**ISLAMIC REPUBLIC OF MAURITANIA**

*MINISTRY OF HEALTH*

**DIRECTORATE OF BASIC HEALTH SERVICES**

##### **EXPANDED PROGRAMME ON IMMUNIZATION**

PLAN FOR INTRODUCING THE PNEUMOCOCCAL VACCINE

**INTO ROUTINE EPI**

**May 2011, October 2011 Revised Version**

**ABBREVIATIONS**

AEFI: Adverse Effects Following Immunization

AFP: Acute Flaccid Paralysis

BCG: Bacille Calmette-Guérin

BCI: Central Investment Budget

CC: Cold Chain

cMYP: Comprehensive Multiyear Plan

DTP: Diphtheria-Tetanus-Pertussis

DTP-HepB Diphtheria-Tetanus-Pertussis Hepatitis B

DTP-HepB+Hib Diphtheria-Tetanus-Pertussis /Hepatitis B/Haemophilus influenzae type b

EPI: Expanded Programme on Immunization

GAVI: Global Alliance for Vaccines and immunization

GIVS: Global Immunization Vision and Strategy

Hep B Viral Hepatitis B Vaccine

ICC: Inter-Agency Coordination Committee

IDSR: Integrated Disease Surveillance and Response

JICA: Japanese International Cooperation Agency

MCV: Measles-containing vaccine

MDG: Millennium Development Goals

MICS: Multi-indicator Cluster Survey

MLM: EPI mid-level management course

MNT: Maternal and Neonatal Tetanus

NHDP: National Health Development Plan

NRA: National Regulatory Authority

OPV: Oral Polio Vaccine

PRSF: Poverty Reduction Strategy Framework

NID: National Immunization Days

NSAP: National Structural Adjustment Programme

PNS: National Health Policy

RED: Reach Every District

TT: Tetanus Toxoid

UNICEF: United Nations Children's Fund

WHO: World Health Organization

WPV: Wild Polio Virus

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**SUMMARY**

In accordance with the Poverty Reduction Strategy Framework, the 2006-2015 National Health Policy, the new Global Immunization Vision and Strategy (GIVS), and as part of the ongoing strategic plan for the 2001-2005 EPI, a comprehensive multiyear plan (cMYP) was prepared and then revised. It covers the 2011-2015 period. This cMYP plans for introducing new vaccines into the routine immunization program, and the pneumococcal vaccine in particular in 2012.

With this in mind, this introduction plan was prepared in cooperation with the partners in order to mobilize Government and partner expertise and resources to successfully introduce this new vaccine into the routine EPI.

The assessment of the EPI in its current state shows a certain number of deficiencies that the program plans to address to ensure the desired success. The implementation of the strategies developed in this plan is consistent with the strategies in the cMYP. They are:

* Upgrading the supply of immunization services by strengthening the implementation of the WHO’s Reach Every District approach to sustainably determine the DTP3 vaccine coverage rate;
* Implement storage logistics for vaccines and transportation, since the 2010 evaluation showed considerable gaps;
* Build national resource management capacities (vaccine storage and distribution);
* Epidemiological surveillance, injection safety, AEFI monitoring, and immunization data management;
* Communication in favor of the EPI.

With the introduction of the pneumococcal and rotavirus vaccines, planned for the second half of 2012 and the second half of 2013 respectively, total program costs are expected to increase considerably, from USD 23 million to over 57 million by late 2014. The largest expenditure items are for vaccine distribution and the implementation of advanced and mobile strategies. Regarding the co-financing of the new vaccines and the purchase of traditional vaccines, Mauritania will have no difficulties to co-finance them, since each year the vaccine and immunization supplies budget line item is allocated the necessary resources.

In sum, with the improvement in Mauritania’s economic situation due to the diversification of the economic base in 2011 with an outlook for further improvement in 2012, and the re-energizing of financial cooperation with the emerging countries and other partners, including GAVI and the World Bank, the country has a good opportunity to introduce the pneumococcal vaccine, requested from GAVI with greater success to effectively contribute to achieving Millennium Development Goal 4: reduce child mortality.

**INTRODUCTION**

Like other countries around the world, the Islamic Republic of Mauritania has adopted the Millennium Development Goals (MDG). MDG number four – to reduce by two-thirds, the under-five mortality rate by 2015 – has attracted the most attention from the highest State authorities. Mauritania has also joined the Global Immunization Vision and Strategy (GIVS), which stipulates in two of its four strategic aims:

* Protecting more people against more diseases; and
* Introducing new vaccines and access to new technologies

Thanks to support offered by GAVI, the country has begun the process of introducing new vaccines in the routine EPI immunization schedule for the protection of mothers and infants.

This desire has become a reality with the introduction of the monovalent presentation of the viral hepatitis B vaccine in March 2005, the pentavalent liquid single-dose presentation of the Haemophilus influenza b in 2009, and the introduction of the pneumococcal vaccine is planned for 2012.

As of 2012, therefore, Mauritania’s EPI will target 9 diseases: tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, measles, hepatitis B, Haemophilus influenza type b infections, and pneumococcal infections.

Pneumococcal infections are a true public health issue in developing countries, particularly in Africa. This bacteria is the cause for nearly 19% of the deaths in children under five, or approximately 1 million children per year; 94% of these deaths occur in developing countries.

The pneumococcal vaccine, to be introduced in 2012, should contribute to lowering mortality in infants and children (children under 5), which is currently high, at about 122 per thousand in the country.

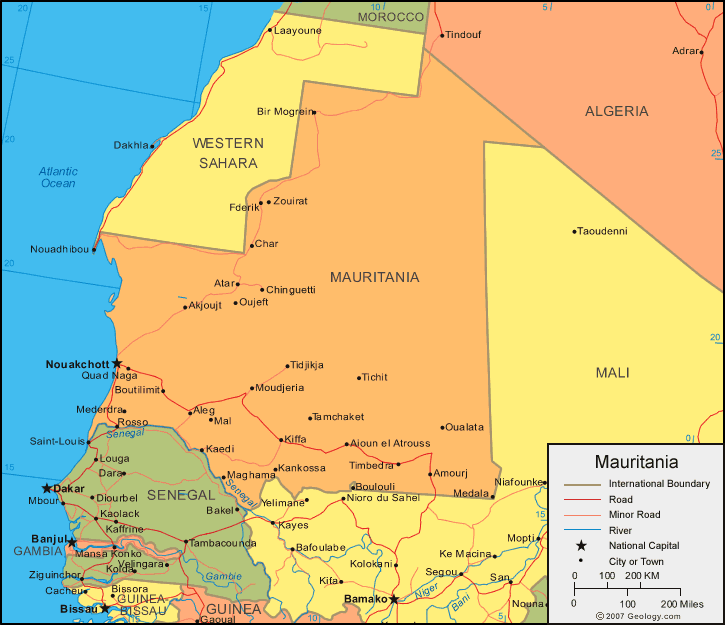
It is in this perspective that this document seeks to identify all the difficulties in the program’s external and internal environment in an effort to find solutions that lead to the success of introducing this new vaccine into the EPI. This plan was developed in collaboration with various development partners to be used as a reference document by everyone involved in the process of introducing the pneumococcal vaccine into Mauritania’s routine immunization program.

# SITUATIONAL ANALYSIS

# 1.1 General Information on Mauritania

The Islamic Republic of Mauritania is located between the 15th and 27th north parallel and covers 1,030,700 km2. It is bordered on the north by Western Sahara and Algeria, on the east and southeast by Mali, on the south by Senegal and on the west by the Atlantic Ocean.

In 2011, the population of Mauritania was estimated at 3,257,000, with an average density of about 3 inhabitants per km2. The majority of the population is young. The gross birth rate is 40 per 1000, and life expectancy at birth is 51 years. The annual demographic growth rate is 2.4% (2005).



Mauritania just completed a four-year transition phase from 2005 to 2007. Then, from 2008 to 2009, an electoral process culminated in the adoption of a democratic constitution, and municipal, legislative, senatorial and presidential elections. Since that time, a democratically elected president of the republic has been leading the country.

Mauritania was among the first countries to adopt (in a participative manner) a Poverty   
Reduction Strategy Framework (PRSF). This is a key paper for the country’s economic and social development policy. It is based on a long-term vision (2015) and includes completely achieving the Millennium Development Goals (MDGs).

Between 2006 and 2010, economic growth stood at an average of 3.7%, excluding oil, and 4% including oil, which was less than half of the forecasts, which were expecting 9.4% growth over that period. This situation is explained primarily by: (i) the poor results in oil development; (ii) the international food, energy and financial crises; and (iii) the different institutional changes the country experienced during this period.

The PRSF’s vision is based on four strategic aims identified in the past and that are still relevant: (i) accelerate growth and maintain macroeconomic stability; (ii) anchor growth in the economic sphere of the poor; (iii) develop human resources and expand basic services; and (iv) improve governance and build capacities. These aims will be supplemented and supported by a new major policy: strengthen management, monitoring, evaluation and coordination.

In the first aim, efforts will involve: (i) putting in place economic policies based on re-establishing the major macroeconomic balances; (ii) maximizing the effects of oil development; (iii) reforming the financial system; (iv) considerably improving the business climate; and (v) strengthening and developing infrastructure that supports growth.

The second aim will stress the development of productive activities accessible to the poor and tailored to their concentration areas, in particular: (i) substantially reducing the gap in socioeconomic infrastructure; (ii) promoting access to customized financial services; (iii) developing vocational training and promoting SMEs; and (iv) improving productivity.

The third aim should result in improving the living conditions of the poor in the short term and, in the long term, put in place conditions that foster sustainable growth.

The fourth aim will (i) strengthen the Rule of Law; (ii) improve economic and environmental governance; (iii) strengthen decentralization; (iv) upgrade the public administration; and (v) entrench the participative approach.

Finally, in addition, a system and appropriate mechanisms will be put in place for coordination, monitoring and evaluation, which will be used to effectively manage the economic and social development policy. These will include (i) improving coordination within the Government to ensure a sequenced and integrated implementation of the priority programs; (ii) align and harmonize public development assistance in accordance with the Paris Declaration; (iii) streamline existing arrangements; and (iv) periodically produce information and analysis that are relevant for monitoring the implementation of the PRSF.

To measure the progress achieved in the second phase of the PRSF, the Government set the following objectives: (i) lower poverty incidence to less than 35% at the national level, less than 45% in rural areas, and less than 15% in urban areas; (ii) guarantee an annual average economic growth rate of more than 10% over the period; (iii) ensure universal access to basic education; (iv) lower the illiteracy rate among adults over 15 years old to less than 20%; (v) raise the primary health care coverage rate to 90% in a radius of 5 km; (vi) lower the infant mortality rate, the infant-child mortality rate and the maternal mortality rate to less than 60, 70 and 400 per 100,000 respectively; and (vii) increase the rate of drinking water coverage in urban areas to 48%, and the rural and semiurban coverage rate to 62%.

To achieve these objectives in the medium and long terms, the programs included in the second phase of the PRSF will be implemented according to the following four types of priorities:

* 4 priority areas: education, health, water resources and infrastructure (transport, energy, telecommunications, etc.)
* 2 priority zones: arid rural areas and dangerous neighborhoods;
* 2 cross-cutting priority programs: (i) prepare a national Land Development Strategy (SNAT) that includes a forward-looking long-term vision of the country (Mauritania 2030), in particular with the implementation of the Mauritanian Coastal Development Plan (PDALM) which is already available; and (ii) adopt the National Environmental Action Program (PANE) as an important stage in fully taking into account the cross-cutting nature of the environment issue.
* 1 priority working method: the concerted, coordinated and monitored implementation of the PRSF.

# 1.2 HEALTH SITUATION IN MAURITANIA

## 1.2.1 Health System Organization

The health system is modeled on the administrative organization as a three-level pyramid:

* The central or national level includes the Minister’s cabinet, the Secretariat General, the Health Inspectorate General, and the Central Directorates with their departments and divisions as well as health programs;
* The regional level, which currently fulfills the role of operational level as well as coordination, a source of disharmony in the system; it includes the Regional Directorates for Health Action (*Directions Régionales à l’Action Sanitaire*, DRAS), which themselves include regional health services;
* The peripheral or department level (Moughataa), made up of Moughataa health districts (*circonscriptions sanitaires de Moughataa*, CSM).

At the technical level, the system is comprised of three service levels:

At the first level (Moughataa) there are two kinds of facilities:

* 421 health posts (postes de santé, PS) which are run by one or two nurses and a midwife and are located in large rural communes and large hard-to-reach collectives
* 56 Moughataa health districts (CSM), 13 of which are type A and 43 of which are type B centers (definition). These are led by medical officers and provide preventive and curative services as well as emergency services and observations, depending on the level of the technical support center.
* At the second (intermediate or regional) level are the 12 hospitals (Néma, Aioun, Kiffa, Kaédi, Aleg, Rosso, Boutilimit, Atar, Chinguetti, Nouadhibou, Tidjikja and Sélibaby); the hospitals of Nouadhibou, Kiffa, Néma, Aioun, Kaédi and Rosso have management autonomy;
* The third (national) level is comprised of public reference facilities:
* National Hospital Centre (*Centre Hospitalier National*, CHN);
* Neuropsychiatric Centre (*Centre Neuro-psychiatrique*, CNP);
* National Public Health Research Centre (*Centre National de Recherches en santé publique*, CNRSP);
* National Orthopaedics and Functional Rehabilitation Centre (*Centre National d’Orthopédie and de Réadaptation Fonctionnelle*, CNORF);
* Nouakchott Cheikh Zayed Hospital;
* National Blood Transfusion Centre (NBTC);
* Nouakchott Military Hospital;
* National Cardiology Centre (*Centre National de Cardiologie*, CNC);
* Mother-Child Hospital Centre (*Centre Hospitalier Mère Enfant*, CHME);
* National Oncology Centre; and
* Nouakchott Friendship Hospital (*Hôpital de l’Amitié).*

In addition to these facilities, there are three facilities for health personnel training, the National Public Health School of Nouakchott (*Ecole Nationale de Santé Publique,* ENSP), the Public Health School of Kiffa (*Ecole de Santé Publique de Kiffa*, ESPK), and the Nouakchott School of Medicine.

