

Prevention is through vaccination against meningococcal infections and by avoiding contact with infected persons.

2.12. Rotavirus Diarrhea

2.12.1. Definition

Rotavirus is a common cause of diarrheal diseases which could be severe among infant mostly those less than 1-year-old. It is a gastrointestinal infection characterized by the inflammation of the stomach wall and the intestine. It is a very contagious virus that destroys the intestinal wall, thereby affecting digestion and absorption of micronutrients. Infection is by fecal-oral transmission (when a healthy child ingests the virus orally from an infected object). A child infected by the Rotavirus can transmit the virus 3 to 5 days before the onset of diarrhea and up to 2 weeks after the stop of diarrhea.

2.12.2. Incubation Period

It has a short incubation period of 1 to 2 days.

2.12.3. Clinical Manifestation

It is characterized by fever of 38^{o}C and above, vomiting, and watery diarrhea. These symptoms subside in 3 to 7 days but could persist for 2 to 3 weeks. The severity of the Rotavirus infection is often related to severe dehydration in children below 2 years.

2.12.4. Treatment

Treatment is symptomatic with fluids and electrolytes replacement orally (ORS), or parenterally, and Zinc supplementation.

2.12.5. Prevention

It consists of vaccinating infants of less than one year against Rotavirus, in addition to proper food, environmental, and personal hygiene.

2.13. Rubella and Congenital Rubella Syndrome

2.13.1. Definition

Rubella is a common viral infection that affects children and generally accompanied with no signs and symptoms in 1 out of 2 cases. If the infection occurs in early pregnancy, the probability of viral transmission to the fetus is 90%. If the pregnancy is successful, the newborn can suffer from congenital rubella syndrome which may result in numerous congenital malformations such as deafness, cataract, cardiac and brain disorders.

Rubella is transmitted through infected droplets after an infected person coughs or sneezes.

2.13.2. Incubation Period

The incubation period can last 2 to 3 weeks.

2.13.3. Clinical Manifestation

It varies according to the different diseases namely:

a) **Rubella:** It is characterized by skin rash, mild fever, enlarged lymph nodes, joint pains and arthritis.
b) **Congenital Rubella Syndrome:** It occurs in the fetus and is manifested by serious malformations or diverse complications. The systems or organs mostly affected are the central nervous and cardiovascular systems, the eyes and the ears. Poor fetal development is equally observed.

2.13.4. Treatment

There is no specific treatment for rubella. Infected persons should be re-hydrated.

2.13.5. Prevention

It consists of vaccination against rubella virus.

2.14. Diseases caused by the Human Papilloma Virus

2.14.1. Definition

The Human Papilloma Virus (HPV) causes genital infections that most often are transmitted through unprotected sexual intercourse. Individuals with weak immune systems due to HIV infection or other causes are at a greater risk of acquiring the HPV. HPV is the cause of almost all cases of cervical cancer, at least 80% anal cancers and 40 to 60% vulva and penis cancers. Some types of HPV are only responsible of genital warts (vagina, cervix, anus and penis).

The HPV is easily spread through unprotected sexual intercourse. Sometimes it can be transmitted through the mucus and cutaneous membranes. The risk factors for the infection with HPV and developing cervical cancer are through early sexual relationships, having multiple sexual partners and smoking.

2.14.2. Incubation Period

It varies between 3 to 4months and could last up to 2 years.

2.14.3. Clinical Manifestation

HPV infections are usually asymptomatic. At the early stage of the infection, genital warts are characterized by painless flat lesions that are flower-like. At the advanced stage of cervical cancer, the symptoms consist of deterioration of the general status (tiredness, weight loss, loss of appetite), irregular vaginal bleeding, or bleeding after sexual intercourse, lower back pain, pelvic pain, pains in the lower limbs and foul-smelling vaginal discharge, etc.

2.14.4. Treatment

There is no known treatment for Human Papilloma Viral infections.

2.14.5. Prevention

It consists of vaccination of teenagers aged between 9 to 13 years (before their first sexual relationship).

2.15. Vitamin A Deficiency

2.15.1. Definition

Vitamin A deficiency (serum retinol < 0.7µg/dl) is the main preventable cause of blindness among children. It leads to severe visual disorders and blindness and could result in death if associated with other common childhood diseases such as measles and diarrhea. In pregnant women, vitamin A deficiency leads to night blindness and may lead to increased risk of maternal mortality. It occurs especially during the 3rd trimester of pregnancy. For breastfeeding mothers, vitamin A deficiency leads to low levels of vitamin A in breast milk and early exposure of the child to vitamin A deficiency.

2.15.2.Treatment

In the presence of signs of vitamin A deficiency such as Xerophthalmia, or in the case of measles, vitamin A supplementation according to the national protocol is the appropriate treatment.

2.15.3.Prevention

Breast milk is rich in vitamin A. Therefore, promoting exclusive breast-feeding contributes to prevent vitamin A deficiency as well as the consumption of food rich in vitamin A.

Administering vitamin A supplement to children below 5 years (every 6months) can reduce death rates. For women in immediate post-partum, vitamin A supplementation improves the level vitamin A in the breastmilk.

3 EPI VACCINES

Vaccines currently offered by the EPI in Cameroon are BCG, OPV, DTP-HepB-Hib, PCV-13, Rotarix, IPV, YFV, MR and Td. The country plans to introduce HPV, Men A and HepB birth dose vaccines.

3.1. Vaccine against Tuberculosis (BCG)

Objective	To prevent serious forms of tuberculosis.
Type and composition	Live-attenuated bacteria vaccine, derived from Bacillus Calmette and Guerin strain.
Presentation	**Pharmaceutical form**: Freeze-dried (powder to be reconstituted with a diluent); **Formulation**: Always alone (never in combination with other vaccines); **Number of doses per vial**: multi-dose vials(vials of 10 and 20 doses).
Mode of conservation	- Keep away from light and heat in a refrigerator whose temperature is maintained between+2° C and +8°C; - The vaccine should be used within 6 hours after reconstitution; - After 6 hours, another vial should be reconstituted; - Discard all opened vials at the end of the immunization session.
Mode of administration	- **Always use vaccine-specific diluent**; - **Route:** Strict intradermal injection (ID); - **Site** : External (or lateral) surface of the upper 1/3 of the left arm.
Dose	- **Dose :**0,05ml in children under 12 months.
Schedule	- **Single dose:** As soon as possible after birth and before the age of 12 months; - The screening by tuberculin test is no longer recommended.
Side effects	Possible local and loco-regional complications: - Ulceration or abscess at the injection site with or without discharge; - Satellite lymphadenopathy that could progress to calcification and fistulization; - Systemic complications: very rare cases of disseminated BCG disease or systemic BCGitis are reported, especially in a subject with immune deficiency.
Contraindication	- Generalized dermatitis at the site of the injection; - Allergy to one of the components of the vaccine; - Congenital or acquired immuno-depression; - Presence of signs of immunosuppression in children with HIV.

In summary:

- Administered at birth or soon after, BCG protects against severe forms of tuberculosis;
- BCG is a freeze-dried vaccine; it must be reconstituted;
- The reconstituted vaccine should be stored between +2°C and +8°C and discarded 6 hours after opening the vial or at the end of the vaccination session (if it ends before);
- A slight swelling may appear under the skin after injection which disappears within 30 minutes;
- A small red ulcer develops and heals spontaneously leaving a scar;
- BCG is not recommended after the age of 12 months;
- WHO recommends countries with high tuberculosis incidence to vaccinate as soon as possible after birth and to limit it to one vaccination per subject, and without any subsequent tuberculin screening.

3.2. Oral Vaccine against Poliomyelitis (OPV)

Objective	To induce individual and collective immunity against poliomyelitis.
Type and composition	Vaccine based on live attenuated viruses; Suspension containing live attenuated poliovirus type 1 and 3.
Presentation	**Pharmaceutical form:** liquid; **Presentation:** Always single (Never in combined form); **Number of doses per vial**: vial of 10 or 20 doses; (1 dose equals 2 drops) equipped with a dropper.
Mode of conservation	Fragile and heat sensitive. Must be kept: - Central level: in the negative cold room between -25°C and -15°C; - Regional level: in the positive cold room between +2°C and +8°C and also in the freezer/cold room between -25°C and -15°C; - Peripheral level : in the refrigerator between +2°C and +8°C.
Mode of administration	**Route**: Oral.
Dose	**Dose**: 2 drops deposited directly on the tongue without contact between the vial, the mouth and the tongue.
Schedule	4 doses required; all 4 different doses should be administered with a minimum interval of 4 weeks: - OPV 0: At birth or as soon as possible after birth; - OPV 1: At the age of 6 weeks; - OPV 2: At the age of 10 weeks; - OPV 3: at the age of 14 weeks.
Side effects	Exceptionally, paralysis in the vaccinated subject (PPAV) or in his/her entourage (cVDPV) (within 30 days after vaccination).
Contraindication	Congenital or acquired immunodeficiency with the exception of asymptomatic HIV infection.

NB: There are also monovalent OPV containing only type 1, type 2 or type 3.

Additional doses will be administered during Supplementary Immunization Activities (SIAs) to all children under 5, regardless of their immunization status.

3.3. Vaccine against Diphtheria, Tetanus, Whooping Cough, Viral Hepatitis B and Haemophilus Influenzae Type B (DTP-HepB-Hib) Infections or Pentavalent Vaccine

Objective	To prevent Diphtheria, tetanus, pertussis, viral Hepatitis B and *Haemophilus influenzae* type b infection.
Type and composition	Combined vaccines containing antigens against diphtheria, tetanus, whooping cough, viral hepatitis B and Haemophilus influenzae type B infections.
Presentation	**Pharmaceutical form**: Injectable liquid; **Number of doses per vial:** 10 doses.
Mode of conservation	- Fragile, sensitive to heat and specially to freeze; - Must not be frozen; - Must be stored at a temperature between+2°C and +8°C.
Mode of administration	**Route:** Deep intramuscular (IM); **Site:** Anterolateral aspect of the left thigh; **Dose:** 0,5 ml.
Schedule	**Three doses required:** All three different doses should be administered within a minimum interval of 4 weeks: - Penta 1: at the age of 6 weeks; - Penta 2: at the age of 10 weeks; - Penta 3: at the age of 14 weeks.
Side effects	- Redness, pain and hardening at the injection site may persist for 48 hours ; - Hyperthermia not exceeding 24 to 48 hours; - Convulsions may occur sometimes; - Rarely anaphylaxis or collapse.
Contraindication	None.

3.4. Vaccine against Pneumococcal Infections (PCV-13)

Objective	To prevent pneumococcal infections that cause pneumonia, meningitis, otitis medium, etc.
Type and composition	- Vaccine subunits; - Conjugated polysaccharide vaccine with 13 valences.
Presentation	**Pharmaceutical form**: liquid; **Number of doses per vial**: 4 doses.
Mode of conservation	- Fragile and heat sensitive especially when frozen; - Must not be frozen; - Must be stored between+2°C and +8°C.
Mode of administration	- **Route**: Intramuscular injection (IM); - **Site:** Injection on the antero-lateral side of the right thigh; - **Dose** : 0,5ml.
Schedule	**Three doses required:** The different doses should be administered with a minimum interval of 4 weeks: - PCV13-1: at the age of 6 weeks; - PCV13-2: at the age of 10 weeks; - PCV13-3: at the age of 14 weeks.
Side effects	- **General:** irritability, fever, headache, low appetite, diarrhea or vomiting; - **At site of administration:** pain, redness or swelling at the injection site. These manifestations generally disappear within 2 to 5 days.
Contraindication	- Hypersensitivity to the active substances or to any of the excipients (neomycin, etc.); - It is recommended to postpone vaccination if the child is moderately or severely ill or with a temperature ≥39°C.

3.5. Vaccine against Gastroenteritis Caused by Rotavirus

Objective	To prevent Rotavirus Gastroenteritis.
Type and composition	Live -attenuated vaccine of human Rotavirus.
Presentation	**Pharmaceutical form**: Liquid; **Valency**: It's not combined with other vaccines; **Number of doses per vial** : single dose.
Mode of conservation	- Must be refrigerated at +2°C and +8°C; - Must not be frozen.
Mode of administration	- **Route:** oral; - **Site:** the inner cheek. Administer the entire contents of the dosing applicator of the liquid vaccine into the infant's mouth toward the inner cheek until empty; - **Dose :** 1.5ml.
Schedule	Two doses respectively: - **Rota1:** at the age of 6 weeks; - **Rota2:** at the age of 10 weeks; In case of non-vaccination at 6 and 10 weeks, both doses can be administered before the age of 24 months with a minimum interval of 4 weeks.
Side effects	In general, the vaccine is friendly. However, the following signs and symptoms may be observed: - Loss of appetite and irritability; - Sometimes minor signs: fever with gastrointestinal symptoms (vomiting, diarrhea, bloody stool, abdominal pain, constipation, change in stool appearance); - Drowsiness; - Rhinorrhea; - Skin rash; - Muscle cramps; - Crying.
Contraindication	- Hypersensitivity to any of the components of the vaccine or previous vaccination; - History of intestinal intussusceptions; - Infant with severe immunodeficiency; Vaccine administration should be deferred in patients with acute severe febrile illness, diarrhea or vomiting.

3.6. Inactivated Polio Vaccine (IPV)

Objective	To induce individual immunity against Polio.
Type and composition	Suspension contains inactivated poliovirus types 1, 2 and 3.
Presentation	**Pharmaceutical form:** liquid; **Association:** exists alone or in combination with other vaccines; **Number of doses per vial**: 10 doses.
Mode of conservation	- Must be stored between +2°C and +8°C; - Fragile and sensitive to heat and especially freeze; - Must not be frozen.
Mode of administration	- **Route:** Deep intramuscular**;** - **Site:** Anterolateral aspect of the **right thigh, spaced at least 2.5cm or 2 fingers apart from the PCV-13;** - **Dose:** 0,5 ml.
Schedule	1 dose required at 14 weeks.
Side effects	Reported rarely : Swelling, redness at the injection site.
Contraindication	Allergy to streptomycin, neomycin, hemostasis disorder.

NB:

- Single dose at 14 weeks.
- It can be given to children with immunodeficiency and to premature infants

3.7. Vaccine against Yellow Fever (YFV)

Objective	To prevent yellow fever.
Type and composition	Live -attenuated virus vaccine.
Presentation	**Pharmaceutical form:** Lyophilized with a diluent vial for reconstitution; **Presentation:** Yellow fever vaccine not combined; **Number of doses per vial:** 10 doses.
Mode of conservation	- Must be stored between +2°C and +8°C; - Fragile and heat sensitive; - The diluent should be stored at room temperature and in the refrigerator at +2°C to +8°C for a few hours before use.
Mode of administration	- **Route:** Subcutaneous; - **Site:** at the level of the left thigh; - **Dose:** 0,5ml.
Schedule	A dose of Yellow fever vaccine (YFV) administered at 9 months of age.
Side effects	- Moderate fever; - Headache; - Encephalitis in very young children (Rarely); - Liver failure; - Rare reports of death due to massive multi-visceral failure.
Contraindication	- Egg allergy; - Immunodeficiency of drug origin or due to HIV/AIDS; - Do not administer until the age of 6 months; - Hypersensitivity reaction to an earlier dose; - Pregnancy.

3.8. Vaccine against Measles and Rubella (MR)

Objective	To prevent measles and Rubella.
Type and composition	Live -attenuated virus vaccine.
Presentation	**Pharmaceutical form:** lyophilized with a diluent vial for reconstitution; **Presentation:** Combined vaccines containing antigens against Measles and Rubella; **Number of doses per vial:** 10 doses.
Mode of conservation	- Fragile, sensitive to heat; - The diluent should be stored at room temperature and in the refrigerator at + 2°C to + 8°C for a few hours before use.
Mode of administration	- **Route:** subcutaneous; - **Site:** at the level of the right thigh; - **Dose:** 0.5ml.
Schedule	- A first dose of MR administered at 9 months of age; - A second dose of MR at 15 months.
Side effects	- Moderate fever; - Moderate cutaneous or skin eruption with or without fever that can appear between 8 and 12 days after vaccination; - Rarely, thrombocytopenia, anaphylactic shock, encephalitis.
Contraindication	- Acquired or Congenital Immune Deficiency; - Pregnancy (rubella vaccine); - Known allergy to vaccine components (including neomycin and gelatin) and egg white; - Severe reaction to a previous dose.

3.9. Vaccine against Viral Hepatitis B (HepB)

Objective	To prevent viral Hepatitis B.
Type and composition	Recombinant vaccine; Exists in two forms: - Vaccine obtained by purification of the viral envelope; - Vaccine obtained by genetic recombination technique.
Presentation	**Pharmaceutical form:** liquid **Presentation:** either alone (HepB) or combined with other vaccines such as pentavalent (DTP-HepB-Hib or other vaccines); **Number of doses per vial** : 10 doses.
Mode of conservation	- Must be stored between + 2°C and + 8°C; - Fragile, sensitive to heat and freezing; - Must not be frozen.
Mode of administration	- **Route:** Deep intra muscular; - **Site:** anterolateral aspect of the thigh of the new-born; - **Dose:** 0.5ml.
Schedule	**National schedule recommends 1 dose of monovalent HepB** vaccine within 24 hours or as soon as possible after birth.
Side effects	Rare and mild to local reaction type (pain, swelling, redness), fever.
Contraindication	Anaphylactic shock or hypersensitivity after a previous dose.

NB: Do not use DTP-HepB-Hib (Pentavalent) instead of HepB (monovalent) for the dose administered at birth.

3.10. Vaccine against Tetanus and Diphtheria (Td)

Objective	To prevent neonatal tetanus and diphtheria.
Type and composition	Attenuated (toxoid) and modified tetanus toxin combined to attenuated and modified diphtheria toxin.
Presentation	**Pharmaceutical form**: liquid; **Presentation:** anti-tetanus and anti-diphtheria vaccine; **Number of doses per vial**: 10 doses.
Mode of conservation	- Must be conserved between +2°C and +8°C; - Heat sensitive and mostly freezing; - Should not be frozen**.**
Mode of administration	- **Route:** Strictly intramuscular; - **Site**: at left deltoid; - **Dose** : 0,5ml.
Schedule	In women 5 doses are recommended: - Td1: First contact; - Td2: at least 4 weeks after Td1; - Td3: At least 6 months after Td2; - Td4: At least 1 year after Td3; - Td5 : At least 1 year after Td4.
	In women 3 doses are recommended If she had received 3 doses during her childhood: - Td1: First contact; - Td2: at least 4 weeks after Td1; - Td3 : At least 6 months after Td2.
Side effects	- Pain, redness and swelling at injection site; - Moderate fever possible during 24 to 48 hours.
Contraindication	Known hypersensitive or anaphylactic shock after a previous dose.

In summary:

- Never resume the nomenclature of subsequent vaccination doses with Td from zero;
- Continue the nomenclature of doses from the last dose received by a woman in the previous pregnancy.

3.11. Vaccine against Type A Meningococcal Meningitis (MenAfriVac)

Objective	To prevent meningococcal meningitis caused by serotype A.
Type and composition	Polysaccharide conjugate vaccine.
Presentation	**Pharmaceutical form:** lyophilized; **Formulation:** Always alone (never combine it); **Number of doses per vial:** 10 doses.
Mode of conservation	- Must be stored between +2°C and +8°C; - Freeze sensitive; - -the vaccine must be used within 6 hours following its reconstitution. After 6 hours, reconstitute another vial if need be; Discard all open vials at the end of the vaccination session.
Mode of administration	- **Route:** Strictly intramuscular; - **Site**: at left deltoid; - **Dose** : 0,5ml.
Schedule	A dose is required at 15months of age.
Side effects	- Pain, redness and swelling at injection site; - Moderate fever, possible between 24 to 48 hours; diarrhea, Irritability, vomiting, Anorexia, fatigue.
Contraindication	- Hypersensitivity to one of the product's components; - Pregnancy.

3.12. Vaccine against Human Papilloma Virus Infection (HPV)

Objective	To prevent cervical cancer due to HPV type 16 and 18 and infections (condyloma) due to HPV type 6 and 11.
Type and composition	Absorbent recombinant vaccine.
Presentation	**Pharmaceutical form**: liquid; Formulation: Injectable suspension containing purified proteins and not the virus (virus-like particles or VLP), for four types of human papilloma virus (types 6, 11, 16 and 18); **Number of doses per vial**: 10 doses.
Mode of Conservation	- Must be stored between +2°C and +8°C; - Heat and freeze sensitive; - **Should not be frozen.**
Mode of administration	- **Route:** Strictly intramuscular; - **Site**: at left deltoid; - **Dose**: 0,5ml.
Schedule	Two doses are recommended for young girls: - HPV-1: From the age of 9 years or later, but before 14 years; - HPV-2: at least 6 months after the first dose.
Side effects	Pain, redness and swelling at injection site ;
Contraindication	Known hypersensitivity.

4 EPI TARGET POPULATION

4.1. Definition of the Concept of EPI Target Population

The EPI target population refers to the age or category of the population to benefit from the service of the national vaccination program.

4.2. Classification of targets

According to the definition above, three types of target populations for the EPI can be distinguished:

- The targets for routine vaccination (children of 0 to 11 months and pregnant women);
- Targets for Supplementary immunization activities (SIAs);
- Particular targets (HPV, MR 2nd dose, women of childbearing age).

4.3. Methods to Calculate the Sizes of Target Populations

The size of the different target EPI population is estimated from demographic data obtained from populations and housing census.

Table 1: Proportion of the total corresponding population at the national level

Targets	Estimated Proportion of total annual population								
	2017	2018	2019	2020	2021	2022	2023	2024	2025
Live births	3,6	3,6	3,6	3,5	3,5	3,5	3,5	3,5	3,4
Surviving infants (0 to 11 m)	3,5	3,5	3,4	3,4	3,4	3,4	3,3	3,3	3,3
Children 0-59 months	15,7	15,6	15,5	15,4	15,4	15,3	15,2	15,1	15
Children 0-15 years	43,6	43,4	43,3	43	42,7	42,5	42,4	42,2	42
Children 9-59 months (**SIAS/MR**)	13,2	13,1	13,1	13	13	12,9	12,9	12,8	12,7
Children 12-59 months (**AVS/Mebendazole**)	12,2	12,1	12,1	12	12	11,9	11,9	11,8	11,7
2nd MR targets (**children aged 15 months**)	3,5	3,5	3,4	3,4	3,4	3,4	3,3	3,3	3,3
Pregnant women	3,7	3,7	3,7	3,6	3,6	3,6	3,6	3,6	3,5
Women of child bearing age (15-49 years)	24,9	24,9	25,1	25	25,1	25,2	25,3	25,4	25,1
HPV targets	12,1	12	12	11,9	11,9	11,9	11,8	11,8	11,7

NB : These data are subject to change based on the general population census data.

Example:

Calculate EPI target population for a health district with a total population of 95 000 inhabitants, which is located in a region X where proportion of live births in 2018 is 3,6%, surviving infants is 3,5% and pregnant women is 3,7%.

The calculations are as below:

- Live births : this annual population target for the year 2018 will be equal to 95 000 x 3,6% = 3 420 children ;
- Surviving Infants (0-11months) : this annual population target will be equal to 95 000 x 3,5% = 3 325 children ;
- The annual population target for pregnant women will be equal to 95 000 x 3,7% = 3 515 women.

It should be noted that, unvaccinated children older than one year are expected to be reached within the framework of Integrated Management of Childhood Illnesses (IMCI) and could receive all EPI vaccines except BCG, which is administered only to children below one year. However, they will not be considered while calculating EPI vaccination coverage.

5 VACCINATION SERVICE DELIVERIES

5.1. Routine Vaccination or Systematic Vaccination

Routine vaccination should be practiced by all health facilities, in a fixed/static, outreach or mobile strategy, according to a pre-established schedule planned in collaboration with the community. This ensures the effective administration of vaccines included in the vaccination schedule of various targets.

At the end of the monthly monitoring meetings, catch-up activities should be systematically conducted with the aim of reaching the missed children during the routine immunization for that month.

5.2. Supplementary Immunization Activities (SIAs)

These are the immunization activities carried outside the routine activities in order to strengthen the collective immunity of the population. They can be programmed as part of the strategy to eliminate certain diseases, or as a response to disease outbreak. Supplementary immunization activities give the possibility of reaching a high coverage of the target population in a relatively short time (a few days). For example:

- **Polio Eradication:** In the context of polio eradication, National Immunization Days (NIDs) or Local Immunization Days (LIDs) can be organized. The aim may be to stop the circulation of the virus during epidemic (response campaign) or to improve the immunity coverage of a high-risk population (preventive campaign). These activities are limited in time and cover the entire national territory (NID) or just part (LID).

- **Measles Control:** For measles control, campaigns are organized continuously in epidemic districts or in districts with outbreaks. The country also organizes follow-up and catch-up campaigns with a frequency that depends on the speed and built-up of the population of susceptible children such as those un-immunized.

- **Yellow Fever Control:** Preventive or response campaigns targeting persons aged 9 months and above are also organized.

- **Maintenance of MNT Elimination Status:** Supplementary immunization activities targeting women of childbearing age (15-49 years) in high-risk Health Districts that do not meet the elimination threshold are organized. In addition to this, there is the organization of response SIAs following confirmation of new cases.

6 VACCINATION STRATEGIES

6.1. Routine vaccination strategies

6.1.1. Fixed Vaccination Strategy

These are vaccination sessions organized at the level of a public or private health facility (HF), according to a pre-established program, and concerns target group which lives near the HF (within a radius of less than 5 km) or which has easy access (less than an hour of trekking). Health facilities with a functioning cold chain are expected to provide daily immunization services.

As vaccination is integrated into the Minimum Package of Activity (MPA), any HF enrolled in the vaccination system is considered as a fixed immunization center.

6.1.2. Outreach Vaccination Strategy

These are vaccination sessions organized outside a health facility for part of its population that is located far from it (between 5 and 15 km radius or beyond trekking time), or where geographical access to the HF is not easy. However, depending on the specificities of the area concerned, outreach activities can be carried out within a radius of less than 5 km.

The HF staff travels to a specific point in the village or neighborhood following a program of visits agreed on between the immunization staff and the communities concerned. Teams must travel to the sites and return to the health facility the same day. This session requires not only vaccines but also:

- ❖ vaccine carriers /coolers, cold packs or ice packs;
- ❖ Transportation means and fuel;
- ❖ Trained staff (vaccinator and social mobilizer).

The outreach, far from being limited only to immunization activities, may also involve other services in the Minimum Package of Activity (MPA). It is recommended to organize an outreach immunization service at least once a month at each outreach immunization post (village or neighborhood).

6.1.3. Mobile Vaccination Strategy

Mobile vaccination strategy consists of traveling to one or more remote locations (beyond 15 km from the HF) to spend several days for outreach vaccination and other health activities. Its implementation follows the same principles as those of the outreach activities.

6.1.4. Vaccination in a temporary fixed post

Vaccination in a temporary fixed post consists of installing a vaccination post in the community (school, station, market, etc.) for a fixed period of time. It brings the community closer to immunization services and other services in the Minimum Package of Activity (MPA).

6.2. Additional vaccination strategies

6.2.1. Door to Door

Vaccinators travel to households to administer vaccines to children of the targeted group.

6.2.2. Fixed or Temporary Fixed Post for Injectable Vaccines during Campaigns

Vaccination in a temporary fixed post consists of installing a vaccination post in the community (school, station, market, etc.) or in a health facility during the campaign period.

6.2.3. Special Vaccination Strategies

Special vaccination strategies are used during supplementary immunization activities. Among these sessions, the most frequently used are: hit and run, permanent health team, fire walling, vaccination in train stations, toll stations, markets, churches, fields, borders.

These sessions aim to ensure access to vaccines for the entire target population.

Hit and run, permanent health team and the fire walling are strategies that help to reach people living in insecure areas.

7 VACCINATION SCHEDULE

7.1. Introduction

The EPI vaccination schedule/calendar identifies vaccines that are applicable to eligible persons according to age and makes general vaccination recommendations, including specific recommendations for immuno-compromised and severely sick persons. The objective is to administer the intended vaccines in six contacts before the age of 24 months while respecting the time intervals between doses.

A child under one year is considered completely vaccinated if he has received all doses of the scheduled vaccines while respecting minimum time interval between doses. It is recommended to vaccinate children within the specified time interval, through the correct route of administration and with standard quality of vaccine according to the schedule below;

Adolescent girls 9 to 14 years are considered fully and adequately immunized against HPV after receiving two doses of the HPV vaccine within an interval of six months.

NB: A series of **INTERRUPTED** vaccinations must never be **REPEATED.**

The vaccination schedule could be modified depending on the introduction of new vaccines into the EPI.

7.2. Children vaccination schedule/calendar

Each child has an individual vaccination program. To develop a comprehensive program for the first 6 contacts, it is important to correctly determine the age and situation of vaccines that the child has already received.

7.3. Evaluation of a child's age

To determine the age of the child, it is necessary to refer to documents such as: Birth Notification, birth certificate, baptismal card etc. or, as in certain cases, the parents' verbal declarations.

7.4. Evaluation of children's vaccination status

With regard to the immunization status of the child or vaccines already received, it is recommended that immunization staff refer the immunization records kept in the health facility, or the vaccination card (the correct path to health) held by the parent, or as in certain cases, to the verbal declarations of the latter.

Table 2: Routine Vaccination schedule

Vaccination Schedule for children 0 to 24 months:				
Contacts	**Age**	**Vaccines**	**Route of administration**	**Preventable diseases**
1st Contact	At birth	BCG	Intradermal	Tuberculosis
		OPV 0	Oral	Poliomyelitis
		HepB 0	IM	Viral hepatitis B
2nd Contact	6 Weeks	DTP-HepB1-Hib1	Intramuscular	Diphtheria, Tetanus, Pertussis, Viral Hepatitis B, Haemophilus influenza b infections
		OPV-1	Oral	Poliomyelitis
		Pneumo 13-1	Intramuscular	Pneumococcal infections
		ROTA 1	Oral	Rotavirus diarrhea
3rd Contact	10 Weeks	DTP-HepB2-Hib 2	Intramuscular	Diphtheria, Tetanus, Pertussis, Viral Hepatitis B, Haemophilus influenza type b infections
		OPV 2	Oral	poliomyelitis
		Pneumo13-2	Intramuscular	Pneumococcal infections
		ROTA 2	Oral	Rotavirus diarrhea
4th Contact	14 Weeks	DTP-HepB3-Hib 3 Pneumo 13-3	Intramuscular	Diphtheria, Tetanus, Pertussis, Viral Hepatitis B, Haemophilus influenza type b infections
		OPV 3	Oral	Poliomyelitis
		IPV	Intramuscular	Poliomyelitis
		Pneumo13-3	Intramuscular	Pneumococcal infections
5th Contact	6-11 Months	Vit A	Oral	Vitamin A deficiency
	9 Months	MR 1	Subcutaneous	Measles, Rubella
		YFV	Subcutaneous	Yellow Fever
6th Contact	15-24 Months	MR 2	Subcutaneous	Measles, Rubella, MenAfriVac

Example 1:

For a first contact with a new born, the immunization status of the child is "zero vaccine," therefore:

a) Administer BCG,
b) Administer the birth dose of poliomyelitis (OPV 0),
c) Administer the birth dose against viral hepatitis B (HepB 0),
d) Fix the date of the appointment for the next contact (at 6 weeks from birth) taking into account the plan of the immunization sessions in the health facility,
e) Record the following information in the register or documents prepared for this purpose: the effective date of the current vaccination, the name of the vaccine administered, the date of the next appointment, the reason for the appointment, and any other comments deemed necessary by the health staff,
f) Inform the child's mother on the vaccines received, the diseases they prevent, the date and reason for the next appointment, the likely post-vaccination reactions and the action to be taken.

Example 2:

If on the other hand, during the contact it is clear that the child has probably received one or more doses of vaccine during previous contacts, it will be necessary to:

a) Evaluate the immunization status of the child;
b) Administer the missing dose (s) according to the official vaccination schedule;
c) Set the date of the next appointment while taking into account the plan of the immunization sessions in the health facility;
d) Record the following information in the register or documents prepared for this purpose: the effective date of the current vaccination, the name of the vaccine administered, the date of the next appointment, the reason for the appointment, and any other comments deemed necessary by health staff;
e) Inform the parent of the child about the date of the next appointment and the vaccine to be administered.

7.5. Vaccination schedule/calendar for pregnant women

Pregnant women should continue and complete their vaccination against tetanus. They are advised to be vaccinated during the 1st antenatal consultation of their first pregnancy. The timing of vaccination for pregnant women depends on the number of doses of tetanus toxoid vaccine received during childhood and adolescence. Tables 3 and 4 below present the different proposed guidelines for the administration of tetanus and diphtheria (Td) vaccine;

Table 3: Tetanus immunization schedule for pregnant women who received 3 doses of DTP/Penta during childhood (verify the vaccination card)

Dose of Td	Schedule	Duration of Protection
Td1	At first contact or as soon as possible during pregnancy.	None
Td2	At least 4 weeks after Td1 and 2 weeks before delivery.	1-3 years
Td3	At least 6 months after Td2 or during a subsequent pregnancy.	For all reproductive years

Table 4 : Tetanus immunization schedule for pregnant women who did not receive any dose of DTP/Penta during childhood or are not able to prove that they were previously immunized

Dose of Td	Schedule	Duration of Protection
Td1	At first contact or as soon as possible during pregnancy	None
Td2	At least 4 weeks after Td1	1-3 years
Td3	At least 6 months after Td2 or during a subsequent pregnancy	At least 5 years
Td4	At least 1 year after Td3 or during a subsequent pregnancy	At least 10 years
Td5	At least 1 year after Td4 or during a subsequent pregnancy.	For all reproductive years and possibly longer.