In addition to public healthcare facilities, the private sector, which began in 1988, contributes significantly to health coverage. The private sector currently includes:

12 medical clinics with several specialties and average 10 hospital beds;

22 outpatient consultation doctor offices run by physicians;

15 healthcare offices run by nurses;

14 dentist offices; and

1 not-for-profit ophthalmological foundation.

The health centers and health posts provide immunization in all cases; only 3 referral facilities out of 11 provide immunization. Private practices seldom provide immunization.

## 1.2.2 Analysis of the health system and vision

The different health indicators have not really changed over the past few years. The 2003-2004 Child Mortality and Malaria Survey (EMIP) shows that the infant and child mortality rate has changed little since 1990; it went from 123 %o in 2004 to 122%o in 2007 according to the preliminary results of the MICS, now in progress. The fertility index stabilized around 4.6 during the 2000-2004 period. The HIV/AIDS  
prevalence rate (HIVPR) also remained relatively stable at about 0.5% in pregnant women. According to SNIS data and the health map, 67% of the population is located in a radius of 5 km from a health facility. However, the usage rate of facilities located less than 5 km from the home is declining, from 73% to 58.2% in 2000 and 2004 respectively. The decline was primarily in rural areas, with 55% in 2000 versus 34.55% in 2004.

Given this undesirable health situation, the right to health is a basic human right of all the citizens of Mauritania. The national health and social policy seeks to sustainably improve the people’s health and to mitigate the impact of poverty on the most vulnerable groups. By 2015, the health policy will have promoted the implementation of a modern, proactive and sophisticated health system accessible to everyone in the country, regardless of place of residence, level of education, age, gender, origin, economic status, etc. This health system will have contributed significantly to improve the quality of life and life expectancy. The health policy, with the other sectors, will fight poverty and thus conquer the diseases that are related to poverty and ignorance. To this end, emphasis will be placed on: (i) making the people accountable, (ii) community participation, and (iii) intersectoral cooperation as part of harmonious health and social development.

The purpose of this health policy for Mauritania is to improve the health status and social protection of the people through access to quality health and social coverage. This implies the existence of an integrated health system in which all the actors participate effectively and responsibly, and users and communities in particular.

This policy primarily targets mother and child health, controlling the major endemics and emerging diseases.

* Regarding mother and child health, the priority programs in effect over the last several years should be continued in order to reduce by 2015 maternal mortality by three-fourths and child mortality by two-thirds.
* Nutritional status should be improved as well to contribute to lowering mortality and morbidity caused by malnutrition, including micronutrient deficiencies in children under 5 and pregnant women (Vitamin A deficiencies and disorders caused by iodine deficiencies).
* Regarding the major endemics and emerging diseases, efforts must be made by 2015 in order to:
* Stabilize the prevalence of HIV/AIDS below 1% in the general population and treat all new cases that are reported,
* Decrease the prevalence of malaria, hepatitis B and tuberculosis,
* Develop programs to prevent, test for and control noncommunicable emerging diseases.
* In the area of social protection, this policy should ensure that health care is provided for the majority of the poorest of the poor and people living in social exclusion.
* Moreover, in the area of social action, it should improve the targeting, orientation and insertion of children in difficulty and the treatment and insertion of disabled persons.

**1.2.3 STATUS OF THE EPI IN THE CONTEXT OF INTRODUCING THE PNEUMO VACCINE**

## 1.2.3.1 National Immunization Policy

The Expanded Programme on Immunization (EPI) started in our country in 1977 in two experimental areas in Trarza, Keur Macène and Rosso.

It extended gradually to become nationwide in 1984.

It used two strategies:

* A fixed strategy through health facilities, and
* A mobile strategy using mobile teams in rural areas.

Two other strategies were introduced in 1985:

* The advanced strategy, which consists of sending teams within 5-10 km around fixed facilities to conduct activities; and
* The acceleration strategy, first through municipal immunization days, then from 1989 to 1994 through Maghreb immunization days, and finally through National Immunization Days (NID) beginning in 1995 to eradicate polio and then control measles.

Under the Expanded Programme on Immunization, the national immunization policy recommends immunizing children from 0 to 11 months old and women of childbearing age (14-45 years old).

For children, all antigens in the program are scheduled to be administered before age 1, over 5 immunization contacts. Initially these vaccines were tuberculosis (BCG), polio, diphtheria, tetanus, pertussis (DTP) and measles (MCV). The hepatitis B vaccine was added to this schedule in March 2005 and the Haemophilus influenza vaccine was added in 2009. Table 1 below gives the minimum recommended ages for each vaccine:

Table 1: *Immunization schedule for children 0 to 11 months*

|  |  |  |
| --- | --- | --- |
| **Contact** | **Age** | **Recommended Antigens** |
| 1 | Birth | BCG, polio 0 |
| 2 | 6 weeks | Penta 1, Polio 1 |
| 3 | 10 weeks | Penta 2, Polio 2 |
| 4 | 14 weeks | Penta 3, Polio 3 |
| 5 | 9 months | MCV |

Five immunization contacts are also scheduled for women of childbearing age to combat maternal and neonatal tetanus:

Table 2: *Immunization schedule for pregnant women and women of childbearing age*

|  |  |
| --- | --- |
| ***Dose*** | ***Administration Period*** |
| **TT1** | 1st contact |
| **TT2** | 4 weeks after TT1 |
| **TT3** | 6 months after TT2 |
| **TT4** | 12 months after TT3 |
| **TT5** | 12 months after TT4 |

## 1.2.3.2 Analysis of the status of the EPI by immunization system component

1.2.3.2.1 Reminder of the objectives of the EPI

* By 2015, reach and maintain at least a 90% coverage rate for all the antigens in the EPI at the national level, and at least 80% in each Moughataa. More specifically:
  + from 85% for BCG in 2010 to 99%
  + from 64% for DTP-HepB-Hib3 in 2010 to 89%
  + from 67% for measles in 2010 to 89%
  + from 30% for TT2+ in 2010 to 45%
* Lower the dropout rates for DTP1-DTP3 < 10% in all the Moughataa in the country
* Lower the rate of antigen wastage
* By 2012, introduce the pneumococcal vaccine in the routine EPI
* By 2013, introduce the rotavirus vaccine.
* Maintain the interruption of the circulation of polio
* By 2012, eliminate MNT in all the high-risk Moughataa
* Lower mortality due to measles by 95% by 2012
* By 2012, increase national financing for immunization activities
* Strengthen the surveillance system and the system for controlling EPI target diseases and diseases under surveillance.

1.2.3.2.2 Analysis of the immunization system by component:

* Delivery of services

### Change in the vaccine coverage rate

After very poor performances that were registered until 2000, the vaccine coverage rate for routine EPI antigens changed dramatically from 2001 to 2002, climbing from 26% for DTP3 in 1999 to 82% in 2002, and then falling to 75% in 2007. These performances dropped between 2008 and 2010 despite the introduction of the pentavalent vaccine with a substantial fall in the coverage rate, down from 75% in 2007 to 64% in 2009 and 2010.

### 

(Chart 1) Figure 1: Change in routine EPI antigen vaccine coverage from 1991 to 2010 (source: routine EPI annual reports)

Key:

DTC3 DTP3

VAR MEASLES

VAT2+ TT2+

Currently only 17% (9/53) of the Moughataa for 2010 have DTP3 coverage rates greater than 80%, hence the need to focus viable and sustainable strategies on poorly performing districts to reach regional and global goals by 2015, while at the same time ensuring that the number of antigens to protect children (pneumococcus and rotavirus) are increased.

Figure 2: Mapping of the Moughataa according to DTP3 vaccine coverage rate in 2002 and 2010



Table 3: District performance in 2001 and 2010 (DTP3/PENTA3)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Years** | **Moughataa** | **DISTRICT PERFORMANCE** | | | | | |
| **< 50%** | | **50% and 79%** | | **>=80%** | |
|  | **#** | **#** | **%** | **#** | **%** | **#** | **%** |
| **2001** | 53 | 17 | 32% | 25 | 47% | 11 | 21% |
| **2002** | 53 | 2 | 4% | 31 | 58% | 20 | 38% |
| **2003** | 53 | 9 | 17% | 32 | 60% | 12 | 23% |
| **2004** | 53 | 10 | 19% | 28 | 53% | 15 | 28% |
| **2005** | 53 | 12 | 23% | 27 | 51% | 14 | 26% |
| **2006** | 53 | 13 | 25% | 29 | 55% | 11 | 21% |
| **2007** | 53 | 9 | 17% | 26 | 49% | 18 | 34% |
| **2008** | 53 | 7 | 13% | 34 | 64% | 12 | 23% |
| **2009** | 53 | 13 | 25% | 34 | 64% | 6 | 11% |
| **2010** | 53 | 17 | 32% | 23 | 51% | 9 | 17% |

Between 2009 and 2010, the number of Moughataa with Penta 3 coverage <50% increased from 13 (25%) to 17 (32%), and only 51% Moughataa fell between 50% and 79%.

By the end of 2010, only 9 of the 53 Moughataa in the country recorded coverage >80%.

Furthermore, as shown in the graph, since 2002 the dropout rate has oscillated between 16% and 21% above acceptable standards (10%), evidence that the quality of immunization service continuity is poor. This is why the RED strategy needs to be intensified in all Moughataa (districts).

Figure 3: Change in DTP1-DTP3 dropout rate from 2001 to 2010



The main reasons for non-immunization revealed in the latest national vaccine coverage survey of 2004 revolved around the following points:

* Lack of information (41%)
* Vaccinator and/or vaccine not available (14.6%)
* Immunization site too far away (14.2%) and ignorance of the need to return for a child’s immunization (8.2%).

The most important reasons are the ones related to immunization services (no vaccinator or vaccine available, lack of inter-personal communication).

National averages conceal significant disparities in vaccine coverage or dropout rates.

At this same time, reasons related to anti-immunization prejudice (fear of side effects, incorrect beliefs, lack of confidence, false rumors, etc.) were only cited 3.1% of the time

* Supplemental polio immunization activities

Figure 4: Average annual vaccine coverage rates (polio NID) from 2000 to 2011



Chart 4 above shows that the polio NIDs continued from 2000 to 2005 and from 2009 to 2011 after the wildvirus was reimported in October 2009. These days, which are synchronized with the other West African countries, have consistently reported vaccine coverage rates above 95%. These vaccine coverage figures are problematic in terms of reliability in view of the sometimes high rates of unvaccinated children according to data from independent monitoring. The reasons are the unreliability of the denominator, the fact that a child’s age is not known, and the desire of people to vaccinate their children even beyond the age group targeted by the campaign.

Despite certification in 2007 and satisfactory AFP performance indicators in recent years, the WPV has been reimported into the country, with 13 cases in 2009 and 5 cases in 2010. The last case was detected on April 28, 2010.

* Measles control

As part of the fight against measles, Mauritinia conducted a measles catch-up campaign between 2003 and 2004 in four segments, targeting children aged 9 months to 14 years (42% of the total population) with a national post-assessment vaccine coverage rate of 96%. Therefore, two monitoring campaigns were organized in 2008 and 2011. Indeed, during the first follow-up campaign held in 2008, 464,564 children aged 9-59 months were vaccinated in five days (January 29 to February 2), for 98% coverage. To maintain the achievements and strengthen and strengthen the fight against this disease, a second follow-up campaign was conducted from 20 to 24 February 2011, and 510,155 children aged 9-59 months were vaccinated in 4 days, for 96.4% coverage.

In the catch-up campaign, as well as the follow-up ones, the main difficulties encountered are related:

* to the failure of the target population to know children’s ages, resulting in vaccine coverage rates above 100% for some Wilaya
* to inadequate logistics (vehicles) and vaccine holders in some areas
* to the inadequacy of local communication in some locations
* and to the failure to standardize the waste disposal method due to the lack of incinerators in most Moughataa.

Finally, we must nevertheless point out that routine measles coverage is relatively low (67% in 2010), and that efforts are still needed at this level.

* Elimination of Neonatal Tetanus (NNT)

A plan to eliminate maternal and neonatal tetanus for the 2006-2010 period was developed and implemented with the organization of three sets of supplemental immunization activities targeting women of childbearing age in high-risk Moughataa. This plan divided the country int, one of which consists of 27 Moughataa and the other of 26 Moughtaas. Thus, between 2007 and 2010, all 53 of the country’s Moughtaas organized at least three SIA passages against tetanus.

The first block of 27 Moughataa held SIAs from 2007 to 2008 for a target population of 463,519 women of childbearing age. The second block of 26 Moughataa was held between 2009 and 2010 for a target population of 232,643 women of childbearing age for the three rounds of the campaign.

As shown in the table below, vaccine coverage by dose is as follows:

Table 4: SIA results for the 27 & 26 Moughataa (2nd block)

|  |  |  |
| --- | --- | --- |
|  | 1st Group | 2nd Group |
| TT 1 | 101% | 107% |
| TT 2 | 83% | 73% |
| TT3 | 77% | 57% |

Finally, it must be admitted that the routine immunization coverage rates for TT2 + in pregnant women and women of childbearing age are low and that the RED strategy should be intensified.

In addition, a joint UNICEF-WHO-EPI mission on the pre-validation phase of Maternal and Neonatal Tetanus (MNT), conducted from 7 to 14 November 2010, carried out a site inventory. It emerged that Mauritania is on track to claim that MNT will be eliminated, but all the districts with TT2 + <85% and an assisted delivery rate of <50% remain at high risk. In addition, the field missions and the data review identified 7 high-risk districts, all in the 2nd group. They are:

- R'kiz and Mederdra (for the Wilaya of Trarza)  
- Ouadane Aoujeft and Atar (for the Wilaya of Adrar)  
- Bassiknou and Tembedra (for the Wilaya of Hodh Echargui).

For these districts, a one or two-round supplemental campaign will be conducted to further enhance immunity before planning the evaluation mission for the certification of the elimination of MNT. Meanwhile, it is still necessary to strengthen community-based surveillance of MNT and additional efforts are needed to increase coverage for routine TT2+ and the rate of assisted deliveries.

* **Target EPI disease epidemiological surveillance**

For polio, despite satisfactory performances in AFP surveillance over the last few years, the WPV was reimported into the country, with 13 cases in 2009 and 5 cases in 2010. This re-importation was halted thanks to the efforts of the Government and its partners through the organization of 10 SIA rounds to control polio between 2009 and 2010, for the mostpart in sync with the countries of the sub-region and the scheduling of two other rounds in 2011. The last WPV case dates back to April 2010.

Furthermore, with regard to measles, Mauritania experienced a measles epidemic from September 2009 until May 2010, with 1,519 cases, 18% of which were in children under 5 years, with 21 deaths among adults.

In addition, a new outbreak of the measles epidemic was reported in three south-eastern regions of the country, the 2 Hodhs and Assaba, with over 207 cases and 3 deaths. An investigative mission conducted in March 2011 with WHO and UNICEF support showed that the outbreak probably began in January 2011, and that the most affected group is between 15-29 years old. This epidemic is caused by a large number of vulnerable individuals who are not eligible for vaccination and have escaped the disease. A non-selective vaccine response (regardless of vaccine status) of the population aged 5-30 years (about 50% of the total) is scheduled for May 2011 in these three Wilaya.

The number of cases of maternal and neonatal tetanus has remained very low, especially over the last three years. Just 3 cases were reported (2 in 2009 and only 1 in 2010).

No cases of yellow fever were reported; although the YFV is not included in the immunization schedule, this disease does appear on the list of IDSR diseases because of its presence in neighboring countries.

* Supply and quality of antigens

*Inventory monitoring and control*

At the central level, appropriate tools exist to record and monitor vaccine inventory movements. The computerization of inventory management, begun in 2000, is now implemented. At the intermediate level, management logs for monitoring vaccine inventories are in place and are generally up to date.

As part of the WHO initiative, UNICEF known as EMWV (Effective Management of Warehouses Vaccines), an assessment was conducted in November 2010 with WHO and UNICEF support. It addressed warehouses at the central, intermediate and peripheral levels. This evaluation was conducted according to international standards using the new EVM assessment tool based on the following nine criteria:

Vaccine arrival procedure  
Vaccine storage temperature  
Storage capacity  
Buildings, cold chain and transportation equipment  
Building and cold chain maintenance and maintenance of transportation equipment   
Inventory management  
Distribution of vaccines and consumables  
Vaccine management (proper and effective use of thinners, PCV, PFE   
monitoring of management indicators, etc.).  
Information system and management support

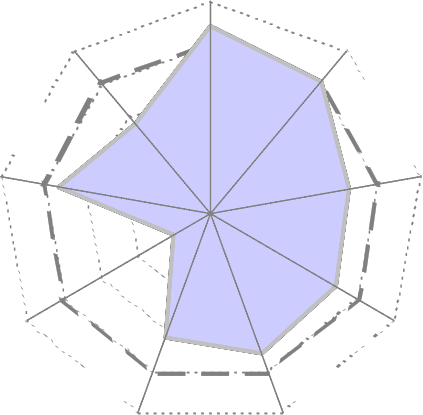
The results obtained from the evaluation of indicators at the different levels of the health system are as follows:

1. **Central level**

The performance level of the vaccine management indicators in the EPI central warehouse is illustrated in the graphs below.

Figure 5: Performance level of vaccine management indicators at the central EPI depot level

Central EPI depot level Criteria scores



E1: Arrivage/Réception vaccin

100%

E9: SIG, f onctions d'appui

80%

E2: Température

60%

40%

E8: Gestion des vaccins

20%

E3: Capacité de stockage

0%

E7: Distribution

E4: Bâtiments, équipement, transport

E6: Gestion de stock

E5: Maintenance

Cible% Maximum% Moyenne% Minimum% Etendu: Entier Niveau: Dépôt central (1) n: 1

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| E1: Arrivage/réception vaccin | E1: Receipt of vaccines |
| E2: Température | E2: Temperature |
| E3: Capacité de stockage | E3: Storage capacity |
| E4: Bâtiments, équipements, transport | E4: Buildings, equipment, transport |
| E5: Maintenance | E5: Maintenance |
| E6: Gection de stock | E6: Stock managment |
| E7: Distribution | E7: Distribution |
| E8: Gestion des vaccins | E8: Vaccine management |
| E9: SIG, fonctions d’appui | E9: GIS, support functions |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dépôt central (1) | Level: Central depot |

Central EPI depot level Category scores

Bâtiments

100%

Véhicules

80%

60%

Capacité

40%

20%

0%

Training

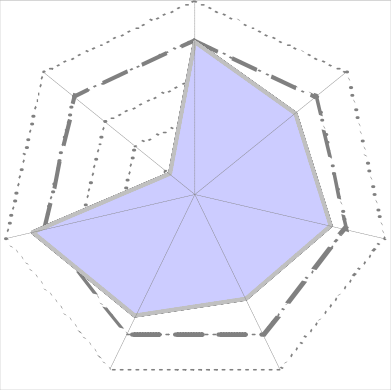
Equipment

Réparations/maintenance

Management;

Cible% M aximum% M oyenne% Minimum% Etendu: Entier Niveau: Dépôt central (1) n: 1

Source: EVM evaluation reports in Mauritania, November 2010



|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Bâtiments | Buildings |
| Capacité | Temperature |
| Equipements | Equipment |
| Management | Management |
| Réparations/maintenance | Repair/maintenance |
| Training | Training |
| Véhicules | Vehicles |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dépôt central (1) | Level: Central depot |

Based on these charts, it is clear that from the 9 criteria evaluated, only 2 (22%) scored higher than or equal to 80%.They are the "Vaccine arrival procedure" and "Vaccine storage temperature." Of the seven (7) others that have not reached the required level of performance, the weakest are: distribution (20%), information and management support system (55%), and vaccine management (62%).

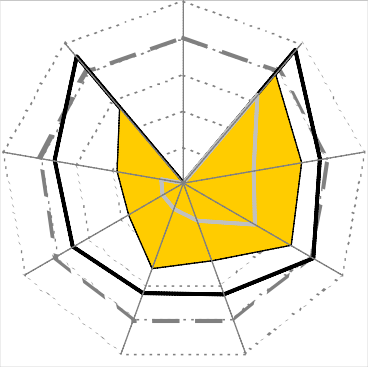
* Storage capacities: insufficient for introducing the new vaccines.
* Buildings: the building is defective despite the sufficient space. Cold chain equipment: There are no continuous temperature recorders, which lowers the quality of vaccine storage in case of power failures.
* Transport: the central EPI has no means of transport for shipping the vaccines and for regularly and securely carrying out the supervisions.
* Building, cold chain and transport equipment maintenance: There is no structured maintenance plan, even though maintenance activities are occurring.
* Inventory management: despite the computerized management of inventory management, there are no supplemental manual registers; the registers that do exist do not contain the information necessary for evaluation, such as the status of the indicators, manufacturer, country of origin, etc.
* Distribution of vaccines and consumables: vaccines are sent sporadically based on the distribution plan, due in part to the fact that no vehicles exist for the EPI specifically, and the fact that financial resources are lacking to cover the costs of public transportation.
* Vaccine management: there is a discrepancy between the number of vials of vaccine and the corresponding number of vials of thinners; management indicator management is insufficient at the central level.
* Information system and management support: training of staff is lacking at the central level other than the national logistics manager. Supervision of the senior and coordination levels is lacking.

B. Wilaya level (regional)

Regarding the Wilaya, the indicator for shipment and receipt of inputs is not rated for this level. Thus, as shown in Charts 10 and 11 below, no criteria in the 8 evaluated points have reached the score of 80%. The weakest criterion at this level is mainly in the areas of vaccine distribution (35%), vaccine management and inputs (37%), the information and management support system, buildings and equipement maintenance (46%), and inventory management (50%). The territory is vast and transport logistics, a distribution and a financing plan are lacking at all levels.

* No plan for distributing vaccines from the regional level to the peripheral level
* No logistical means for resupply at the district and post level
* Insufficient training in EPI management and formative supervision from the Wilaya to the Moughataa.
* Instability of trained staff.
* Nearly nonexistent maintenance at this level, a plan was never written, and equipment is seldom monitored.

Figure 6: Performance level for vaccine management indicators at the Wilaya level



Niveau Dépôts Wilaya

Scores de critères

E1: Arrivage/Réception vaccin

100%

E9: SIG, f onctions d'appui

80%

E2: Température

60%

40%

E8: Gestion des vaccins

20%

E3: Capacité de stockage

0%

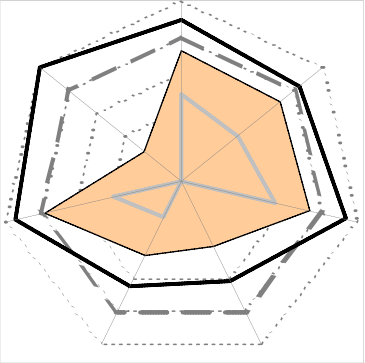
E7: Distribution

E6: Gestion de stock

E4: Bâtiments, équipement, transport

E5: Maintenance

Cible% M aximum% M oyenne% M inimum% Etendu: Entier Niveau: Dépôt intermédiaire (1) n: 9



Niveau Dépôts Wilaya

Scores de catégories

Bâtiments

100%

Véhicules

80%

60%

Capacité

40%

20%

0%

Training

Equipment

Réparations/maintenance

Management;

Cible% Maximum% Moyenne% Minimum% Etendu: Entier Niveau: Dépôt intermédiaire (1) n: 9

Source: EVM evaluation reports in Mauritania, november 2010

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau dépôts Wilaya | Depot level WIlaya |
| Scores de critères | Criteria scores |
| E1: Arrivage/réception vaccin | E1: Receipt of vaccines |
| E2: Température | E2: Temperature |
| E3: Capacité de stockage | E3: Storage capacity |
| E4: Bâtiments, équipements, transport | E4: Buildings, equipment, transport |
| E5: Maintenance | E5: Maintenance |
| E6: Gection de stock | E6: Stock managment |
| E7: Distribution | E7: Distribution |
| E8: Gestion des vaccins | E8: Vaccine management |
| E9: SIG, fonctions d’appui | E9: GIS, support functions |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dépôt intermédiaire (1) | Level: Intermediary depot (1) |

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau dépôts Wilaya | Depot level WIlaya |
| Scores de catégories | Category scores |
| Bâtiments | Buildings |
| Capacité | Temperature |
| Equipements | Equipment |
| Management | Management |
| Réparations/maintenance | Repair/maintenance |
| Training | Training |
| Véhicules | Vehicles |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dépôt intermédiaire (1) | Level: Intermediary depot (1) |

C. Moughataa level (District)

As was the case for the Wilaya, the indicator on procedures for taking delivery of inputs is not rated for that level. Thus, as shown in Figure 7 below, no criteria on the 8 that were evaluated reached a score of 80%. The weakest criteria at this level are: the information and management support system (25%), inventory management (32%), vaccine and input management (33%) and vaccine distribution (34%). The highest score of 58% is for storage capacity. In general, the same specifc issues described above for the Wilaya are found in the health districts.

Figure 7: Performance level for vaccine management indicators at the Moughataa level



Niveau Dépôt Moughataa

Scores de critères

E1: Arrivage/Réception vaccin

100%

E9: SIG, f onctions d'appui

80%

E2: Température

60%

40%

E8: Gestion des vaccins

20%

E3: Capacité de stockage

0%

E7: Distribution

E4: Bâtiments, équipement, transport

E6: Gestion de stock

E5: Maintenance

Cible% M aximum% Moyenne% M inimum% Etendu: Entier Niveau: Dernier niveau de distribution n: 15

Niveau Dépôt Moughataa

Scores de catégories

Bâtiments

100%

Véhicules

80%

60%

Capacité

40%

20%

0%

Training

Equipment

Réparations/maintenance

Management;

Cible% Maximum% M oyenne% M inimum% Etendu: Entier Niveau: Dernier niveau de distribution n: 15

Source: EVM evaluation reports in Mauritania, November 2010

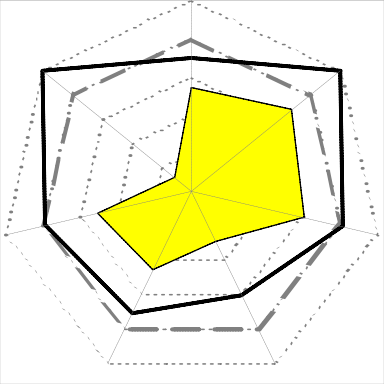


Chart 12:

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau dépôt Moughataa | Depot level Moughataa |
| Scores de critères | Criteria scores |
| E1: Arrivage/réception vaccin | E1: Receipt of vaccines |
| E2: Température | E2: Temperature |
| E3: Capacité de stockage | E3: Storage capacity |
| E4: Bâtiments, équipements, transport | E4: Buildings, equipment, transport |
| E5: Maintenance | E5: Maintenance |
| E6: Gection de stock | E6: Stock managment |
| E7: Distribution | E7: Distribution |
| E8: Gestion des vaccins | E8: Vaccine management |
| E9: SIG, fonctions d’appui | E9: GIS, support functions |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dernier niveau de distribution | Level: Last level of distribution |

Chart 13:

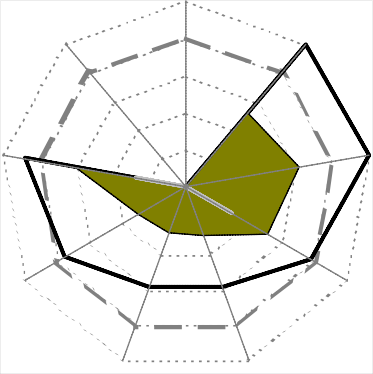
|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau dépôts Moughataa | Depot level Moughataa |
| Scores de catégories | Category scores |
| Bâtiments | Buildings |
| Capacité | Temperature |
| Equipements | Equipment |
| Management | Management |
| Réparations/maintenance | Repair/maintenance |
| Training | Training |
| Véhicules | Vehicles |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Dernier niveau de distribution | Level: Last level of distribution |

**D. Level of services in the health centers and health posts**

At this level, the E1 and E9 criteria, on the procedures for taking delivery and the shipment of vaccines and the information and management support system respectively, were not assessed.