The number of Td doses to be administered to any non-pregnant woman seeking Tetanus vaccination varies according to the number of doses of DTP or DTP-HepB-Hib received during childhood and adolescence.

Table 5: Guidelines for tetanus immunization of any non-pregnant woman, vaccinated as infant, child or adolescent

Age of Last Vaccination	Previous Vaccinations (Documented)	Recommended protocol at the time of contact	
		At the moment of the current contact	One year after the current contact
Infant	3 DTP/Penta	2 doses of Td, i.e. Td1 and Td2 (at least 4 weeks apart between doses)	1 dose of Td3
School Age (From 9 Years Old)	3 DTP/Penta + 1 Td	1 dose of Td or Td2	1 dose of Td3

7.6. Adolescent Immunization Schedule/calendar (HPV and Td)

The vaccines to be given to adolescent girls are the vaccines against HPV and tetanus toxoid. These 2 vaccines will be administered at 9 years of age, in 2 doses with 6 months' interval.

Table 6: Adolescent Vaccination Schedule

Contacts	Age	Vaccines	Route of Administration	Preventable Diseases
1st Contact	9 Years	HPV vaccine	Subcutaneous	HPV infections
		Td	Strictly intramuscular	
2nd Contact	6 months after first contact	HPV vaccine	Subcutaneous	Tetanus, Diphtheria
		Td	Strictly intramuscular	

NB: For any woman in immediate postpartum period (0-8 weeks after birth) give 1 capsule of Vit A 200 000 IU, to be repeated 24 hours later.

The health professional must always communicate the **time**, **place** and **reason** for the next appointment to the mother; the presence of the mother for this appointment is important, it must be confirmed during this discussion.

In principle, the daily vaccination strategy minimizes missed opportunities at least at first contact. However, the practice of daily vaccination should be adjusted to the rate of attendance or the population served.

The impact of the implementation of this strategy should be analyzed so as to make a balance between the increases in immunization coverage rates and vaccine consumption rates.

7.7. Vaccination of HIV-infected children and Pregnant Women

In principle, live vaccines should not be administered to people with innate or acquired immune deficiency due to HIV, malignancy, immunosuppressive therapy or radiation therapy.

However, it is recommended that all EPI vaccines except BCG (for which the decision to administer it is based on local risk) be administered as soon as possible to asymptomatic infants and children known or presumed to be at risk including those infected with HIV.

Because of the high risk of early and severe measles in these infants, they will receive one dose of measles vaccine at 6 months and a second dose as soon as they are over 9 months old.

For BCG, the decision whether or not to give it depends on the risk of tuberculosis at the local level. When the risk of contracting TB is high, it is recommended that BCG be given at birth.

Children with symptomatic HIV infection are eligible for all EPI vaccines except BCG and yellow fever vaccine.

Table 7: Recommended Schedule for Vaccination of Children Born To HIV-Positive Mothers

Vaccines	Asymptomatic HIV Infection	Symptomatic HIV Infection	Best Time For Vaccination
BCG	YES	NO	Birth
HepB0	YES	YES	Birth
DTP-HepB-Hib, Pneumo-13	YES	YES	6, 10, 14 Weeks
OPV[1]	YES	YES	0, 6, 10, 14 Weeks
IPV	YES	YES	14 Weeks
ROTA	YES	YES	6, 10 Weeks
Td	YES	YES	6, 10, 14 Weeks
MR	YES	YES	9 and 15 Months
YFV	YES	NO	9 Months
Vitamin A	YES	YES	From 6 months
MenAfriVac	YES	YES	15 Months

7.8. The minimum Interval Between the Administration of Doses of the Same Vaccine

The minimum interval between two successive doses is 28 days, which allows an adequate immune response (sero-conversion). Two doses of the same vaccine should be avoided at intervals of less than 28 days. A dose administered under these conditions should not be taken into account in the vaccination series.

On the other hand, if the interval between two injections is longer than 28 days, the protection will be correct and it is not necessary to administer additional doses nor restart the schedule.

It is important to complete immunization at an early age and to protect the child before they reach the age when they might be at high risk of the infection. When vaccination has not been given according to the indicated ages, all the missing antigens should be given as soon as the opportunity arises.

For women, the first contact is during pregnancy, then after delivery, they will continue their series of vaccination until Td3.

It is crucial to respect the minimum interval of 28 days between 2 doses otherwise the vaccine administered is invalid. However, there is no maximum interval between two doses. We must not repeat doses after interruptions, we must only complete it from where it stopped.

NB: Never vaccinate before the planned ages. Otherwise, the vaccines is invalid, because maternal antibodies present till about 6 months in the child may compromise his immune response.

[1]Can be replaced by IPV in case of symptomatic HIV infection

8 TECHNIQUES AND ROUTES OF VACCINE ADMINISTRATION

Each vaccine should be strictly administered according to the manufacturer's instructions, in order to optimize immune response and minimize AEFI. EPI vaccines are administered orally or parenterally.

Memory Aid

Before each administration of the vaccine, the following procedure should always be executed by the health personnel:

Before administration

- Check the vaccination record and / or the child's record to obtain vaccination status.
- Determine the vaccines to be administered.
- Wash your hands before handling equipment.
- Prepare the equipment required to carry out the vaccination.
- Take note of the characteristics of the product to be administered.
- Make sure the temperature of the diluent is the same as that of the vaccine before administration.
- Use diluent from the same manufacturer.
- Do not pre-fill syringes to reduce the risk of contamination or misadministration and loss of vaccine.

During administration

- Check the expiry date and the VVM stage.
- Use a separate self-locking syringe for each injection.
- Use a dilution syringe for each vial of vaccine.
- Reconstitute the products as indicated by the manufacturer.
- Reconstitute only one vial of the same vaccine at a time.
- Do not mix different vaccines in the same syringe.
- Administer the vaccine according to the recommended schedule (age, route of administration, dose and interval between doses).
- Administer vaccines as soon as possible after reconstitution.

After administration or after the vaccination session:

- Discard all reconstituted vaccines at the end of the immunization session or 6 hours after opening.
- Liquid vaccines (Td, Penta, IPV, OPV) can be stored and used within 28 days if and only if the following conditions are met: Vaccine vial monitors (VVMs) has not reached the point to be discarded, not expired, not been exposed to cold and heat and not soiled.

8.1. Oral Administration

8.1.1. Administration of Oral Polio Vaccine

- ❖ Use a dropper or the device provided with the vaccines;
- ❖ Open the child's mouth;
- ❖ Directly deposit 2 drops on the tongue without contact between the vial, the mouth and the tongue.

Figure 2: Administration of OPV

NB: In case of simultaneous administration of an injectable vaccine (DTP-HepB-Hib) and an oral vaccine (OPV), always start with the oral vaccine because after an injection, the child can cry which will make the administration of the oral vaccine difficult.

8.1.2. Administration of Rotavirus Vaccine

- ❖ Follow the instructions given by the manufacturer for opening the vial.
- ❖ Keep the child in a semi-inclined position to take the vaccine.
- ❖ Carefully open the child's mouth by pressing on both cheeks at the same time.
- ❖ Tilt the tube to the inside of a cheek.
- ❖ Administer the entire vaccine by gently squeezing the tube.
- ❖ Make sure the child swallows the vaccine.

Figure 3a: Position for the child

Figure 3b: Administration of Rotavirus vaccine

Figure 3: Position of the child and administration of rotavirus vaccine

8.2. Parenteral administration

To administer the vaccine parenterally, the following material is required:

- Clean tray;
- Vaccine and diluent;
- self-locking disposable safety syringe;
- Dilution syringe;
- Cotton;
- Clean water to clean the injection site;
- Soap for washing hands;
- Security boxes;
- Adrenaline;
- Garbage bags;
- Lime.

8.2.1. Procedures for Reconstitution of Lyophilized Vaccines (BCG, YFV and MR)

For vaccine vials with VVM:

- Double check the VVM status;
- Make sure the expiry date has not passed;
- Open the vial. If the cap is metallic, use a file to lift the pre-cut core and fold it down; if it is plastic, lift it with your thumb or slowly turn it, according to the instructions for this type of vial;
- Open the vial by holding it between the thumb and middle finger of the left hand and holding the upper part with the index finger; with the right hand filing the neck of the vial, then without forcing, separate the upper part taking care not to hurt yourself with the sharp parts of the glass (see Figure 4 below);
- In case you get hurt, discard the vial as it may have been contaminated. Protect the wound before opening a new vial;
- Extract the entire diluent with a needle and a reconstitution syringe;
- Insert the syringe needle of the reconstitution syringe into the vial of vaccine and empty the entire contents; gently press the plunger of the syringe to prevent bubbles from forming inside the vial;
- Extract and gently re-insert the contents of the vial several times to mix the vaccine properly with the diluent, or gently shake the vial to mix the vaccine and the diluent. Take care not to touch the membrane or the rubber opening. Remove the needle and the reconstitution syringe and dispose of them in the safety box. (**Never recap a used needle**);
- Put the reconstituted vaccine vial into the foam pad of your vaccine carrier.

Some Things to Remember About Diluents

- ❖ Always use diluents from the same manufacturer as the vaccines.
- ❖ Diluents are not interchangeable: Use only the diluent supplied by the manufacturer for each vaccine – check the labels. The administration of a vaccine mixed with an incorrect diluent can result in severe adverse events and even death.
- ❖ Diluents must be cooled before reconstitution.
- ❖ Reconstitute vaccines with the diluent just before using them.
- ❖ Handle reconstituted vaccines in accordance with WHO multi-dose vial policy.

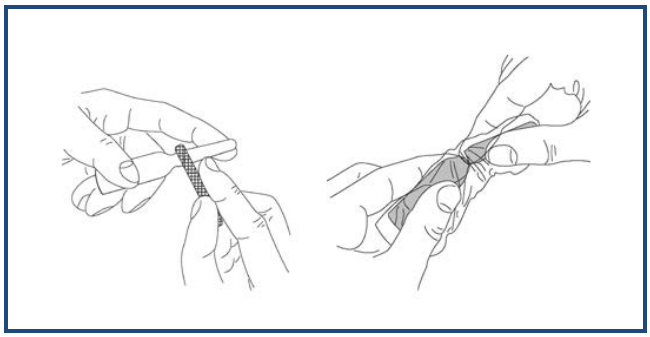

Figure 4: File and break the neck of the vial

8.2.2. Vaccine Injection Procedures

1. Wash the skin with clean water. Do not use alcohol to clean the skin before vaccination.
2. Hold the syringe barrel between your thumb, forefinger and middle finger. Do not touch the needle.
3. For intradermal injection (ID): Gently stretch the skin of the left forearm (upper third) and hold it with your thumb and forefinger. Lay the syringe and needle almost flat against the infant's skin and gently insert the needle into the upper layer of skin or epidermis (see Figure 5).
4. For subcutaneous injection (SC): lightly pinch the skin of the left thigh (child under 15 months) or left shoulder (child over 15 months), then insert the entire needle at a 45 ° angle (see Figure 5).
5. For intramuscular injection (IM): Gently stretch the skin of the left or right thigh (anteroposterior) and hold it with your thumb and forefinger, then push the entire needle in at a 90° angle with a quick, smooth action (see Figure 5).
6. For all injections, depress the plunger slowly and smoothly, taking care not to move the syringe around.
7. For all injections, pull the needle out quickly and smoothly at the same angle that it went in.
8. For all injections, the parent/caregiver may hold a clean swab gently over the site if it bleeds after injection.
9. For all injections, dispose of the needle and syringe immediately in the safety box without recapping the needle.
10. For all injections, soothe and distract the child when all the vaccines have been given.

Reminder concerning the proper injection technique

A good injection technique involves the administration of all injectable vaccines with a Self-Locking Syringe (SLS). To correctly use a SLS, remember that the plunger of this type of syringe can only move once; therefore, when filling the BSA, do not draw air into the vaccine vial.

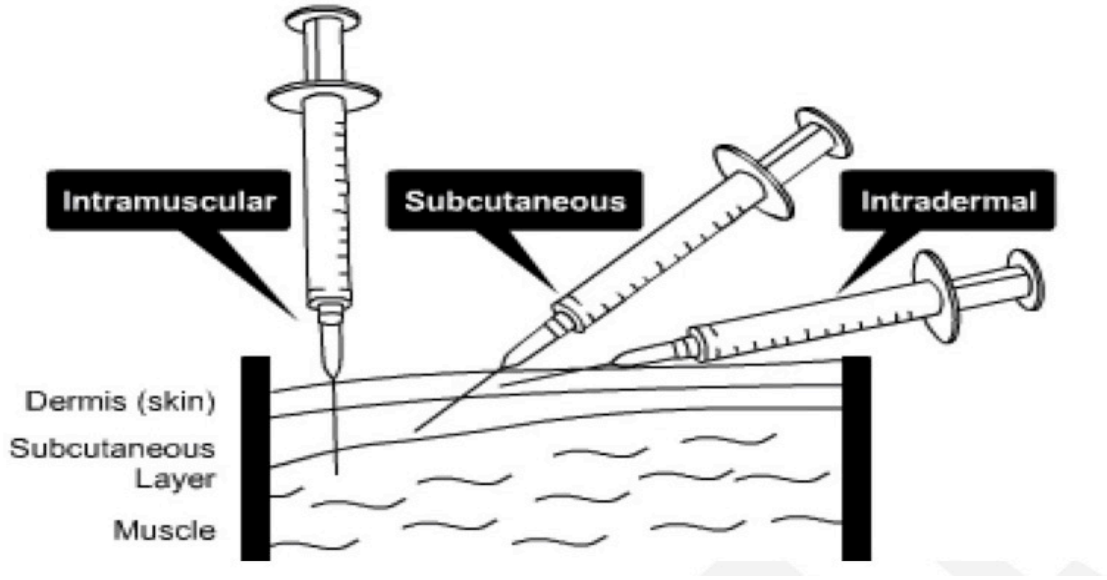

Figure 5: Needle position corresponding to ID, SC and IM injections

8.2.3. Intramuscular Injection Technique to an Infant

❖ **Position**

The position to be adopted depends on the age of the child, the number of vaccinations to be administered and the posture that is easier and more convenient for the vaccinator.

❖ **Administration**

- Hold the syringe barrel between the thumb, forefinger and middle finger of the right hand; with the bevel (hole) of the needle facing upwards;
- Gently stretch the skin on the upper third of the left or right thigh with the left hand and quickly push the needle at a 90 ° angle down through the skin into the muscle;
- Depress the plunger smoothly, taking care not to move the needle under the skin;
- Pull the needle out quickly and smoothly at the same angle as it went in;
- The parent or caretaker may hold a clean swab gently over the site if it is bleeding. Do not rub or massage this sore part;
- Calm and distract the infant.

❖ **Elimination**

Throw the needle and syringe directly into the safety box.

WHO Recommendations for the Administration of IPV and Multiple IM Injections

❖ For IM injections in infants younger than 12 months, the left deltoid (shoulder)

should not be used as an injection site because of insufficient muscle mass.

- ❖ When three IM injections are planned for an infant under 12 months of age at the same immunization session, it is safe and correct to give two injections in the same thigh as follows.

RIGHT leg: PCV-13 + IPV, at a distance of 2.5 cm or two fingers (see Figure 6b).

Figure 6a: Intramuscular injection

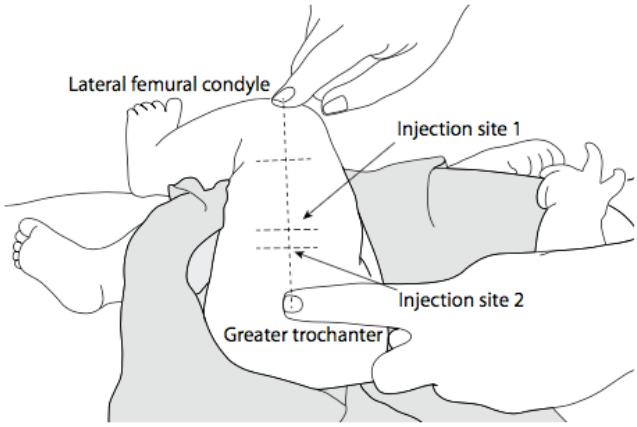

Figure 6b: Intramuscular injection sites

Figure 6: Intramuscular injection in infants

8.2.4. Intravenous (IM) Pentavalent, PCV-13 and IPV Administration

For infants under 15 months, the deltoid muscle of the shoulder is not safe because it is not sufficiently developed to absorb the vaccine, and the radial nerve is located too close to the surface. However, it is possible to vaccinate older children, adolescents and adults in that muscle.

On the other hand, the muscle of the outer part of the upper thigh is larger and presents no danger with regard to intramuscular injections: see Figures 6a and 6b.

8.2.4.1. Intramuscular Administration of PCV-13

- ❖ Disinfect the skin at the injection site with a cotton swab moistened with clean water.
- ❖ With the fingers of one hand, spread the skin of the middle antero-lateral surface of the right thigh.
- ❖ Inject with an instant insertion of needle at the injection site.
- ❖ Push the plunger slowly and empty the vaccine.
- ❖ Remove the needle.
- ❖ Press the injection site lightly with dry cotton.

8.2.4.2. Intramuscular Administration of IPV

- ❖ Disinfect the skin at the injection site with a cotton swab moistened with clean water.
- ❖ With the fingers of one hand, spread the skin of the middle antero-lateral surface of the right thigh.

- ❖ Inject with an instant insertion of needle at the injection site.
- ❖ Respect a gap of 2.5 cm or two fingers between the injection point of PCV-13 and IPV.
- ❖ Push the plunger slowly and empty the vaccine.
- ❖ Remove the needle.
- ❖ Press the injection site lightly with dry cotton.

8.2.5. Intradermal Vaccination Technique for BCG

- ❖ **Position**

Place the child in a snuggle position on the parent's or caregiver's lap (BCG is only recommended for infants under 12 months of age).

- ❖ **Administration**

- Hold the barrel of the syringe between the thumb, forefinger and middle finger of the right hand with the bevel (hole) of the needle facing upwards;
- Place the syringe and needle almost flat on the infant's skin;
- Insert the tip of the needle under the surface of the skin just past the bevel;
- Keep the needle close to the skin at the same angle as it was inserted;
- Place the left thumb on the lower end of the syringe near the needle to hold the needle in position, but do not touch the needle;
- Gently press the plunger. If you do not feel any resistance from the plunger, this means that you are not in the right position and you need to resume the operation;
- A pale flat-topped swelling with small pits like an orange peel should appear on the skin;
- Carefully remove the needle smoothly at the same angle as it went in;
- The parent or caregiver may hold a clean swab gently over the site if it is bleeding. Do not rub or massage the area;
- Calm the infant.

- ❖ **Waste disposal**

Throw the needle and syringe directly into the safety box.

NB: If an intradermal injection is performed correctly, the plunger of the syringe is hard to push. If the piston penetrates too easily, it may be that the injection is too deep into the skin. In such a situation, stop the injection immediately, correct the position of the needle and administer the rest of the dose.

If the entire dose has already penetrated under the skin, include the infant among the vaccinated persons even if the vaccine was administered subcutaneously and not intradermal. Do not repeat the dose.

The risk of side effects, such as abscess or swollen lymph nodes, is increased when the vaccine is not administered properly. It is therefore important to proceed with care. It is best to use a supervisor or other more experienced colleagues than to administer BCG wrongly.

8.2.6. Subcutaneous Injection Technique in Children

❖ **Position**

The position to adopt depends on the age of the child, the number of vaccines to be administered and the convenience of the vaccinator.

❖ **Administration**

- Hold the syringe between the thumb, forefinger and middle finger of the right hand, with the bevel (hole) of the needle facing upwards;
- Push the needle quickly into the skin that you have pinched; the needle should be pointing towards the shoulder at an angle of 45;
- Gently press on the plunger, be careful that the needle does not move under the skin;
- Cautiously and quickly pull out the needle at the same angle as that injected;
- The parent or caretaker can gently squeeze clean cotton on the injection site if he or she is bleeding. Do not rub or massage this sore part;
- Calm and distract the infant.

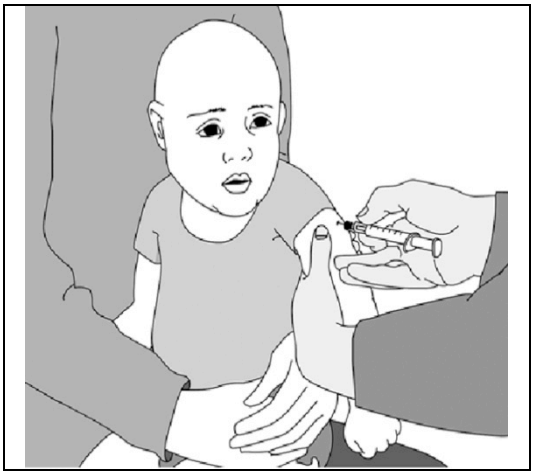

Figure 7: Sub-cutaneous administration

❖ **Waste disposal**

Throw the needle and syringe directly into the safety box.

NB: The child's care giver should be informed that the child may be feverish at night and that they don't need to be worried.

8.2.6.1. Subcutaneous Administration of Measles + Rubella (MR) Vaccine and YFV

❖ **Reconstitution**

- Open the 2 vials: diluent and vaccine;
- Use a dilution syringe to aspirate the required amount of the diluent as recommended by the vaccine manufacturer (use a single-use 5 ml syringe);
- Always use the diluent and MR vaccine received from the same manufacturer;
- Transfer the diluent from the syringe into the vial containing the vaccine;
- Mix the diluent and the vaccine thoroughly by carefully stirring the vial (without shaking) until the mixture is homogeneous.

❖ **Injection**

The injection is administered in the subcutaneous tissue, at the left (deltoid) shoulder.

Table 8: Summary of Administration Routes of Vaccination

Order of Vaccine Administration	Route of Vaccination	Vaccine

1	Oral	Rotarix, OPV
2	Sub-cutaneous (SC)	MR, YFV
3	Intradermal (ID)	BCG
4	Intramuscular (IM)	IPV, PCV-13, Penta, MenAfriVac

8.2.7. Intramuscular Injection Technique in Adolescents and Adults

- Unlike infants, adolescents and adults may suffer stress of anticipation prior to immunization. If they have had a previous bad experience, this anxiety may be more severe;
- If an individual is crying, pale or showing any other signs of distress, it is best to take them aside to be reassured, comforted and immunized first to reduce the potential for anxiety to spread among the others;
- Allow time for discussion about the vaccine and the disease(s) it protects against, if this is what is wanted. Ask if there are any questions. Complete your own pre- immunization check;
- In line with the national guidelines, allow the person to choose in which arm they would like to receive the injection. Choice gives a feeling of being in control in what may be a frightening situation for them;
- Talk quietly and be patient. They might like to have a support person with them, or a fellow vaccinator who is able to calm and distract them;
- Provide privacy for the administration of vaccines; a screen, even if just a curtain, will help;
- Explain what you will do when you are going to give the injection and how it may feel. Some will compare it to a minor sting or prickle. Use words such as booster rather than needle or shot.

- **Position**

Most will be comfortable sitting on a chair Those who are known to be prone to fainting may feel better lying down.

- **Administration**

  - With your palm resting on the subject's shoulder, hold the injection site gently with your thumb and forefinger. This touch is comforting to the person and it will alert you of any potential movement;
  - Talk about how important it is for them to remain still and then distract them by chatting about non-related subjects like their favorite school subject or hobby;
  - While holding the barrel of the syringe as if you are throwing an arrow, cautiously and quickly push the needle in at a 90° angle until it enters the muscle. Meanwhile, do not stop talking. Distracting the person can reduce any unpleasant sensation associated with an injection;
  - Gently and cautiously press the plunger, being careful not to move the needle;
  - Remove the needle quickly and gently at the same angle as when you have injected;
  - Do not rub the arm. Press the injection site with clean cotton swab;
  - Comfort, reassure, and distract the patient.

- **Waste disposal**

Throw the needle and syringe directly into the safety box.

8.2.7.1. Intramuscular Administration of HPV Vaccine

- ❖ The deltoid muscle of the left arm is the recommended site for the administration of HPV vaccine.
- ❖ Grab the skin of the lateral side of the left arm using your fingers.
- ❖ The angle of intramuscular injection is 90 degrees.
- ❖ Gently press the plunger and inject 0.5 ml of vaccine.
- ❖ Remove the needle.
- ❖ Press the injection site lightly with dry cotton swab.

8.2.7.2. Intramuscular Administration of Combined Tetanus + Diphtheria Vaccine in Pregnant Women (Td)

- ❖ Administer the vaccine in the left deltoid.
- ❖ Clean the skin with a pad soaked in clean water and allow to dry.
- ❖ Push the needle into the muscle and gently inject the needle.
- ❖ Press the injection site lightly with dry cotton swab.

Figure 8: Td Vaccine in pregnant women

NB: Injections of vaccines into the gluteus maximus (buttocks) involve risk of sciatic nerve injury and risk of inoculating the vaccine into the deep fat tissue in women, a situation which could decrease the immune response. Before injection, disinfect the skin with clean water, then swab with dry cotton (the use of alcohol is not recommended).

9 ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI)

9.1. Definition

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

While targeted vaccination population should be sufficiently informed on the benefits it can bring, they should also be aware of occasional side effects that may also occur.

These adverse effects must be systematically notified. It is important for healthcare staff to discuss potential AEFIs with the parent so as to reassure them and better manage eventual cases.

9.2. Causes of AEFI

The vaccines used in immunization programs are safe and effective if used correctly. However, adverse reactions can still occur after their administration. Apart from the vaccines themselves, the vaccination process is a potential source of adverse reactions. The causes of AEFI can be classified into various categories (Table 9).

Table 9: Definition of AEFI according to their cause

AEFI linked to a specific cause	Definition
Vaccine product related reaction	An AEFI that is caused by a vaccine, due to one or more properties inherent to the vaccine product.
Vaccine quality defect-related reaction	An AEFI that is caused or precipitated by a vaccine that is due to one or more quality defects of the vaccine product including its administration device as provided by the manufacturer.
Immunization error-related reaction (previously called «programmatic error»)	An AEFI that is caused by inappropriate vaccine handling, prescribing or administration and thus by its nature is preventable.
Immunization anxiety-related reaction	AEFI caused by anxiety due to vaccination.
Coincidental event	AEFI whose cause is other than the vaccine product, an error in vaccination or anxiety due to vaccination, but for which there is a temporal relationship with the timing of vaccine administration.

9.3. Types of AEFI

AEFIs can be grouped into three types, depending on their cause, severity and frequency of occurrence:

- **Minor AEFI**

These are the most common AEFI occurring after exposure to the vaccine which causes short-term or temporal disorder or discomfort.

❖ **Serious AEFI**

This is any medical event that occurs within a defined time after the vaccination and which may lead to:

- A life-threatening illness;
- Hospitalization;
- An extension of an existing hospitalization.

❖ **Clusters AEFI**

A clustered case of AEFI is from either a vaccination post or a health facility, or patients who have received a specific batch of vaccine, or who have been vaccinated with same vial of vaccine or diluent. They may be due to an alteration in the quality of the vaccine or diluent, or to a programmatic error.

NB: The occurrence of serious or cluster AEFI requires immediate investigation to identify causes and provide corrective measures.

9.4. What to do in case of an AEFI

When faced with any case of AEFI, healthcare personnel must:

- Fill the notification form correctly and completely;
- Notify the hierarchy weekly of minor AEFI cases;
- For serious cases Immediately notify the hierarchy and the AEFI National Committee of Experts;
- Investigation of serious AEFI cases:
  - Correctly and completely fill the investigation form;
  - Take 5ml of whole blood in an EDTA tube, and 5ml of serum, a urine bowl and others as indicated by the AEFI Expert Committee;
  - Keep the samples at +2 to + 8 ° C and send them to the Biological Sample Reception Station (BSRS) within 24 hours;
  - To be reimbursed the transport cost, the bearer of the sample must present himself at the BSRS with a mission order duly signed by his hierarchy and a photocopy of his/her national identity card (NIC).
- Ensure proper case management;
- Develop and send the medical report to the EPI-CTG within 48 hours;
- Sensitize the population around the case;
- Ensure that AEFIs are reported in the Monthly Activity Report.

NB: **Routine prescription of antipyretics after vaccination is not recommended.** The mother should be encouraged to adopt essential measures in case of fever (warm bath, tepid sponge, undressing) and to bring the child back to the nearest health facility if the fever persists or the condition of the child goes worse.

Table 10: Checklist of common AEFIs by antigen and course of action

Vaccine	Minor AEFI	Management of Minor AEFI	Serious AEFI	
BCG	- Local reactions (redness, swelling, pain) - Superficial ulcers at the injection site	- Reassure parents - Monitor - Dry dressings, (healing is spontaneous)	- Abscess at the injection site (due to SC instead of ID injection) - Satellite Lymphadenopathy (sometimes with suppuration or collection of pus)	- Dry dressings, (healing is spontaneous) - Do not incise or drain - Refer to a higher level Health facility if necessary
OPV	No side effects known		Paralysis associated with polio vaccine.	- Rehabilitation - Rest
IPV	- Local reaction (redness, swelling, pain) - Symptomatic reaction: fever, malaise, muscle pain. - Headache or loss of appetite	- Reassure parents - Surveillance - Antipyretic/ analgesic (Paracetamol)	Allergic reaction/ anaphylaxis	- Lay patient on flat surface - Adrenaline (IM) - Corticosteroid (if possibly) - Salbutamol (if necessary) - Refer to a higher level Health facility if necessary
DTP-HepB-Hib	- Local reaction (redness, swelling, pain) - Fever within 48 hours - Irritability	- Reassure parents - Surveillance - Dry dressings, (healing is spontaneous). - Antipyretic (paracetamol)	- Persistent inconsolable crying (3 days and more) - Convulsions - Episodes of hypo reactivity and hypotonia - Anaphylactic shock - Encephalopathy - Guillain Barre syndrome	- Antipyretic (paracetamol) - Lay patient on flat surface - Adrenaline (IM) - Corticosteroid (if possible) - Salbutamol (if necessary) - Refer to a higher level health facility if necessary
MR	- Local reaction (redness, swelling, pain) - Fever and /or rash	- Reassure parents - Surveillance - Dry dressing - Spontaneous healing - Antipyretic (paracetamol)	- Febrile convulsions - Low platelets count - Anaphylactic shock - Acute arthralgia - Encephalomyelitis	- Lay patient on flat surface - Antipyretic (paracetamol) + Diazepam - Adrenaline (IM) - Corticosteroid (if possible) - Salbutamol (if necessary) - Non-steroidal anti-inflammation - Refer to a higher level Health facility if necessary
YFV	- Muscle pain - Headaches - moderate fever	- Analgesic/ Antipyretic (paracetamol)	- Allergic reaction/ anaphylaxis - Post vaccine Encephalitis	- Adrenaline (IM) - Corticosteroid (possibly) - Salbutamol (if necessary) - Refer to a higher level Health facility if necessary
Td	- Local reaction (redness, swelling, pain - Fever and/or rash within 5 to 10 days - Irritability	- Analgesics/ Antipyretic	- Anaphylactic shock - Brachial Neuritis - Sterile abscess	- Lay patient on flat surface - Adrenaline (IM) - Corticosteroid (if possible) - Salbutamol (if necessary) - Refer to a higher level Health facility if necessary
PCV 13	- Local reactions (Erythema, edemas, induration of injection spot and pain) - Fever	- Surveillance - Dry dressing - Spontaneous healing - Analgesics/ Antipyretics		
Rotarix			Intestinal intussusception (rare)	Refer to a higher level Health facility if necessary
HPV (Gardasil)	- Local reaction (redness, swelling, pain - Systemic reactions: fever, fatigue, nausea, aches	- Surveillance - Antipyretic, analgesic (Paracetamol)	Anaphylactic shock	- Lay patient on flat surface - Adrenaline (IM) - Corticosteroid (possibly) - Salbutamol (if necessary) - Refer to a higher level Health facility if necessary
MenAfriVac	- Local reaction (redness, swelling, pain - Systemic reactions: fever, rash - Gastrointestinal disorders	- Surveillance - Antipyretic, analgesic (Paracetamol)	Anaphylactic shock	- Lay patient on flat surface - Adrenaline (IM) - Corticosteroid (possibly) - Salbutamol (if necessary) - Refer to a higher level Health facility if necessary

NB: All healthcare personnel involved in vaccination must find, investigate and notify all cases of AEFI. For all AEFI cases, strengthen IEC and ensure case management.

10 CONTRAINDICATIONS OF VACCINATIONS

In principle, there is no contraindication for vaccination. However, it is necessary to avoid vaccinating children in the following situations:

- Children referred urgently to the hospital. Eventual death of a child may be wrongly attributed to the vaccine;
- Children who convulse within three days after first dose of DTP-HepB-Hib: Do not administer the 2nd and 3rd dose of this vaccine in the absence of medical investigation.
- Children under 6 months of age and pregnant women with known allergy to albumin or egg yolk for YFV;
- Children and/or women who have had a severe allergy such as anaphylactic shock after the first dose of an injectable vaccine.

A child who is not vaccinated because of illness is missing an opportunity that may be unique. This situation is termed "missed opportunity". Missing an opportunity to vaccinate a child because of a minor or relative contraindication delays vaccination schedule and may lead to incomplete immunization of many children.

It is recommended that health personnel seize any opportunity that arises to vaccinate eligible children. Target children who visit health facilities should be vaccinated as well as those hospitalized provided their health conditions allow it.

Diarrhea is not a contraindication of vaccination. If a child has diarrhea at the time of oral vaccine administration (OPV and rotarix), give an appointment to the parent for the administration of an extra dose, i.e. one more dose after the diarrhea has stopped.

Main Recommendations

If a child under five is not fully immunized, all missing vaccines (except BCG) must be administered within the minimum interval according to the immunization schedule.

- For multiple-dose vaccines, the minimum interval of four weeks between two conservative doses must be respected;
- Do not repeat an interrupted series of vaccination, it must be completed where it was stopped;
- Do not vaccinate a child before the recommended age (maternal antibodies may compromise immune response);
- HIV infection is not an absolute contraindication to the administration of EPI vaccines (see 7.7).

11. COLD CHAIN

11.1. Definition

The cold chain is a system that guarantees the quality of the vaccine from the manufacturer to the user. It is made up of human, material, financial resources and Standard Operating Procedures, at different levels.

11.2. The main elements of cold chain

The main elements are as follows:

- Staff who organize, direct, receive, dispense and administer vaccines;
- Vaccine storage equipment: cold rooms, freezers and refrigerators;
- Vaccine transportation equipment: coolers, vaccine carriers and ice-packs;
- Means of transportation of vaccines and commodities: airplane, train, vehicle, bicycle, motorcycle, canoes, etc.;
- Temperature control devices: thermometer, fridge-tag, freeze-tag, 3M record.

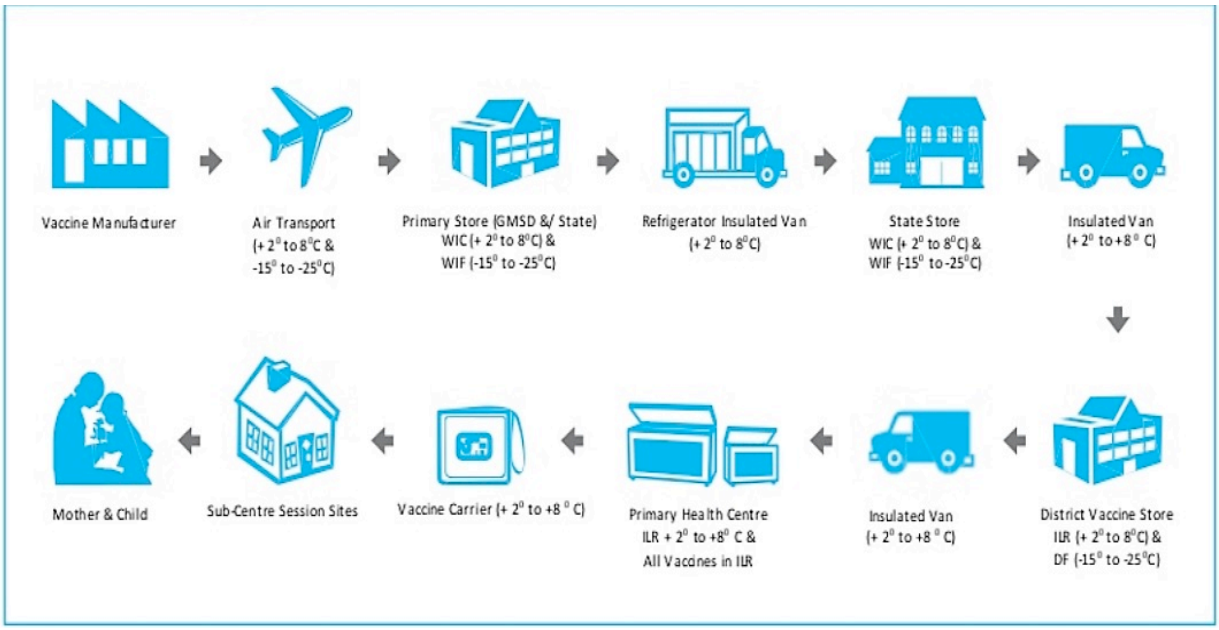

Figure 9: Main elements of cold chain

11.3. Different Types of Cold Chains

They are two types of cold chain:

- Rapid cold chain.
- Slow cold chain.

11.3.1. Rapid Cold Chain

It is used for the transport of vaccines; however, the equipment used do not produce cold, but conserves vaccines by use of cool water packs (vaccine carriers and cold boxes). This equipment is transported from the central warehouse to the intermediate or peripheral locations by plane, train, truck, motorcycle, on foot etc.

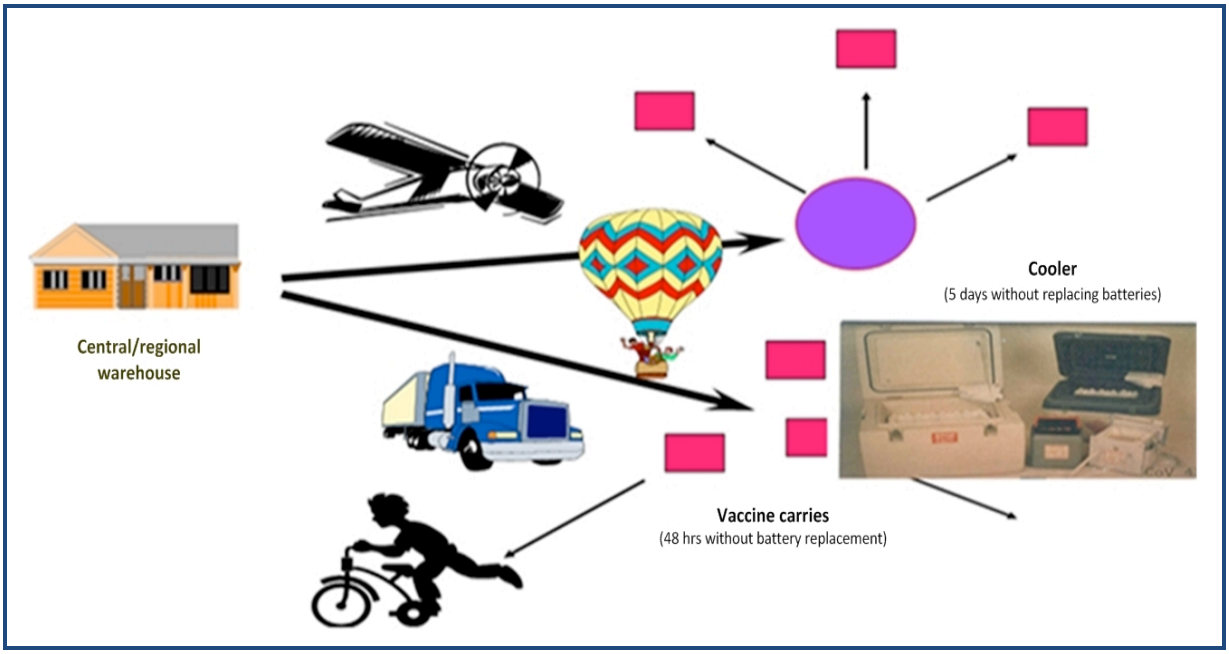

Figure 10: Rapid cold chain

11.3.2. Slow Cold Chain

It is used to store vaccines at vaccine stores and health centers. These are equipment that produce cold (mixed refrigerators, electric refrigerators, solar refrigerators, freezers, cold rooms).

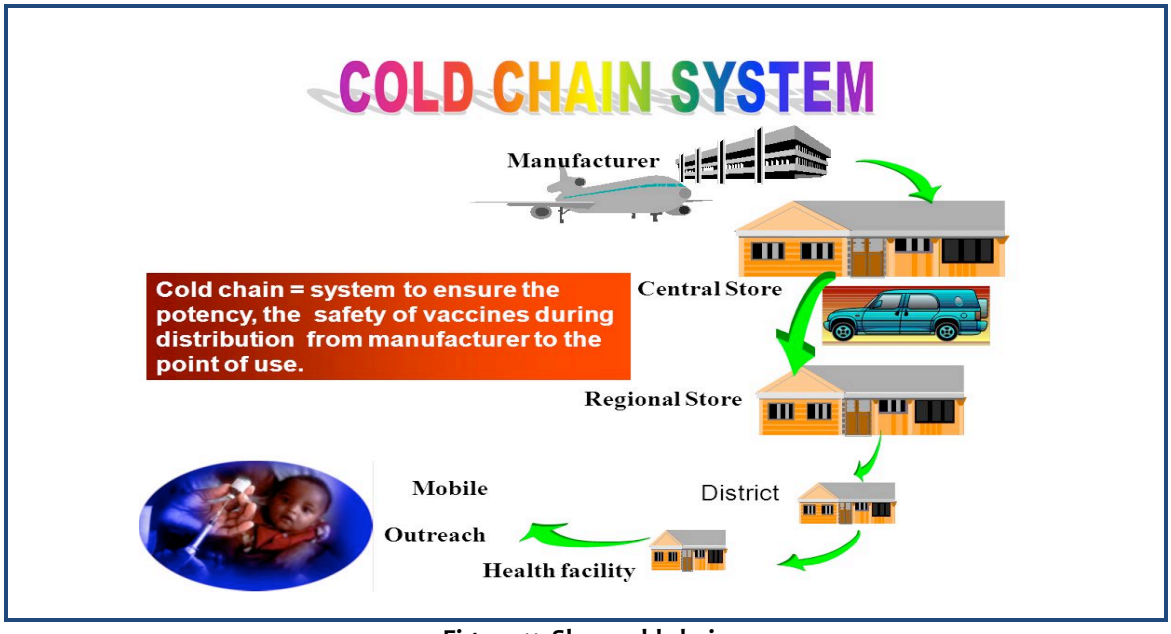

Figure 11: Slow cold chain

11.4. Storage of Vaccines

Vaccines are fragile organic products. While some are sensitive to freezing, others are sensitive to heat or light. Vaccines lose some of their activity or effectiveness, that is, their ability to adequately protect children, when exposed to inappropriate temperatures. This decline in vaccine efficacy is irreversible. To maintain the quality of vaccines, it is essential to protect them from extreme temperatures; To do this, it is important to put in place a cold chain system that ensures vaccines are stored within recommended temperature ranges (+2°to + 8°C). At the central and regional levels, it is recommended to keep OPV at -15°C to -25°C.

11.4.1. Sensitivity of Vaccines to Heat

All vaccines are heat sensitive, and are grouped into six categories classified in alphabetical order according to their heat sensitivity. Group A includes the most heat-sensitive vaccines and Group F includes those that are least sensitive to heat.

Table 11: Vaccines sensitivity to heat

Most sensitive to heat ⟶ The least sensitive to heat

Group A	Group B	Group C	Group D	Group E	Group F
OPV	Vaccine against influenza	IPV	Penta	BCG	MenAfriVac
		MR	ROTA	HPV	PCV-13
			YF	Td	HepB

11.4.2. Sensitivity of vaccines to freeze

Freezing can irreversibly damage certain vaccines and when a vaccine has been frozen, its immunological properties are compromised. The vaccines below should not be frozen.

Freeze-sensitive vaccines : **DO NOT FREEZE**

Penta; IPV; Rota; Td; HepB; Anti HPV

11.4.3. Recommended storage temperatures for vaccines and diluents

The storage temperatures should take into account the level of the structure in supply chain and the type of vaccine. The recommended temperature range for vaccine storage is +2 to + 8 ° C. However, **only OPV can be stored in negative temperatures at the central and regional levels (-15 ° C -25 ° C).**

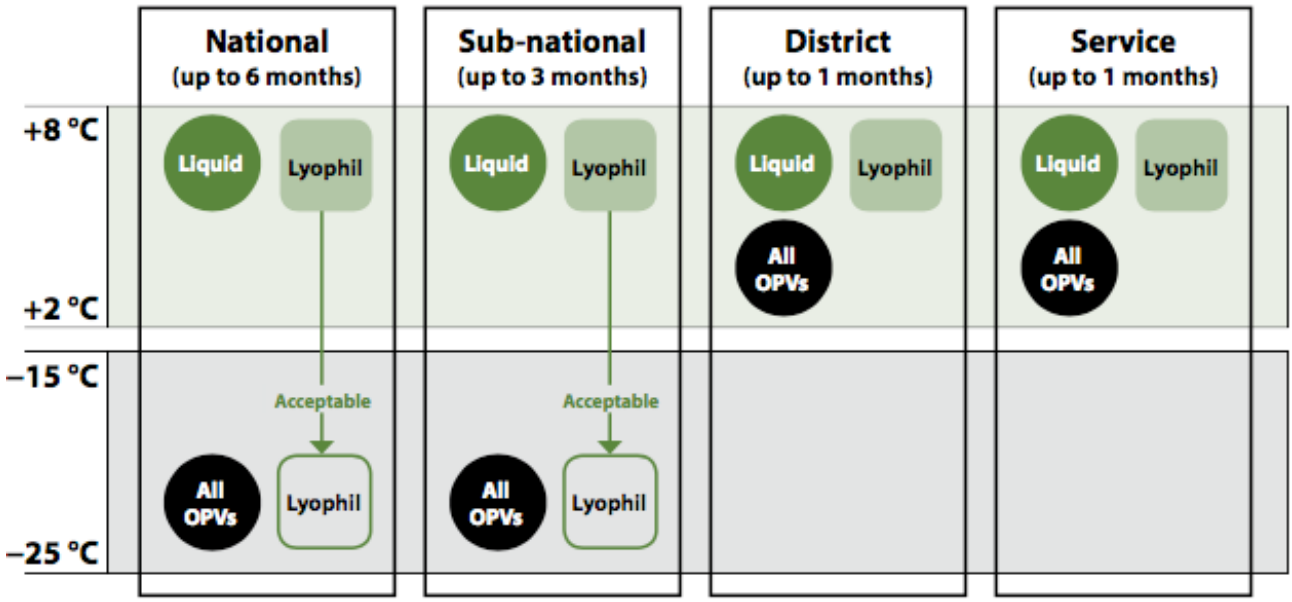

Figure 12: WHO recommended temperatures storage for vaccines and diluents

NB:

- ❖ Diluents should never be frozen.
- ❖ If diluents are stored with vaccines, all should be maintained in the range temperature of +2°C to +8°C
- ❖ Reconstituted lyophilized vaccines should never be frozen and should be stored between +2°C and +8°C.
- ❖ At the operational level (district and health facilities), all vaccines must be stored between +2°C and +8°C.

11.5. Diluents

If the package insert contains a precise lower and upper limit for diluents that are packaged separately, this must be followed. When there is limited cold chain storage capacity, these diluents can be stored outside the cold chain until delivery to the point of supply; In this respect it is essential to comply with the manufacturer's instructions for refrigeration before and after reconstitution.

If the diluents are packaged with the vaccine, the product should be stored between +2°C and +8°C. In the absence of specific instructions, separately packaged diluents should be treated in the same manner as any other non-cold chained pharmaceutical product, freeze-protected, stored and transported at + 2°C and + 25°C until delivery to the point of supply.

Diluents should NEVER be frozen.

NB: : Diluents should NEVER be frozen.

- ❖ If the storage temperatures are not observed, a vaccinated child may not be immunized and therefore the work done by the health care staff will be completely lost;
- ❖ All diluents should be kept at a temperature between + 2°C and + 8°C while they are stored at the delivery points as well as after reconstitution of the vaccine during a vaccination session. This rule also applies when vaccines and diluents are transported for peripheral interventions.

12 TEMPERATURE MONITORING

In order to maintain the quality of vaccines, it is essential to monitor the temperature along the supply chain. To ensure the effectiveness of this control and to record the data it is necessary to:

a) Ensure that the storage temperatures remain within the recommended range of + 2°C to + 8°C in positive cold rooms and refrigerators and between -25°C and -15°C in negative cold rooms and freezers;
b) Detect any storage temperature excursions at fix storage sites so as to take corrective action;
c) Detect any storage temperature excursions during transport so as to take corrective actions.

12.1. Temperature Monitoring Devices

Temperature can be monitored through several devices: Vaccine Vial Monitor (VVM), 30-day electronic temperature loggers (30 DTR), and thermometers.

12.1.1. Monitoring Heat Exposure using VVMs

VVM is a label containing a heat-sensitive material which is placed on a vaccine vial to register cumulative heat exposure over time. VVMs are the only temperature control devices routinely attached to vaccines throughout the supply chain. A VVM is a chemical label affixed to the vaccine container by the manufacturer. As the vaccine container is transported along the supply chain, VVM registers a cumulative exposure to heat resulting in a gradual change in color.

The main goal of VVM is to avoid administering heat-damaged vaccines. The state of the VVM is also a reference for making decision on the choice of vaccines to keep, following a break in the cold chain. This greatly reduces vaccine losses, and helps the provider decide which vaccine to use first.

NB: It is important to note that a batch of vaccines with evidence of significant heat exposure should be used before the one with less exposure, even if the expiry date of the least exposed lot is closer than that of the most exposed lot. Note that VVMs **DO NOT** record exposure to negative temperatures.

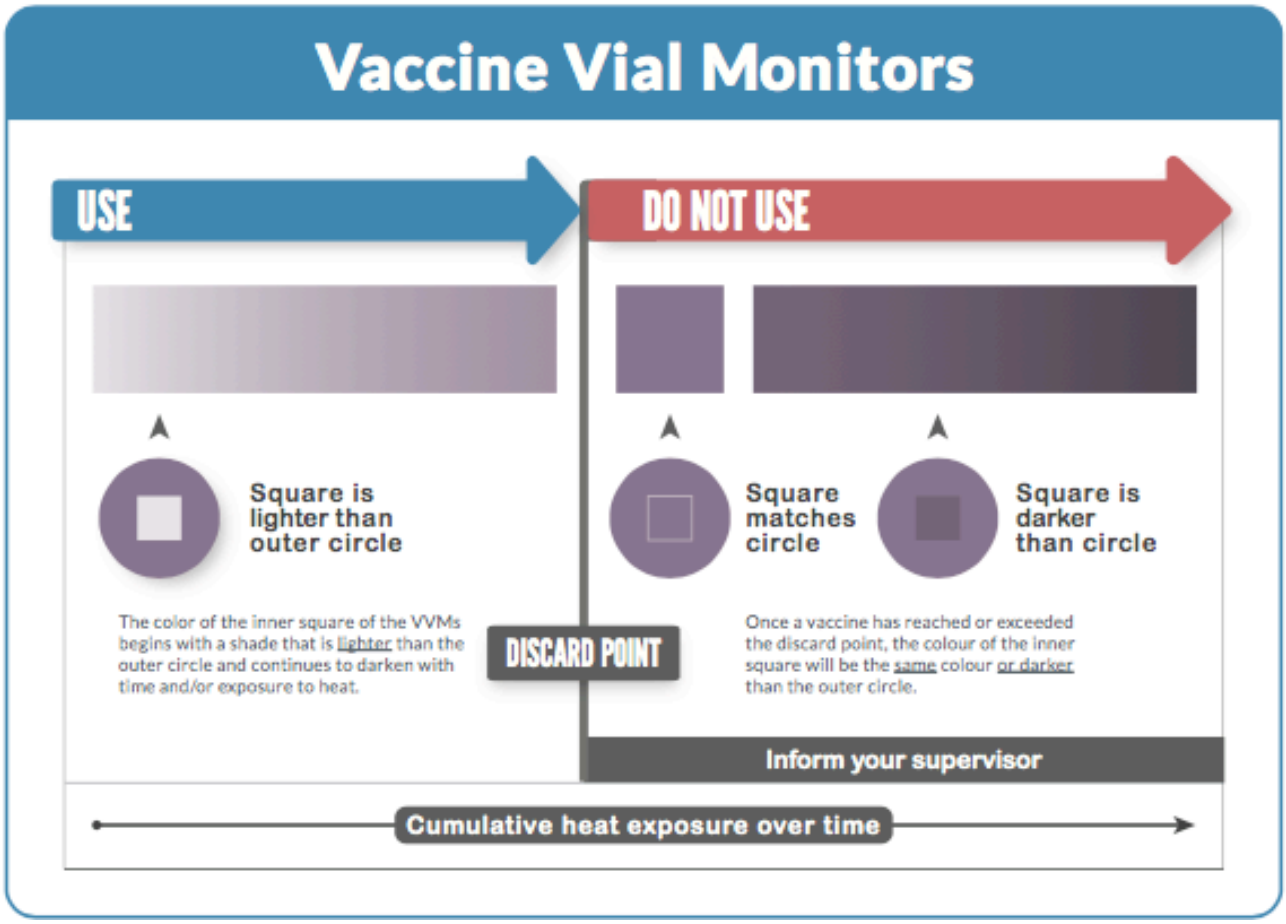

Figure 13: Different stages of the VVM and their interpretation (WHO)

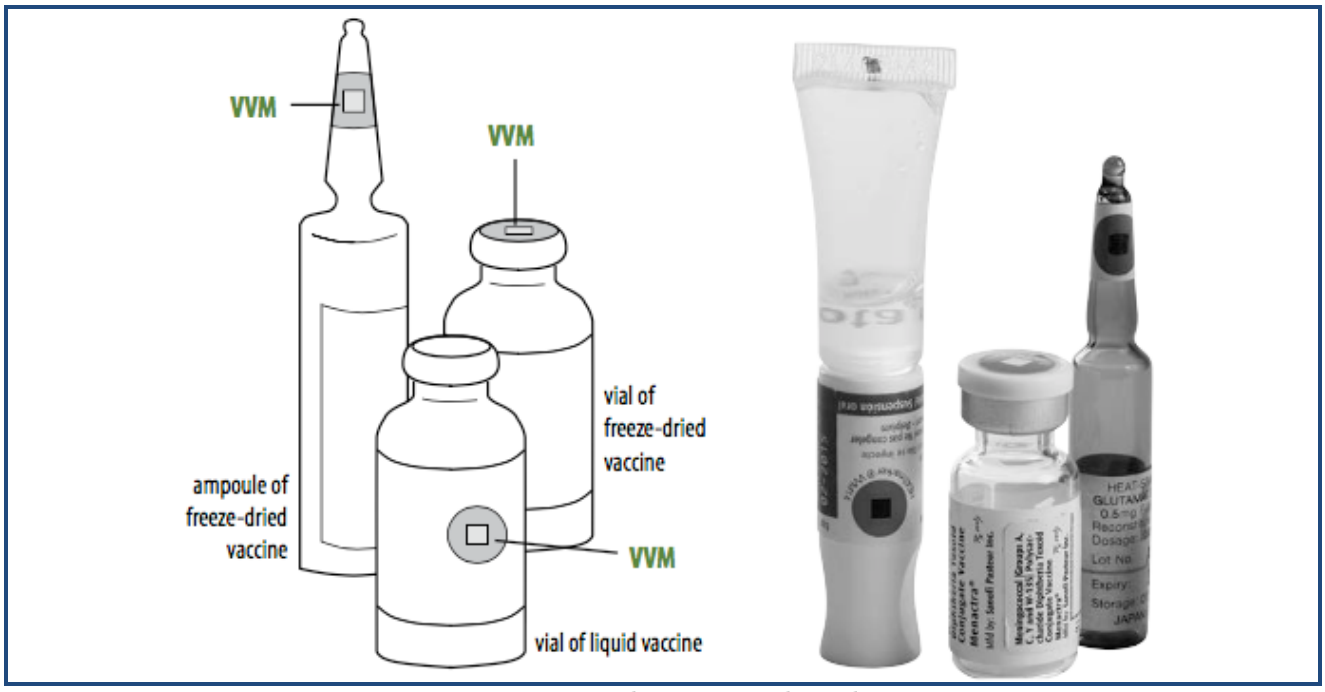

Figure 14: VVM locations on the vials

CAUTION: Never use a vaccine beyond its expiry date even if the VVM remains good.

12.1.2. Electronic Temperature Recorders (Fridge-tag)

The daily electronic temperature recorders (Fridge-tag) are installed in refrigerators. They record the temperature at intervals not exceeding 10 minutes and present the detailed

evolution of these records during the previous 60 days. However, the temperatures of the last 30 days are displayed on the screen, while those of the first 30 days are stored in the memory of the Fridge-tag. In addition, they record and display the progress of all heat and freeze detection alarms that have occurred during the last 60 days.

An alarm is triggered when the refrigerator temperature drops to -0.5°C or below for 60 minutes at least, or if it exceeds + 10°C for a continuous time of 10 hours. As long as the temperature remains within the recommended range, the device displays the symbol "√". In the case of more recent versions such as the Fridge-tag 2, it is possible to download the recorded data by connecting to a computer.

NB:

i The Fridge-tag is the recommended device for monitoring temperature in refrigerators;
ii Temperatures must always be recorded manually twice a day;
iii All users must be briefed / trained before using the Fridge-tag;
iv The Fridge-tag is powered by a non-replaceable battery that has a lifespan of 2 years. Therefore, it should be put into operation as quickly as possible from the date of manufacture;
v After its lifespan, the Fridge-tag will be replaced. The lower level must notify the upper level in case of the low battery in order to trigger the replacement process;
vi Do not use the Fridge-tags in freezers and cold rooms.

Figure 15: Fridge-tag 2

12.1.3. Continuous Monitoring Device

Recommended by WHO for cold rooms, the continuous monitoring device helps maintain confidence in the performance of the cold room. It gives a guarantee that the vaccines have not been damaged by temperature fluctuations. It sends automatic alerts by SMS, email or fax.

Figure 16: Examples of continuous monitoring devices

12.1.4. Temperature Readers

There are several types of temperature readers

- Integrated thermometer with digital display;
- Stem and metal dial thermometer;
- The max/min laser thermometer.

12.1.4.1. Integrated digital display thermometer

The pre-qualified refrigerators and freezers currently in use are equipped with devices such as the one shown in the figure below. An internal temperature sensor monitors the storage compartment; a temperature reading is instantly displayed on the control panel of the device.

Figure 17: Integrated digital display thermometer

Source: Vestfrost Solutions (VLS 094 SDS)

NB: The built-in digital display thermometer is recommended for temperature control of freezers and cold rooms.

12.1.4.2. Stem and dial thermometer

Stem and dial thermometers are no longer recommended by WHO because they provide instant temperature readings. However, they can be used as subsidiary temperature control devices in case of lack of built-in digital display Fridge-tag / thermometer**.**

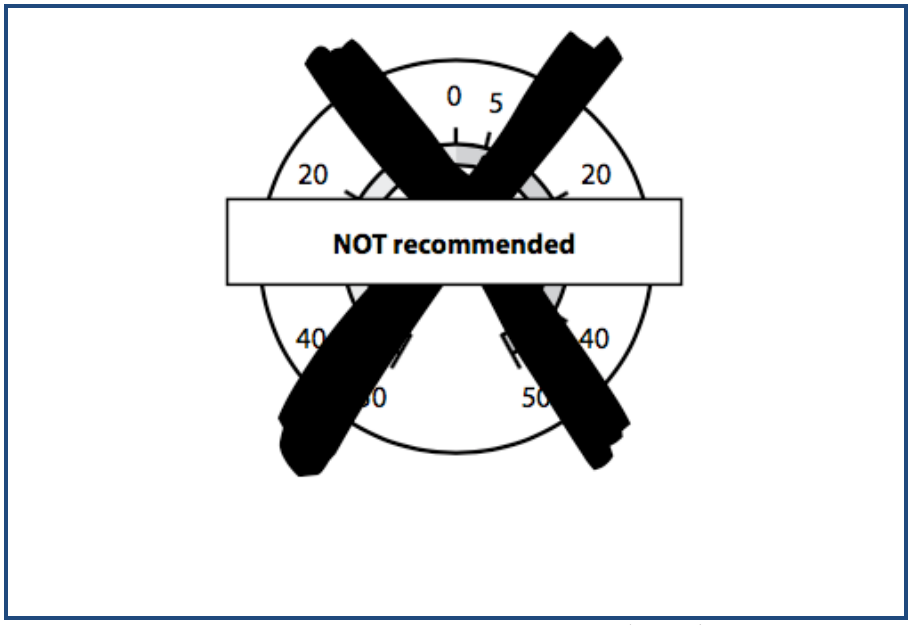

Figure 18a: Dial thermometer not recommended (WHO)

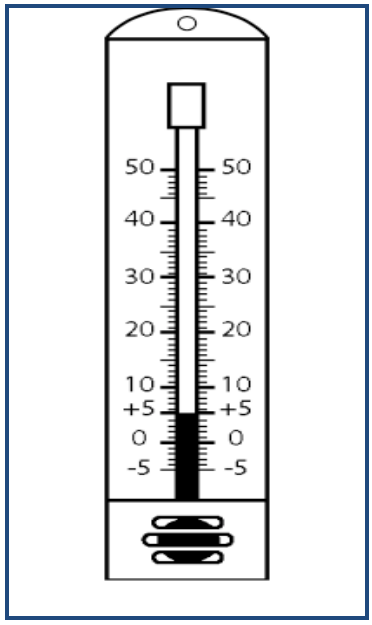

Figure 18b: Stem thermometer

Figure 18: Dial and Stem thermometer

12.2. Temperature Monitoring Devices by Level and Specific Equipment

There are several types of temperature control devices. These must be adaptable to the specific cold chain equipment. The table below summarizes the different temperature control devices by level and by type of equipment.

Table 12: Temperature control devices by level and equipment Type

Cold chain material	Temperature control devices		Examples of devices
	Recommended devices	Minimum required	
Cold rooms of central and regional warehouses	- External digital thermometer or gas/vapor pressure dial thermometer. - Continuous electronic temperature monitoring system. - VVM	- External digital thermometer or gas/vapor pressure dial thermometer. - Pen recording thermometer. - VVM	Remote temperature monitoring system (Beyond Wireless, Smart View)
Vaccine freezers of regional central ware-houses and districts	- Electronic continuous temperature monitoring system.	- Stem thermometer. - Integrated thermometer with digital display.	Libero data logger
Vaccine refrigerators from central and regional warehouses	- Continuous electronic temperature monitoring system. - - VVM	- 30-day electronic refrigerator temperature logger - Integrated thermometer with digital display - VVM	Fridge-Tag 2, Data logger Testostore
Vaccine refrigerators in districts and health facilities	- Continuous electronic temperature monitoring system. - VVM	- 30-day electronic refrigerator temperature logger. - Integrated thermometer with digital display. - VVM	Fridge-Tag 2
Material used during transportation	- Continuous electronic temperature monitoring system. - cold chain temperature indicator card (3M card) - VVM	- Continuous electronic temperature monitoring system. - Electronic freeze indicator - VVM	Freeze-tag, 3M card

12.3. Temperature Control During Transport

Defective management and monitoring of transport operations pose a risk of vaccine damage due to exposure to heat or freezing. If the vaccines are equipped with VVMs, it is possible to detect the damage caused by heat by observing the changes. On the other hand, if no temperature monitoring device is present, it is impossible to detect the damage caused by freezing.

12.3.1. Electronic Indicators of Freezing

These are small digital display devices that are placed with freeze-sensitive vaccines during transport or storage (see Figure 19). They have a screen that indicates if the vaccine has been exposed to freezing. Once the alarm signal has been triggered, the device can no longer be used and must be discarded. Otherwise, it can be used until the built-in battery is dead.

Figure 19: Electronic Frost indicators to find in older versions

12.3.2.Cold Chain Temperature Indicator Card

They are only used for international shipments of OPV and packed with dry ice. They have no other use.

Figure 20: Cold chain temperature indicator card.

12.3.3.Electronic Devices for Monitoring Temperature During Transport

They record the temperature every 10 minutes for at least 20 days. They include a digital display and a preset temperature alarm system corresponding to the heat or freeze sensitivity of the transported vaccine.

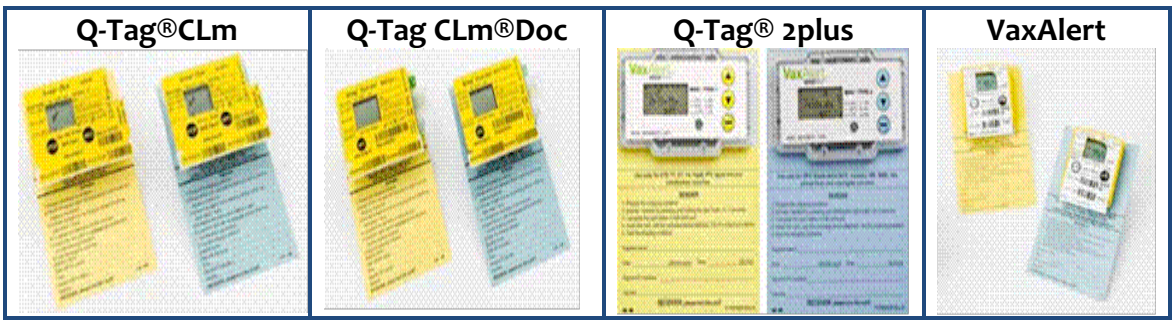

Figure 21: Electronic devices for temperature monitoring

12.4. Recommended Temperature Monitoring Devices for Health Districts and Health Facilities

Table 13: Recommended temperature monitoring devices for district and health facility

Option	Fridge	Freezer (when available)
Option A: optimal practice	- Fridge Tag 2 - Digital display thermometer - Vaccine Vial Monitor (VVM)	- Stem thermometer - Digital display thermometer - VVM
Option B	- Electronic freezing indicator - Integrated thermometer with digital display - VVM	Not Applicable
Not recommended	- Stem thermometer - Bimetal dial thermometer	Not Applicable

Table 14: Temperature monitoring in coolers and vaccine carriers during transport

Options	Coolers and vaccine carriers		Observations
	With freeze-sensitive vaccines	Without freeze-sensitive vaccines (Polio campaign)	
Best practice	- Fresh water cold packs - Fridge Tag, VVM	- All types of isothermal cold packs - VVM only	
Not recommended	- Packaged frozen accumulators ice-packs - VVM only	Not applicable	If freeze-sensitive vaccines are transported with packaged frozen ice-packs, there is always a risk of freeze damage if these packs are not properly packaged. That's why you always have to include an electronic freeze indicator.