As shown in the figure below, no criteria were satisfactory out of the 7 that were evaluated. Indeed, the highest scores are for the criteria on the storage capacity of health facilities (62%) and the management of vaccines and consumables (61%). The weakest criteria are mostly observed in inventory management (26%), building and equipment maintenance (27%), and vaccine distribution (29%). At this level, the same problems occur and explain these poor performances: lack of training and supervision, lack of management tools, information, training, maintenance, etc. In addition, there is the geographical inaccesibility of some zones due to remotness (long distances in the desert) and lack of means of public transportation. Most health posts are rune by just one nurse, who must perform all the curative, preventive and promotional activities. In the event of absence for one reason or another (illness, mission, collecting the monthly sdsalary in the city, etc.), the health post is closed. Some posts have no staff at all and are closed, although the number of these is negligeable.

Figure 8: Performance level of vaccine management indicators at the health post level



Niveau Prestation CS/PS

Scores de critères

E1: Arrivage/Réception vaccin

100%

E9: SIG, f onctions d'appui

80%

E2: Température

60%

40%

E8: Gestion des vaccins

20%

E3: Capacité de stockage

0%

E7: Distribution

E6: Gestion de stock

E4: Bâtiments, équipement, transport

E5: Maintenance

Cible% Maximum% Moyenne% Minimum% Etendu: Entier Niveau: Point de prestation n: 15

Niveau Prestation CS/PS

Scores de catégories

Bâtiments

100%

Véhicules

80%

60%

Capacité

40%

20%

0%

Training

Equipment

Réparations/maintenance

Management;

Cible% Maximum% M oyenne% Minimum% Etendu: Entier Niveau: Point de prestation n: 15

Source: EVM evaluation reports in Mauritania, November 2010

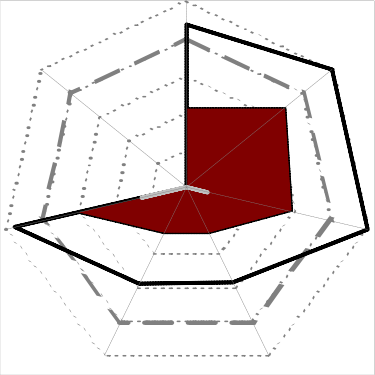


Chart 14:

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau Prestation CS/PS | Service center level HC/HP |
| Scores de critères | Criteria scores |
| E1: Arrivage/réception vaccin | E1: Receipt of vaccines |
| E2: Température | E2: Temperature |
| E3: Capacité de stockage | E3: Storage capacity |
| E4: Bâtiments, équipements, transport | E4: Buildings, equipment, transport |
| E5: Maintenance | E5: Maintenance |
| E6: Gection de stock | E6: Inventory managment |
| E7: Distribution | E7: Distribution |
| E8: Gestion des vaccins | E8: Vaccine management |
| E9: SIG, fonctions d’appui | E9: GIS, support functions |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Point de prestation | Level: Service point |

Chart 15:

|  |  |
| --- | --- |
| *French* | *English* |
|  |  |
| Niveau Prestation CS/PS | Service center level HC/HP |
| Scores de catégories | Category scores |
| Bâtiments | Buildings |
| Capacité | Temperature |
| Equipements | Equipment |
| Management | Management |
| Réparations/maintenance | Repair/maintenance |
| Training | Training |
| Véhicules | Vehicles |
| Cible% | Target% |
| Maximum% | Maximum% |
| Moyenne% | Average% |
| Minimum% | Minimum% |
| Etendu: Entier | Area: Entire |
| Niveau: Point de prestation | Level: Service point |

#### *Use of open vials*

To minimize losses and ensure immunization quality, national EPI directives were prepared and provide guidelines on the use of the open vial policy. These guidelines recommend keeping and using opened vials of liquid vaccines (Penta, OPV and TT) and the systematic destruction of lyophilized vaccine vials (BCG and measles) at the end of each immunization session, or six (6) hours after they are reconstituted. Despite the existence of these directives, the personnel have not yet mastered the open vial policies for liquid vaccines.

#### *Monitoring and control of vaccine wastage*

The program still does not have the resources necessary to effectively control wastage. The wastage study, performed in past years, showed relatively high rates for TT and measles. There are difficulties collecting information on the status of the vaccines with the vaccine activity monitoring form. More specifically, there is no paper trail for inventory movements at the regional, district, health center and health post levels.

#### *Injection safety*

The immunization staff has used AD syringes and safety boxes since 1996. Through the 2002-2006 injection safety strategy plan, additional resources were mobilized through the GAVI application for building incinerators in 40% of the Moughataa (districts).The majority of these incinerators are out of order due to lack of maintenance (see the PHE). However, one of the major weakness is the irregular destruction of filled safety boxes due to the workload (just one nurse per health post), insufficient training, especially for newly assigned and hired staff, insufficient supervision and occasionally the lack of financial resources to make pits suitable for burning and burial.

* Logistics and Transport

### *Analysis of storage capacity based on needs with the introduction of the new vaccine*

* ***Cold chain: available storage capacity***

The central level has 2 cold rooms, including 1 negative room with a gross capacity of 10,000 liters and 1 positive room with a gross capacity of 20,000 liters, 2 MK 304 Refrigerators with a net capacity of 108 liters each, 4 TFW 800 freezers with a net capacity of 145 liters each, used for freezing batteries, and one 75 KVA generator that serves as a standby in case of a power failure.

The intermediate depots have refrigerators and freezers. The net capacity available is listed below:

Table 5: Storage capacities available at the intermediate depots

|  |  |  |  |
| --- | --- | --- | --- |
| Total population,  Wilaya base year  2010 | | Net cold chain availability capacity (liters) | |
| Positive Negative | |
| Hodh Echagui | 356,970 | 379 | 181 |
| Hodh El Gharbi | 268,940 | 173 | 159 |
| Assaba | 307,107 | 108 | 0 |
| Gorgol | 307,673 | 216 | 0 |
| Brakna | 313,117 | 100 | 126 |
| Trarza | 340,009 | 322 | 0 |
| Adrar | 88,155 | 69 | 0 |
| Nouadhibou | 100,799 | 46 | 138 |
| Tagant | 97,127 | 47 | 284 |
| Guidimakha | 225,270 | 193 | 14 |
| Tiris Zemmour | 52,127 | 210 | 290 |
| Inchiri | 14,578 | 262 | 0 |
| Nouakchott | 707,596 | 108 | 145 |
| TOTAL 3,179,468 2233 1337 | | | |

Based on data from the 2010 evaluation of the cold chain, all the equipment is being replaced to enhance the storage capacity of the antigens at all levels of the health pyramid in anticipation of introducting the pneumococcal vaccine.

• Analysis of storage capacities in view of the required needs with the introduction of new vaccines

o Central depot

The current positive storage capacity at the central level is sufficient for storing all the quantities needed to operate the program as well as for the first year introduction of the Pneumo vaccine. However, it is essential to strengthen the capacity with at least one cold room of 30m3 to cover requirements beginning in 2013 to raise storage capacity from 5,621 to 12,764 liters. The cost of the investment is estimated at $ 54.286.

In the negative compartment, the available capacity at the central level is largely sufficient and can accommodate the introduction of PCV13. No investment is required during the current plan. See Annex 1: Negative storage capacity at the central depot.

* ***Intermediate depots***

***Positive storage in 2010***

For reference year 2010, the Assaba and Nouakchott regions have insufficient positive storage capacity for vaccines, even before the introduction of the new vaccine (see Table xxx Annex xxx: Positive storage capacity in the regional depots in 2010). The capacity building that was done after the inventory in the fourth quarter of 2010 will not only correct current needs, but will also give these regions sufficient capacity for the introduction of PCV13 until 2015.

***Positive storage in 2011 and 2012***

It appears that in addition to the Wilaya of Nouakchott and Assaba, which had insufficient storage capacity in 2010, Gorgol Wilaya will also need to have its cold storage equipoment strengthened before PCV13 is introduced. The allocation of one HBC-340 in 2011 or early 2012 will be sufficient to bridge the gap.

***Positive storage in 2013***

Based on current capacity, if no action is taken, only the regions of Tagant, Guidimaka, Inchiri and Brakna will not have a gap. Orders already placed by UNICEF and those planned by the Government through UNICEF for the second half of 2011 are expected to build sufficient capacity in all regions during 2012.

***Positive storage in 2014***

Table 6 Positive storage capacity in the regional depots in 2014

|  |  |  |
| --- | --- | --- |
| **WILAYA (Regions)** | Difference (if applicable) = Capacity requirements  *((A/D) - B)* | Estimated expansion cost in *US $* |
| **HODH ECHARGUI** | **-625** | $1,196 |
| **HODH EL GHARBI** | **-409** | $ 00 |
| **ASSABA** | **-479** | $1,196 |
| **GORGOL** | **-482** | $1,196 |
| **BRAKNA** | **-542** | $1,196 |
| **TRAZA** | **-575** | $ 1,196 |
| **ADRAR** | **-136** | $ 0.0 |
| **DAKHLET NOUADHIBOU** | **-167** | **$ 0.0** |
| **TAGANT** | **-170** | **$ 0.0** |
| **GUIDIM AKHA** | **-427** | **$1,196** |
| **TIRIS ZEMMOUR** | **-187** | **$ 0.0** |
| **INCHIRI** | **-268** | **$ 0.0** |
| **NOUAKCHOTT** | **-1,367** | **$ 0.0** |

***Positive storage in 2015***

The analysis of storage capacities for 2015 shows that if the upstream requirements from the previous years are covered, there will be no gap to be covered in 2015 for the positive cold chain.

Negative storage

Table 7: Negative storage capacity and regional depots investment cost

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| WILLAYA 2010 2011 2012 2013 2014 2015 | | | | | | | |
| Adrar | Gap, requirements and exisitng storage capacity  age existante | 5 | 8 | 9 | 10 | 11 | -25 |
| Estimated cost of the expansion | - | - | - | - | $1,610 | - |
| Assaba | Gap, requirements and exisitng storage capacity | 19 | 28 | -194 | -191 | -189 | -185 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |
| Brakna | Gap, requirements and exisitng storage capacity | -126 | -116 | -114 | -111 | -109 | -106 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Gorgol | Gap, requirements and exisitng storage capacity | 19 | 28 | -193 | -191 | -189 | -185 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |
| Guidimakha | Gap, requirements and exisitng storage capacity | 14 | 21 | -14 | -11 | -10 | -7 |
| Estimated cost of the expansion | - | $1,610 | - | - | - | - |
| Hodh El Chargui | Gap, requirements and exisitng storage capacity | -159 | -148 | -146 | -142 | -140 | -136 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Hodh El Gharbi | Gap, requirements and exisitng storage capacity | -273 | -265 | -263 | -261 | -259 | -256 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Inchiri | Gap, requirements and exisitng storage capacity | 1 | 1 | 2 | 2 | 2 | 2 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Nouadhibou | Gap, requirements and exisitng storage capacity | -139 | -136 | -135 | -134 | -133 | -132 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Nouakchott | Gap, requirements and exisitng storage capacity | -102 | -81 | -76 | -69 | -64 | -56 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Tagant | Gap, requirements and exisitng storage capacity | -284 | -281 | -280 | -279 | -279 | -277 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Tiris Zemour | Gap, requirements and exisitng storage capacity | -249 | -247 | -247 | -246 | -246 | -245 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Trarza | Gap, requirements and exisitng storage capacity | 21 | 31 | -191 | -187 | -185 | -181 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |

The assessment shows that for the DRAS that had working equipment during the evaluation, negative capacities can accommodate negative storage. The situation through 2015 reveals no significant major additional needs. Facilities planned in 2011 and being acquired are able to fill all the gaps. Device maintenance performed after this evaluation contributed to solving the problem (maintenance mission by cold technicians at the national level in late 2010-early 2011).

Table 8: Summary of requirements for cold chain equipment at the national and regional level for 2011-2015

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Willaya | Type  of device | 2011 | 2012 | 2013 | 2014 | 2015 |
| Adrar | Refrigerator |  |  | MK304 |  |  |
| Assaba | Refrigerator | MK304 |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Brakna | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Gorgol | Refrigerator |  | HBC-340 |  | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Guidimaka | Refrigerator |  |  |  | HBC-340 |  |
| Freezer | V 170 GE |  |  |  |  |
| Hodh El  Chargui | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Hodh EGarbi | Refrigerator |  |  | HBC-340 |  |  |
| Nouadhibou | Refrigerator |  |  | MK304 |  |  |
| Nouakchott | Refrigerator | Positive cold room-5m3 |  |  |  |  |
| Tagant | Refrigerator |  |  | MK304 |  |  |
| Trarza | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| National (central EPI) | Positive cold chain |  |  | Positive cold room-30m3 |  |  |

Table 9: Summary of investment costs at the regional and national levels– 2011-2015

|  |  |  |
| --- | --- | --- |
| **Type of material** | **Number** | **Cost** |
| V 170 GE | 1 | $1,610 |
| TFW800 | 3 | $8,576.40 |
| HBC-340 | 12 | $14,352 |
| MK304 | 4 | $4,166.40 |
| Positive cold room-5m3 | 1 | $29,251.99 |
| Positive cold room-30m3 | 1 | $54,286.43 |
| TOTAL |  | $112,243.22 |

1. ***Transport of vaccines, immunization materials and distribution***

Rolling stock is aging and the pick-up vehicles acquired as part of the EPI relaunch under the HIPC Initiative, and those of the polio eradication for the surveillance of acute flaccid paralysis (AFP) have been in use for 7 years longer than their normal service life. This issue was raised in the Ministry of Health review in December 2007 and the 2008-2010 three-year plan and provided for the gradual acquisition of vehicles and the development of a maintenance plan of the fleet. It should be recognized, however, that implementation has not yet begun.

Just as at the central level, the national level has neither supervisory vehicles nor specific means for shipping vaccines, the regional and Moughataa levels have no means of transportation that are still in working order, acquired as part of the relaunch of the EPI or of integrated surveillance.