12.5. Manual Temperature Recording

For active temperature monitoring, it is recommended to use standard temperature recording chart to be pasted on the door or on the lid of each vaccine refrigerator. Temperature recording must be done twice a day including weekends and holidays. It is recommended to use the same device for temperature recording. The personnel responsible for this task must read the Fridge-tag 2 and note the data found on the sheet. In the absence of a Fridge-tag 2, check the built-in digital display thermometer, or if necessary a stem thermometer. Recording temperatures according to this procedure is a guarantee that the refrigerator is well controlled

and that regular readings take place. Regular temperature recording can help identify performance curves, sometimes even before alarms are triggered automatically.

Manually enter the data on a temperature record sheet pasted on the refrigerator door, as follows:

- In the morning, start by checking the fridge temperature and do the same at the end of the working day;
- Note the temperatures on the chart by date and time. When a chart is completely filled, replace it with a new one. Keep all all completed temperature records for reference.

NB: Some measures are required when the recorded temperatures deviate from the expected range.

12.6. Notification and Use of Temperature data

The monthly activity reports and notifications must include temperature data. At each level of the supply chain, managers need to collect and analyze this data, after which they will report on the Key Performance Indicators (KPIs): number of high and low alarms related to the operation of the chain supply and different equipment. These KPIs can serve as a guide for decision-making.

- At the health facility level, monthly temperature data must be reported in the monthly activity report (number of high and low alarms);
- At district level, Fridge-tag data must be downloaded and sent to the regional level every month. The data coming from the health facility must be collected and sent to the regional level These data coming from the health facility must be analyzed for decision-making;
- At the regional level, the monthly reports obtained on the temperature control system platform must be downloaded and archived. In case the Fridge-tags are used, the data must be downloaded and sent weekly to the next level.

Internet or SMS data transmission technologies can simplify and facilitate this process.

12.7. Shake Test

This test shows whether the DTP-HepB-Hib, TT/Td, vaccines have been frozen. It is not applicable to IPV.

The procedure

1. Take a vial of vaccine of the same type and batch number as the vaccine you want to test, and made by the same manufacturer.
   - Clearly mark the vial as "FROZEN."
   - Freeze the vial in a freezer or the freezing compartment of a refrigerator until the contents are completely solid.
2. Let it thaw. Do NOT heat it!
3. Take your "TEST" vial from the batch that you suspect has been frozen.
4. Hold the "FROZEN" vial and the "TEST" vial together in one hand.
5. Shake both vials vigorously for 10–15 seconds.
6. Place both vials on a flat surface side-by-side and start continuous observation of the vials until the test is finished.

Result:

- If the test sample has a lower sedimentation rate than the control sample, it can be concluded that the test sample was NOT FROZEN and therefore can be used;
- If the sedimentation rates are similar and the test sample contains flakes, it can be concluded that the vaccine was damaged by freezing, in which case it **SHOULD NOT BE USED**.

NB: If the vials have large labels that conceal the vial contents, turn both vials upside down and observe sedimentation in the neck of the vial.

If the test procedure indicates that the test sample has been damaged by freezing, immediately inform your supervisor. Follow the standard operating procedures to identify all the vaccines that have been damaged and prevent their distribution.

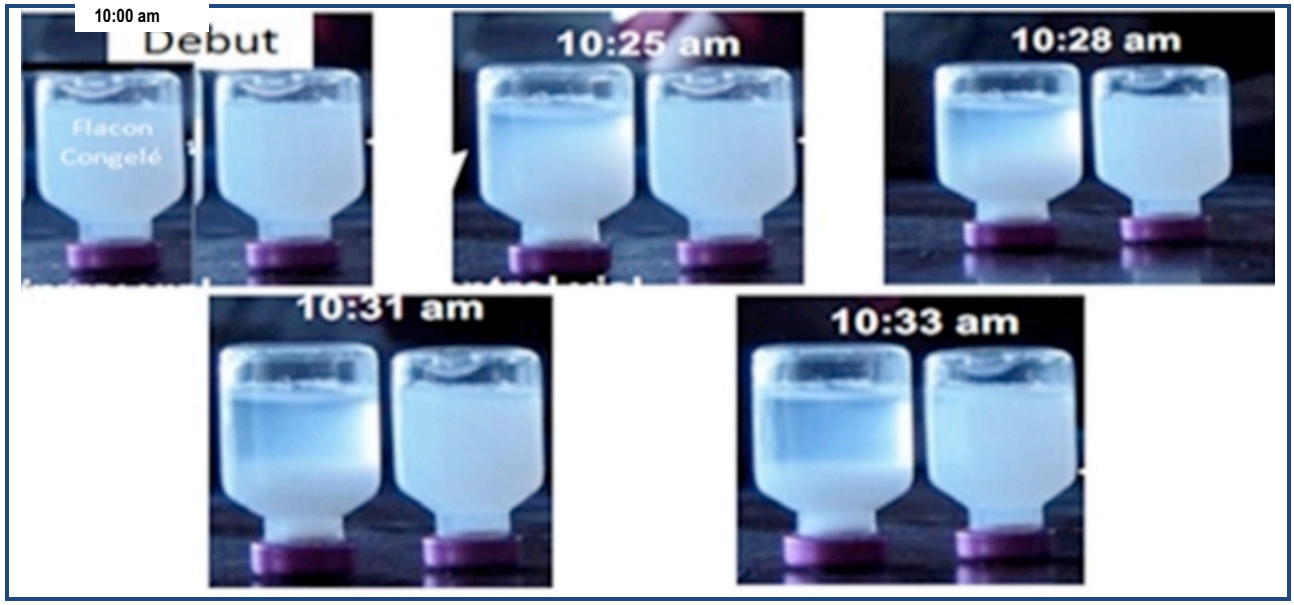

Figure 22: Shake Test

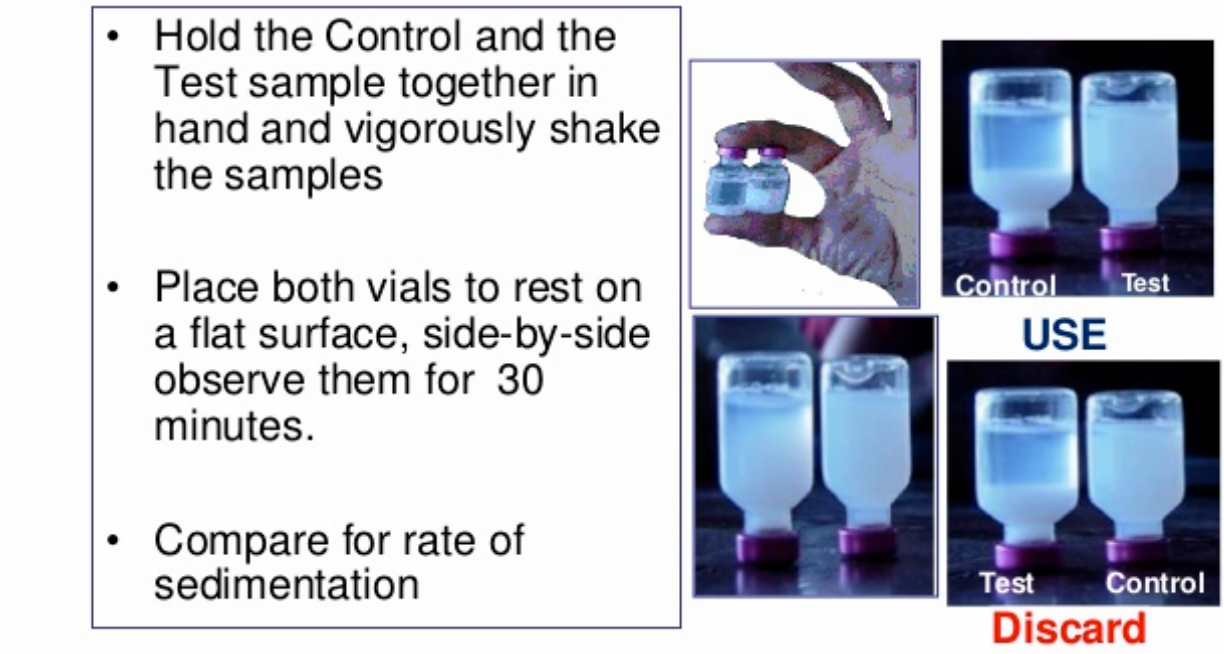

Figure 23: Shake test analysis and result

12.8. Vaccines Storage

To keep vaccines in good condition, and to best avoid exposing them to damaging temperatures, it is important to store them properly in the cold chain.

12.8.1. Storing Vaccines and Diluents in a Frontal Opening Refrigerator (Vertical Refrigerator)

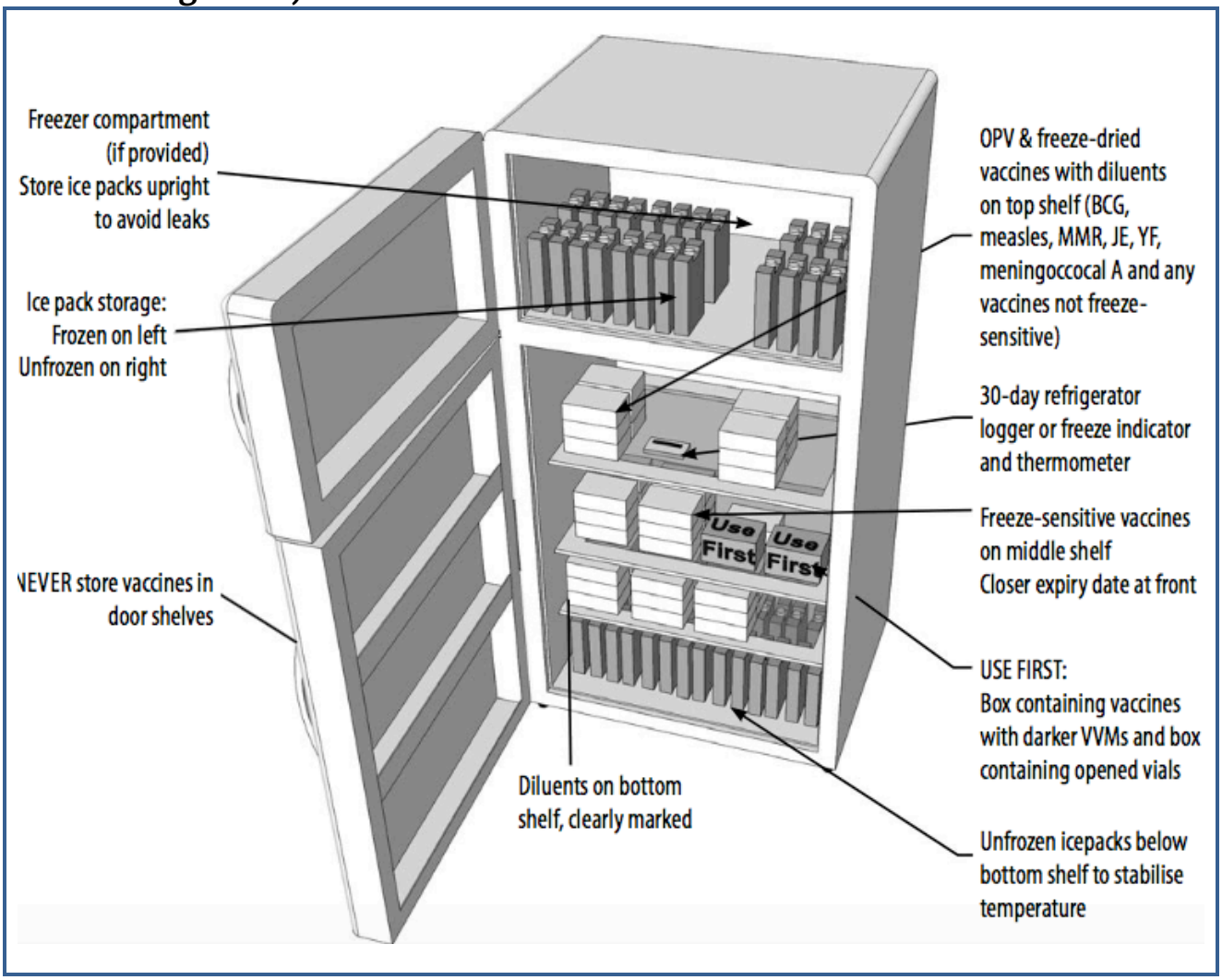

Figure 24: Storage of vaccines and diluents in a vertical refrigerator

Warning! Rules governing the use of front-opening refrigerators:

- *Never put vaccines or diluents in the door shelves. The temperature is too warm and vaccines are exposed to room temperature each time the door is opened.*
- *Never put freeze-sensitive vaccines in contact with, or close to, the evaporator plate in the refrigerator.*
- *Put water packs or plastic bottles full of colored water in the space below the bottom shelf. It helps to stabilize the temperature if there is a power cut. Do not use the water packs in vaccine carriers. Never drink the water, do not leave it within the reach of children.*
- *Put MR, BCG, OPV, yellow fever, meningococcal A conjugate and/or any other vaccines not damaged by freezing on the top shelf.*
- *Put Td, HepB, DTP-HepB-Hib, HPV, rotavirus and/or any other freeze-sensitive vaccines on the middle or lower shelves.*
- *Store the diluents next to the freeze-dried vaccine with which they are supplied, on the appropriate shelf. If there is not enough space on the shelf, put the diluents on the bottom shelf, clearly labelled so they can be easily identified to their matching vaccine.*

12.8.2. Storing Vaccines and Diluents in a Chest Refrigerator (Horizontal Refrigerator with Baskets)

- Freezer Compartment (for some models):

  DO NOT LEAVE THE LID OPEN!!!

- Ice Bench Compartment (for some models with direct solar power):

  DO NOT REMOVE FROZEN ICE-PACKS!!!

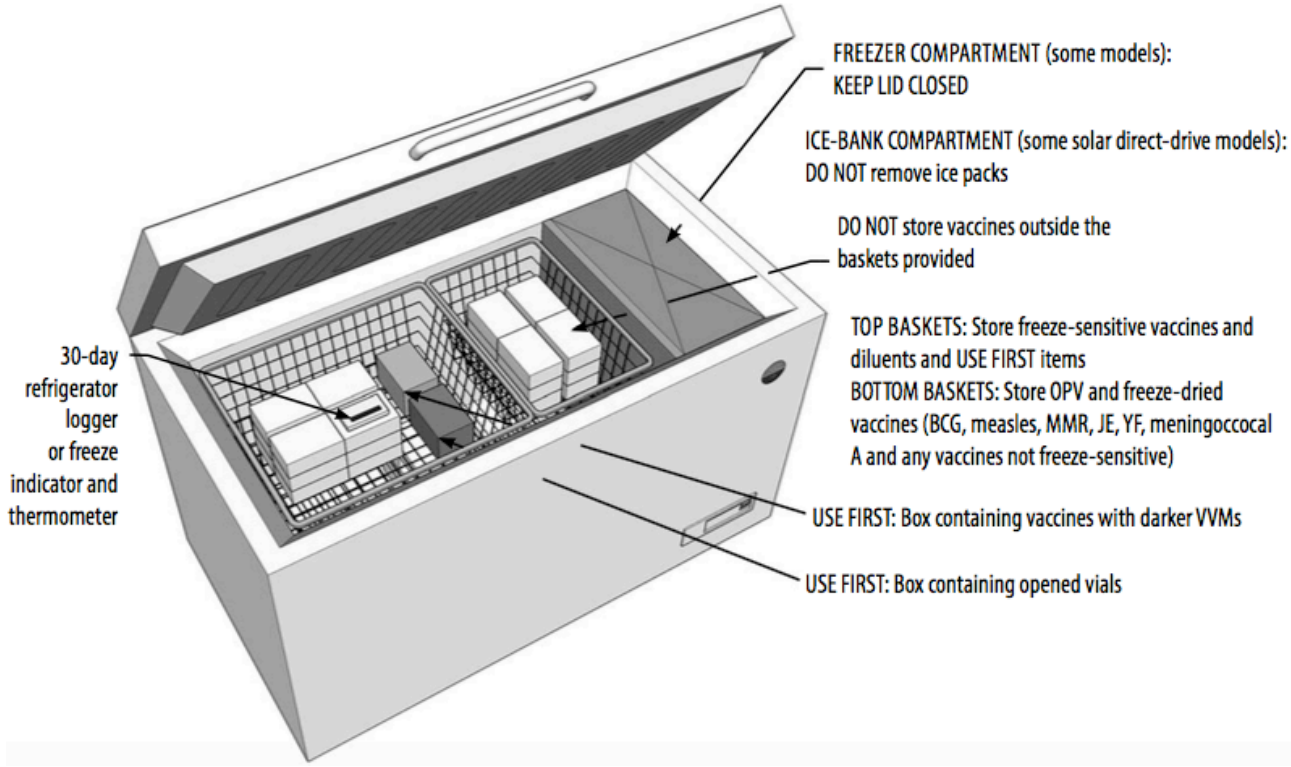

Figure 25: Storage of vaccines in a horizontal (chest) refrigerator

Warning! *Rules governing the use of the chest refrigerator:*

- *Always store vaccines and diluents in the baskets provided for this purpose, and never outside the baskets;*
- *Some direct solar energy refrigerators have an ice shelf on one side. Never remove frozen ice-packs water from this area;*
- *Some direct solar energy refrigerators have a freezer compartment separate from the ice-pack compartment. It is important to follow the manufacturer's instructions or user manual as the instructions vary from one refrigerator to another;*
- *Store vaccines: Anti-measles, MR, BCG, OPV, yellow fever, and / or any other vaccine that are not damaged by freezing in the bottom baskets;*
- *Use the top baskets to store products for immediate use, diluents and vaccines: Td, HepB, DTP-HepB-Hib, HPV, anti-Rotavirus and / or other freeze-sensitive vaccines. Never put freeze-sensitive vaccines in bottom baskets because, for some models of chests refrigerators, there is a risk of freezing in these areas;*
- *Store the diluents next to the freeze-dried vaccine with which they are supplied, on the appropriate shelf. If there is not enough space on the shelf, put the diluents on the bottom shelf, clearly labelled so they can be easily identified to their matching vaccine.*

13 VACCINES SUPPLY AND OTHER EPI MATERIAL

Transportation is an integral part of a supply chain system and must be well planned and executed.
To optimize this system, a combination of two supply models is applied:

- Vaccines and injection material are delivered to the intermediate level (regional) by the central level (push model);
- The health districts get their supplies from regional depot and the health centers get their supplies from district vaccine stores (pull model).

13.1. Packaging During Transport

A lack of follow-up of transport operations poses a particular risk of damage of vaccines due to exposure to heat or freeze. Temperatures during transport must be maintained between + 2°C and + 8°C. To do this, cool water packs must be prepared and the vaccines well stored in the cold boxes or vaccine carriers.

13.2. Cool Water Packs

Cool water-packs contain liquid water with an initial temperature between + 2°C and + 8°C. These eliminate the risk of freezing. Cool water packs must be stored in a refrigerator and must not be frozen. If the HF has more than one refrigerator, it is preferable to separate cool water packs from vaccines.

NB:
- The use of frozen or conditioned ice-pack is no longer recommended.
- Check the status of the VVM on vaccines prior to departure and upon arrival at HFs.

13.3. Storing Vaccines in Cold Boxes and Vaccine Carriers

It is important to properly arrange vaccines in cold boxes and vaccine carriers. Proceed as follows:

1. Arrange the cool water-packs in the coolers and / or vaccine carriers per manufacturer's instructions (these instructions are found in the lid);
2. Place vaccines and diluents in a plastic bag/cartons in the middle of the cold box or vaccine carrier to protect them from possible damage due to condensation;
3. Place the foam pad on the container in the vaccine carriers before closing;
4. Close the cold box or vaccine carrier tightly.

Figure **25** below illustrates the procedure for placing vaccines in cold boxes and vaccine carriers.

Vaccine carriers

Cooler

Cooler

Figure 26: Placing vaccines in cold boxes and vaccine carriers

Attention!

- *Once opened, place the vaccines in the vaccine carrier on the day of the immunization session. (NB: vaccine carriers are not always effective in storing vaccines for more than 12 hours);*
- *Do not drop or sit on the vaccine carrier;*
- *Do not leave the vaccine holder in the sun, keep it in a shade;*
- *Do not leave the lid open when the vaccine carrier is loaded with vaccines.*

14 MULTI-DOSE VIALS POLICY

In accordance with WHO recommendations, Cameroon has adopted the policy on the **use of opened multidose vials**.

It states that all opened reconstituted multi-dose vials should be discarded at the end of the vaccination session or no later than six hours after opening or reconstitution. Meanwhile, opened vials of the liquid vaccines **(DTP-HepB-Hib, PCV-13, TT/Td, IPV and OPV)** could be kept for 4 weeks (as from the date of opening as indicated on a label) until they are completely used. They shall be subjected to the following conditions:

- Vaccines are not expired;
- Vaccines are stored at the temperatures as recommended by WHO or the manufacturer;
- VVM is visible on the label and remains good;
- Vaccines have not been damaged by freeze;
- Vaccines have not been contaminated (rules of asepsis observed when taking doses);
- Vaccines have their tags;
- Vaccines do not have any particulate matter and do not precipitate on shake-test.

For freeze-dried vaccines (BCG, MR, YFV), once reconstituted, they should not be stored beyond 6 hours and must be discarded.

Through the application of the multi-dose vial policy and the use of VVM, the loss rates of liquid vaccines such as DTP-HepB-Hib, PVC-13, OPV, IPV and Td could be minimized.

15 MANAGEMENT OF VACCINES, MATERIAL, VITAMIN A AND CONSUMABLES

A vaccine is a very sensitive biological product that loses its potency if exposed to very high or very low temperatures.

Immunization is based on four elements: beneficiaries, services, vaccines and injection equipment; if one of these components runs out, the system cannot work.

The management of vaccines, vitamin A and consumables has 4 stages:

- Estimation of needs;
- Supply;
- Inventory management;
- Tracking usage.

15.1. Needs Estimation

15.1.1. Definitions

- **Availability of stock:** represents the cumulative amount of products received up to a given date. This cumulative supply includes the stock at the beginning of the management cycle (year).
- **The rolling stock** (Q) represents the quantity of vaccine sufficient to meet the needs (distributions) between two deliveries in case there is no particular problem (delivery delay, unforeseen increase in consumption, or other).
- **The safety stock (S), still called reserve stock or buffer stock,** represents on the contrary, the quantity of vaccines needed to cope with unforeseen events in the normal pattern of consumption (delivery delay, increase unforeseen consumption, or others). If all events are perfectly predictable, without risk of error, the security stocks would not be necessary; only rolling stocks would be essential. But it is impossible to predict everything with certainty, hence the need to build such stocks. The safety stock represents 25% of the needs.
- **Delivery time** refers to the time between the moment an order is placed and when the order is delivered.
- **The available stock** is the total quantity of vaccines that can be used, between two deliveries. It is the sum of the rolling stock and the safety stock (i.e. Q + S).
- **The review period** is the scheduled date for review of inventory levels.
- **The average monthly consumption refers** to the total stock consumed divided by the total number of months of stocks.
- **The minimum stock** is the available safety stock, plus the lead time.
- **The maximum stock** is the minimum stock, plus the inventory of the review period.

15.1.2. Needs Estimation Methods

Needs are estimated according to three main methods. Namely:

- Target population;
- Previous consumption;
- Size of the vaccination sessions.

15.1.2.1. Method Based on the Target Population

This method, which is the most used, takes into account 4 parameters:

- The size of the target population (TP);
- The current vaccination schedule (Nd);
- The desired immunization coverage rate (CV);
- The defined or calculated wastage factor (Wf);

Needs estimation formula based on target population

TP		Nd		CV		Wf		NEEDS
0–11 months old infants	X	Number of doses in a single calendar	X	Coverage Rate	X	Wastage Factor	=	Total doses per year
10 000		**4**		**80%**		**1.33**		**42 560**

Calculation of wastage multiplication factor = 100 / (100-Tx wastage) or 1 / (1 - wastage rate)

Example: If the estimated wastage rate for OPV is 25%, the calculation of the wastage multiplication factor (WMF) is: $\frac{1}{1-0,25} = \frac{1}{0,75} = 1,33$

Example of vitamin A needs estimation

Health facility X covers a population of 10,000. Calculate the annual vitamin A needs for this health facility with an expected coverage rate of 80% for children 6-11 months (proportion 3.5%).
Calculation: Target population: **= 350** children
Expected coverage rate = **80%**
The annual vitamin A needs **= 350 x 0.80 x 1 dose = 280** capsules
The amount of vitamin A required taking into account wastages or losses of **5%** is **280 × 1.05 (Wf) = 294 capsules.**

Example of OPV needs estimation
Health facility X covers a population of 10,000. Calculate the annual OPV needs for this health facility with an expected coverage rate of 90% for children 6-11 months (proportion 3.5%).
Calculation: Target population: (10 000 x3.5)/100 = 350 children
Expected coverage rate = 90%
OPV needs = 350 x 0.09 x 4 dose = 1260 doses
The amount of OPV required taking into account wastages or losses of 10% is 1260 × 1.11 (Wf) = 1398.8 doses.

NB: Knowing that OPV is packed in vial of 10 doses, an order of 1400 doses or 140 vials is required.

15.1.2.2. Method Based on Previous Consumption

This method takes into account 4 parameters:

- The initial stock at the beginning of the period (I);
- The quantity received during the period (R);
- The end of period stock (F);
- Wasted vaccines during the period (W).

Needs estimate formula based on previous consumption

I		R		F		W		NEEDS
Initial stock at the beginning of the year	X	Quantity received during the year	-	Stock at the end of the year	-	Wasted vaccines during the year	=	Total doses per year
10 000		50 000		20 000		5 000		35 000

15.1.2.3. Method Based on Size of Vaccination Session

Posts		Weeks		Sessions		Vials		Doses		NEEDS
Number of vaccination posts	X	Number of weeks	X	Number of vaccination sessions per week	X	Number of vials per week	X	Number of doses per vial	=	Total doses per year
20		48		3		2		10		57 600

15.2. Vaccines Supply and Material

Each level of the health system obtains its supply from the level above. The logistics information system takes into account the lead time (or waiting time), the minimum stock, and the maximum stock at each level.

15.2.1. Stock level and Supply Interval

Table 15: supply intervals

Level	Supply interval	Minimum stock	Maximum stock
Central	6 months	Security stock + waiting time (**3 months**)	Minimum stock **(3 months)** + need during supply interval **(6 months)**
Regional	3 months	Security stock + waiting time (**1 month**)	Minimum stock (**1 month**) + need during supply interval (**3 months**)
District	1 month	Security stock + waiting time (**2 weeks**)	Minimum stock (**2 weeks**) + need during supply interval (**1 month**)
Health facility	1 month	Security stock + waiting time (**2 weeks**)	Minimum stock (**2 weeks**) + need during supply interval (**1 month**)

15.2.2.Forecasting

The evaluation of storage capacity is the first step to better prepare the vaccine supply plan. It is the foundation of security of vaccine supply. The accuracy of the forecast is important and is intended to estimate the need for vaccines, other inputs, and the financial needs to carry out the immunization activities.

A poor forecast can cause delays or incomplete deliveries, resulting in stockout and additional costs. At the end of the year, the country needs to estimate its vaccine needs using the target population method. Physical inventories should be conducted at all levels of the health pyramid for the preparation of the annual forecast by the central level.

15.2.3.Placing an Order for Vaccines

Placing an order for vaccines depend on the level of the structure in the health pyramid. This order is placed after inventory. The supply period varies depending on whether you are at the central, intermediate or operational levels. As for the central level, the order is 6 months. For the intermediate level it is quarterly and monthly for district and health facility levels. Estimates are made taking into account the available stock and the 25% of the safety stock and the average monthly consumption. Each level obtains its supplies at the next level of the hierarchy.

15.3. Stock Management

The management system can be computerized or based on the use of registers and individual stock-keeping records. In either case, stocks are rationally managed according to **Wilson's model.**

The concepts of "rolling stock" and "safety stock" are presented here through Wilson's theoretical model. It is an ideal model of inventory management because it does not allow stockout and so on receipt of each order, the rolling stock is zero.

15.3.1. Wilson's Model

In this model, orders are delivered on request and in accordance with the principle, "first expired, first out", in order to limit losses by expiry.

The stock available decreases steadily until it reaches the ordering point and a new order is placed for its replenishment.

The available stock reaches its maximum level when the rolling stock (Q) and safety stock (S) are at maximum. Then it decreases again gradually until the arrival of the new stock.

During the interval between two orders, the rolling stock (Q) decreases first. The safety stock (S) is only consumed if the rolling stock has been exhausted.

15.3.2.Supply Lead Time (SLT)

When the rolling stock reaches a certain level, usually called the order point, a new order must be placed to avoid stockout.

The **order point** is the amount of vaccine that meets the needs while waiting to receive the new order.

It depends on:

- The average consumption of vaccines during a given period;
- The supply period, i.e. the time interval between the moment the order is placed and the time when the vaccines are received.

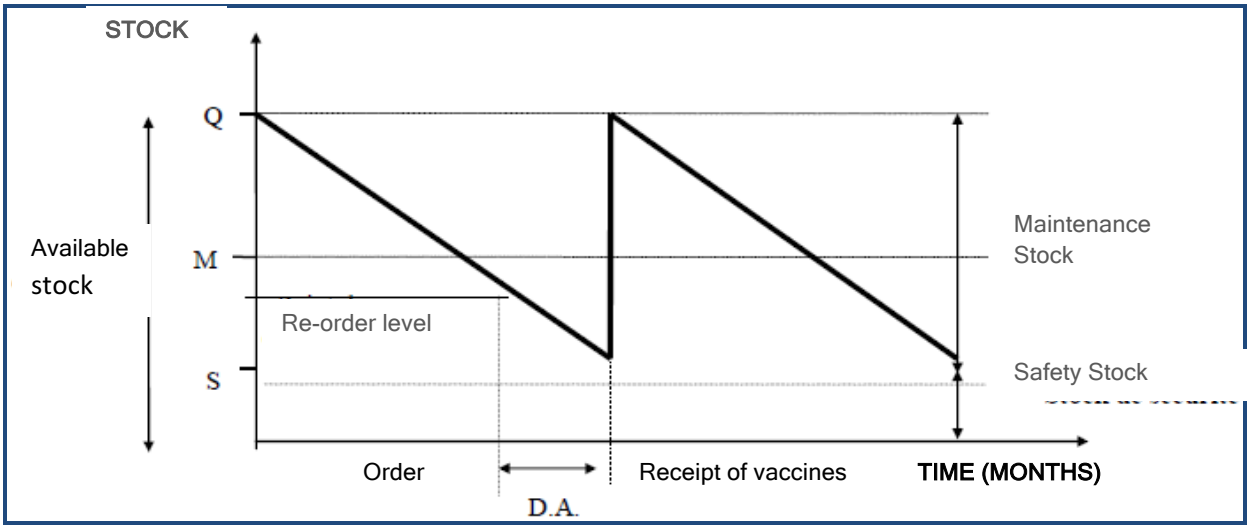

Figure 27: Ideal Inventory Model: The Wilson Model

Logically, the longer the lead time, the closer the re-order level to the maintenance stock level. This is to ensure the availability of enough vaccines to meet the needs during the period between the placement of an order and its reception.

The re-order point must be set before hand, as well as the level of maintenance and safety stocks. They will depend on the type of inventory chosen and the frequency of supply.

15.3.3. Stock Management Tools

The tools used for management of vaccines and consumables at different levels of the health facility are:

- The inventory registers;
- The inventory sheets;
- The Stock Management Tool (SMT);
- District Vaccine Data Management Tool (DVDMT).

15.3.4. Distribution of Stocks

The distribution of vaccines is based on the First Expired, First-Out (FEFO) principle. It is an inventory management principle in which vaccines with the earliest expiry date are first issued, regardless of the order in which they are received. The regions are supplied by the central level (applying "Push System"), while the districts obtain supplies (applying "Pull System") at the regional level. The health units obtain supplies at district level by applying the same Pull System.

15.4. Monitoring the Use of Vaccines, Material, Vitamin A and Other Consumables

The purpose of monitoring the use of vaccines, vitamin A and consumables is to improve stock management so as to minimize losses.

15.4.1. Reporting of Stock Levels

For good vaccine management practice, each level should send stock inventory reports at the end of the month (as soon as possible).

The peripheral level must send the monthly activity report to the district level. Districts must send DVDMTs to the regional level.

In the end, the regional level has to send the SMTs to the central level.

15.4.2. Monitoring of Vaccine Wastage

Vaccine wastage means any vaccine that has been removed from the stock and can no longer be considered for administration to the target population for any reason.

These wastages can be of two types:

- Loss of unopened vials that occur during transportation or storage (expired, frozen, VVM indication, compromised cold chain, theft, broken vials) and;
- Losses during the administration of the vaccine (overdose, vial discarded at the end of the session, vaccination off target, broken vials).

The factors favoring wastages are:

- the size of the vial;
- the type of syringe;
- failure to comply with the "bundling" principle;
- bad practices in stock management;

- transport;
- poor reconstitution practice / administration of the vaccine;
- the non-application of the opened vial policy;
- an unreliable cold chain;
- the frequency and size of immunization sessions (the fewer the targets to vaccinate, the more vaccine losses can occur).

Wastage can occur at any level of the health pyramid. To minimize them, it is important to scrupulously monitor the stocks and use of vaccines.

Wastage rate formula applicable at central, regional and district levels

$$\text{Wastage rate} = \frac{\text{Number of doses lost}}{\text{Initial stock+ Stock received}} \times 100$$

NB : Lost doses = Doses damaged + expired doses + broken vials

Formula for calculating the wastage rate at the level of the HF

$$\text{Wastage rate} = \frac{\text{Doses used – Doses administered}}{\text{Doses used}} \times 100$$

NB:

- **Doses used:** doses released from the stock (open, expired, broken, damaged, stolen vials, etc.).
- **Doses administered to the target population:** vaccination process.

16 MAINTENANCE OF COLD CHAIN EQUIPMENT

The cold chain will operate effectively at all times only if it is systematically controlled, so that problems can be detected and corrected without delay. This control and monitoring system is called maintenance.

Maintenance is the set of actions that are intended to maintain or restore equipment in a state or under safety operating conditions, to perform a required function. Maintenance therefore aims to:

- ensure the availability of supplies;
- improve the accessibility and quality of vaccines;
- optimize costs (financial objectives);
- optimize working conditions and safety;
- preserve the environment;
- enhance EPI image.

There are two types of maintenance: preventive maintenance and curative maintenance.

16.1. Preventive Maintenance

It is performed to reduce the probability of equipment failure or breakdown.

We can distinguish:

- **Systematic preventive maintenance**: it is carried out according to a schedule established based on the time or the number of units of use and,
- **Conditional preventive maintenance:** it is the maintenance that depends on a predetermined type of event (self-diagnosis, information of a sensor, measurement).

16.2. Repairs

The repair is performed after a failure or breakdown of the equipment. It can be done temporarily to maintain the equipment in working condition before repair, or permanently on site or in a shop after a comprehensive diagnosis.

16.3. Organization of Maintenance

To organize the maintenance of equipment, the following steps should be followed:

- Conduct an exhaustive inventory of all equipment;
- Conduct an analysis of maintenance needs;
- Analyze the available resources;
- Adopt a maintenance policy defining the maintenance tasks to be carried out internally and those that must be subcontracted;
- Develop a maintenance plan;
- Implement this maintenance plan.

16.4. Monitoring of Cold Chain

Health personnel responsible for the cold chain monitor storage devices daily, weekly, and monthly.

Table 16: Maintenance Tasks

Daily	Weekly	Monthly	Every 3 months	Every 6 months
User's tasks				**Maintenance tasks carried out by a qualified**
Check and record temperature (at least twice a day)	Clean solar panels, remove dust using damped or dry sponge (do not clean when there is bright sunlight)	Clean the hinges and outside of the refrigerator	Apply grease to door hinge and other mobile parts	Verify horizontal and vertical positioning of equipment
Check the monitoring display (manual or digital display)	Dust and clean equipment	Defrost freezer compartment (if applicable). If weather of dry or arid, pour water on the copper electric earth wire	Check if earth cable is attached and well secured	Remove dust from compressor and condenser
Check if the fan is functioning	Check door shelves, the state of joints and clean them if necessary	Include a table and report of temperature and alarms in monthly activity report	Verify all cable connections to solar panel	Verify the mounting parts and the attachments of solar panel
Check the burner flame is blue	Verify the level of ice in the compartments and defrost if necessary (if thickness of ice is more that 5 mm	Verify if the solar panels are under shades or other obstacles. If so , prune the tree or remove the obstacle		Verify the earth wire and test the electrical conductance
Check the level of fuel (gas or kerosene)	Verify door hinges			
Check the indicator light on the battery charge regulators (for solar power)				
Adjust thermostat (in case of variation of temperature)				
Use a sponge to clean the outside of refrigerator				

16.5. How to Maintain Solar Panels

Solar panels do not work effectively without maintenance. Dirt, dust and bird droppings on the module can reduce the efficiency of the system. Also, it is important to respect the following recommendations:

- ❖ Inspect solar panels periodically (frequency depends on location) to remove debris and dust;
- ❖ Clean the surfaces of the solar modules with a soft cloth, soap and water;
- ❖ Remove bird droppings by brushing with a soft fiber brush;
- ❖ Make sure all connections are tight;
- ❖ Inspect the exposed wiring;
- ❖ Check for rust, galvanic corrosion and electrolysis;
- ❖ Check and adjust the tilt angle (by a technician) after every six months depending on the position of the sun.

Main recommendations

- ❖ Never put a refrigerator in a horizontal position or refrigerator on its side during transport.
- ❖ After transport, wait 24 to 48 hours before switching it on.
- ❖ Install the refrigerator in a level position, out of direct sunlight and wind. Allow a gap of about 10 to 20 cm between the refrigerator and the wall.
- ❖ The Freeze-tag and / or Freeze Watch must be installed in the DTP-HepB-Hib and Td vaccine compartment.
- ❖ Do not put the vaccines inside the refrigerator until 6 to 8 hours after switching on (when the temperature is between + 2°C and + 8°C).
- ❖ Open the refrigerator only to remove or keep the vaccines.
- ❖ A temperature control device must be placed in each vaccine storage equipment, including those used for the recycling of water packs.
- ❖ During vaccine transport, each cooler or cool box must contain 3M cards.
- ❖ Before use, check the VVM and the expiry date of the vaccines.
- ❖ Vaccines with the closest expiry dates should be used first even if they arrive afterwards.

16.6. Contingency Plan

This "back-up" plan developed at each level must always be available and used during emergency situation (stockout, breakdowns, epidemics, disasters). It aims to promptly have vaccines in adequate quantity and quality at all levels. **The contingency plan involves** all personnel concerned in vaccine management at all levels of the health pyramid. Some examples of contingency plan:

16.6.1. What to Do in Case of Breakdown of Cold Chain

- Short-term power failure (04 hours): do not open the cold equipment;
- Long-term or unpredictable power outage or equipment failure: transport vaccines in a cooler well-stocked with cool water packs to the nearest center with a functioning refrigerator;
- This course of action should be known in all vaccination centers and EPI warehouses and each level should have instructions on how to proceed in case of a breakdown.

16.6.2. Tips for Keeping Vaccines in a Refrigerator

- Install the vertical refrigerator away from a heat source and air currents;
- Keep BCG, OPV, MR vaccines in the area just below the freezer; DTP-HepB-Hib, YFV and Td in the lower part;
- Do not place anything on the shelves of the refrigerator door;
- Leave space between compartments for fresh air circulation;
- Place the ice packs in the freezer;
- Place cool water packs in the lower part of the refrigerator;
- Keep opened liquid vials such as DTP-HepB-Hib, Td, and IPV for a maximum of 4 weeks;
- Place a temperature monitoring device inside each cold chain equipment;
- Record the temperature twice daily (morning and evening) on the temperature sheet paste on the refrigerator door;
- Highlight abnormal temperatures in red;
- For the kerosene refrigerator, periodically clean the burner and chimney;
- Always have a reserve stock of oil, gas and wicks;
- Set up a register and / or stock cards and ensure that they are regularly updated.

16.6.3. Vaccine Storage Tips for those Who Do not Have Refrigerators

- Plan regular immunization sessions and ensure the supply of vaccines the day before the sessions;
- Use vaccine carriers with corresponding water packs (type and adequate number) and a temperature monitoring device, to transport vaccines the day before the vaccination session (quantity planned for a session);
- Avoid unintentionally and frequent opening of the vaccine carrier containing the vaccines;
- Ensure that all vaccines are used within 48 hours;
- Discard the opened vials and make a record of the vaccines used with the lot numbers;
- Always place vaccine carriers tightly closed in the shade and in cool places.

17 INTEGRATED MONITORING AND SURVEILLANCE OF VACCINE-PREVENTABLE DISEASES (VPD) AND RESPONSE

17.1. Definition

Epidemiological surveillance is the systematic and continuous collection of healthcare data, analysis and interpretation, as well as dissemination of information collected to those who need it to take the necessary action. This information is essential for the planning, implementation and evaluation of healthcare interventions.

17.2. Functions of Surveillance

The eight functions of surveillance[2] are:

1. Case identification and detection;
2. Case notification;
3. Analysis and interpretation of the data;
4. Investigation and confirmation of suspected cases, epidemics and health events;
5. Preparation for action;
6. Response;
7. Dissemination of information;
8. Monitoring &Evaluation for improvement of the system.

17.3. Types of Surveillance

There are several types of epidemiological surveillance, depending on the data collection process (active/passive) or the geographic characteristics of the monitored area (sentinel/ exhaustive):

17.3.1. Passive Surveillance

It consists of the declaration by health workers of cases of illness and death recorded in health facilities. The diseases concerned have been identified as those with "mandatory reporting". These are epidemic-prone diseases (EPD) and other health events. Cases are identified in health facilities, using case definitions. Data is collected in EPD reporting forms, as well as EPI Monthly Activity Reports (MARs). Health managers should ensure that the data transmitted in both tools is consistent.

17.3.2.Active Surveillance

It consists of regular visits to health facilities and the community to find cases of diseases that might have escaped passive surveillance. Cases are identified in the community (community-

[2] For details, see Integrated diseases surveillance and Response (IDSR) guide

based surveillance) and health facilities, using case definitions. Active surveillance requires planning and prioritization of sites including traditional healers and other places outside hospitals where patients will seek care. This type of surveillance has been developed since 1998 as a key element in the surveillance of acute flaccid paralysis (AFP) for the global eradication of poliomyelitis and currently covers all vaccine-preventable diseases (VPD).

There are 4 priority levels of surveillance sites (very high, high, medium and low) depending on the probability of finding AFP cases. The frequency of visits to a site is determined by its priority level, the principle being to visit more regularly sites where the probability of receiving AFP cases is high.

Table 17: Prioritization of active surveillance sites and frequency of visits

Priority level	Probability for a case of AFP or VPD to frequent the health facility	Frequency of visits
Very high priority	Very probable	Twice a week
High	Very probable	Once a week
Average	Likely	Once every two weeks
Low	Unlikely	Once a month

17.3.3.Exhaustive Surveillance

Surveillance is said to be exhaustive when it is conducted throughout the national territory and in all health facilities and other community places. This is the case for surveillance of Epidemic Prone Diseases (EPD), including surveillance of AFP, measles, yellow fever and neonatal tetanus. It also concerns the surveillance of all public health events.

17.3.4.Sentinel Surveillance

Surveillance is sentinel when it is done in selected health facilities in a few regions of a country in order to document in a precise and specific way an epidemiological situation or a public health intervention. It is often dictated by the constraints of human resources, required equipment or financial restrictions. The choice of sites often depends on their geographical location, the presence of certain medical specialties and their ability to make accurate diagnoses. In Cameroon, surveillance of rotavirus diarrhea and pediatric bacterial meningitis sentinel surveillance was conducted at the Chantal Biya Foundation's Mother and Child Center (FCB/CME), and was part of the process of introducing the new vaccines into the EPI.

17.3.5.Case by Case Surveillance

Surveillance is case-by-case when it focuses on a disease where each case is immediately notified and investigated.

17.3.6.Integrated Surveillance

It involves using the same actors, structures, resources and tools to simultaneously monitor multiple diseases or health events.

17.3.7. Environmental Surveillance

It consists of looking for germs in waste water or other environmental samples. In the particular context of poliomyelitis environmental monitoring, it complements surveillance of AFP and is part of the activities of the final phase of polio eradication.

17.3.8. Community-Based Surveillance

It involves integrating the community in the detection, reporting, response and monitoring of health events in their environment. Its scope is limited to the continuous and systematic collection of data on events and diseases and notification to health services. It uses simplified case definitions and forms to fill out, to notify the health facility so that it, in turn, verifies, conducts a survey, compiles the survey data, analyzes them and prepares for response.

17.4. Vaccine Preventable Diseases under EPI Surveillance

The VPD currently being monitored on a case-by-case basis in Cameroon are: poliomyelitis (Acute Flaccid Paralysis (AFP)), measles, yellow fever, neonatal tetanus (NNT), pediatric bacterial meningitis, rotavirus diarrhea and congenital rubella syndrome.

Case definitions, actions to be taken, as well as the notification, investigation and survey forms can be found in the annex.

17.5. Organization of the Surveillance System in Cameroon

Cameroon has adopted and implemented the strategy of Integrated Disease Surveillance and Response (IDSR) since 2005, through the adoption of the national technical guide for the IDSR. This technical guide was revised in May 2011 to take into account the provisions of the International Health Regulations (IHR), which came into effect on June 15, 2007.

VPD is among the 44 diseases, conditions and priority events identified in the IDSR technical guide for Cameroon. The notification of the VPD to the EPI-CTG is done instantly. However, at the end of the month, a monthly summary is made in the MAR. In epidemic situations, a line listing of cases is opened and their notification becomes daily.

The notification forms are transmitted from the base of the health pyramid (health area) to the summit (central level) according to the frequency below:

- From the health center / HA to the District: every Monday of the following week;
- From district to region: every Wednesday of the following week;
- From region to central level: Every Thursday of the following week.

In addition to the weekly notification forms, two other summary tools are used and transmitted on a monthly basis: the EPI monthly reports, consolidated and analyzed at the level of the EPI-CTG and the monthly activity reports (MAR) compiled and analyzed by the Health Information Cell (HIC). The data in these two tools must be consistent. These two reports are transmitted to each level of the health pyramid according to the following periodicity:

- District health center: no later than the 5th of the following month;
- From health district to region: no later than the 10th of the following month;
- From the region to the central level: no later than the 15th of the following month.

NB: Each manager must systematically provide feedback at the lower level as soon as the report is received.

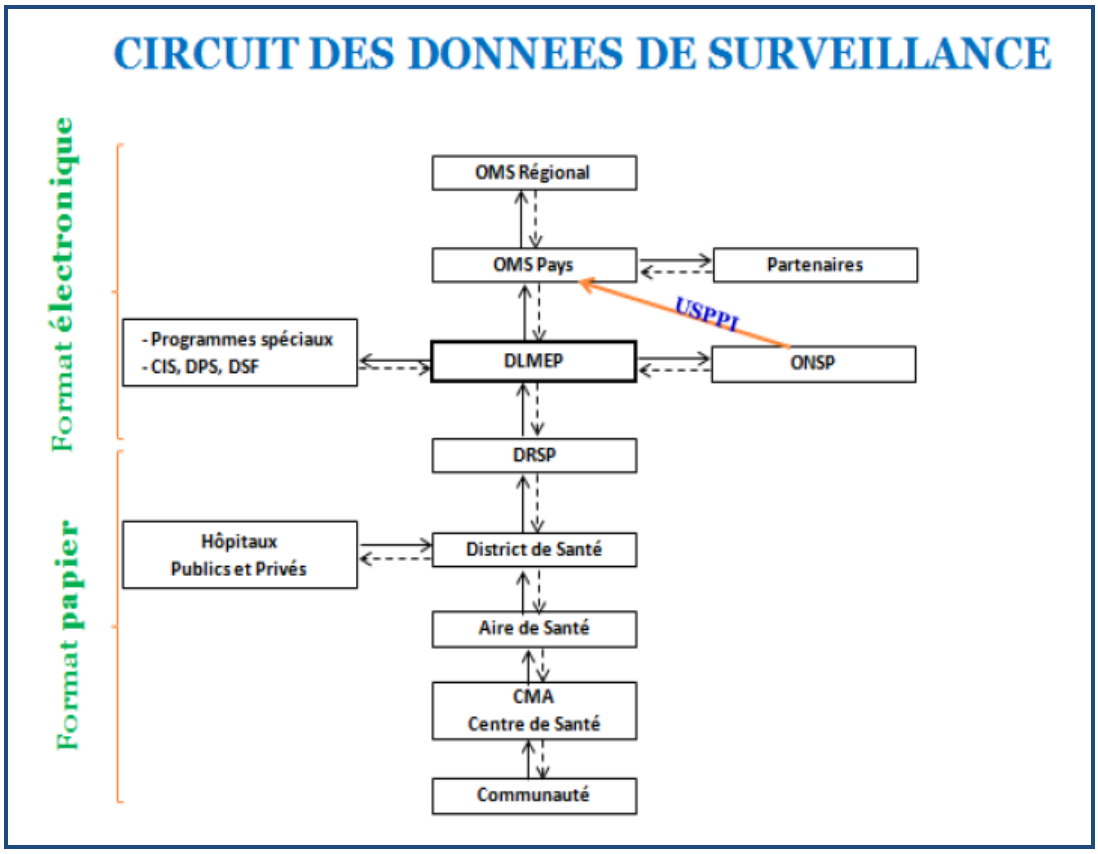

Figure 28: Data Flow

17.6. Epidemics and Response

17.6.1. Epidemics

17.6.1.1. *Definition*

This is an unusual increase in the number of cases of a disease in a given population, during a well-defined period in relation to the usual incidence, or compared to the number of cases in the same period of the previous year

17.6.1.2. *Epidemic Threshold*

This is the minimum number of cases from which an outbreak can be declared. Every disease has its epidemic threshold:

Table 18 : Case definition

Illness	Epidemic threshold
Yellow fever	1 confirmed case
Poliomyelitis	1 confirmed case
Measles	3 confirmed cases in a district within 28 consecutive days (and not necessarily in the same month), with plausible reasons for transmission between them (results of an investigation).
Cerebrospinal Meningitis	In a population of less than 30 000 inhabitants: incidence of 5 cases per 100 000 inhabitants during one week or doubling of the number of cases during 3 consecutive weeks; In a population of 30,000 to 100,000 inhabitants: incidence of 10 cases per 100,000 inhabitants in endemic areas.

17.6.2. Response

17.6.2.1. Definition

It is a set of emergency measures to be implemented in order to circumscribe (isolate) the epidemic focus, interrupt the chain of transmission and ensure effective case management. The implementation of response interventions is the responsibility of the District Health Service (DHS) and should be planned with support from the region and the central level.

To be very effective, the response to epidemics has to be sufficiently:

- ❖ Fast to limit or prevent the spread of the disease in the population,
- ❖ Wide enough to cover the entire risk area,
- ❖ Exhaustive to protect the entire target population at risk.

Once the outbreak is confirmed, the following steps should be taken immediately at the level of the DHS:

a) Officially declare the epidemic (local authority);
b) Create a list of cases (line listing) in all health areas and at the DHS level to monitor the progress of cases and assess the impact of the response;
c) Urgently investigate the epidemic to assess its magnitude, extent, severity and case characteristics using the appropriate template, and submit the investigation report to the hierarchy;
d) Develop a budgeted micro-plan and mobilize resources;
e) Re-inforce active surveillance;
f) Ensure adequate case management;
g) Organize a quality response campaign and share results of the campaign with the regional and central level;
h) Evaluate the emergency response;

i) Submit to the central level the final report of the intervention within two weeks of the response.

17.6.2.2. Specific Cases

a) In case of a polio outbreak by wild poliovirus, the polio emergency plan provides for the organization of quality supplementary immunization activities (SIAs) to stop the circulation of wild poliovirus within 120 days of confirmation.

This response must:

- Start immediately (at the latest 14 days after confirmation of the outbreak),
- Deploy on a large scale at least two million people,
- Feature several SIAs with at least five planned sessions from the beginning of the epidemic,
- Pay special attention to populations most at risk (these groups, particularly those vulnerable to poliovirus circulation, need to be identified and targeted for vaccination and social mobilization campaigns. These include nomadic groups, refugees, displaced persons, minorities, in areas of insecurity and difficult access, etc.),
- Follow up and monitor to cover a growing number of children (the vaccination activity must be independently evaluated and must reach at least 95% of the target population).

The main strategy is door-to-door. It is complemented by other strategies depending on the context: vaccination in transit stations (stations, markets, borders, etc.), in areas of insecurity (hit and run, fire-walling, permanent health team, etc.), in areas of difficult access, schools, health facilities. The type of vaccine will depend on the type of virus responsible for the outbreak (monovalent OPV if type 2 virus, bivalent OPV if type 1 and 3 viruses).

b) In the event of maternal neonatal tetanus (MNT), the District Medical Officer must:

- Immediately notify the case by phone to the hierarchy, then in the weekly reports (EPD) and monthly reports (MAR),
- Completely and correctly fill the investigation forms and share it with the regional and the central level,
- Ensure clinical management of the patient,
- Compulsory vaccination of the mother against tetanus,
- Organize a vaccine response locally targeting all women of childbearing age i.e. 15 to 49 years in the village / neighborhood where the case occurred: 3 sessions with at least 1-month interval between the first and the second and at least 6 months apart between the second and the third session,
- Share the data of each session of the response campaign with the region and the central level.
- At the end of each session, produce a report of the mini-campaign of the local response organized in the village / neighborhood where the case arose with possible field illustrations.

c) For DHS who have crossed the elimination threshold (> 1 case of neonatal tetanus (NNT) per 1,000 live births, the procedure is the same except that the response campaign targets women of childbearing age in the entire district and all health areas by respecting the delays between transitions.

d) In event of a measles outbreak, in addition to the above measures, the head of DHS must:

- Suspend the collection of blood specimen,

- Take a nasopharyngeal swab for viral isolation of 5 cases: the cases must be taken within 5 days after the start of the rash, preferably for different chains of transmission,
- Administer vitamin A according to the table below.

Table 19: Vitamin A administration in the event of a measles outbreak

Age	immediately	Next day	Color of the capsule
6-11 months	100 000 UI	100 000 UI	Blue
>12 months	200 000 UI	200 000 UI	Red

NB: If the most affected age group is less than 9 months, children can be vaccinated from 6 months. In this case, ensure that the child will be revaccinated at 9 months.

e) **In case of yellow fever outbreak**, the head of the HD must:

- Conduct a preliminary investigation for probable cases;
- Conduct an in-depth investigation possibly with the support of the regional and central level;
- Conduct a survey to assess vaccination coverage in the area concerned;
- Lead the fight against vector (epidemic occurring in urban area): destruction of larval habitats in the environment, use of LLINs, etc.

The central level must:

- Conduct a multidisciplinary investigation (epidemiological, entomological, laboratory) within 48 hours of the confirmation of the epidemic;
- Notify WHO by using the International Health Regulations tool (IHR 2005);
- In case of confirmation of human-to-human transmission in a poorly immunized population, organize within 4 weeks a high quality vaccination campaign in the geographical area concerned.

Communication for development is one of the fundamental components for the success of EPI. It ensures optimal participation of populations and other stakeholders at different levels in immunization and epidemiological surveillance for the achievement of EPI objectives.

EPI communication for development aims to achieve universal coverage of target populations by immunization services. To this effect, it seeks to dispel all the myths and doubts surrounding vaccination, but also helps to understand the importance of vaccination and specially to maintain permanently the constant dialogue between the immunization services, the communities and authorities (administrative, political, religious, traditional).

The overall goal of C4D services is to increase demand and use of immunization services based on social and behavior change, while mobilizing political support.

18.1. The principles of C4D

- Enhance measurable change in behavior and social;
- Are based on planning and use of evidence (social and epidemiological data);
- Promote the participation of all categories and components of the society;
- Aim at empowering people and their appropriation of vaccination;
- Focus on human rights and equity;
- Use a mix of channels, communication strategies and are flexible.

18.2. Stratégies

To achieve immunization goals, it is necessary to inform, sensitize and motivate the beneficiaries of immunization services through the following main communication strategies:

- Advocacy and partnership;
- Social mobilization;
- Behavior Change Communication (BCC);
- Social Change Communication (SCC);
- Social marketing;
- Capacity building of communication actors.

18.2.1. Advocacy and Partnership

Advocacy is a communication strategy aimed at decision-makers to encourage their engagement and their effective commitment to social cause. It is usually conducted by a group of people or organizations and influences the process of developing and applying decision in given area. CCC strategies and techniques are used to achieve the expected goal.

Partnership is the set of coordinated support actions undertaken in the field of immunization by health staff and the communities concerned to achieve the common goal of providing accessible, reliable and user-friendly services that are best used by all.

18.2.2. Social Mobilization (SocMob)

It is a communication strategy that involves associative networks and organized group in a specific action of social interest. Its purpose is to identify perceived needs, to raise awareness of a particular development goal and to increase demand. It involves gaining the participation of actors such as instructions, groups, networks and communities in the identification,

mobilization and management of diverse resources, increasing and reinforcing the self-sufficient and sustainability of the results achieved.

18.2.3. Behavior Change Communication (BCC)

The BCC concept is intended to promote the desired behaviors of development programs with the effective involvement of partners in the process. It aims to overcome both the simple apology for unsafe behaviors and the stigmatization of negative behaviors, to emphasize the benefits of desired behavior to those who adopt it.

18.2.4. Social Change Communication (SCC)

SCC is a strategy that focuses on the community in general and the community leaders in particular. Indeed, social change is a process of transformation of the way society is organized and whose power is distributed among the various social and political institutions. It aims to collectively change negative cultural and social practices for immunization so as to bring about social change.

18.2.5. Social Marketing

Social marketing is a communication strategy used in EPI to meet the growing needs of beneficiaries in order to improve the quality of provision and use of immunization services. It focuses on explaining the benefits of vaccines offered in routine immunization. The use of planned or periodic events (eg International Women's Day, International Polio Day, etc.) is considered an opportunity for vaccination and contributes to improving the user-friendliness of the vaccination posts.

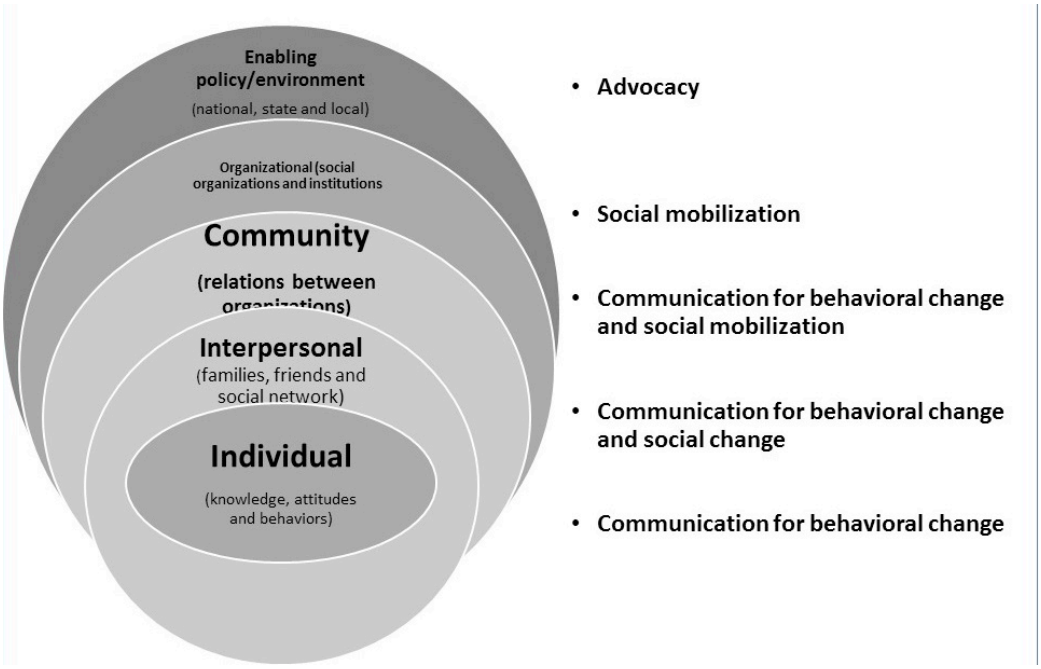

Figure 29: Ecological Social Model

The diagram of the ecological social model above focuses on the choice of strategies and even activities to be carried out in the field of C4D. It links targets to different communication strategies, it is therefore important to define the targets we want to achieve in order to better determine communication strategies.

18.3. Communication in practice for EPI

It is a form of communication that welcomes, soothes and reassures worried children and adults. It makes vaccination more accessible and enjoyable. Given its importance, essential information about the services offered must be shared at the end of each immunization session. This practice creates a climate of trust and respect between health workers and communities, highlighting health problems in the community and for which it is important to find solutions.

For health staff, it should be noted that during an immunization session, attitude, facial expression, posture and other gestures that convey non-verbal communication can positively or negatively influence vaccination services.

Providers should, for this purpose, have a friendly and reassuring attitude to reduce anxiety and strengthen the willingness of beneficiaries to return to continue and complete the vaccination schedule.

Table 20: communication attitudes and practices during a vaccination session

Attitudes/practices	Implications
Exchanges	Welcome parents with: **smile, listen, respect, empathy** Ask and answer mothers / parents questions; Reward (encouragement, price, etc.).
Inform about vaccination	Provide information / knowledge: on immunization, its importance, etc. Provide additional information / advice; Have a counseling session with the mothers / parents in case of a particular problem.
Reassure parents	Warn parents about possible vaccine-related adverse events (fever, pain or swelling); Tell the mothers / parents that side effects are minor and transient, deterring them on rumors ("vaccines make sick"); Tell parents what to do; Tell mothers / parents that health staff is available in case of problems.
Invite /agree for the next appointment	To educate parents about reading, using and keeping the vaccination record; Announce the date of the next immunization appointment; Get parents' commitment to respect vaccination appointments; Share with parents the techniques of self-remembering of the immunization session.
Recall	Take stock of the children who missed the immunization session; Send a reminder message to parents or contact them (SMS, Calls); Organize home visits; Use representatives and leaders of the community.

18.4. The main channels of communication

The three main communication channels used at the EPI are:

- The mass communication channels (radio, television, press, posters);
- Interpersonal and traditional communication channels (health staff);

- The confessional (churches, mosques, etc.) and traditional channels (traditional leaders, town criers, Health Committee (HC) members, health staff, etc.).

18.5. Interpersonal communication (IPC) for EPI

18.5.1. Definition

Interpersonal communication is when communication occurs between people who can see each other, talk to each other, get along and / or touch each other. The communication target is reduced.

18.5.2. Some types of interpersonal communication

- Group talk / community conversations;
- The health talk;
- Home visits.

18.5.2.1. Group talk and educational talk

- Group talk or community conversation is a mean of interpersonal communication to promote exchanges between members of a group or community in order to find an adequate solution to a problem.
- The health talk is a facilitation technique use to inform and transmit knowledge on a given theme.

There are three basic steps in group or educational talk:

- Prepare for the talk;
- Carry out the talk itself;
- Conclude the talk.

Prepare for the talk:

- Identify the target audience (15 to 25 participants);
- Set the objectives of the talk;
- Bring the group talk sheet;
- Choose the location, date and time of the talk (waiting room of the vaccination post);
- Plan the duration of the talk (about 15 to 30 minutes);
- Choose the visual aids to use: picture boxes, posters, leaflets, flyers, vaccination cards, leaflets, etc.;
- Prepare the theme well and master the key messages;
- Prepare the premises (installation) before the arrival of the participants;
- Install participants according to their needs.

Carry out the health talk

- Welcome and greet participants;
- Introduce the facilitator and the participants;
- Start with an ice-breaker: tell a funny story for example;
- State the theme and objectives of the session;
- Develop the content: a story, visual aids;

- Exchange with participants, take their concerns into account, answer questions with courtesy;
- Summarize by highlighting the most important points.

Conclusion of the chat

- Summarize the essence of the exchanges and deliver the key messages again;
- Check if the message is understood by the participants;
- Make an appointment for other talks;
- Thank the participants and say good-bye;
- Complete the talk sheet.

18.4.2.2. Home visit (HV)

This is the visit of a provider or community health worker in a household in order to discuss with him on a specific topic: the importance of vaccination for example.

Preparation of home visit

- ❖ Identify the household to visit: specify the day, time and duration of the visit (15 minutes);
- ❖ Set the objectives of the visit;
- ❖ Plan the visit taking into account the target group and priorities;
- ❖ Prepare communication tools and supports (picture boxes, posters, leaflets, flyers, vaccination cards, leaflets, etc.);
- ❖ Prepare the data collection sheet.

Conduct of home visit

- ❖ Greet the people;
- ❖ Settle in a suitable place;
- ❖ Introduce yourself and recall the purpose of the visit;
- ❖ Give a talk on vaccination: drop out cases, the importance of vaccination, the vaccination schedule, the target diseases;
- ❖ Count all targets in the household;
- ❖ Check vaccination cards of all EPI target persons in the household;
- ❖ Remind them about the dates of the next immunization appointment;
- ❖ Refer the parent to the health facility by giving him / her vaccination schedule at this health facility;
- ❖ Look in the household and in the entourage for the presence of cases of diseases under surveillance;
- ❖ Take leave in a good atmosphere;
- ❖ Provide feedback to the health / association structure to find solutions to identified problems.

Conclusion of home visit:

- ❖ Summarize the most important points and deliver the key messages again;
- ❖ Check if the messages are well understood by the household visited;
- ❖ Make appointments for other chats or home visits;
- ❖ Say good-bye.

After Home Visit:

- ❖ Tidy-up the place;
- ❖ Provide feedback to the health / association structure to find solutions to identified problems;
- ❖ Write the report and send to hierarchy;
- ❖ Call parents to follow up progress.

18.5.3. Other techniques/Communication activities

18.5.3.1. Visit or advocacy meeting

An advocacy visit is the visit of an immunization provider, a community health worker or any other communication actor (mobilizer, communication focal point, alone or in a small team of at least 2 people) with a leader, a local political, traditional or religious authority. An advocacy meeting is a meeting organized for one or different traditional political or religious leaders considered as decision-makers. It can also be conducted by a provider, a community-based community health worker or any other communication actor (mobilizer, communication FP, alone or in a small group of 2 people) . both the visit and the advocacy meeting are based on an advocacy document that is essentially a reflection of the situation or extent of the problem; actions taken to reduce this problem; gaps to improve intervention and expectations for the advocacy target. The purpose of the visit or advocacy meeting is to obtain a formal commitment from the targeted leader (s) / authority (s).

Preparation of visit / advocacy meetings:

- Identify the leader (s) / authorities to meet;
- Define what is expected from participant and ensure they are able to do it;
- Prepare the presentation and advocacy document;
- Choose the site and prepare it;
- Set the agenda and invite participants;
- Meet participants in advance if possible;
- Get the authority to chair the advocacy meeting.