Today, vaccines are shipped (supply), and the supervision trips and mobile trips are carried out using means of transportation acquired by other programs or through hired vehicles.

Table 10 Inventory of WHO transportation means allocated to polio eradication

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| WHO | Maker | Model | Year placed in service | Status |
| 2 | Toyota | Hilux | 2010 | GoodDD |
| 2 | Toyota | Hilux | 2002 | Fair |
| 3 | Toyota | Hilux | 2002 | Inoperative |

These logistical resources that the WHO provides in the country are also used for procurement, supervision and other EPI activities. In addition to their poor condition for the mostpart, it should be mentioned that these vehicles belong to another department in charge of surveillance.

Inadequate transportation logistics are affecting EPI activities at the central level as well as the intermediate and peripheral levels. They affect not only the supply of antigens and consumables, but also advanced immunization activities in a country characterized by low population density (2.5 inhabitants/km2) that is very scattered.

Conclusion on storage capacities and transport/distribution

To ensure adequate storage capacity, Mauritania would have to invest US$ 112,243.22 over the period from 2011 to 2015 to purchase cold chain equipment. Palpable efforts are already being made and the outlook is good to close the gap at the central and regional levels. At the health center and health post levels, where gaps exist as well, the gaps are being filled gradually; this began with the 2010 inventory (see Chapter 4 Strategies). As for the difficulties in transporting and distributing vaccines in the field, innovative solutions tailored to the local context are being planned.

Communication and social mobilization

The shortcomings found in the social mobilization component of the 2004 national immunization coverage survey are still relevant since not all the corrective measures could be implemented in their entirety. The survey revealed that almost all parents (97%) were satisfied with the awareness sessions held when their children were being immunized. Unfortunately, only 37% of parents mentioned these sessions. The fact that there were few of these sessions explains the fact that the children did not return to complete the vaccination process (the high dropout rate). The fact that few awareness sessions for vaccinations were held is a structural problem. This raises issues of skills in awareness and interpersonal communication among those responsible for vaccination in the health facilities.

Nevertheless, health care workers are the second main source of information on vaccination (44%) after the radio (58.2%) and before television (11%). Radio and television ownership was 50% and 20% respectively in the 2000-2001 EDSM. Information obtained from neighbors and friends called "word of mouth” represents a significant proportion (10%) as a source of information on the EPI. Information through community leaders is still negligible. The analysis of information channels during polio SIAs shows that television represents 28%, radio 41%, health workers 7% and community health workers 2%, mosques 2%, and others 1%. Uninformed parents represented 7%.

The average number of EPI target diseases mentioned by respondents during the national survey ranged from 1 to 2.2 with a national average of 1.9. Only 2% of people cited all six target diseases. The average number of diseases mentioned increases significantly with education level.

Support components:

* Programme management

• The EPI’s place in the Ministry of Health’s structure,

At the institutional level, the EPI is one of four core programs under the supervision of the Directorate of Basic Health Services (DSSB), one of eight central departments that currently comprise the Ministry of Health.

O  ***Central level***

A National Coordinator Program is in charge of program management, and the Coordinator is supported by a team of 10 as follows:

o one computer scientist responsible for data management

o one registered nurse in charge of logistics

o one registered nurse responsible for training and supervision

One health technician who serves as a communication focal point, one cold chain technician and two registered (2) nurses provide support, plus a secretary and two guards who take turns guarding the cold chain where the vaccines are kept.

In addition to the buildings that house the cold chain and the storage for dry inputs, the program has an area that was opened recently, composed of a meeting room and equipped offices.   
  
The team has no transportation means for liaison, supervision or replenishment of vaccines for the peripheral facilities. It should be noted that the WHO surveillance vehicles belong to another department.

o ***The other levels***

At the Wilaya level, immunization activities are coordinated by a focal point in close collaboration with the DRAS. This person may also serve as the contact person for other programs and services.   
  
At the Moughataa level, the Chief Medical Officer and his team coordinate the EPI activities of the peripheral facilities (health centers and posts). Currently, of the 421 existing health facilities, 317 units are involved in immunization. At this level, immunization activities have slowed down in recent years, mainly due to inadequate funding and lack of logistical resources.

• Coordination within and between sectors

An Inter Agency Coordinating Committee (ICC) for the EPI was created by Ministerial Order Nº R/08 dated 16 January 2002. It is comprised of the various players involved in the vaccination process. This committee's role is to coordinate all the program activities, but meetings are not held regularly. The committee was officially seated on March 5, 2002.

Several key meetings on the organization of polio NIDs and strengthening the EPI have been held, including meetings for monitoring the process of submitting proposals to GAVI, as well as a round table organized by the committee with the GAVI/UNICEF/WHO mission in October 2010, which yielded positive results. For example, in 2010, 3 out of 4 meetings were chaired by the Secretary General who represents the Minister of Health.

The usual operational partners of the Ministry of Health in the EPI framework are the WHO, UNICEF, the World Bank, Rotary International, the European Union, GAVI, Contrepart and a few national NGOs. The heads of the partner agencies generally attend these meetings.

It was decided at the ICC meeting in the first quarter of 2011 to revise the text of the order to include the chairman of the parliamentary group on health, the adviser in charge of prevention, and the communication adviser to the Minister of Health, in addition to national organizations active in the field of immunization. This process of revising the text is in progress.

It is important in the future to establish a technical committee dealing with all aspects related to vaccination alongside the ICC.

However, the insuffiencient production and processing of financial information, primarily due to the poor dissemination of management standards and the low rate of using accounting and financial management tools, makes it difficult to control the information system on EPI funding. In this regard, the use of new information technology is an opportunity that can build a reliable database.

• Supervision

The plan developed by the national program is structured as follows:

- biannual supervision by the central for the regional level

- quarterly supervision by the regional level for the Moughataa level,

- monthly supervision by the Moughataa for the health post level.

In 2010 the central EPI carried out a few supervisions, one of which was national and the other was at the level of regional groups interested in mobile vaccination activities.

However, the supervisions by the regional level for the Moughataa level and by the latter for the health posts are irregular, mainly due to inadequate funding and lack of transportation logistics.

• Data management

The data collection tools are completed at all levels of the health pyramid but quality is lacking, especially in the section on vaccine management in the monthly report.

Data are not usually analyzed at the Moughataa level. Data compiled by the regional level are analyzed to be sure, but feedback is not always provided and the reports always arrive late.

At the central level, the immunization data is monitored at the national level on the basis of monthly summary reports on immunization activities from the districts. The coverages are calculated and dropout rates are determined, and feedback is sent to the EPI focal point in the Wilaya for action. This feedback information is often supported by circulars signed by the Secretary General of the Ministry of Health. This shows the importance the health department places on immunization.

Following the recommendations of the 2004 Data Quality Audit (DQA), guidelines for reporting data were developed and disseminated. An effort was made at the end of 2010 by designating for each Wilaya an EPI manager who will monitor data from reports of his Wilaya and who will in particular be able to contact the DRAS and regional focal points either by telephone or during a field trip to ensure that the reports arrive on time at the central level.

Capacity building

The 2002-2004 EPI training plan was partially implemented due to lack of resources mobilized. Nevertheless, training on immunization in recent years was frequent for staff at the central level, but rather infrequent for the staff at the peripheral level.

Most program staff (central and regional) were trained at various levels, which helped to improve immunization coverage from 2002 to 2004.

The cold chain technician was trained in maintaining equipment without CFCs. This training was held by the WHO in 1998 in Abidjan. The national logistics and data managers were trained in the use of vaccine management tools during a mission in Burkina Faso in October 2001.

At the central level, most workers have been trained in recent years in the management of the "MLM course" program.

At the intermediate level, some health workers were trained in various degrees of EPI and the cold chain. This applies to all regional EPI focal points. To date, 11 out of 53 Moughataa medical officers attended EPIVAC training courses.

In 2010, a dozen medical officers and four focal points were trained in EPI management tools (SMT and DVD).

The logistics officer was trained in the cold chain management tool.

However, major shortcomings in training were observed at the peripheral level among vaccinators.

The evaluation of vaccine management conducted in November 2010 revealed these training requirements.

There are therefore training needs to be met at the peripheral level for health workers involved in immunization (an estimated 25% the number of staff trained). These needs exist in all the managerial aspects of the EPI (vaccine management, micro-planning, supervision and monitoring) as well as the practical aspects, especially for newly assigned employees:

- Vaccine storage

- Temperature readings and use of PCV

- Completing forms for collecting information (immunization registry and book)

- Conducting IEC activities in the field

A training plan was developed for the peripheral level to be implemented beginning in 2011.

* Funding mobilization, management and administration

Management systems are specific to each partner. The mobilization of finacnnial resources for implementing activities is evaluated in the annual action plan and the financing comes from the Government budget and the principal partners, which are the WHO, UNICEF and GAVI.

The analysis of costs and the funding of the EPI shows significant gaps to be filled according to the goals by 2012 (secure funding). An effort in the area of internal mobilization and external resources is crucial to meet the program requirements on the basis of the expected results.

In the latter half of 2010, and in October, a joint GAVI/UNICEF/WHO mission on the sidelines of the ICC meeting held a round table to encourage the Government to invest more in funding immunization activities. A meeting in the form of a workshop was held with ICC members at a local hotel. Visits were organized to different ministry departments (Finance, Economic Affairs) and to the Parliament, where a meeting was held with the parliamentary health group, as well as some cooperation agencies (Spanish Cooperation, EU, French Cooperation) and the U.S. Embassy. This mission was a success because it significantly increased the operation of the program this year (2011).

Despite this, the efforts for mobilizing resources will continue through the African immunization week, and numerous advocacy and mobilization activities are on the agenda, involving our partners and NGOs working in this field.

* Analysis of implementing the RED strategy

The Reach Every District Strategy has not actually been implemented to date in Mauritania as regards the following five components:

* Planning and resource management
* Reaching the target populations
* Establishing a link between the staff and the communities
* Formative supervision
* Monitoring for action

Steps will be taken early in 2012 to implement all the components of this approach, with priority in the Moughataa that perform poorly, and GAVI-HSS funding will be used. Other partners such as the WHO and UNICEF are also involved in supporting this process.

**2. PNEUMOCOCCAL INFECTIONS AND PREVENTION**

Pneumococcal infections are a major public health problem. According to the 2006 WHO report[[1]](#footnote-1), 1.6 million children under 5 suffer from serious pneumococcal diseases: 800,000 of them die from them every year, with 90% of the deaths occurring in developing countries. According to WHO, children infected with HIV are particularly vulnerable to pneumococcal infections.

## 2.1 Pathogenic Agent

Pneumococcus, from the scientific name *Streptococcus pneumonia*, is the primary causal agent of pneumonias. It is a circular (coccus) gram positive bacteria (stained blue under a microscope) found in pairs of two (diplococci). This bacteria is found in its normal state in the human respiratory tract.

Pathogenic forms are surrounded by a capsule, which confers virulence to them. This capsule contains a sugar (polysaccharide) whose composition and molecular structure have been used to distinguish 90 serotypes to date, 11 of which are responsible for 80% of invasive infections. Serotypes 1 and 5 are the most common in Africa.

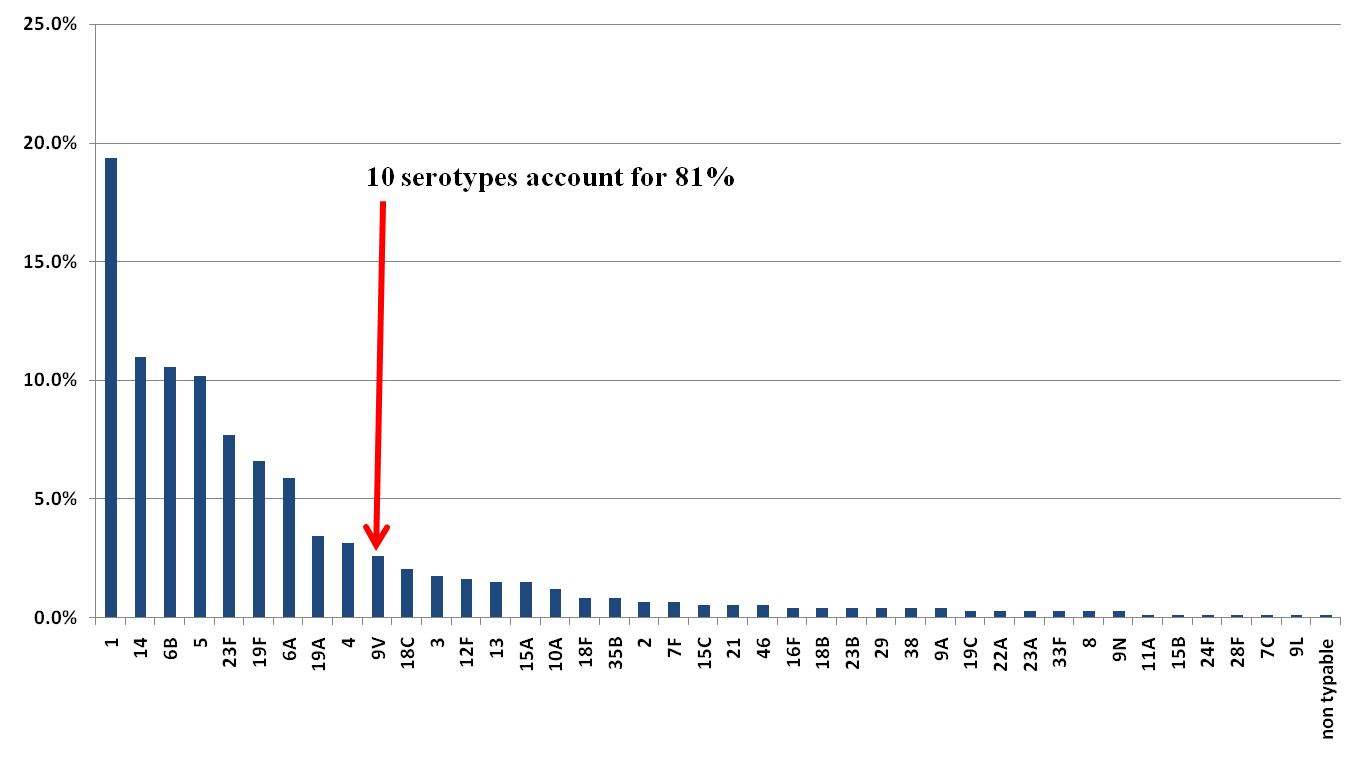


Figure 9: Various serotypes responsible for pneumococcal infections in Africa

We have observed that 81% of these infections are due to serotypes 1, 14, 6B, 5, 23F, 19F, 6A, 19A ,4 and 9V.