Conduct of the visit/advocacy meetings:

- Welcome, install participants and distribute advocacy documents;
- Make a communication to the participants, essentially outlining the situation or the extent of the problem; actions taken to reduce this problem; gaps to improve intervention and expectations for advocacy target participants
- Discuss with participants the actions taken to reduce the problem of vaccination as a motive for advocacy; gaps to improve intervention and expectations for advocacy target participants;
- Obtain commitments.

Conclusion of the visit/advocacy meeting

- Thank participants;
- Summarize the essence of the talk and deliver the key messages again;
- Separate in a good atmosphere.

After the visit/Advocacy meeting:

- Transmit reports to the hierarchy;
- Follow up on commitments;

- Send thanks in case of realization of these commitments.

18.5.3.2. Awareness raising by organized groups and other community actors

Awareness raising by organized and other community groups under the social mobilization strategy. It basically targets local associations, the media, schools (education sector) women's associations etc. For both organized groups and individual actors, sensitization towards social mobilization aims to engage, involve and encourage them in the promotion of vaccination.

How to engage organized groups and individual actors?

- List the community actors (associations, leaders, CHWs, media, places of worship, etc.);
- Organize awareness raising for targeted community actors;
- Present to community actors the activities in which they can engage;
- Collect the commitment of community actors.

How to involve organized groups and individual actors?

- Involve community actors in the activities undertaken (search for lost to follow-up, monitoring of VPD, etc.);
- Propose to community actors the activities to be included in their action plan;
- Motivate community actors to share the report of their activities.

How to encourage organized groups and individual actors?

- Transmit reports;
- Follow up on commitments;
- Send thanks in case of fulfillment of a commitment.

18.5.3.3. Motivating mothers, caregivers, and relatives

During immunization sessions	At the beginning and at the end of the vaccination schedule
• Thank the mothers or parents who came to the immunization session; • Encourage mothers or parents to participate in the discussion during immunization sessions; • Ensure that women can have drinking water or benefit from other facilities such as toilets, etc.	• Congratulate mothers / parents who came for the first time to the immunization session (for example, invite another mother to say a word of welcome); • verbally congratulate the mothers whose children have completed their vaccination schedule; • Give rewards to mothers / parents who have completed their vaccination schedule (scrolls)

18.6. The main actors of communication

The actors of communication can be:

- ❖ Communication focal points (PFCs) at all levels;
- ❖ Municipal, traditional, religious, administrative and other leaders;
- ❖ Health committee delegates and all community-based health workers;
- ❖ Civil society organizations (CSOs);

- ❖ Health professionals;
- ❖ Media professionals.

18.7. Some advocacy techniques

18.7.1. Lobbying and negotiation

These two techniques aim to engage one-on-one with decision-makers to directly or indirectly influence them, as well as leaders and all influential people to support and implement actions that contribute to the resolution of a given problem.

Bargaining is usually conducted between two people face to face while lobbying involves one group of people facing another.

18.7.2. Conferences, events, meetings

It brings together different stakeholders and decision-makers to identify the causes of the problem and to identify their solutions, with follow-up including concrete and immediate measures.

18.7.3. Development of partnerships, coalitions and alliances

These techniques consist of generating organizational support and momentum as a result of the problems identified, and then establishing a link between message carriers and decision-makers.

18.8. Work with the community

Working with the community is an important part of communication for the promotion of vaccination. The goal is to involve all members and groups in the community in immunization activities. Ideally, community participation will be self-initiated based on a self-identification of its needs, which will lead to actions it intends to lead on its own. But, health staff have a role to play in motivating and supporting community engagement. This can be done at two levels: information and collaboration.

With regard to information:

- Take into account all the members of the Community (parents, authorities, leaders, youth, divers groups, etc.);
- Interact with the community about their needs, concerns and expectations;
- Sensitize the community on essential messages and immunization activities;
- Rely on interlocutors within the community.

For collaboration:

- Involve the community in the planning of immunization services (site identification, distribution of roles);
- Involve the community in specific activities (search for lost to follow-up children, community-based supervision, etc.);
- Give feedback to the community;

- Encourage the community to identify their needs and take initiative.

Communities and more broadly society are not homogeneous, that is why it is important to take into account the different specific groups that compose them for greater equity in immunization. Some specific groups in communities are usually called special populations. Namely:

- Nomads;
- Agricultural Migrants;
- Displaced population;
- Ethnic minorities;
- Population living in areas of difficult access;
- The poor.

Working with the community must also be done taking into account the special population. Which implies:

- Map special population groups by specifying their movements;
- Identify the leaders or resource person of the groups concerned;
- Supervise the choice of a local representative or several;
- Discuss with the authorities and the community how to vaccinate children and use other health services;
- Inform and involve them in immunization and health activities.

18.9. Communication during crisis

The crisis may be due to:

- The occurrence of an epidemic;
- An incident (e.g. serious AEFI);
- Crazy rumors;
- Other situation likely to affect people's confidence in vaccination.

During crisis:

- Gathering accurate information about the situation by limiting itself to the facts;
- Report to hierarchy with transparency;
- Disseminate messages received from the Crisis Management Committee based on credible sources;
- Do not communicate in the media without prior authorization of the Crisis Management Committee;
- Recall the importance of vaccination.

18.10. The management of refusals and resistances

Vaccination can only be effective if people adhere to the services offered in health facilities and in other circumstances. However, the acceptance of vaccination services by populations and communities is not always guaranteed. This explains the refusals and resistance to vaccination. These can be the act of an individual, a group or, community. Several reasons can be the cause of refusal and resistance. These include:

- A religious belief;
- Anti-vaccine information;

- A lack of knowledge of the benefits of vaccination,
- Rumors based on false information or mistaken presumptions;
- The quality of the supply of vaccination services and the non-participation of the population.

it is necessary to manage refusals and resistance. This will not only reach the maximum number of people targeted by vaccination, but also avoid possible epidemic outbreaks. Health personnel must demonstrate a number of professional qualities and skills to achieve effective management of refusal and resistance cases. We can cite:

- Identify the source or focus of resistance;
- Give correct and positive information;
- Rely on the social influencers;
- Give a quick, firm and clear answer in cases of false rumors;
- Make several attempts without getting discouraged;
- Favor dialogue.

More specifically, faced with a case of refusal or resistance, one should keep in mind the four imperatives described in the diagram below:

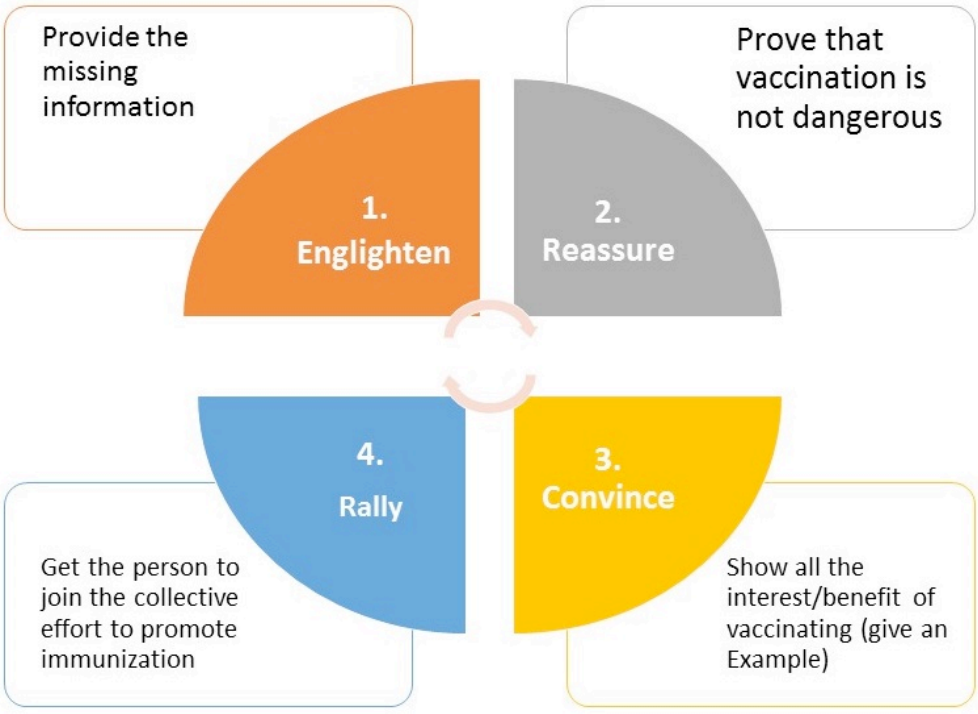

Figure 30: 4 key points to consider in the management of a case of refusal

19.1. Definition

Monitoring is defined as a continuous surveillance technique that tracks the progress of a program during action, identifies problems as they arise, selects and implements corrective strategies to ensure the smooth running of activities.

19.2. Monitoring Objectives

19.2.1. General Objectives

- Improve the performance of the vaccination team.

19.2.2. Specific Objectives

- Produce quality vaccination data in a timely manner;
- Determine the main programmatic and performance indicators;
- Determine gaps in the achievement of objectives;
- Identify bottlenecks and their causes;
- Determine solutions to solve identified bottlenecks and prioritize them;
- Ensure micro-planning and implementation of corrective actions;
- Provide feedback to providers and populations.

As part of the implementation of the "Reach Every District (RED)" strategy, monitoring for action is the option chosen at all levels of the health pyramid. Not only does it analyze the data, but it also uses this data at all levels to guide the program by measuring progress. It also identifies areas that require specific interventions and conducts practical reviews of work plans.

19.3. Different Stages/phases of Monitoring

This is a cyclical process that includes the eight steps listed and described below:

- Setting performance standards;
- Choice of indicators and targets;
- Data management;
- Data collection;
- Data reporting;
- Analysis and feedback;
- Archiving of data and reports;
- Informed decision making.

19.3.1. Setting Performance Standards

The performance standards describe the national standards and the objectives of the immunization program. These standards are based on past performances and available resources. They must be adapted and documented during planning to guide performance monitoring.

19.3.2. Choice of Indicators and Targets

The choice of program monitoring indicators is made at the national level as well as the choice of targets at all levels. The main indicators are:

- Programmatic monitoring indicators:

- The rate of achievement of outreach strategies;
- The rate of achievement of health talks and home visits (HV);
- The rate of completion of active surveillance visits;
- The number of days of stockout.

- Performance indicators:

- The vaccination coverage rate (all antigens);
- The specific (Penta 1-penta 3) and general (BCG-MR) dropout rate
- Wastage rate;
- The rate of non-polio AFP (annual);
- The quality of the stool.

19.3.3. Data Management

19.3.3.1. *Data Management Procedures*

19.3.3.1.1. Health Facilities

On a daily basis:

- Systematically record all immunization activities in the vaccination registers and indicate in the vaccination cards;
- Fill and archive the recorded AEFI data;
- Collect data on communication activities;
- Update the register/record of inventory management;
- Fill the fridge temperature monitoring sheet twice daily (morning and evening);
- Fill in the notification forms for VPD and update the monitoring chart of the VPD.

At the end of the month (last day of the month):

- Collect health information and fill the data collection forms (MARs, weekly reports, etc.);
- Report the data (on vaccine and vaccine doses used) in the MAR;
- Enter the MAR data into the DHIS2 platform;
- Update the monitoring curve;
- Prepare the monthly requisition for vaccine and other materials and transmit it to the district;
- Submit no later than the 5th of the month, the MAR to the health district;
- Archive all hard copies of reports submitted to the district.

19.3.3.1.2. District Health Service

On a daily basis

- Update the register/record of inventory management;
- Fill temperature monitoring sheets twice daily (morning and evening);
- Fill in the validation sheets of the VPDs and update the monitoring table of the VPD surveillance.

At the end of the month

- Collect health facility MARs;
- Enter data from health facilities in DHIS2 platform;

- Analyze and use health information from health facilities;
- Update monitoring curve at the end of the month;
- Prepare the monthly requisition for vaccine and other materials and transmit it to the RTG-EPI;
- Transfer to the RDPH, the data review report and other summaries of the data received from the health facilities no later than the 10th of the month;
- Send the summary of district statistics to the health facilities (feedback) no later than the 10th of the month;
- Archive received and submitted reports.

19.3.3.1.3. Regional level

On a daily basis

- Daily update of register/recorded of inventory management;
- Fill the temperature monitoring sheets of refrigerators and cold rooms twice daily (morning and evening);
- Update the monitoring tables for VPD surveillance.

At the end of the month

- Summarize district data and transmit to Health Information Bureau and CTG-EPI;
- Analyze and use the health information of the health facilities

19.3.3.1.4. Central level

Central Technical Groups

- Make a synthesis of the data from the regions and transmit to the health information Unit;
- Contribute to the production of the annual report.

Health Information Cell and National Public Health Observatory

- Participate in the publication of health data;
- Submit validated data to partners.

19.3.3.2. Immunization Data Collection

The collection of immunization data is mainly at the operational level during immunization and awareness sessions. For surveillance, data is collected according to the type of surveillance.

A) Routine Immunization

Information on routine immunization activities is recorded in the following formats:

- Vaccination record;
- Tally register;
- Vaccination card.

During a vaccination session, vaccination records must be carried simultaneously in the vaccination register, the tally register and the vaccination card. These different collection tools are used for the preparation of the monthly activity report.

B) Vaccine Management

The following tools are used for the collection of vaccine management data:

- Purchase order / inventory sheet;
- Vaccine movement register;
- Lot number card/sheet;
- Delivery slip of vaccines;
- Temperature monitoring sheet.

C) Epidemiological Surveillance

Information on epidemiological surveillance is recorded in the following formats:

- Registry of consultations;
- Hospitalization record;
- AEFI notification form;
- Investigation sheet of AEFI;
- Register of AEFIs;
- Monitoring sheet of diseases under surveillance;
- Investigation sheet of cases of diseases under surveillance;
- Linear list of cases of diseases under surveillance (in case of epidemic);
- EPD report (weekly and monthly);
- Monthly monitoring report.

Actors will pay particular attention to the concordance of information between these different collection tools. When parents come for their vaccination appointment, they should be questioned about possible occurrence of AEFI following the previous vaccination and the information obtained should be entered in the AEFI register.

D) Communication

Information regarding communication activities is recorded in the following formats:

1. Communication activities register;
2. Activity report;
3. Community Health Agent narrative report form for communication activities.

The log of communication activities must be completed after each session and signed by the person who conducted the activity.

E) Supplementary Immunization Activities (SIA)

During SIAs, technical data are collected by the recorders while social mobilization data is collected by social mobilizers on recording or tally sheets. This information is compiled daily into daily summaries for the zone or health area and then forwarded to the district health service. At this level, the data is consolidated, then transmitted to the regional coordination team. The regional coordination team in turn will verify, analyze and consolidate before forwarding to the central level for the constitution of databases across the country.

19.3.3.3. Data Reporting

The data collected is compiled at the health facility level in the Monthly Report Activity (MRA). This integrated tool covers all aspects of immunization: routine immunization, communication, surveillance and vaccine management.

The MRAs of the health units are transmitted to the district health service through the health facility leader of the health area. The district management team (DMT) consolidates and analyzes, transmits and synthesizes the data then sends to the Regional Technical Group of the Expanded Program on Immunization (RTG/EPI). The RTG in turn ensures the consolidation and analysis of the data received and transmits the summary to the central technical group of the EPI (CTG-EPI).

Table 21: Deadline for transmission of MARs to higher level

Sanitary structure	Deadline
Health Facility	Before the 03rd of the month
Health Area	Before the 05th of the month
District Health Service	Before the 10th of the month
Regional Public Health Delegation	Before the 15th of the month

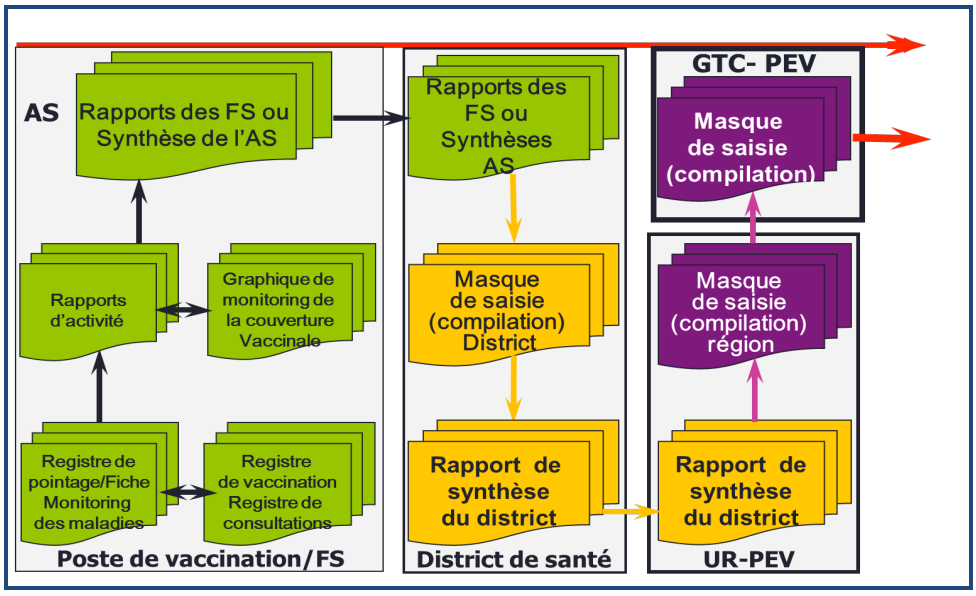

Figure 31: Data flow in the health system

19.3.4. Recording in Vaccination and Tally Registers

19.3.4.1. Allocation of Numbers in the Vaccination Register

The allocation of numbers in the vaccination register starts at the beginning of the year (1st immunization session of the year) and ends at the end of the year (last immunization session). Thus, a new allocation of numbers is made every year. The numbers are assigned to any child starting vaccination in the health center i.e. BCG or OPV or continuing vaccination in any health center. The number of the child starting vaccination in a health center with BCG or OPV0 is written in blue. The number of the child continuing his vaccination at another health center is written in red. This number must be recorded in the vaccination card.

Any child vaccinated in a health center must be registered in the vaccination register with a number. This new number must be recorded in the child's vaccination card. The registration number format in the child's card is "XXX / year". XXX is the serial number of the child in the vaccination register. Year is the year of registration in the vaccination register.

19.3.4.2. Registration of Vaccination Dates

The date of vaccination of any vaccine administered by the health center to a child must be recorded in blue in the vaccination register. The date of vaccination of any vaccine administered by another health center to a child, must be copied in red in the health center that receives the child during its immunization session.

The date of the next immunization visit should be recorded in pencil in the vaccination register and the child's vaccination card, taking into account future immunization sessions at the health center.

At the end of each month, all the children with dates in pencil are considered lost to follow-up (LTF) and should be recorded in the register provided for this purpose. In the event that the parents of the child or woman vaccinated has a telephone contact, the health facility will call to remind them about the missed appointment. The list of LTF must be given each month to community health workers so they can carry out a search of the child in the community.

19.3.4.3. Marking the Tally Register / Using the Tally Register

Always specify the date of vaccination and the type of vaccination strategy (fixed, outreach or mobile). For outreach or mobile strategies, note where the vaccination session took place. A stroke will be used for tallying. To facilitate the count of the number of vaccinated children and women, the strokes should be grouped in five.

The score is based on gender, place of residence (area or out of area) for each antigen. The blue color for children residing in the health area and the red color for children residing outside the health area. For a child receiving multiple antigens, peer or not, each antigen will be scored.

N.B: Score in the tally register immediately after administering a vaccine, otherwise you may forget to do so.

19.3.5. Archiving Data and Reports

The data must be kept at all levels of the health system for audit purposes, as well as for research when necessary. Data retention can be done on paper or electronically.

The following documents must be kept for at least three years in each health center:

- Vaccinations registers;
- Score sheets;
- Register / notebook / any other active search system for lost to follow-up;
- Copies of monthly reports;
- Data on the target population;
- Monitoring curve for immunization coverage;
- Diagrams and reports relating to disease and epidemic cases;
- Reports of supervision visits;
- Vaccine movement register (stock register);
- Maintenance records of the cold chain.

19.3.6. Analysis and Feedback

The collected and compiled data is only useful if it is used to improve program performance.

19.3.6.1. Draw Monitoring Curves to Monitor Vaccination Coverage

A monitoring curve showing administered doses and dropout rates is a simple and effective tool for monitoring performance. This curve can illustrate:

- The number of doses given in relation to the number of expected infants likely to receive them;
- Drop-out rates, comparing the number of infants who started receiving vaccinations to those who received all the necessary doses of the vaccines.

Each health center should display the current monitoring curve on the wall, where it can be seen by all staff. This curve can be used at all levels of the pyramid with the same principle.

19.3.6.2. Compile data for calculating indicators

To analyze the data, it is necessary to compile them correctly by village / district at the level of the health area. The tables below illustrate a simple way of compiling and analyzing data to calculate the key indicators described in 19.3.2. (choice of indicators and targets).

Table 22: Examples of compilation and data analysis tables

Table 22a: Vaccination data

Village/Quarter	**Compile population data, doses of vaccines administered**						
	Target pop for the period	Doses of vaccines administered			Immunization coverage (%)		
		DTP1	DTP3	Measles	DTP1	DTP3	Measles
Locality 1							
Locality 2							
Locality 3							

Table 22b: Surveillance data

Village/Quarter	**Compile monitoring data**					
	Target pop for the period	**Measles**	**Yellow fever**	**AFP**	**TNN**	**Epidemic (indicate the name of the disease)**
Locality 1						
Locality 2						
Locality 3						

19.3.7. Data Quality Elements

Beyond the quantitative aspects, the quality of the reports is evaluated at different levels of transmission. The criteria for a quality report are as follows:

- **Completeness/timeliness**

Completeness is measured by the number of reports received on the expected number. It also consists of filling in all the fields of the report, especially:

The header is fully informed:

- All items are filled in (zero is a number, so do not leave the blank or put a line to mean zero);
- The data in the report is consistent with the information contained in the data collection tools;
- The totals are accurate;
- The report is dated and signed by the head of the structure;
- Timeliness is the timely transmission of data as described in table 20: Deadline for transmission of MAR to higher level.

❖ **Consistence of the numerator**

- Comparison of the number of doses administered with Penta1 ≥ Penta2 ≥ Penta3;
- Comparison of the number of doses of vaccines administered simultaneously;
- The specific / general dropout rate below the threshold (negative to be investigated);
- Search for values (number of doses administered) unusual over the period: (value very different from the usual trends);
- Search for duplicate values, uniformity over time;
- Consistency of the denominator.

The targets come from censuses and demographic surveys as decided by the health information cell. The data transmitted are distributed by health area, and must be redistributed to health facilities according to the populations served.

❖ **Triangulation**

Comparison of administrative data with:

- The doses of vaccines used;
- The wastage rates;
- Coverage surveys, EDS, MICS;
- Surveillance data (vaccination status of the cases investigated, recorded epidemics).

The quality of the data must regularly be evaluated through specific supervisions with administration of the DQS tool (Data Quality Self-Assessment tool).

20.1. Definition

Planning is a continuous, cyclical and dynamic process involving all actors at each level of the health system concerned (CTG-EPI, RTG-EPI, HD, HA and community). It begins with the analysis of the situation and ends with the budgeting of the planned activities, through the determination of priorities and the setting of objectives according to the resources available. This is a fundamental function of the program management process.

Depending on the level of the system where the plan is developed, there are:

- The strategic plan: Duration of 4 to 5 years (central level);
- The operational plan (all levels);
- The micro plane (Health District, HA).

This section focuses on the micro-planning process that reaches each community and each child. It then describes how to identify priority high-risk health facilities and communities based on the number of unvaccinated children. Then it shows how to identify barriers to accessing and using services in priority communities and how to prepare a work plan to provide solutions. Finally, it indicates how to plan the immunization sessions and organize the follow-up of the "lost to follow-up".

20.2. Updating Maps

Micro-planning begins with the updating of district maps and health areas or villages covered by health facilities. It takes into account all population groups, areas of difficult access and high risk.

A map showing the current location and relative population size in the area served should be displayed in each district health unit and in each leading health facility in the area.

Maps of districts and health facilities should take into account all eligible population groups in the areas served. A table listing these populations or communities should be displayed next to each map. It is essential to update the maps at regular intervals so that all the changes observed in the coverage areas are shown, as well as any new administrative divisions. These maps should clearly indicate the high-risk priority areas identified based on the number of unvaccinated children.

All possible sources must be explored in the process of updating maps. Community and administrative leaders should be involved in the design and updating of maps and encouraged to participate in the entire micro-planning process.

20.3. District Map

As provided in the ACD micro-planning framework, the map is an important part of micro-planning. It includes the main geographical features, the population groupings of the district, the location of all health facilities under the control of the authorities.

The following items must appear on the district map:

- Health facilities and their area of coverage (with boundaries) as well as the distance to the district infrastructure;
- Urban communities, cities, villages, rural communities, isolated households;
- Rivers, mountains, valleys and other geographical features;
- Seasonal natural obstructions, such as flood areas during the rainy season;
- Roads and tracks.

The following items must appear on the board to be displayed next to the District map:

- Total population and target population of the area served by each health facility;
- Approximate distances and travel time for each health facility;
- List of contact persons and any other information relevant to the coordination and management of immunization activities;
- List of health facilities by health area that vaccinate.

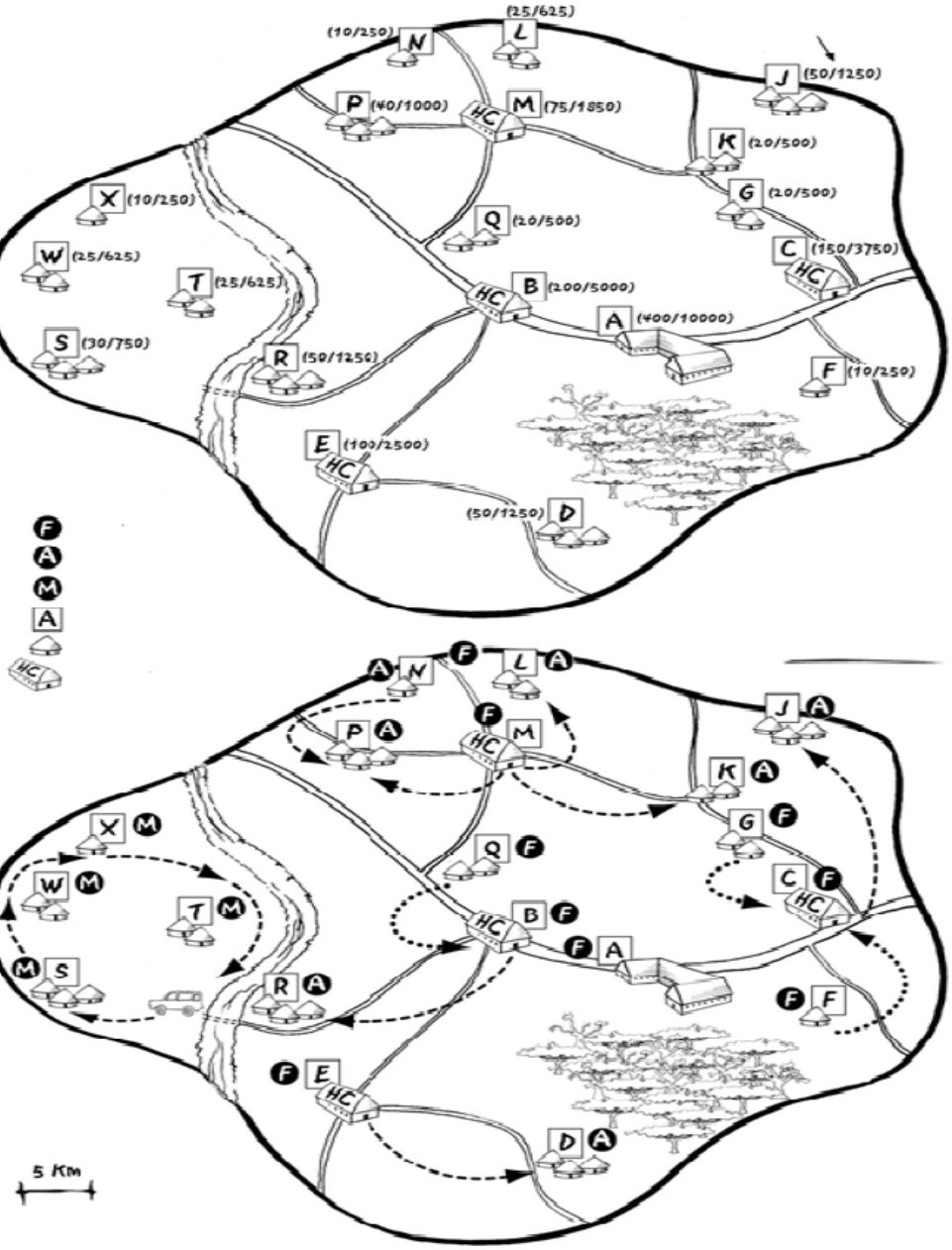

Figure 32 : sample of health district map

21.1. Definitions

Supervision is a process by which an experienced technical staff trained as a supervisor, guides and assists service providers / managers in performing their assigned duties and tasks to achieve planned organizational objectives. It is a follow-up activity to assess the quality of the services offered through vaccination and to improve staff performance.

Supportive supervision is an approach that helps the supervisee improve on the services and performance of health programs through the transfer of skills, knowledge and attitudes between the supervisor and the supervisee. It aims to ensure quality and more efficient services. Thus, supportive supervision focuses on identifying and solving problems by helping to optimize the allocation of resources.

21.2. Principles and characteristics of a good supervision

Supervision is a systematic, ongoing review of the tasks and assignments given to supervisees. It permits the:

- Identification of good practices to encourage and bad practices to discourage,
- Appreciation of the quality of services and performance (compliance with norms, standards & tasks of the supervisee),
- Identification of problems to be corrected on the spot, and those to be the subject of a problem solving plan,
- Support, motivation and training of staff (teaching / learning),
- Strengthening of the supervisees' accountability.

Supervision must:

- Be planned, announced and regular with clear terms of reference,
- Be considered as an act of support and training,
- Aim at identifying problems, analyzing them and finding appropriate solutions in consultation with the supervisee.

21.3. Supervision objectives

The overall goal of supervision is to improve the performance of the EPI by improving the quality of immunization services. It is more specifically about:

- Ensuring the effective implementation of activities and the level of immunization performance;
- Reinforcing the skills of the various stakeholders of the vaccination system (managers, providers, community) in the field of vaccinology and the management of the vaccination program;
- Providing support for the immediate correction of deficiencies, the development, implementation and monitoring of a problem-solving plan.

21.4. Content of supervision

To ensure the:

(i) Availability of good quality vaccines and other inputs,
(ii) Accessibility to and use of immunization services,
(iii) Proper target coverage.

Supportive supervision under the EPI takes into account the five operational components and the three support components of the immunization system.

The five operational components:

- Supply of quality vaccine;
- Logistics;
- Services delivery,
- Epidemiological surveillance;
- Communication.

The three support components:

- Program management;
- Financing;
- Capacity development.

Supervision can be comprehensive, taking into account all components of immunization. It can also be specific, covering some previously identified components. EPI supervision can be integrated with the supervision of other programs or areas of health.

21.5. Frequency of supervision

The supervision must be regular and periodic according to a frequency adapted to each level of the health pyramid:

- Central level to health region / district: semi-annual;
- Regional level to district / health area: quarterly;
- District level to health area: monthly.

However, supervision can be planned according to needs, context and resources.

21.6. Tools and methods of supervision

The supervisor must master appropriate supervision methods and tools.

There are several methods of supervision that should be combined:

- Review of program performance,
- Analysis of district management materials and health programs,
- Discussions and interviews with the supervisee and team,
- Observation of practices and the environment,
- Sharing of experiences including good practices,
- Demonstration and practical exercises, etc.

Several tools are used to facilitate supervision. Overall, there are five main groups:

- Administrative documents: mission order, memo, terms of reference, supervision plan;
- Vaccination reference documents: norms and standards, immunization registry, tally register, case definition sheet;
- Supportive supervision tools: supervision guide, SOPs;
- Information gathering tools: supervisory grids, maintenance guide, road map (Dashboard), data quality self-assessment grid (DQS),
- Reporting documents: report frame, problem solving plan (PSP).

The supervisory grid is one of the main supervision tools that:

- Allows a systematic approach to situational analysis;
- Highlights the aspects and systematic points to be examined;
- Facilitates monitoring to save time;
- Facilitates compliance with the chosen supervisory procedure;
- Facilitates reporting of supervision and PSP development;
- Documents the points examined, observations made and actions taken.

21.7. Supervision stages

Supportive supervision can be carried out in 6 main phases which are the:

1. Preparation;
2. Execution;
3. Development of the PSP;
4. Debriefing;
5. Drafting of the report and the feedback;
6. Follow-up after supervision.

21.7.1. The preparatory phase

The main activities of this phase are to:

- Carry out the situational analysis of the entities to be supervised;
- Inform the supervisees;
- Send the terms of reference and specific tools of supervision to the supervisees;
- Mobilize human, financial and logistical resources;
- Prepare the technical and administrative documentation necessary for supervision;
- Carry out a documentary review on EPI vaccination or any other program.

21.7.2. The execution phase

It includes the following steps:

- The visit to the administrative and health authorities;
- The presentation of the objectives of the supervision and briefing of the people to be supervised;
- The visit of the coordination unit (RTG, HD, HF);
- The visit to the vaccination post, including the cold chain;
- The observation of a vaccination session;
- The community visit if possible;
- The correction of deficiencies identified on site;
- The staff briefing / on-site training and recall of standards and guidelines;

- ❖ The summary and analysis of the observations.

21.7.3.Problem Solving Plan Development Phase

The objectives of the Problem Solving Plan (PSP) are to:

- ❖ Prioritize problems;
- ❖ Identify relevant and realistic activities to solve the problems identified;
- ❖ Identify the persons responsible for carrying out the planned activities;
- ❖ Establish a schedule for carrying out the activities selected;
- ❖ Identify relevant indicators for monitoring the implementation of programmed activities.

This is a participatory process involving the supervisor and the supervised team. This process must be linked to the situational analysis conducted and must take into account the resources available at the supervised entity level. The analysis of the problems and the identification of their causes must be methodical, systematic and be based on the classical methods used: Who, What, Where, When, How (WWWWH), and the 5M rule: Matter, Man- power, Methods, Medium and Material etc. The PSP will strive to find solutions to short, medium and long term problems. The deadlines will allow the clear identification of activities whose achievement will be evaluated from one supervision to another.

21.7.4.Debriefing phase

At the end of the supervision, a debriefing meeting must always be organized at each supervised site. This meeting should involve, as far as possible, all those involved in the vaccination system, the persons in charge of the structure visited or any other person concerned with the resolution of the problems identified. This debriefing involves:

- ❖ Summarizing the course of supervision;
- ❖ Congratulating and publicly encouraging good practices and discouraging bad ones;
- ❖ Presenting the PRP and the resulting recommendations;
- ❖ Discussing the next supervision;
- ❖ Discussing follow up steps after supervision.

21.7.5.Report writing phase and feedback

During supervision, written feedback will be made at the level of all the entities visited. Recommendations and action points should be recorded in the supervision / visit books / registers of the supervised structure for follow-up. Their level of implementation will be evaluated during the following supervisions.

A supervision report will be prepared by the supervision team according to the proposed outline. It will be shared with the heads of the supervised structures and the hierarchy, and then will be archived.

21.7.6.Follow-up phase

Follow-up after supervision maintains close contact with the supervisee to assist the supervisee in implementing the PSP, monitor progress and identify potential difficulties. All opportunities and technologies must be used to maintain this contact (phone, email, reports).

21.8. Roles of supervisee (s) and supervisors

21.8.1. Roles of the supervisee

- ❖ Gather all the necessary documents for supervision;
- ❖ Ensure the availability of resources (human, material);
- ❖ Provide a feedback on the conclusions of supervision to colleagues and collaborators;
- ❖ Participate in the development and implementation of the PSP.

21.8.2. Role of the supervisor

- ❖ Conduct a situation analysis of the sites to be supervised and updated;
- ❖ Provide supervision tools while strengthening the knowledge and skills to the supervisee;
- ❖ Provide reference documents and guidelines;
- ❖ Develop a PSP alongside the supervisee;
- ❖ Monitor the progress of the implementation of the PSP.

21.9. Profile and qualities of a good supervisor

21.9.1. Profile of a good supervisor

- ❖ Master the methodology, techniques and tools of supervision;
- ❖ Master the fundamentals of the EPI and the RED approach;
- ❖ Master the tasks and responsibilities of the supervisee.

21.9.2. Qualities of a good supervisor

- ❖ Competent, humble, loyal, honest, flexible, open-minded, farsighted, good leader, self-confident, dynamic;
- ❖ Be able to listen, communicate, motivate and persuade;
- ❖ Promote effective communication and teamwork;
- ❖ Appreciate good work;
- ❖ Be sensitive to the constraints and problems of the supervisee;
- ❖ Differentiate the individual and his performance.

The supervisor should, if possible, immediately correct the deficiencies and resolve the identified problems on the spot, develop with the supervisee a problem solving plan for unresolved problems and record the recommendations in the supervision booklet. All these aspects should be reviewed during subsequent supervision. Supervision must be formative and can be integrated with the supervision of other programs. It will be done using a harmonized supervision grid. Written feedback should be done after each supervision.

NB: The recommendations and instructions will be recorded in the supervision book and left with the supervisor of the program/structure being supervised.

A.1. EPI microplanning of activities

A.1.1. Introduction

A well- formulated microplan aims to reach all the target populations with immunization services. It also considers and includes actions to improve the quality of those services. Where drop-out and/ or missed opportunity rates are high, it proposes actions to reduce them. Microplans should propose realistic solutions to those critical issues and to the challenges that program managers encounter in specific District and health facilities. The following are microplanning steps:

- Step 1: Preparation;
- Step 2: Situation analysis and mapping;
- Step 3: Set annual objectives and targets;
- Step 4: Identify strategies, develop activities and timelines;
- Step 5: Select key indicators for monitoring and evaluating activities;
- Step 6: Estimate resource needs and prepare a detailed budget;
- Step 7: Integrate the microplan in the overall plan of the district or health facility and use it as an advocacy and resource mobilization tool.

A.1.1. The health area map

The health area map is an essential part of a microplan. Each leading health facility in the health area should provide a simplified map of their catchment area. The communities in the catchment area should be noted and the list updated regularly. The map of the Health Area catchment should be an operational diagram with the following information:

- Health facility and posts that vaccinate in outreach and mobile strategies;
- Location of every village / community in the catchment area, including those that are not reached and/ or are new;
- Landmarks and significant buildings, for example, prayer grounds, motor parks, markets, schools, water points, administrative boundaries;
- Settlements of migrants and/ or displaced persons in urban and rural areas;
- Settlements of poor urban areas like slums;

The table displayed next to the health center map should include:

- The total population and target populations in each community in the catchment area;
- Approximate distance s and travel times to each community;
- Names of community volunteers and their phone numbers.

NB: Include every community on the map even if accurate numbers are not available. This applies particularly to communities of migrant workers, urban poor, ethnic minorities, new rural settlements and groups in movement or unrest.

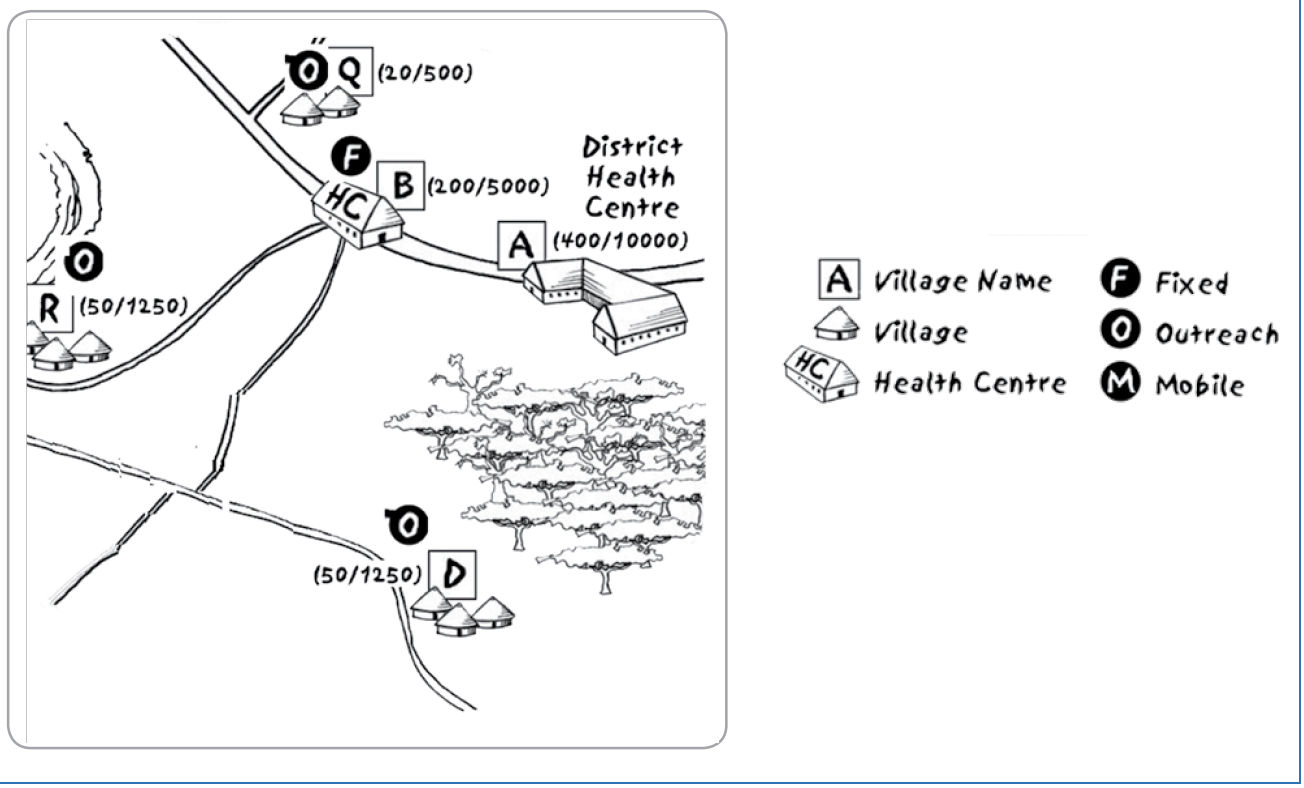

Figure 33 : Example health center map

A.1.3. Identification of priority health areas and communities

The identification of priority health areas and communities is based on the analysis of immunization data from the preceding 12 months. The format identifies and prioritizes high-risk health centers where immunization performance is problematic both for routine immunization and SIAs. Health centers are ranked and prioritized by the number of unimmunized infants in their catchment areas.

How to prioritize health areas using district immunization data?

- Use all available information to complete the analysis of immunization data – the inputs of community and administrative leaders is needed to best assemble all available information;
- Rank health centers by the number of unimmunized infants; the one with the highest number of unimmunized children is ranked first (1) and so on. The health center ranked 1 has the highest priority, and so on;
- Consider prioritizing health centers that have inaccurate data; for example, a health center that shows negative values for unimmunized children due to inaccurate population data or negative vaccine wastage rates may need to be given priority;
- Consider prioritizing health centers with known management problems.

A.2. Preparing a vaccination session

The aim is to plan sessions so that staff time is used efficiently. It begins with listing all communities served by the health center and specifies how frequently each community will be reached based on such factors as distance, target population, workload and other relevant operational issues. This section provides an example format and gives a simple method for choosing session frequency, scheduling dates and organizing the supplies needed to complete a session plan that reaches every community in a health center catchment area. It uses an immunization schedule that requires a minimum of four contacts during the first year of life and ensures that all communities are reached.

A.2.1. Planning an Immunization Session

The session format depends on the type of session needed, fixed or outreached, usually depending on the distance of the community from the health center or on the travel time needed if the terrain is difficult.

Table 23: example of a format for a health center overall session plan

Community name	Distance from HC in km	Type of session (fixed or outreached	Total Population	Session frequency

A.2.2 Frequency of Fixed Strategies

All health centers are expected to vaccinate on daily bases. In this light, the head of each center should ensure that the center offers vaccination activities each day.

A.2.3. Frequency of Outreach or Mobile Strategies

Every health center should make, display and monitor an outreach schedule to show the date and place of each session, the means of transport and the person responsible for arranging it. It should also include a community contact person who will communicate session dates and other reminders to the wider community. An example format is shown in Table 4.11. Note that fixed sessions can be added to this if needed to keep all on one sheet (leave the transport column blank or write "fixed" there).

Outreach sessions are often planned for rural communities that are 5–15 km from the health center and for urban populations who use convenient locations such as markets, community centers and schools. Outreach sessions may also need to be planned to take place before and/or after seasonal rains or other factors that make populations hard to reach at certain times of the year. In some programs, communities living more than 10 km away from the health center may be served by mobile activities organized from district level.

Other activities, such as EPI Plus and maternal–child health interventions, may be integrated in immunization sessions examples prenatal visits, distribution of impregnated mosquito bed nets, deworming, administration of vitamin A. Additional staff, logistics and financial resources

may be needed.

Table 24: Example of a format for a health center outreach session plan

Table 4.11 Health centre outreach session plan – example format

Community name	Session frequency	Distance	Transport needed*	Person responsible for transport	Community contact name & mobile phone #	Date(s) scheduled & done	Month 1**	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
						Date(s) scheduled:												
						Date(s) done:												
						Date(s) scheduled:												
						Date(s) done:												
						Date(s) scheduled:												
						Date(s) done:												
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						Date(s) scheduled:												
						Date(s) done:												
						Date(s) scheduled:												
						Date(s) done:												
						Sessions done:												
						Sessions planned:												
						% done												

* In the transport column, write "overnight" if needed to complete sessions in the community. Leave the transport column blank or write "fixed" in it if the community is served by fixed sessions at the health centre.

** Write all dates each month (for example, 2 dates if biweekly sessions)

A.3. Communication

A.3.1. What are the essential elements for discussion during a vaccination session?

- ❖ The different vaccine –preventable diseases;
- ❖ The importance of vaccination
- ❖ Risks involved with non-vaccination;
- ❖ Vaccines and their schedules, including the number of doses, their timing;
- ❖ The importance of completing the series and due date(s) for the next dose(s);
- ❖ Information on the potential adverse events and what to do if they occur;
- ❖ Importance of immunization cards and documents and what is written on them;
- ❖ Immunization session locations and times, especially for the next visit.

A.3.2. Some key messages on vaccination

Topic	Messages
Importance of vaccination of children towards parents	**Dear parents!** The vaccination of infants 0 to 11 months and pregnant women is free in all health facilities. Let's vaccinate our children following the vaccination calendar to guarantee good health!
	Dear parents, respect the vaccination appointments of our children in order to protect them from polio, measles, diarrhea, hepatitis B, meningitis and other vaccine-preventable diseases!

	Vaccines do not present any danger to the child. All vaccines included in EPI are of good quality. They are sure, effective, economic, free and approved by the government and its partners!
	Vaccination is the most effective method of protecting against certain diseases. It strengthens the body of the child, it helps fight against diseases such as tuberculosis, polio, measles, meningitis and yellow fever! Therefore dear parents, let's vaccinate our children to guarantee them a good health!
	Dear parents! As often as a child is vaccinated, the better he is protected as well as his entourage. Multiple vaccination campaigns poses no risk!
	By fully vaccinating our children in conformity with the EPI vaccination schedule, we are protecting them from being affected by serious and sometimes fatal diseases. Dear mothers, let's respect the vaccination calendar of our children by taking them for vaccination at birth ; at 1 month and half ; at 2 months and half ; 3 months and half and at 9 months.
Importance of vaccination to a pregnant woman	Pregnant women, future mothers, tetanus is an infectious disease that attacks and kills the newborn and even the pregnant woman if she is not protected! After your 5 doses of vaccination against tetanus, you are protected for life together with your future baby during birth!
	Pregnant women, it is very important to respect the vaccination calendar. Let's take all 5 doses of the vaccine against tetanus for our protection and that of our unborn baby!
	Vaccination protects the pregnant woman and her unborn baby against tetanus which is a deadly disease for newborns! So dear mothers get vaccinated against tetanus during your pregnancy and after delivery, for your good and that of your future baby, by respecting the appointments of the vaccination calendar!

Topics	**Messages**
Involvement of other family members in the vaccination of children	The vaccination of our children concerns all of us, grandparents, uncles, aunts. Let's ensure that all our children are completely vaccinated, because a fully vaccinated child is a source of the family's well-being.
	Dear people; This concern all. Vaccination is the best way to prevent diseases in children 0 to 11 months and pregnant women. It is efficient, necessary, sure, economic and free. Let's vaccinate them on time!

	Vaccination is everyone's business! Protect the health of our children by vaccinating them at the nearest health facility or at vaccination post indicated by the health services. It is free!
	Dear parents, vaccination is the most effective way of protecting our children against diseases like measles, meningitis, tetanus, polio, etc. For this, simply go to the health facility to get his vaccines! So dear parents get our children fully vaccinated! **It's free!**
	Vaccination is everyone's business! Let's save the health of our families by having them vaccinated at the nearest health facility or at a vaccination post indicated by the health service. Children 0 to 11 months and pregnant women are the most concerned. It is free!
The importance of keeping the vaccination card properly (booklet)	Dear parents, let's keep our children's vaccination cards (booklets) for a proper follow –up of their vaccination.
	Pregnant women, keep your vaccination cards well amongst your important documents during pregnancy and after delivery. This allows you to proper monitor the progress of your tetanus vaccination.
Involvement of administrative, political and religious authorities	For a religious leader I am (Imam) (Pastor) or (priest) of I have a message for all believers: "God is not against vaccination." So let's vaccinate our children on all occasions. And you pregnant women, get vaccinated against tetanus, it protects you and your future baby against this disease! (May Allah bless you!) (God bless you!)
	Administrative and traditional authorities, elected representatives of the people; religious authorities Vaccination is the best way to protect children and pregnant women from serious diseases. Our social role is decisive. Let's get more involved, support vaccination!
	Dear parents! Refusing to vaccinate our children exposes them to disabling diseases. Routine immunization protects our children from at least 12 diseases in five appointments. Together, let's clear the way for vaccine-preventable diseases by visiting the nearest health facility!
	Municipal authorities! Vaccination of children and pregnant women is a public health priority in our country. Your involvement in community mobilization and your commitment to supporting immunization activities is of paramount importance!
	Administrative and local authorities, traditional and religious leaders and the civil

	society! The health of our people concerns all of us. Join us in promoting the vaccination of our children and pregnant women!
Themes	**Messages**
Involvement of administrative, political and religious authorities	**Administrative and municipal authorities!** The vaccination of children and pregnant women is an issue of public health. Your involvement in mobilizing the population and financing vaccination activities is of great important!
	Local authorities, representative of the civil society, family member! Let's be actively involved in the vaccination of our children. The health of our children is our responsibility!
Community base surveillance	**Dear people:** This message concerns us, if a child in our mist presents with signs of fatigue fever and sudden paralysis, etc. Report immediately to the close health facility. It can be the case of polio or other serious and contagious disease can spread quickly.
	Slogan: a vaccinated population, a population in good health! ***Signature : This is a message from the Ministry of Public Health!***

A.3.5. Communication tools

A.3.5.1. Picture Box

It is a visual representation comprising a series of images on a given theme. It is used for oral communication in group or individual presentations (group discussion, home visits)

A.3.5.2. Posters / Flyers

It is a picture printed on a paper intended to give information on a given subject or theme.

A.3.5.3. Leaflet

A flyer is a printed visual medium that usually consists of several pages and unfolds during reading. It is a document that contains useful information for awareness

A.3.5.4. Megaphone

It is a cone-shaped device for magnifying / intensifying and directing the voice, chiefly used in addressing a large audience out of doors.

Reminder : the mobilizers will have to express themselves in local languages during home visit sessions or health education, etc.

A.3.6. Data Collection Tools

A.3.6.1. Traditional healer's visit report form

Health District: _____ **Health area:** _____

Surname and name of tradipractitioner: _____

_____

Village of location: _____ Contact: _____

Discussion point: _____

_____

Case of vaccine preventable disease identified: ☐ Yes ☐ No

If yes indicate the number of case **AFP**/__ /**Measles**/___/**Yellow Fever**/__ /**MNT**/___/

Signature of CBO Signature of Tradipractitioner

A.3.6.2 Health Talk Form/Community Communication

Health District: _____ **Health Area:** _____

Date: _____ Village: _____

Topic: _____

Main questions asked: _____

_____

_____

Number of Participants: Men:_____ Women: _____

A.3.6.3. Attendance Sheet for Health Talk/Community Communication

Date: _____ Region: _____ District: _____ Area: _____

N°	Name	Village	Sex	Contact	Signature
1.					
2.					
3.					
4.					
5.					

Name and signature of village chief

Name and signature of OBC

Name and signature of head of health area

A.3.6.4. Traditional and religious authorities visit report forms

Health District: _____ **Health Area:** _____ **Village:** _____

Name of authority: _____

Post occupied: _____

Discussion points: _____

_____

Resolutions made: _____

_____

Signature of CBO

Signature of authority

A.3.6.5. Register for children found and referred for vaccination

Health District: _____ **Health Area:** _____

N°	Name	Vaccination card Number	Village	Parent or Guardian's contact
1.				
2.				
3.				

A.3.6.6. Children's referral card for vaccination

Date /___/____/_____/ Reference N°

Health District: _____ Health Area: _____
Name of referring CBO: _____
1. Name of referred child: _____
2. Place of residence: _____ Current address: _____
3. Age: /_____/month Sex: ☐ Male ☐ Female
4. Last vaccine received: _____
5. Oriented towards: _____
6. Date child arrived at the health facility: /_____ /_____ /_____/
7. Has the referred child been vaccinated? ☐ Yes ☐ No Vaccination Card N°: /_____/
8. If yes for which vaccine: _____

Health Facility's stamped

A.3.6.7. Summary Sheet for Communication Activities

Summary Sheet for Communication Activities

Ministry of Public Health
CTG-EPI Region:
Health District: **Health area:** **Month:**
Reports awaited/received:

Strategies	Activities C, CE,CO,CM, VAD	Targets	Topics	Supports used	Number of participants	Observations	Person in charge	signature
Planning								
Advocacy / partnership								
Social mobilization/ social marketing								
CCC/CCS								
Capacity building								

***C** = shouting or sensibilsation using megaphone; **CE**= Health talks
CO= Counselling; **CM**= Mass media communication; **VAD**= Home visits

Name and signature of person in charge

A.3.6.9 Outline of a communication plan

1. Background and rationale
2. Situational analysis
3. Analysis of communication problems
4. Prioritization of communication problems
5. Objectives
6. Strategies
7. Activities
8. Identification of the actors and available communication channel

A.3.6.10 Example of a summary of a Communication Plan

OBJECTIVES	OUTCOME	ACTIVITIES	INDICATORS	PERSONS IN CHARGE	MEANS OF VERIFICATION	PERIOD	COST	SOURCE
STRATEGY 1 : ADVOCACY/PARTNERSHIP								
1. Obtain the support of the highest authorities at all levels	Involvement of administrative, religious and traditional authorities	Send correspondence to the authorities	Number of addressed correspondence over the total number planned		Copies of available correspondence			
2. Inform the various stakeholders about the activity	All relevant sectors and all heads of organized groups are informed about the activity	Organize an information meeting on the activity	Number of organized groups and related sectors informed		Reports of meeting			
STRATEGY 2 : SOCIAL MOBILISATION/ SOCIAL MARKETING								
3. Implement the media plan	All media materials produced and disseminated	Produce and diffuse the different types of support	Number and types of media produced and disseminated		Distribution and receipt slips			
4. Conclude partnerships with the media	Partnership agreements implemented with the media	Sign contracts with the media	List of partner media		Number of contracts signed			
STRATEGY 3 : COMMUNICATION FOR BEHAVIOUR AND SOCIAL CHANGE								
5. To involve population in activities	All populations adhere to the activity	CIP, Focus Group Discussion (health talks)	Number conducted on the expected number		Activity report available			

OBJECTIVES	OUTCOME	ACTIVITIES	INDICATORS	PERSONS IN CHARGE	MEANS OF VERIFICATION	PERIOD	COST	SOURCE
STRATEGY 4 : CAPACITY BUILDING								
6. Strengthen the capacities of the people involved in the communication for the activity	People involved in communication for the activity are capacitated	Identify and train supervisors, communicators for the activity	Number of supervisors trained		Final list of supervisors available			
		Develop / adapt, produce and disseminate training modules	Number of training modules developed / adapted to the planned number		Training modules available at all levels			
		Day of information exchange between media men and health professionals on the activity	An information day actually organized		Report of the information meeting			

OBJECTIVES	OUTCOME	ACTIVITIES	INDICATORS	PERSONS IN CHARGE	MEANS OF VERIFICATION	PERIOD	COST	SOURCE
7. Produce educational and social mobilization messages and materials	All educational and social mobilization messages and materials developed and produced	Organize a message development / adaptation meeting and choice of media	➢ Number of elaborate messages ➢ Number and types of media selected		Available messages Available media			
		Organize a pre-test of the different materials needed	Number of materials pre-tested against expected number		Availability of pre-test report			
		Develop and produce the press release	Number of press releases produced		Available press releases			
		produce kits	Number of kits produced on the planned number		Number of Kits available			
		Support the production of announcements and messages	Number of correspondence addressed on the planned number		Copies of correspondences available			
		Produce material	Number of materials produced by type		Available support by type			
		Ensure the distribution of media print	Number of media prints distributed by type		Dispatch the concerned			
STRATEGY 5: MONITORING / SUPERVISION / EVALUATION								
8. Oversee the implementation of activities	Adequate implementation of communication	Develop supervisory / evaluation plans and tools	Number of tools and plans developed		Available tools and supervision plans			

OBJECTIVES	OUTCOME	ACTIVITIES	INDICATORS	PERSONS IN CHARGE	MEANS OF VERIFICATION	PERIOD	COST	SOURCE
		Supervise field activities	Supervision reports		Supervision reports available			
9. Monitor / Evaluate the implementation of activities	Adequate implementation of communication / social mobilization activities	Organize an evaluation meeting	Number of participants who attended the meeting		Available record of the evaluation meeting			
		Analyze monitoring and evaluation data	Document of elaborate summary		Available summary document			
10. Document the activities carried out	Detailed report written, produced and disseminated	Obtain reports on activities	Number of reports produced on the expected number		Available documentation			
		Produce the annual report on the implementation of the communication plan for the activity	Finalized summary report		Report on the implementation of the communication plan available			
TOTAL								

A.4. Surveillance

Telephone Contacts of CTG Surveillance Section and Regional Technical Groups Coordinators

N°	STRUCTURE	POSTE	Telephone Contacts
1	CTG-EPI	Chief of Section Surveillance Monitoring and Evaluation	655 978 614
2	CTG-EPI	Chief of Unit Epidemiologic Surveillance of VPD	655 978 613
3	CTG-EPI	Chief of Unit Management of data and Knowledge Management	698 009 409 / 690 102 282
4	CTG-EPI	Poste de Réception des Echantillons Biologique (PREB)	698 009 426

REGION	Name	Telephone number		EMAIL
		MTN	ORANGE	
ADAMAWA	Dr. KOONA KOONA Joseph Adonis	675 12 01 59	698 218 441	koonajoseph@yahoo.fr
CENTER	Dr. EDZOA ESSOMBA Brice	690 98 46 82	698 217 339	brice81es@yahoo.fr
EAST	Dr. NKENGUE née POUTH Christine Charlotte	677 59 10 08	698 21 07 94	nkenguepc@yahoo.fr
FAR-NORTH	Dr. TCHOKFE SHALOM NDOULA	656090978	663 11 63 64 (Nextel)	shalom_ndoula@yahoo.fr
LITTORAL	Dr. OTTI Jacques Georges	677 53 10 26	696 76 83 61	georgesjacquesotti@gmail.com
NORTH	Dr. IBRAHIMA HOUSSEINI	675 368 406	698 21 90 12	Ibrahimahousseini2004@yahoo.fr
NORTH-WEST	Dr. SAMA Julius NKAM	677 60 07 34	698 213 344	samajn@yahoo.com
WEST	Dr. SIMO Elie	677 36 87 00	699 09 19 69	esimo_cameroun@yahoo.fr
SOUTH	Dr. DEBNET Jeudi		699 77 79 67	jeudidebnet@gmail.com
SOUTH-WEST	Dr. NJOH Andreas ATEKE	675 81 74 89	698 218 642	njohandreas@yahoo.com

Acute Flaccid Paralysis – AFP

DEFINITION: Any child less than 15 years of age presenting with a loss or a reduction of muscular strength and/or muscular tone (paresis, weakness in a limb, difficulty in walking or standing, difficulty in moving limb, hypotonia, etc.) with rapid onset (24–72 hours) involving one or more limbs including a suspected trauma of the sciatic nerve due to injection

Or

any person regardless of age in whom a clinician suspected poliomyelitis.

Fever + Maculopapular eruption + Cough or Coryza (watery nose) or Conjunctivitis

Definition of a suspected case of

MEASLES

A clinician that suspects measles

Or

(measles)

Case definition of Yellow Fever

Suspected

A case that is characterized by acute onset of fever (>39°C) followed by jaundice within two weeks of the onset of the first symptoms

Confirmed

A suspected case that is laboratory-confirmed or epidemiologically linked to a laboratory-confirmed or epidemiologically linked to a laboratory-confirmed case or outbreak

Epidemic

One single case of Yellow Fever confirmed constitutes an epidemic

Neonatal Tetanus (NNT)

Definition of confirmed cases

Any neonate with normal ability to suck and cry during the first 2 days

AND

Who, between 3 and 28 days of age:

Cannot suck normally

AND

Becomes stiff or has convulsions (jerking of the muscles) or both (no laboratory confirmation needed)

NNT cases reported by physicians are considered confirmed

BEFORE ANY CASE OF AFP:

1- Collect **2 stool samples** (sufficient amount, 8–10 g or one third of the vial) **24–48 hours apart**, each in a stool pot within 14 days of onset of paralysis. If the child is seen **after 14 days and before 60 days after** the onset of paralysis, always take 2 stool specimens at 24-48-hour intervals including at **02 contact under 5 years** of age and send to the laboratory;

2- Preserve the first stool specimen in the fridge (+2 to +8 ° C) while waiting to take the second stool specimen within 24 to 48 hours.

3 - After collecting the second specimen, place the two pots in an AFP kit while ensuring the cold chain with the cold accumulators frozen to the point;

4- Completely and correctly fill the AFP survey form;

5- Transport the samples to the regional delegation of public health in Garoua or EPI-CGT in Yaoundé within **72 hours** after the collection of the second specimen. You must bring your national identity card and a mission order.

Measles and Yellow Fever Surveillance

Before any case of measles or yellow fever:

5. Collect 3 to 5 ml of blood in a citrate tube between 1 and 30 days after rash;
6. Let it decanted from a centrifuge if possible, if not leave to rest on the bench;
7. Put the plasma in a dry tube;
8. Fill out the survey form correctly and completely and pack it in a plastic envelope;
9. Put everything in a kit with frozen ice packs +2 to +8 ° C;
10. Transport the samples to the CRE;
11. Have a mission order duly signed by a superior, as well as a photocopy of the NIC and / or that of the Community Agent for the reimbursement of transport costs and the payment of the Community detection premium.

NB: For the removal of the case of YF it is at any time from the onset of jaundice

EPIDEMIOLOGICAL SURVEILLANCE OF TARGET EPI DISEASES

	MEASLES	YELLOW FEVER (YF)	ACUTE FLASK PARALYSIS (AFP)	NEONATAL TETANUS (NNT)
Case definition (suspects)	**(2 possibilities) Either:** **1- Presence of fever with maculopapular rash + one of the following 3 signs:** **—cough** **—runny nose** **—Conjunctivitis (red eyes)** **or** **2- A clinician suspects a measles case.**	**—Presence of a high fever (> 39 °)** **and** **—Icterus within 2 weeks after the first symptoms**	**—A loss or decrease in muscle strength and / or muscle tone (paresis, limb weakness, difficulty walking or standing, difficulty in moving a limb, hypotonia, etc.), rapid installation 24 to 72 hours and interesting one or more limbs including nerve trauma by injection.** **—Anyone with whom the clinician suspects poliomyelitis**	Any new born with normal ability to suck and cry during the first 2 days who, between 3 and 28 days of age can no longer suck normally and becomes stiff or has convulsions (jerking of the muscles) or both.
Age	**All ages**	**All ages**	**0 - under 15 years**	**3rd - 28 days**
Sample to be collected	**Blood (serum)**	**Blood (serum)**	**Stool**	No sample collection
Adequate Sample collection conditions	**Collect 5 ml of blood in a citrate or dry tube between the 1st and 30th days after the eruption. Collect 3 ml of serum in a dry tube.**	**Take 5 ml of blood in a citrated or dry tube. Collect 3 ml of serum in another dry tube.**	In the 14 days following the onset of paralysis, take 2 stool samples at intervals of 24 to 48 hours in an amount equivalent to the size of your thumb or 1/3 of the pot. Keep these specimens cold (between +2 and + 8 ° C). Carry the 2 pots in a kit with two well-frozen batteries. (If the case is seen between the 15th and the 60th day, take the case with at least one contact of less than 5 years and make a follow-up examination at the 60th day.)	Notify and complete the investigation sheet regardless of the evolution of the case. Organize the response with the HD.
	Store (between + 2 ° and + 8 ° C) in a kit or vaccine holder with well-frozen batteries.			

6. **Fill out the appropriate survey form correctly and completely for each case. (See instructions behind the survey sheet).**
7. **Quickly (within 3 days) send the samples to the EPI-CTG in Yaoundé in a kit with well-frozen ice-pack accumulators.**
8. **Bring a duly signed Mission Order and photocopy of a NIC.**

NB: The EPI-CTG receives every day even on weekends and holidays.

DEFINITIONS OF DISEASES UNDER EPI SURVEILLANCE FOR TRADITIONAL HEALERS

	MEASLES	YELLOW FEVER (Y.F.)	ACUTE FLACCID PARALYSIS (AFP)	NEONATAL TETANUS (NT)
Definition of cases (suspects)	**Anyone, especially young children, with fever and rash on the skin**	**Any person suffering from fever and yellowing of the eyes or skin (plants of the feet, nails, palms of the hands).**	**Any child under the age of 15 who crawled or walked and abruptly no longer creeps, no longer walks or is unable to move one of the limbs normally.**	**Any child born normally and who has suckled normally and suddenly:** **- No longer suckling during the first days of her/his life** **- Becomes stiff, has spasms or convulsions that are triggered by light, noise or touch**
Age	**Any age**	**Any age**	**0 – Less than 15 years**	**0 – 28 days**

HOW TO TRACE CASES' REGISTER OR BOOK

N°	Date	Patient's name	Age	Quarter or village	Groan	Parents' name	Phone number of contact person	Reference Heath center

Form for Acute Flaccid Paralysis (AFP) physical review (Validation, Follow up exam, detailed investigation)

Region:
District:

Town /Village/Quarter: **Heath Area:**

Reasons for the investigation:
☐Validation; ☐follow up Exam ☐AFP case detected after 14 days of the onset of the disease;
☐Child of Zero Dose.
NB: Fill out the form completely and correctly.