## 2.2 Pneumococcal infections

Pneumococcus lives in a commensal state in the human upper respiratory tract, but due to certain contributory factors including cold, fatigue, immunodepression (HIV/AIDS infection), genetic defects (sickle cell anemia), diabetes, etc., it can become pathogenic and manifest in two ways:

**a. Invasive manifestations**

* **Lobar pneumonia** is the typical infection caused by pneumococcus. A child presents with cough, respiratory distress and fever. This respiratory distress deprives the child of the oxygen required for breathing, and death can occur following asphyxia. Radiography reveals systematic opacity in a segment of the affected pulmonary lobe or any other pulmonary lobe. In our country, several children have died in the community from a lack of adequate management.
* **Pyothorax** or **thoracic empyema** is an accumulation of pus in the membrane surrounding the lungs (pleura). This manifestation can be isolated or associated with pneumonia (pleuropneumonia). This condition aggravates the child’s respiratory difficulty and requires emergency chest draining for relief. If this is not performed, death is inevitable.
* **Febrile septicaemia/bacteremia:** In this condition the pneumococcus invades the blood circulation, from where it reaches all other organs (meninges, peritoneum, kidneys, joints, heart, etc.).
* **Purulent meningitis:** The meninges (membranes surrounding the brain) are gradually affected from the nasal cavities to the base of the brain through the bloodstream. The child may present with convulsions, fever, incessant crying and refusal to nurse. The meningitis must be quickly diagnosed and properly managed or the child could die or suffer from lifelong sequellae (lower IQ, motor deficit, language difficulty, blindness, deafness, hydrocephaly, etc.).
* **Primary peritonitis** is an inflammation of the peritoneum that may be seen in subjects who have undergone kidney ablation and in children with sickle cell anemia. This manifestation is mistaken with surgical abdomen.

**b. Non-invasive manifestations**

* In addition to the manifestations listed above, pneumococcus can also be the cause of acute otitis media, sinusitis, bronchitis, arthritis, osteomyelitis, etc.

## c. Means of transmission

**Pneumococcal infections are transmitted:**

* Either through direct airborne transmission (droplet nuclei) from a sick subject to a healthy one, or through contact with the secretions of a sick person. Caregivers can become contaminated under these conditions and carry the infection if hygiene measures are not observed;
* Or through endogenous transmission from commensal strains that have become virulent due to a decrease in local or general defenses (flu, measles, HIV/AIDS infection, diabetes, fatigue, sickle cell anemia).

Environmental factors like second-hand smoke, smoking, dust and toxic gases can promote the onset of pneumonia.

Children under 2 years have the highest risk of contracting serious forms of the disease, which causes significant deaths in this age group.

In Mauritania, both the climate and health lifestyle favor acute respiratory infections, especially in children where the prevalence is estimated at 6.5%[[2]](#footnote-2); these diseases are the leading cause of under-5 mortality and pose a major public health problem.

## d. Natural immune response

In a pneumococcal infection the body usually responds by launching its own defense system, essentially composed of phagocytes (neutrophils, macrophages) that destroy the bacteria by digesting them (phagocytosis). Such digestion is further facilitated by the presence of specific antibodies, which is known as opsonization. This mechanism does not function properly in children with sickle cell anemia, which explains their predisposition for pneumococcal infections. It should be noted that the antibodies that are produced are primarily directed against the capsule of the serotype involved. No cross-immunity therefore exists between the different serotypes of pneumococcus. However, these antibodies against the polysaccharide capsule do not regularly demonstrate protection in children under 2 years or individuals with advanced immune deficit. In addition, the polysaccharides do not create immune memory, which is required to boost future responses.

## e. Treatment and prevention of pneumococcal infections

**Curative treatment**

***Symptom treatment:*** This consists of treating the fever, cough and pain.

***Etiological treatment:*** Several years ago penicillin was the antibiotic of choice to fight pneumococcal infections. Unfortunately, the spectacular increase in cases of antibiotic resistance makes the treatment quite difficult (nearly 40% of invasive pneumococcal infections are currently resistant to conventional antibiotics). Treating patients who have resistant strains requires alternative products that are much more expensive and less accessible for our population.

**Preventive treatment**

**Health and dietary measures**

* Healthy environment: Avoid dust, second-hand smoke, promiscuity, toxic gases, smoking, poor ventilation, cold, etc.
* Breastfeeding: A child who is breastfed is more resistant to infections because of the protection provided by antibodies in addition to nutritional benefits.

**2.3 Immunization of children under 12 months**

# 2.3.1. Pneumococcal vaccines

There are several types of pneumococcal vaccines.

* The first generation is polysaccharide vaccines containing 23 serotypes. However, this vaccine is only indicated in children over age 2 and the elderly. Children under 1 year of age have a poor immune response to this vaccine. Therefore it will not be considered for routine immunization.
* The second generation is made of conjugated vaccines. Binding the polysaccharide capsular antigen to a protein significantly improves immune response in children under 2 years. These vaccines include:
  + **PCV-7**, which comprises 7 pneumococcus serotypes (4, 6B, 9V, 14, 18C, 19F, 23F); it is marketed under the trade name *Prevnar 7®* in the form of a pre-filled glass syringe. This form requires large storage capacity, creates a large quantity of waste that is difficult to destroy and requires high-temperature incinerators (> 1000°C) for the destruction of glass syringes and needles. It arrives without a vaccine vial monitor or attached needle. Due to the complex presentation and non-inclusion of certain serotypes that are responsible for some invasive infections in Africa, it will not be used in our country.
  + **PCV-10** (decavalent pneumococcal conjugate vaccine): This vaccine comprises the same serotypes as Prevnar as well as serotypes 1, 5 and 7F. It offers the advantage of including the serotypes most often involved in pneumococcal infections in the African region. It is packaged in a 1- or 2-dose vial for a volume of 4.8 cc/dose. This vaccine will be marketed by the British company GlaxoSmithKline (GSK) under the trade name *Synflorix ®.* The formulation planned for GAVI-approved countries does not include a stabilizer to allow the open vial policy to be applied. An open vial must be used within 6 hours, provided the cold chain is maintained and infection risks are minimized.
  + **PCV-13** contains the polysaccharide antigen capsule of *Streptococcus pneumonia* with the same serotypes as PCV-10 as well as serotypes 3, 6A and 19A. Like the other conjugate vaccines, they are conjugated with a nontoxic diphtheria CRM 197. One 0.5-mL dose of PCV13 contains approximately 2 µg of polysaccharide of each of the 12 serotypes and approximately 4 µg of serotype 6B polysaccharide. The total CRM 197 concentration is approximately 34 µg. The vaccine contains 0.125 mg of aluminum phosphate additive rather than thiomersal preservative.

PCV-13 or Prevnar 13 is a WHO-approved vaccine for children aged 6 weeks to 5 years (before completing 6 years of age).

Prevnar 13 is indicated in the routine immunization program for the prevention of invasive infections (pneumonia, purulent meningitis, septicaemia) due to *Streptococcus pneumonia* serotypes 1,3, 4, 5, 6A , 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F.

Prevnar 13 is also indicated for the prevention of otitis media caused by *Streptococcus pneumonia* serotypes 4, 6B, 9V, 14, 18C, 19F and 23F.

**3. SUMMARY OF THE ASSESSMENT**

The summary of the assessment will include the essential components that stem from the analysis of the EPI’s intenal environment and the external environment in the context of preparing to intoduce the pneumococcal vaccine.

3.1 Internal environment

Table 11: EPI strengths and weaknesses

|  |  |  |
| --- | --- | --- |
| Component | StrengthsStrengths | Weaknesses |
| **Health system** | * Existence of the 2006-2015 National Health Policy, taking into account the EPI as an important element of the strategic thrust to control disease * A NHDP is now being prepared and all the partners are involved * Mauritania just received the deposit of GAVI/HSS funds for strengthening the health system to make EPI accomplishments sustainable | − Low level of budget funding allocated to health compared to regional and international commitments  − The coordinating bodies do not function at all levels (regional and annual health sector review) |
| **Immunization service delivery** | − Reporting is 100% complete at the national level (2010 JRF)  − A network of VHF communication radios is operating as part of supervision and other activities;  − Private structures are included in routine immunization  − NGOs are involved in national immunization activities;  − The increase in vaccine coverage rates resumed in 2010 | − Existence of areas with difficult access that are rarely visited as part of the advanced strategy  − Persistence of districts with vaccine coverage <50% (17/53 - JRF 2010);  − Low proportion of Moughataa with a microplan  − Vaccine coverage increasing but still low compared to regional and global objectives as well as the cMYP objectives  − Dropout rates in some Moughataa are higher than 10% (27/53 - JRF 2010)  − Partial completion by the majority of Moughataa of the antigen management part of the monthly report, so that rational follow-up of loss rates is not possible   * No automatic recorders, coolant alarm at the central cold chain * Lack of training for new employees in EPI management * The RED approach has not been implemented |

|  |  |  |
| --- | --- | --- |
| **Vaccine supply and quality** | − Government commitment through a dedicated budget line item for purchasing vaccines and consumables  − No vaccine stockouts  − Existence of a pool of trainers in computerized vaccine management  − Conducting a vaccine replenishment plan for regioinal structures  − Ordered automatic recorders for the cold chains | − Delayed supply in some peripheral areas due to the lack of refrigerated and other service vehicles  − Loss rates remain high compared to national and global goals |
| **Logistics**  **- Cold chain**  **-Immunization safety**  **- Transportation means** | − Central, intermediate and peripheral level cold chain equipement meet the required standards  − Cold chain inventory carried out in 2010 along with a replenishment and rehabilitation plan  − Recent evaluation of central level EPI depots according to the evalaution norms, carried out in 2010  − Implementation of the multiyear plan for injection safety  − Use of AD syringes and safety boxes for vaccine injections  − Availability of certain spare parts  − Beginning of implementation of the rehabilitation plan with distribution in  45 CCs at the national level  − Availability of national level CC requirements for the next 5 years  − Carrying out maintenance missions at the national level | * CC to be completed in some Wilaya in order to introduce the pneumo vaccine * Absence of a specific plan for preventive and corrective maintenance of CC equipment * - Nonexistent rolling stock   − Lack of incinerators at the operational level for waste management  − Lack of maintenance personnel and lack of training for existing technicians |

|  |  |  |
| --- | --- | --- |
| **Eradication/**  **control/**  **elimination of diseases with epidemic potential** | * High vaccine coverage rates during the campaigns * Initiatives are evolving satisfactorily | * Threats of importing WPVs * Measles epidemics in 2010 * Poor routine vaccine coverage hampers the process |
| **Epidemiological surveillance** | − Existence of a national strategic plan for integrated disease surveillance and available response  − Integrated monitoring of the EPI target diseases (AFP, Measles, Maternal and Neonatal Tetanus), of other diseases with epidemic potential in the context of integrated epidemiological surveillance  − Epidemiological surveillance network functional throughout the country  o Performance of AFP surveillance to meet the certification criteria  o Monitoring of epidemic-prone diseases  − Existence of a national reference laboratory to confirm cases of measles | − Poor NNT monitoring and surveillance based on cases of measles  − Near absence of community-based surveillance  − No national laboratory for the examination of suspected polio cases |
| **Social mobilization** | − Existence of a Communication/ social mobilization Plan  − Preparation of tools for EPI target diseases  − First African Immunization Week for 2011 | − Poor implementation of the plan  − Poor communication about the EPI in the media outside the mass vaccination campaigns  − Lack of communication plans for routine EPI  − Lack of tools for social mobilization/ awareness, updated and used for routine activities |

|  |  |  |
| --- | --- | --- |
|  | Strengths | Weaknesses |
| **Coordination/ Management** | − Existence of a functional ICC that holds quarterly meetings  − Organizing twice-yearly meetings of the regional focal points  − Weekly coordination meetings for the EPI team | − Poor integration of activities with other parties involved (PALU, IMCI, National Reproductive Health Program [PNSR], Nutrition)  − Lack of coordination between EPI and  surveillance |
| **Capcity building** | − Availability of a national team trained duing the inter-country MLM course and chief physicians of Moughataa during EPIVAC  − Hiring of trained AFP focal points  − Hiring of new health workers  − Presence of a logistician trained in certain management tools | − Absence of training for newly-hired workers  − Absence of training of EPI managers in the Moughataa, as well as nurses for the health centers and posts |
| **Supervision** | − Resumption of supervisions at the end of 2010 by the central level for the Wilaya  − Supervision of active surveillance | − Lack of supervision at the intermediate and peripheral level   * Poor quality of supervisions |

3.2 External environment

Table 12: EPI threats and opportunities

|  |  |  |
| --- | --- | --- |
| Areas | Opportunities | Threats |
| **National level** | - Strengthening administrative decentralization; - Existence of a comprehensive Medium-Term Expenditure Framework (MTEF)  - Participation of development partners to finance the program - Existence of various funding sytstems for the sector GF, GAVI, CERF, MCC, etc. - Control mismanagement of public assets | − Lack of recent population census (problems with the denominators)  − Low level of disbursement of funds allocated to the health sector  − Institutional instability due to frequent changes in players at the ministry department level  − Increase in the cost of living with the consequences of social instability "High living expenses " |
| **Global level** | − Funding from GAVI and other partners  -Adoption of new EPI Global Immunization Vision Strategy (GIVS) | − Emergence of other priority diseases (Avian Influenza, Congo Epidemic, etc.), and other emerging diseases  - Gradual increase in the cost of fuel and its impact on soaring prices |

**4. PROBLEMS AND PRIORITIZATION**

The assessment reveals issues grouped below by component in the process of preparing for the introduction of the pneumo vaccine.

a. Immunization services delivery component and RED

* + The overall vaccine coverage rate is low, below the objectives: Only 17% of the Moughataa have coverage rates above 80% (JRF 2010)
  + High dropout rate above 10% for children who are incommpletely vaccinated
  + High antigen wastage rate
  + Insufficient implementation of the RED strategy for harmoniously increasing vaccine coverage rates.

b. Vaccine supply and quality component

* Artificial vaccine and consumables stockouts at the intermediate level due to the difficulty of obtaining supplies and the lack of trucks and refrigerated vehicles suitable for the EPI.

c. Cold chain and immunization safety component

* Cold chain to be completed in some Wilaya
  + Absence of a maintenance plan for general biomedical equipment and for the EPI in particular, and lack of qualified technicians at the regional level
  + Lack of conventional medical waste disposal methods (only 40% of Moughataa have functional incinerators).

d. Epidemiological surveillance component

* + Low promptness and completeness of data
  + Inadequate surveillance based on cases of measles and NNT.

e. Awareness and communication component

* + Poor interpersonal communication
  + Poor use of media, namely, radio, in routine activities.

f. Capacity building

* + Lack of staff with EPI management skills at all levels
* Irregular and insufficient quality of formative supervision at the operational level.
* Poor quality of data reporting (particularly for the antigen management component) and feedback.

**4.2 Action priorities for successfully introducing the pneumo vaccine**

The analysis above of the different problems determined the following proiorities for an effective introduction of the pnemuococcal vaccine:

* Strengthen the system to sustainbly iimprove the vaccine coverage rate, and in particular the implementation of the RED approach and innovative strategies;
* Continue to upgrade vaccine storage and transport capacities, taking the introduction of the pneumococcal vaccine into account, and especially CC equipment and rolling stock;
* Strengthen injection safety and surveillance measures;
* Strengthen the management and quality of EPI data.

**5. PURPOSE AND OJBECTIVES OF THE PLAN**

**5.1 Purpose**

* The purpose of the current plan is to effectively introduce the pneumococcal vaccine into the expanded program on routine immunization in Mauritania.

**5.2 Objectives**

5.2.1 General objective

* The general objective of the plan is to meet all the conditions necessary for the absolute success of the process of introducing the pneumococcal vaccine in the routine expanded program on immuniztion in Mauritania during the stages: before, during and after.

5.2.2 Specific objectives

* Strengthen the implementation of the EPI beginning in the second half of 2011 to achieve by 2015 an 89% DTP3 vaccine coverage rate (including pneumo3) for the national level and at least 85% in all of the country’s Wilaya;
* Fill the gap in the cold chain and transport at the central level, in the Wilaya and in the Moughataa;
* Strengthen the injection safety measures;
* Improve the management and quality of EPI data.

Table 13: National objectives for immunization coverage from 2012 to 2015 by antigen, including the pneumococcal vaccine

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Antigens | Objectives of immunization coverage | | | | | |
| 2010 2011 2012 2013 2014 2015 | | | | | |
| Routine immunization | (%) | (%) | (%) | (%) | (%) | (%) |
| BCG | 85% | 90% | 93% | 97% | 98% | 99% |
| DTP 3 | 64% | 70% | 75% | 80% | 84% | 89% |
| Hep B 3 | 64% | 70% | 75% | 80% | 84% | 89% |
| TT2+ - Pregnant women | 30% | 35% | 37% | 40% | 42% | 45% |
| RVV | 67% | 70% | 75% | 80% | 84% | 89% |
| OPV 3 | 52% | 70% | 75% | 80% | 84% | 89% |
| **New Vaccines** |  |  |  |  |  |  |
| DTP-HepB-Hib 3 | 64% | 70% | 75% | 80% | 84% | 89% |
| Pneumococcal vaccine |  |  | 20% | 80% | 84% | 89% |
| Rotavirus vaccine |  |  |  | 20% | 84% | 89% |

Considering that the pneumoccocal vaccine will be introduced in 2012, our objective is only 20%. In 2013, pneumococcal vaccine coverage will follow the coverage of the pentavalent vaccine, administered at the same time, and the objective will be 80% for both vaccines.

**6. IMPLEMENTATION STRATEGIES**

**6.1 Procedures for introducing the pneumococcal vaccine**

*6.1.1 Choice of vaccine*

In consideration of the logistical analysis and from its experience introducing new vaccines, Mauritania selected the single-dose vial liquid PCV-13 as its pneumo conjugate vaccine.

This will be one of the second generation vaccines, which offers the advantage of being a conjugate vaccine.

Therefore PCV-13 will be our selection, for the reasons listed above. In addition, one 0.5-mL dose of PCV-13 contains approximately 2 µg of polysaccharide of each of the 12 serotypes and approximately 4 µg of serotype 6B polysaccharide; the total CRM 197 concentration is approximately 34 µg. The vaccine contains 0.125 mg of aluminum phosphate additive rather than thiomersal preservative. The PCV-13 vaccine was selected for our country for its advantage in protecting against a greater number of serotypes as well as for logistical reasons.

## *6.1.2 Immunization schedule*

Currently, EPI administers the following vaccines: BCG, OPV, Pentavalent and MCV. With the introduction of the pneumococcal conjugate vaccine (PCV), the EPI vaccine schedule will be as follows:

Table 14: *EPI immunization schedule with PCV introduction*

|  |  |
| --- | --- |
| **Vaccines** | **Administration age** |
| **BCG; OPV Zero** | At birth |
| **Penta 1; OPV 1; PCV 1** | 6 weeks |
| **Penta 2; OPV 2; PCV 2** | 10 weeks |
| **Penta 3; OPV 3; PCV 3** | 14 weeks |
| **MCV** | 9 months |

# 

* 1. 3 Administration of the vaccine

This vaccine will be administered as follows:

* Start in 2012 across the entire country
* Vaccine administration per same schedule as pentavalent but not in same injection site. This vaccine will not be mixed in the same syringe with other vaccines
* IM administration of 0.5 mL
* No catch-up dose for children over 12 months
* No immunization at birth or for adults.

Beginning in 2012, the EPI will target 9 diseases: tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, measles, hepatitis B, Haemophilus influenza type b infections, and *streptococcus pneumonia* infections.

**6.2 Strengthening the system for a sustainable improvement in the vaccine coverage rate**

In particular for implementing the RED approach and innovative strategies:

### *6.2.1 Improving planning and resource management*

*Improving planning*

The improvement in planning and resource management will be based on microplanning at the Moughataa (district) level in cooperation with the community. In this exercise, each of the 14 Moughataa with the poorest performance will identify the weaknesses in its immunization system in cooperation with its health posts and will choose the appropriate strategies and actions. This will require a detailed analysis of vaccination coverages by Moughataa to determine the zones to be supported on a priority basis. Microplanning guides will be prepared and distributed at every level. As in the Moughataa, the Regional Health Directorates (DRAS) will also prepare their support plan for the Moughataa to support them in their activities to strengthen the immunization system. The training plan for agents involved in immunization that is included in the comprehensive multiyear plan will be implemented. This training will be based on tailored modules that will be distributed to all the levels. Also, the available immunization guide will be updated to take the new components (new vaccines) into account. The national child survival strategy, now in progress, was implemented in the country in 2010 using secure funding from UNICEF. With this funding, each district will have a microplan and each region will have a plan to support its districts.

### *Improvement in vaccine and consumable supply*

One of the reasons that the RED strategy has not been fully applied was the poor cold chain coverage and the irregular supplies of vaccines and inputs, resulting in many stockouts and no fixed immunization. An inventory of the cold chain in Mauritania was taken in 2010, followed by an evaluation of vaccine management. This inventory estimated the storage capacity gaps and prepared a rehabilitation plan that is now being implemented. As for the specific problem of irregular supplies, and given the lack of transport vehicles specific to the program, alternatives have been in use since 2011 to regularly supply the Moughataa and the health facilities that immunize. Every opportunity is enlisted to this end: the vehicles of the regional directors who come to meetings, ambulances, buses used for public transportation, and private vehicles of individual volunteers, using the rapid cold chain. (See logistics Chapter 4.) Thus, a total of 123 refrigerators (RCW 50 and MK304) and 21 freezers have already been installed in the field. To permanently solve this transport problem for distributing vaccines and formative supervision, the Government and the partners made the commitment to allocate suitable means of transport to the EPI and the Moughataa in the medium term.

### *Improving vaccine and input management and lowering wastage rates*

Staff at the health centers and posts were not trained; most of them that were trained were reassigned elsewhere. Lowering vaccine wastage rates will be one of the program’s key objectives. To this end, vaccine wastage will be monitored at all levels and formative supervision will be used to have the vaccinators avoid wastage caused by improperly keeping vaccines, failure to master vaccine techniques, and insufficiencies in the organization of immunization sessions. Moreover, the management tools for vaccines and inputs were just placed in the field in 2011. The health workers were also trained and this will continued using Government and partner funding.

### *Reaching the target populations*

According to the 2000-2001 Demographic Health Survey, 54% of Mauritanians live in rural areas. Low density (3/km²) and scattered households characterize this population. To reach the populations and streamline the use of resources, further efforts will be made during the advanced and mobile trips, and a package of services that includes immunizing children and pregnant women, Vitamin A supplementation, the distribution of insecticide-treated nets, disinfecting children and other interventions will be offered. The community workers will be heavily involved in preparing and implementing these trips. These advanced and mobile strategy trips will be made monthly to the Moughatta with poor performance (less than 50% vaccine coverage) and will reach a large number of children who were missed, especially given the vast expanse of the country and the scattered households. This strengthening of the advanced and mobile strategy can be successful if we refer to the experience of past years when the EPI was relaunched, when vaccine coverage rose from 31% in 2000 to 92% in 2002 (see the table below). These activities will be financed out of the Government budget and UNICEF funding.

A supplemental strategy was just tried during the first African immunization week and the round of the polio NIDs in June 2011, intended for people who are difficult to access in the Wilaya of Adrar and Assaba. Some routine activities are incorporated into the mass immunization campaigns, particularly the polio SIVs. This strategy will be strengthened to cover the 14 Moughataa with poor performance and will be covered using funding from UNICEF.

This year, 4 physicians are completing their training in the EPIVAC training/action program for immunization and management and 5 others have just been accepted for fiscal year 2011-2012.

The Ministry of Health just received the first envelope of GAVI-HSS funding for strengthening the health system to make the EPI’s achievements sustainable. These funds will be used especially to settle nurses in the peripheral zones, to finance mobile and advanced strategy health activities, and to strengthen equipment (including the CC) and the computers for data management. This financing will be provided to 9 poorly performing districts, and implementation will begin in early 2012.

Finally, having the peripheral structures implement EPI activities in the child survival strategy, using funding from Spain through UNICEF, in progress since 2009, covers the 13 Regions (advanced and mobile activities), and will be more beneficial for immunization.

Thus, by improving supply and by bringing the immunization services closer to the people, the dropout rate will be reduced and vaccine coverage will be improved.

Table 15 *Moughataa with the poorest performance in the first half of 2011 that are now being targeted*

| **Wilaya** | **Moughtaa** | **Population and vaccine coverage** | | | | | **Problem analysis** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Targeted in to the first six months | Doses of (Pentavalent) | | Vaccine coverage (%) | | Not vaccinated | Dropout (%) | Interpretation | | Category | Performance | Reports submitted |
| Name | Name | Number | Penta1 | Penta3 | Penta1 | Penta3 | Penta3 | Penta1- Penta3 | Accessibility | Use | 1,2,3, 4 | Good, average, poor |
| A | B | c | d | f | g | i | k | m | n | o | p | q | r |
| Hodh Echargui | Djigueni | 1,199 | 390 | 397 | 33% | 33% | 802 | -2% | Poor | Good | Cat. 3 | Poor | 66.70% |
| Hodh Echargui | Timbédra | 1,537 | 850 | 719 | 55% | 47% | 818 | 15% | Poor | Poor | **Cat. 4** | Poor | 83.30% |
| Hodh El Gharbi | Tamchaket | 837 | 379 | 354 | 45% | 42% | 483 | 7% | Poor | Good | Cat. 3 | Poor | 100.00% |
| Assaba | Boumdeid | 237 | 82 | 97 | 35% | 41% | 140 | -18% | Poor | Good | Cat. 3 | Poor | 100.00% |
| Assaba | Kankossa | 1,715 | 1,332 | 799 | 78% | 47% | 916 | 40% | Good | Poor | **Cat. 2** | Poor | 100.00% |
| Gogol | M'Bout | 2,116 | 1,815 | 963 | 86% | 46% | 1,153 | 47% | Good | Poor | **Cat. 2** | Poor | 100.00% |
| Trarza | Ouad Naga | 714 | 333 | 353 | 47% | 49% | 361 | -6% | Poor | Good | Cat. 3 | Poor | 100.00% |
| Trarza | R'Kiz | 1,916 | 933 | 854 | 49% | 45% | 1,062 | 8% | Poor | Good | Cat. 3 | Poor | 83.30% |
| Adrar | Aoujeft | 549 | 163 | 169 | 30% | 31% | 380 | -4% | Poor | Good | Cat. 3 | Poor | 100.00% |
| Adrar | Chinguitty | 182 | 99 | 54 | 54% | 30% | 128 | 45% | Poor | Poor | **Cat. 4** | Poor | 100.00% |
| Adrar | Ouadane | 100 | 46 | 43 | 46% | 43% | 57 | 7% | Poor | Good | Cat. 3 | Poor | 100.00% |
| Tagant | Tichit | 126 | 30 | 36 | 24% | 29% | 90 | -20% | Poor | Good | Cat. 3 | Poor | 66.70% |
| Tirs Zemmour | Bir Moghren | 75 | 14 | 10 | 19% | 13% | 65 | 29% | Poor | Poor | **Cat. 4** | Poor | 100.00% |
| Tirs Zemmour | F'Derick | 121 | 38 | 38 | 32% | 32% | 83 | 0% | Poor | Good | Cat. 3 | Poor | 100.00% |

### 6.2.3. Strengthening the links between the services and the community

The re-energizing of the cost recovery system now underway will strengthen the links with the community. Thus, the Health Committees and Management Committees of the health facilities will be re-energized along with the Socio-Health Development Committee. The health centers, health posts and community health workers will be enlisted to search for dropouts. Local communication (imams from mosques, teachers, women’s associations and local radio stations) will serve as relays to lower the number of children who do not complete their series of vaccines. Likewise, specific strategies for the nomads of the Wilaya of the two Hodhs and Assaba will be developed. Thus, immunization sites will be opened in the weekly markets in these regions where many people congregate and sites will be posted at the border crossings with Mali and Senegal. In this context, an improvement in the supply of services will reduce missed opportunities for immunization. In the long run, the mobilization of internal and external resources will contribute to improving the supply and demand for immunization services. Improvements will be made in data management and the use and keeping of immunization cards. In this context, the improvement in the supply of services will reduced missed opportunities for immunization. One project aims to develop a mobile immunization technology based on fingerprints. It improves data management and data use, as well as the electronic filing of immunization cards (Vax Trac), and will be introduced in 2010 using Government and GAVI/ISS funding.