AFP case Identification (According to the data base):

N° EPID:
Year of notification:

Name and surname:
Rt Lt.
Age: *Gender: M or F…* *Location of the paralysis (Tick)*
Number of children under 5 years in the Household:

Interview:
Check from the parents the clinical description of the case during notification.
Date of onset of the paralysis: ……
Date of consultation in the health facility: ……
Rt Lt..
Location of the paralysis at that time (tick)?

Was the paralysis flaccid – (weak, soft, floppy)? ☐ ☐
Yes No
What other symptoms/ illness was the child suffering from? . . .
....
....;
Any fever……... Any injection……....

Give the names of any facilities /traditional healers where the patient went for treatment?
Name and location 1:--- ----------
----------; Date ----------
Name and location 2:--- ----------
----------; Date ----------
Name and location 3:--- ----------
----------; Date ----------

NB: If is a traditional healer, write his name and telephone number.....
....

What medical care was given to the patient and the outcome?
.....
.....
.....
What are the diagnoses mentioned by the clinician?
.....

Did the patient travel within 30 days preceding the onset of the disease? Yes ☐ No ☐
Place1 Date Place

Carried out the investigation:

Is the patient registered in any document of the health facility that notified the case? ☐Yes ☐ No

Have you physically seen the case AFP in question?

☐ Yes ☐No

If yes, question the parents and examine the child:

Person questioned: ☐Mother ☐ Father ☐Others……(specify):

Clinical examination of the child (Clinical description of the case **present state ie day of case review)**

- Is there residual/ persistent paralysis? R L ☐ Yes ☐ No
- If yes, where is it localized? 
- Is the residual paralysis flaccid? Yes ☐ No ☐

Neurological Examination:

Aspects	Date of 60th day follow up examination ____/____/_____	
Location of the paralysis	right left 	
Tone: (normal, increased↑, decreased↓) *Indicate for each limb*	Upper Rt limb: Lower Rt limb:	Upper Lt limb: Lower Lt limb:
Reflexes: (normal, increased ↑,decreased ↓) *Indicate for each limb*	Upper Rt limb: Lower Rt limb:	Upper Lt limb: Lower Lt limb:
Has the cranial nerve been affected? If Yes, indicate : III, IV, VI (ocular movements); V (Swollen jaws); VII (movements of the face) IX-X (pharynx, gag); XII (tongue)	_____ (1 = Yes ; 2 = No ; 9 = undetermined)	
Are the muscles flaccid/weak, floppy? (Yes/No)		
Does the patient feel pains? *(Pinch patient to see if he/she feels pains)*	____ (Yes / No)	
*Is there muscle wasting (reduction in size of any limb) (amyotrophic) of several limbs ? (*Trophicity of muscles*) Precise the limb concerned*	_____ (Yes / No)	

If the child has not been found:

-Can the family however remember the case? Yes ☐ No ☐

- If yes, for what reasons was child not physically seen?

Deceased ☐ Traveled ☐ Missing ☐

Others (precise)…….

……

Comments of the interviewer:

……

……

……

……

Conclusion:

Do you consider this case as an AFP? Yes ☐ No ☐

Are there any contradictions between the initial investigation form and the present one?

Yes ☐ No ☐

If yes, precise the differences observed……

……

……

Diagnostic presumption by clinician if any: _ _ _ _ _ _

Diagnostic presumption by present investigator (validator): _ _ _ _ _

PHYSICAL REVIEW OF SUSPECTS CASES OF MEASLES (Validation)

Region : **District :**

Town / Village / Quarter: **Health area :**

Identification of Yellow fever case (according to database):

N° EPID : *Year of notification :……..*

Name and surname:……

Age : *Sex :*

Conduct of the investigation :

1. Is the case recorded in a document of the health facility who notified it?

Yes ☐ No ☐ If yes, please specify the document:……

2. Have you physically found the aforesaid case of measles?

☐ Yes No ☐

2.1. If yes, interview the parents and examine the child:

Parent interviewed: Mother ☐ Father ☐ Others ☐(specify) :

Current age of the child:: sex :

Inform the parents of the clinical description of the case **at the time of notification**

- What is the date of onset of the disease according to the parents? ……..…..
- Date of consultation at the health facility: ……..…….
- Did the patient have the following signs / symptoms (Yes / No)

Fever :……... ? Red eyes::……. ? Cough::……..… ?

Cold::……. ? Generalized rash:……..... ?

- Was the patient vaccinated against measles? Yes ☐ No ☐
- If yes, please specify the date: ....
- What other symptoms did the patient suffer? ……..…..……

…… :……..……

- What medical care has the child received? .....

……

Clinical examination of the child (Clinical description of the case **presently**)

- Are there still signs / symptoms of the disease? (Yes / No)

Fever :……... ? Red eyes::……. ? Cough::……..… ?

Cold::……. ? Generalized rash:……..... ?

- Does the patient show signs of complications? (Yes / No)

Malnutrition: ....? Problems of sight: ....? Persistent cough .....?

2.2 If No (when you can not find the patient)?

- Does the family still remember the case? Yes ☐ No ☐
- If yes, why is the child not found or met?

Deceased ☐ Travelling ☐ Missing ☐

Others (specify)…….

Conclusion : Do you consider this as a suspected case of measles ?

Yes ☐ No ☐

Investigator's Comments: ……..

……

Date : Investigator: Signature :

PHYSICAL REVIEW OF SUSPECTS CASES OF YELLOW FEVER (Validation)

Region: **District:**

Town / Village / Quarter: **Health area:**

Identification of Yellow fever case (according to database):

N° EPID : *Year of notification :……..*

Name and surname :……..

Age : *Sex :*

Conduct of the investigation:

1. Is the case recorded in a document of the health facility who notified it?

Yes ☐ No ☐ If yes, please specify the document:……

2. Have you physically found the aforesaid case of Yellow Fever?

☐ Yes No ☐

2.1. If yes, interview the parents and examine the child:

Parent interviewed: Mother ☐ Father ☐ Others ☐(specify) :

Current age of the child:: sex :

Inform the parents of the clinical description of the case **at the time of notification**

- What is the date of onset of the disease according to the parents? ……..
- Date of consultation at the health facility :……
- Did the patient have the following signs / symptoms (Yes / No) Fever :…….. ?

  Yellow eyes (jaundice)::……. ? Nasal bleeding::…… ?

  Bleeding from the gums::……. ? Blood-streaked vomiting:…..... ?
- Was the patient vaccinated against yellow fever? Yes ☐ No ☐
- If yes, please specify the date: .....
- What other symptoms did the patient suffer? ……..……

  …… :……..…

- What medical care has the child received?: .....

  ……

Clinical examination of the child (Clinical description of the case **presently**)

- Are there still signs / symptoms of the disease? Yes ☐ No ☐

Fever :…….. ? Yellow eyes (jaundice):……. ? Nasal bleeding :…… ?

Bleeding from the gums:……. ? Blood-streaked vomiting : …..... ?

2.2 If No (when you can not find the patient)?

- Does the family still remember the case? Yes ☐ No ☐
- If yes, why is the child not found or met?

  Deceased ☐ Travelling ☐ Missing ☐

  Others (specify)……

Conclusion: Do you consider this as a suspected case of Yellow Fever?

Yes ☐ No ☐

Investigator's Comments: ……..

……

Date : Investigator: Signature :

FORM FOR INVESTIGATION OF CASES OF ACUTE FLACCID PARALYSIS

Only for official use: **Number:** _____-_____-_____-_____-_____ Received on: ____/_____/_____

EPID Country Region/Prov. District starting year Case number By the National Program

IDENTIFICATION

District of residence:_____ Region/Province :_____ Name of the nearest Health Facility:_____

Adress/Phone number:_____ Village/quarter:_____ ; Town:_____

Contact of home with AFP case (*WGS 1984*format): Longitude :_____ Latitude :_____

(Pour tous les pays menant la surveillance environnementale)

Patient's name:_____ **Father's or Mother's name**:_____

Date Of Birth:____/_____/_____ ; **Age**:_____**years** _____**mois** (*If date of birth is unknown*) **Sex** : ☐ M=Male F=Female

NOTIFICATION / INVESTIGATION

Case notified by:_____ Date of notification:_____/_____/_____ Date of investigation:_____/_____/_____

HOSPITALISATION Hospitalised : ☐ 1=Yes 2=No Date of admission:___/___/___

Admision number:_____ Name /Address of hospital:_____

HISTORY OF DISEASE (1=Y, 2=N, 9=Unknown)

Fever at onset of paralysis? ☐ Progressive paralysis 0-3 jours ? ☐

Date of onset **of** paralysis:____/____/____ Acute Flaccid Paralysis? ☐ (1=Yes ; 2=No ; 9=Unknown)

Asymétric? ☐ (1=Yes ; 2=No ; 9=Unknown)

Site of Paralysis LA ☐ RA LL ☐ RL

Which are the last three (03) health units or tradi-practitioners that the patient visited (name and location)?

1 : ……; 2 :……; 3 ……

AFTER INVESTIGATION OF THE HIERARCHY (HD, DH, REGION), IS IT REALLY A CASE OF AFP? ☐ 1= Yes, 2=No

If No, do not fill in the rest of the form and mark 6 for final classification

If Yes, **Name of HD/Hospital Manager who confirmed the case**: ……Tel :…… ; Signature /Stamp : …….

VACCINAL HISTORY

Total numberof OPV doses ☐ (exclude dose at birth; 99=unknown :)

Doses of OPV Birth.___/___/___ 1st ___/___/___ 2nd ___/___/___ 3rd ___/___/___ 4th ___/___/___ If > 4 date of the last dose ___/___/___

Total doses OPV (tOPV/bOPV/ m2OPV) Received during SIA: ☐ 99=Unknown

Total doses OPV (tOPV/bOPV/ m2OPV) Received during routine: ☐ 99= Unknown

Total doses IPV received during routine and/or SIA: ☐ 99= Unknown

Date of the last dose of IPV received during routine and/or SIA : ___/___/_____

STOOL SAMPLE COLLECTION

Date 1st sample ____/____/____ Date 2nd sample ____/____/____ Date of expedition of stools to the Central/régional level? ____/____/____

Date of receipt of Stools at regional level (PREBs) ____/____/____ ; Date of receipt of Stools at central level ____/____/____ ; Date of expedition of stools to inter-country or national lab ____/____/____

RESULTS OF STOOL SAMPLE ANALYSIS

___/___/___ Date of receipt of stools at Inter-country or national lab

☐ State of the stools culture at the reception in the lab (1=Adequate 2 = Inadequate)

___/___/___ Date of availability of cellular results

___/___/___ Date expedition of results to EPI (national level)

__/___/___ Date of receipt of results at EPI (national level)

Final results of cell culture: ☐ 1 = Suspect poliovirus ; 2 = Négative ; 3 = NPENT; 4 = Suspect Polio + NPENT

___/___/___ Date of expedition from Inter-country/national lab to regional lab

___/___/___ Date of expedition of results from Diff I-T to EPI

___/___/___ Date of receipt of results from diff. I-T at EPI

W1 ☐ W2 ☐ W3 ☐ (1=Y ; 2=N) Sabin Discordant ☐ (Type 1,2,3) V1 ☐ V2 ☐ V3 ☐ (1=Y ; 2=N) (R) Ent. NP ☐ (1=Positive 2=Negative) NEV ☐

FOLLOW UP EXAMINATION ___/___/___ Date of follow-up examination

Residual paralysis? LA ☐ RA LL ☐ RL

Follow up examination results ☐ 1= Paralysie résiduelle 2=Pas de paralysie résiduelle 3= Perdu de vue ; 4= Décès avant le suivi

DISCOVERY CIRCUMSTANCES:

Detected: ☐ In routine monitoring ; ☐ During AVA

Person who first detected:

☐ Health workers; ☐ Traditionnal healer/Place of Prayer; ☐ Community Relay; ☐ Others :……

FINAL CLASSIFICATION OF CASE

Suspicion of immunocompromised state: ☐ 1=Y ; 2=N 9 = Unknown

☐ 1= Polio confirmed 2 = Compatible 3 = Excluded 6 = Not a case of AFP

7 = VDPVc 8 = VDPVa 9 = VDPVi ☐ Serotype (1,2,3)

INVESTIGATOR

District having detected the case: _____Name _____

Ministry of Public Health | **WHO** | **Centre Pasteur du Cameroun** NATIONAL REFERENCE LABORATORY

FORM FOR THE NOTIFICATION OF MEASLES CASE
NOTIFICATION IS COMPULSORY
Please fill all the spaces

Reserve for official use

N0. EPID _____ Country _____ Province _____ Health district _____ Year _____ No of case _____ Received on _____

IDENTIFICATION

Health district: _____ Province : _____ Name of the nearest health unit_____

Village/Quarter _____ Town: _____ Urban / Rural ☐ 1 = Urban 2 = Rural

Name of patient : _____

Address of patient : _____Father/ Mother_____

Date of birth of patient : ____/____/_____ Age : _____ Sex M / F ☐

NOTIFICATION

Date case seen at health facility

_____/____/____ Date of notification to district service : _____/_____/_____

HISTORY OF ILLNESS

Date of onset of rash : ____/____/_____ Progress of patient ☐ 1 = Alive 2 = Died 9 =Unknown

No of doses of anti measles vac. received ☐ _____/_____/____ Date last dose anti measles vacc. received

Which were the last three(3) health units, tradi-practitioners or prayer grounds visited by the patient (name and location of structure)
1_____2_____3_____

BLOOD SAMPLE (Plasma)

Date of blood (plasma) collection ____/___/___ Date when sample sent to lab _____/_____/_____

Date plasma received in lab ____/___/___ Date Result received at EPI unit _____/_____/____

Results IgM For Measles ☐ 1 = Posiitve 2 = Négative 3 = Indeterminate

Indirect test for Rubella ☐ 1 = Positif 2 = Négatif 3 = Indéterminé

FINAL CASE CLASSI-FICATION ☐

1 = Case confirmd by lab or epidemiological linkage with a confirmed case
2 = Clinical findings (compatible/suspect). Lab test not carried out
3 = Rejected

Date of forwarding lab results to the clinician who sent the plasma sample _____/_____/_____

INVESTIGATION IN THE COMMUNITY

Source of infection identified : ☐ 1 = Yes 2 = No

If lab result is positive for measles IgM , was community investigation carried out ☐ 1 = Yes 2 = No

If yes, describe results of the investigation: _____
_____

CIRCUMSTNCE OF DISCOVERY:

Detected: ☐ During routine surveillance ☐ During SIA

PERSON WHO NOTIFIED THE CASE

Name_____Title _____
Health unit : _____Address _____Tel : _____

INSTRUCTIONS FOR THE FILLING OF THE MEASLES NOTIFICATION FORM

These instructions are provided so as to ease the filling of the form by the Nurse, Doctor or Lab Technician

N° EPID : To be filled only by responsible person at Centre Pasteur de Yaoundé

IDENTIFICATION :To be filled by investigator

- Health district : Write name of health district in which measles case is found
- Province : Write name of province
- Name of health unit: Write the name of the health unit nearest to where patient is found
- Name of village/quarter :Place where patient stays
- Name of the town : name of town where patient lives. Write 1 in the square if the patient comes from an urban area , 2 if the case comes from a rural area
- Name of patient :Write name of patient
- Address of the patient : address of the patient or that of parents which could help to trace the patient in the community (postal box, telephone No,etc)
- Father/Mother : Name of parent (s) for whom we have written the address.
- Date of birth : Day, Month, Year.
- Age : Number of Years /number of months
- Sex : Write in the square M , if masculine, F if feminine

NOTIFICATION

- Date Case seen at health facility : write the date on which patient was consulted at health facility (Day, month,year)
- Date of notification : date on which case was notified to the district health service

HISTORY OF THE DISEASE

- Date of onset of rash :To be filled by a health personnel :day, month , year.
- Progression of the illness : 1 if patient dies, 2 if patient is alive, 9 unknown. Write in the space provided the corresponding number.
- Number of doses of valid doses of anti measles vaccine received : consult the vaccination card of the patient
- Date on which anti measles vaccine was received : Write the date on which the last dose of anti measles vaccine was received

BLOOD SAMPLE (Plasma)

- Date on which sample was collected : day, month, year. (to be filled by health personnel of the health unit)
- Date on which sample was forwarded to centre Pasteur (day, month, year)
- Date on which sample was received in the laboratory (day, month, year
- Date on which results were received at the EPI unit. To be filled at the EPI unit (day, month, year
- Results of Measles IgM : Write the corresponding figure in the square.
- Results of Rubella IgM : Write the corresponding figure in the square
- Other results : Other laboratory results
- Date of forwarding results : date on which results were forwarded by the EPI unit to the clinician who sent the blood sample to the laboratory (day, month, year)

FINAL CASE CLASSIFICATION

- Write the corresponding no
- Compatible/suspect : probable case/suspected case

INVESTIFATION IN THE COMMUNITY

- To be filled by the health personnel who is working where the case was seen. Write the corresponding no of the answer in the space provided.

PERSON WHO NOTIFIED THE CASE

- Name of the health worker who did Notified the case

Ministry of Public Health **WHO** **Centre Pasteur du Cameroun**

FORM FOR THE NOTIFICATION OF A YELLOW FEVER CASE
NOTIFICATION IS COMPULSORY

Reserve for official use

N0. EPID _____ Country _____ Province _____ Health district _____ Year _____ No of case _____ Received on _____

IDENTIFICATION

Health district: _____ Province : _____ Name of the nearest health unit_____

Village/Quarter _____ Town: _____ Urban / Rural ☐ 1 = Urban 2 = Rural

Name of patient : _____

Address of patient : _____Father/ Mother_____

Date of birth of patient : ____/____/_____ Age : _____ Sex M / F ☐

NOTIFICATION

Date case seen at health facility

_____/____/_____ Date of notification to district service : _____/_____/_____

HISTORY OF ILLNESS

Date of onset of jaundice : ____/____/_____ ☐

Progress of patient: 1 = Yes, died; 2 = No, alive; 9 =Unknown

No of doses of Yellow fever vaccine received ☐

Date last dose Yellow fever vacc. received _____/_____/____

Which were the last three(3) health units, tradi-practitioners or prayer grounds visited by the patient (name and location of structure)

1_____2_____3_____

BLOOD SAMPLE (Plasma)

Date of blood (plasma) collection ____/___/___ Date when sample sent to lab _____/_____/_____

Date plasma received in lab ____/___/___ Date Result received at EPI unit _____/_____/____

Results IgM For Yellow fever ☐ 1 = Posiitve 2 = Négative 3 = Indeterminate

FINAL CASE CLASSIFICATION

☐ 1 = Case confirmd by lab or epidemiological linkage with a confirmed case
2 = Clinical findings (compatible/suspect). Lab test not carried out
3 = Reiected

Date of forwarding lab results to the clinician who sent the plasma sample _____/_____/_____

INVESTIGATION IN THE COMMUNITY

Source of infection identified : ☐ 1 = Yes 2 = No

If lab result is positive for Yellow fever IgM , was community investigation carried out ☐ 1 = Yes 2 = No

If yes, describe results of the investigation: _____

CIRCUMSTNCE OF DISCOVERY:

Detected: ☐ During routine surveillance ☐ During SIA

PERSON WHO NOTIFIED THE CASE

Name_____Title _____

Health unit : _____Address _____Tel : _____E-mail

INSTRUCTIONS FOR THE FILLING OF THE YELLOW FEVER NOTIFICATION FORM

These instructions are provided so as to ease the filling of the form by the Nurse, Doctor Lab Technician etc

N° EPID : To be filled only by responsible person at Centre Pasteur de Yaoundé

IDENTIFICATION :To be filled by investigator

-
- Health district : Write name of health district in which Yellow fever case is found
- Province : Write name of province
- Name of health unit: Write the name of the health unit nearest to where patient is found
- Name of village/quarter :Place where patient stays
- Name of the town : name of town where patient lives. Write 1 in the square if the patient comes from an urban area , 2 if the case comes from a rural area
- Name of patient :Write name of patient
- Address of the patient : address of the patient or that of parents which could help to trace the patient in the community (postal box, telephone No,etc)
- Father/Mother : Name of parent (s) for whom we have written the address.
- Date of birth : Day, Month, Year.
- Age : Number of Years /number of months
- Sex : Write in the square M , if Male, F if female

NOTIFICATION

- Date Case seen at health facility : write the date on which patient was consulted at health facility (Day, month,year)
- Date of notification : date on which case was notified to the district health service

HISTORY OF THE DISEASE

- Date of onset of Jaundice :To be filled by a health personnel :day, month , year.
- Progression of the illness : 1 if patient dies, 2 if patient is alive, 9 unknown. Write in the space provided the corresponding number.
- Number of doses of valid doses of anti measles vaccine received : consult the vaccination card of the patient
- Date on which anti Yellow fever vaccine was received : Write the date on which the last dose of anti Yellow vaccine was received

BLOOD SAMPLE (Plasma)

- Date on which sample was collected : day, month, year. (to be filled by health personnel of the health unit)
- Date on which sample was forwarded to centre Pasteur (day, month, year)
- Date on which sample was received in the laboratory (day, month, year
- Date on which results were received at the EPI unit. To be filled at the EPI unit (day, month, year
- Results of Yellow fever IgM : Write the corresponding figure in the square.
- Date of forwarding results : date on which results were forwarded by the EPI unit to the clinician who sent the blood sample to the laboratory (day, month, year)

FINAL CASE CLASSIFICATION (to be carried out by EPI)

- Write the corresponding no
- Compatible/suspect : probable case/suspected case

INVESTIFATION IN THE COMMUNITY

- To be filled by the health personnel who is working where the case was seen. Often this investigation is carried out with district service support. Write the corresponding no of the answer in the space provided.

PERSON WHO NOTIFIED THE CASE

-
- Name of the health worker who did Notified the case

FORM FOR THE INVESTIGATION OF A CASE OF NEONATAL TETANUS

Compulsory declaration . Please carefully fill correctly one form for each case.

To be filled at central level EPID N° _____ _____ _____ _____ _____ Received on ____/____/_____

Country Province District Year of onset N° case

IDENTIFICATION

Name of nearest health unit

District : _____ Province : _____ _____

Address : _____ Village : _____ Town :_____

Name of patient :_____Mother : _____

Sex : ☐ M = Male F = Female

Father _____

NOTIFICATION / INVESTIGATION

Case notified by : _____ Date of notification _____ Date of investigation : _____

VACCINATION HISTORY OF THE MOTHER

Mother vaccinated with TT : ☐ 1=Y 2=N 99=Unknown

Number of doses ☐ _____/_____/_____ Date reception last dose

vaccination status of mother during last delivery ☐ 1=à jour 2=non à jour 99=inconnu

Card ? ☐ 1=Y 2=N 99=Unknown

CHILD DELIVERY

Date of birth:_____/_____/_____

Place of Birth ☐ 1=hospitall 2=health centre 3=Home, trained personnel 4=Home, personnel not trained 5=Home , no TBA 9=Unknown

Umbilical cord sectioned with sterile razor blade ☐

Umbilical cord sectioned any other instrument ☐

IDid the mother obtain antenatal care ☐ 1=Y 2=N 99=Unknown

cord dressing

Where ? _____ Name of hospital: _____

How many visits? ☐ Delivery conducted Doctor/nurse ☐ Midwife 1=Y 2=N 99=Inconnu

Delivery conducted by TBA? ☐

1. _____
2. _____
3_____

Name of TBA/Midwife_____

CLINICAL HISTORY

1=0 2=n 9= Unknown

Normal child at Birth ☐ 1=0 2=N 99=Unknown

Stiffness ? ☐

Child died ☐

Date of onset Of symptoms_____/____/_____

Child cried and suckled well the 2 first days ☐ 1=Y 2=N 99= Unknown

Spasm or convulsions ? ☐

Age at onset of illness (days) ☐

Did child next refused to breast? ☐ 1=Y 2=N 99= Unknown

opisthotonos Position ☐ 1=Y 2=N 99=Unknown

Age at moment of death (days) ☐

Which were the last three(3) health units, tradi-practitioners or prayer grounds visited by the patient (name and location of structure)

1_____2_____3_____

TREATMENT

Admitted ☐ 1=Y 2=N 99=Unknown

Date of admission _____/_____/_____

Admission number : _____

Hospital (Address) : _____

COMMENTS

FINAL CLASSIFICATION OF CASE

Neonatal Tetanus ☐ 1= O 2= N 9= Unknown

CIRCUMSTNCE OF DISCOVERY:

Detected: ☐ During routine surveillance ☐ During SIA

INVESTIGATOR

Name : _____Titre

_____

Unit : _____Address : _____Phone :_____Signature :_____

RESPONSE PROVIDED

Did the mother of the tetanus case received a protective dose ☐ Date response : _____/_____/_____ 1=0 2=N 9= Unknown

Of TT during 3 months following the case notification.

Détails de réponse :_____

Were supplementary immunization activities ☐ 1=0 2=N 9= Unknown

Conducted in the locality where the case was found

Please immediately sent a correctly filled sample of this form to national EPI office _____

If you need more information please contact_____

Write the corresponding number

Republic of Cameroon
Peace-Work-Fatherland

Ministry of Public Health
Expanded Program on Immunization

Sample Transport Tracking Sheet

Suspected Disease: AFP / Measles / Yellow Fever *(encircle the carried sample(s))*

Patient's name and surname :……	Age: …….. Sex: M / F (*encircle*)
Patient's Adress : ……	Type of sampling: ……..(stool, blood,…)

ITINERARY	INFORMATION	OBSERVATIONS (Condition of samples at all levels) *
Information to be filled in at the departure		
Health District Name		
Name of the health area		
Name of the health facility where swab was done		
1st Sample Collection Date		
2nd Sample Collection Date		
Departure date:		
Departure time		
Destination		
The transporter's name		
transporter's adress: Tel:		
1st transit / or Stop (DHS, RDPH, SRC,,..)		
Date and time of receipt		
Received from (name)		
Received by (name)		
Storage between + 2° and + 8°C (Yes / No)		
Date and time of departure		
Destination		
The transporter's name Adress: Tel :		
2nd transit / or Stop (DHS, RDPH, SRC,,..)		
Date and time of receipt		
Received from (name)		
Received by (name)		
Storage between + 2° and + 8°C (Yes / No)		
Date and time of departure		
Destination		
The transporter's name Adress: Tel :		
3 transit (Sample Reception Center of du CTG-EPI)		
Date and time of receipt		
Received from (name)		
Received by (name)		
Storage between + 2° and + 8°C (Yes / No)		
Date and time of departure		
Destination		
The transporter's name Adress: Tel :		
CPC Laboratory		
Date and time of receipt		
Received from (name and profession)		
Received by (name and profession)		
Condition of samples at the laboratory arrival:		

* The state of freezing of ice packs, the freshness of the samples etc.

REGISTRATION FORM FOR MISSED CASES IDENTIFIED DURING ACTIVE MONITORING ACTIVITIES

Name of the health facility	Name of the patient	**Age (years)**	**Age (month)**	**Address (village, quarter, Tel)**	**Diagnostic (suspected illness)**	Date of onset of illness	Notified or not notified	**Comments**

NB: *For unreported cases of AFP, neonatal tetanus, yellow fever, cholera, meningitis and other VMEs. This sheet accompanies the active surveillance sheet.*

COMMUNITY CASES / COMMUNITY ALERT NOTIFICATION SHEET

Region: _____ Health District: _____ Health Area: _____

N°	Date of detection	First Name and surname	Age/date of birth	Sex (M/F)	Telephone/ useful contact	Village/Quarter	Date of onset of illness	Signs and symptoms	Community diagnosis (see case definition)

Name, contact and signature of the member of the community:

N.B. Notification of all cases/community alert must be made immediately to the Health Area.

REPUBLIQUE DU CAMEROUN
Paix – Travail - Patrie

MINSTERE DE LA SANTE PUBLIQUE

REPUBLIC OF CAMEROON
Peace – Work – Fatherland

MINISTRY OF PUBLIC HEALTH

Form for Adverse Event (AE) Investigation / Severe PIAE

Complete this summary page at the end of the survey; Classify it with the PIAE notification form (s)

Notification number: …… (Consultation register number)

Presumptive diagnosis:……

Date of investigation: ……... /…..…… /……(DD/MM/YY)

Location (s) of investigation :……..

	PATIENT'S IDENTIFICATION		
Name: ……	**Surname (s):** ……	**Age:** …… year …… month	**Sex** : ❒ **F** ❒ **M**
Region ……**District:** ……		**HF** :……	
Village/quarter: ……		**Address/Tel:**……	

Products/vaccines/diluent	Date of intake/Vaccination _____/_____/_____	Lot N°	Expiry Date	Starting date AEI/PIAE: _____/_____/_____

TYPE OF INDESIRABLE EVENT / MAPI *(TICK)*

❒ Encephalopathy	❒ Respiratory insufficiency	❒ Shock/anaphylactic reaction
❒ Febrile Convulsions	❒ Bleeding	❒ Other :……
❒ Septicemia	❒ Heart Failure	
❒ Guillain Barré syndrome	❒ Death	

Medical history:……
……

Clinical examination:……
……
……
……
……
……

Results of additional tests

General tests performed	Specific tests performed :

Results of biological analyzes made before the investigation:

……
……
……

Patient status: ❒ Alive ❒ Comatose ❒ Cured ❒Escaped ❒ Died Date :___/___/___(DD/MM/YYYY)

Treatment(s) received prior to investigation:

……
……

19. Biological samples / vaccines / consumables and date of expedition			
	Sampling date	Sampling time	Date of expedition :
❒ **Blood 1**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **Blood 2**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **CSF 1**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **CSF 2**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **Urine 1**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **Urine 2**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **Stool 1**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒ **Stool 2**	……/……/…… (DD/MM/YY)	……..….h.....min	……/……/……
❒**Tissues:**	……Date :……/……/……	Time: ……..….h.....min	
	…… …. Date :……/……/……	Time: …….…… h.....min	
	…… Date :……/……/……	Time : ……..….h.....min	
❒ **Vaccine, Lot**:	…… Date :……/……/……	Time: ……..….h.....min	
❒ **Solvent**, **Lot**:	……Date ……/……/……..	Time : ……..….h.....min	

Conclusions of the investigation of the case (given the information available after the investigation

Diagnostic:

……
……

For the investigation team:

(Name, Surname (s) and signature)

TO BE COMPLETED BY THE PIAE EXPERT COMMITTEE	
20. Classification :	
❒ **PIAE related to the vaccine**	❒ No ❒ Yes If Yes specify *degree of accountability* ❒ Suspect ❒ Probable ❒ Confirmed
❒ **Programmatic PIAE**	❒ No ❒ Yes ***Si Yes specify the reason*** *(tick)* ❒ Defective cold chain ❒ Vaccine reconstitution error ❒ Incorrect injection technique ❒ Non-sterile practices
❒ **PIAE by coincidence**	❒ No ❒ Yes
❒ **Other Causes of PIAE**	❒ No ❒ Yes
❒ **Unknown PIAE**	❒ No ❒ Yes

For the Expert Committee : (Name, surname (s) and signature)

What to do in case of a shock

- Lay the patient on his back and raise his legs.
- Ensure freedom of the airways.
- Palpate the carotid pulse:
- if it is well perceived, it is possible that it is not a state of shock (it could be vagal discomfort, hypoglycemia, etc.); in this case, no administration of adrenaline, transfer the patient with a venous route;
- if it is poorly perceived and rapid, follow the rest of the course of action.
- Take the blood pressure and read the heart rate and the respiratory rate, look for coldness of the integuments.
- Administer the correct dose of adrenaline (always less than one ampoule, see dosage below) by deep intramuscular injection into the thigh and repeat if necessary.

Age of patient	Posology of the adrenaline
Less than 2 years	**0,0625 ml = 1/16 ml**
2 to 5 years	**0,125ml = 1/8 ml**
6 to 11 years	**0,25 ml = 1/4 ml**
>11 years	**0,5 ml = 1/2 de ml**

- Take a venous route with a filling solution.
- Record the vital signs (pulse, respiratory rate and BP), the time of administration and the exact dose of all medications used. Make sure these details will not be lost during the patient transfer.
- Put on the immunization card a clear enough statement that the person will never receive the triggering vaccine again. When the time is right, explain to parents or relatives that this vaccine should be avoided in the future.
- Alert and ask for an ambulance (or find other means of transportation) and urgently transfer the patient to the nearest hospital.

SUMMARY RECORD OF AEFI CASES NOTIFIED

Week of: ___/___/201__ to ___/___/201__ **Region:** _____ **District:** _____**HF:** ……

Number of AEFI reported:/___/ Minor /____/ serious /____/

Case N°	Name and surname	Sex F/M	Age	Vaccination card. (yes/No)	Date and place of vaccination	Vaccine Lot N° / Diluent Lot N°	Date the AEFI occurred	Description of AEFI	Received care (yes/No)	Hospitalized (yes/No)	Clinical evolution (C, NC, D, U) *	Notification form and Investigation Form transmitted (Yes/No)

C = Cured, NC = not cured, D=Deceased, U = Unknown

Name and first name (s) of the staff: _____ Tel : _____ **Date :** ___/____/_____/ **Signature/Stamp**