### *6.2.4 Strengthening formative supervision*

To ensure the quality of the supply of services, supervision in all the districts, and in particular those with poor performance, will be maintained and strengthened and improved using the following timeline: quarterly from the central level to the regions and bimonthly from the regional level to the Moughataa and monthly from the Moughataa health centers to the health posts. Priority will be given to the formative supervision approach. Supervisor capacities will be strengthened using modules designed for this purpose and will use simplified supervision grids that will be revised, copied and distributed to the different levels of the health pyramid. The supervision will be based on the problems identified during previous trips and microplans.

### *6.2.5 Strengthening monitoring for action*

The performance of immunization services is closely linked to the timely monitoring of immunization activities, data collection and data analysis to identify the problem zones and to provide the appropriate solutions. The recommendation will be made to the chief physicians of the Moughataa to periodically hold meetings (quarterly) with the health post managers. The purpose of these meetings will be to analyze all the immunization data and give feedback to the health posts. Similar arrangements will be made between the regional levels and the Moughataa and the central and regional levels.

To monitor data quality, the DQS tool will be introduced in all the Moughataa. WHO and GAVI/HSS financing will be used for this activity for the Moughataa involved.

**6.3 Continuing the upgrade of storage and transport capacities**

Given the requirements identified in the assessment, the EPI will oversee the phased-in delivery, step by step, of the equipment scheduled in the table below and that it is operating correctly.

Table 16: National and regional cold chain equipment requirements from 2011 to 2015

| **Region** | **Equipment** | **2011** | **2012** | **2013** | **2014** | **2015** |
| --- | --- | --- | --- | --- | --- | --- |
| Adrar | Refrigerator |  |  | **MK304** |  |  |
| Assaba | Refrigerator | MK304 |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Brakna | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Gorgol | Refrigerator |  | HBC-340 |  | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Guidimaka | Refrigerator |  |  |  | HBC-340 |  |
| Freezer | V 170 GE |  |  |  |  |
| Hodh El Chargui | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Hodh EGarbi | Refrigerator |  |  | HBC-340 |  |  |
| Nouadhibou | Refrigerator |  |  | MK304 |  |  |
| Nouakchott | Refrigerator | Positive cold room-5 m3 |  |  |  |  |
| Tagant | Refrigerator |  |  | MK304 |  |  |
| Trarza | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| National | Positive cold room |  |  | Positive cold room 30 m3 |  |  |

At the central level, the positive cold room, with a capacity of 30 m3, scheduled for 2013, has already been ordered using Government funding (PASN-World Bank) through UNICEF. Delivery is scheduled before the end of 2011.

In the regions (Wilaya), as part of decentralization, two positive cold rooms of 10 m3 each are also on order for the Nouakchott and Assaba regions. One of these cold rooms was funded by the Government (PASN-World Bank) through UNICEF and the other from UNICEF’s own funds.

To fill the gap in the cold chain at the regional level and in the Moughataa, a large number of refrigerators were paid for and delivered through UNICEF according to the distribution plan: 50 refrigerators in 2010 using UNICEF funds and 94 delivered in 2011 using JICA funds and paid for through UNICEF, for a total of 144 new refrigerators acquired and already in place. In addition to these new acquisitions, the old refrigerators, already in operation in the field, should be added, as well as those that were just repaired as part of the rehabilitation and maintenance plan. In addition, 100 refrigerators are on order using the Central Investment Budget for 2011 (MK304, HBC-340 and RCW50 devices).

# 7. LOGIC FRAMEWORK

Table 17: Logic framework

| **Activity areas** | **Expected results** | **Indicators** | **Sources of verification** | **Assumptions/ Risks** |
| --- | --- | --- | --- | --- |
| Preparatory planning | Studies to evaluate the baseline situation have been performed | Evaluation of the EPI | Mission Reports |  |
| Data Quality Assessment (DQA) | 2008 Study Report |  |
| Cold chain inventory | September 2010 Study Report |  |
| Assessment of the Effective Vaccine Management | November 2010 Study Report |  |
| **Vaccine coverage rate improved in general, and especially in HDs with poor performance** | DTP-HepB-Hib 3 and PCV13:   1. 70% in 2011   75% in 2012  80% in 2013  85% in 2014  90% in 2015 | -MOH monthly and quarterly reports  -Ministry of health annual reports  -Joint MOH-WHO-UNICEF reports  -Annual GAVI status reports  -Vaccine coverage survey | Resources available for effectively implementing the strategies that are developed |
|  | **Dropout rate declining** | % of dropouts:  21 in 2010  13 in 2011  12 in 2012  11 in 2013  9 in 2014  6 in 2015 |
| Moughataa with a vaccine coverage rate >/=80% | Number of Moughataa with a vaccine coverage rate >/=80% is declining:   1. 9 in 2010   20 in 2011  30 in 2012  40 in 2013  48 in 2014  53 in 2015 |
| Cold chain, vaccine management and transport | Cold chain upgraded for properly keeping vaccines at all levels | % of CC requirements in volume covered at the central, regional and Moughataa levels | -Periodic inventory reports  -Ministry of Health annual reports  -Annual status reports to GAVI  -Vaccine coverage survey | Effective implementation of the equipment maintenance plan |
| Monitoring and evaluation | Effective data collection and analysis system | % of monitoring sessions carried out by level | -Monitoring session reports | Resources available for effectively implementing the strategies that are developed |
| Evaluation of the introduction of the pneumo vaccine | Level of implementation of the introduction plan | Evaluation report of pneumo vaccine introduction |
| Training and supervision | Supervision plan implemented | % of supervisions carried out by level according to the standards | -Supervision mission reports  -Annual EPI reports | Available financial and logistical resources  Financial resources available |
| Training plan implemented | % of training sessions carried out | -Training reports  -Annual EPI reports |
| Injection safety and waste management | All the Moughataa have a working system for collecting and destroying immunization waste, including the health centers and posts | % of Moughataa that have a working system for collecting and destroying waste:   1. 28% in 2011   53% in 2012  75% in 2013  90% in 2014  100% in 2015 | -Annual ministry EPI reports  -Annual status reports to GAVI  -Vaccine coverage survey | Financial resources available |
| Disease surveillance | A working integrated disease surveillance system | % of Moughataa with a working disease surveillance system (human resources, management tools and seamless information-sharing)  % of integrated surveillance reports received at the central level on time compared to the number expected | -MOH monthly and quarterly reports  -Annual Ministry of Health reports | Willingness of actors  Each actor is made accountable and responsible |
| AEFI monitoring and reporting | NRA operational | -Number of functions operational in the NRA out of 4.  -% of AEFI monitoring reports received at the central level on time compared to the number expected | -MOH monthly and quarterly reports  -MOH annual reports  -Annual status reports to GAVI | Commitment to make the ARN operational |
| Advocacy, communication and social mobilization | Communication plan implemented | % of advocacy and communication activities carried out by level | Activity reports | Mobilization of resources for routine communication |

# 8. ACTIVITY TIMELINE

Table 18: Timeline

| **N°** | **ACTIVITIES** | **In charge** | **Years** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 2010 | 2011 | 2012 | | | | 2013 | 2014 | 2015 |
|  |  |  |  |  | Q1 | Q2 | Q3 | Q4 |  |  |  |
|  | Preparatory planning |  |  |  |  |  |  |  |  |  |  |
| 1 | Conduct an assessment of the EPI |  |  |  |  |  |  |  |  |  |  |
| 2 | Conduct a post-introduction evaluation of the new vaccine (PIE) |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Conduct an injection safety evaluation or an evaluation of waste management |  |  |  |  |  |  |  |  |  |  |
| 5 | Conduct a KAP study (knowledge, attitudes, practices) |  |  |  |  |  |  |  |  |  |  |
| 6 | Prepare and finalize the vaccine introduction plan in the routine EPI |  |  |  |  |  |  |  |  |  |  |
| 7 | Write the proposal |  |  |  |  |  |  |  |  |  |  |
| 8 | Have the ICC validate the proposal documents |  |  |  |  |  |  |  |  |  |  |
| 9 | Send the proposal to the GAVI secretariat |  |  |  |  |  |  |  |  |  |  |
| 10 | Create and set up a National Steering Committee in charge of monitoring the introduction of the pneumo vaccine, with Technical Subcommittees for the activities |  |  |  |  |  |  |  |  |  |  |
| 11 | Prepare a detailed introduction timeline |  |  |  |  |  |  |  |  |  |  |
| 12 | Mobilize the specific resources necessary from the Government and partners |  |  |  |  |  |  |  |  |  |  |
| 13 | Obtain specific financial support from GAVI to implement the plan activities |  |  |  |  |  |  |  |  |  |  |
| 14 | Carry out corrective activities in the Moughataa (health districts) with poor performance to increase vaccine coverage |  |  |  |  |  |  |  |  |  |  |
| 15 | Strengthen the implementation of the RED strategy |  |  |  |  |  |  |  |  |  |  |
| 16 | Develop EPI microplans for each district, including the pneumo vaccine, and promote its use |  |  |  |  |  |  |  |  |  |  |
|  | Provide the funds necessary for the activities at all the levels (Government funding, WHO, UNICEF, World Bank, GAVI-SSV, GAVI-HSS, Rotary, Contrepart, NGOs, etc.) |  |  |  |  |  |  |  |  |  |  |
|  | Adapt the policy, immunization and health strategy documents |  |  |  |  |  |  |  |  |  |  |
|  | Prepare a distribution plan for vaccines, syringes and materials adapted for immunization |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Cold chain, vaccine management and transport |  |  |  |  |  |  |  |  |  |  |
|  | Conduct an inventory of the cold chain |  |  |  |  |  |  |  |  |  |  |
|  | Conduct an Evaluation of Efficient Vaccine Management |  |  |  |  |  |  |  |  |  |  |
|  | Implement the recommendations from the EGECF |  |  |  |  |  |  |  |  |  |  |
|  | Take delivery of the additional cold chain equipment at the central level |  |  |  |  |  |  |  |  |  |  |
|  | Prepare a distribution plan for vaccines, syringes and materials adapted for immunization |  |  |  |  |  |  |  |  |  |  |
|  | Purchase the additional cold chain equipment at the intermediate and peripheral level |  |  |  |  |  |  |  |  |  |  |
|  | Distribute and monitor the equipment and materials that meet the coverage objectives |  |  |  |  |  |  |  |  |  |  |
|  | Order the pneumo vaccine and supplies |  |  |  |  |  |  |  |  |  |  |
|  | Revise the procedures for taking delivery of vaccines in the country |  |  |  |  |  |  |  |  |  |  |
|  | Adapt the vaccine management tools (manuals and computers) |  |  |  |  |  |  |  |  |  |  |
|  | Take delivery of the vaccines and supplies in the country |  |  |  |  |  |  |  |  |  |  |
|  | Carry out the compliance control and quality procedures |  |  |  |  |  |  |  |  |  |  |
|  | Obtain the supply of vaccines and other immunization materials at all the levels |  |  |  |  |  |  |  |  |  |  |
|  | Strengthen vaccine management at all levels and control wastage rates |  |  |  |  |  |  |  |  |  |  |
|  | Monitoring and evaluation |  |  |  |  |  |  |  |  |  |  |
|  | Revise/adapt the management tools (registration form, immunization card, report form, bases of analysis, etc.) |  |  |  |  |  |  |  |  |  |  |
|  | Produce and distribute the management tools to the different levels |  |  |  |  |  |  |  |  |  |  |
|  | Improve data collection, analysis and feedback |  |  |  |  |  |  |  |  |  |  |
|  | Organize the coordination meetings for all the activities at different levels |  |  |  |  |  |  |  |  |  |  |
|  | Organize a post-introduction evaluation of the pneumo vaccine |  |  |  |  |  |  |  |  |  |  |
|  | Organize operational research to improve program performance |  |  |  |  |  |  |  |  |  |  |
|  | Conduct internal audits of the quality of program data (DQS) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Training and supervision |  |  |  |  |  |  |  |  |  |  |
|  | Prepare/adapt the plan to strengthen human resources |  |  |  |  |  |  |  |  |  |  |
|  | Prepare a targeted training plan on the introduction of the pneumo vaccine |  |  |  |  |  |  |  |  |  |  |
|  | Adapt/prepare training materials that specify all the standards and procedures and the supervision forms |  |  |  |  |  |  |  |  |  |  |
|  | Adapt/prepare the supervision and monitoring forms, including the new vaccine |  |  |  |  |  |  |  |  |  |  |
|  | Organize the training/retraining of vaccinators on the management of vaccine activities and immunization techniques, including the pneumo vaccine and the updated tools |  |  |  |  |  |  |  |  |  |  |
|  | Provide specific support to the districts with poor performance |  |  |  |  |  |  |  |  |  |  |
|  | Carry out supervision at all the levels |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Injection safety and waste management |  |  |  |  |  |  |  |  |  |  |
|  | Prepare waste management plans in the districts |  |  |  |  |  |  |  |  |  |  |
|  | Implement and monitor the waste management plans |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | Disease surveillance and research |  |  |  |  |  |  |  |  |  |  |
|  | Conduct research to determine local existing baseline epidemiological data on pneumococcal infections |  |  |  |  |  |  |  |  |  |  |
|  | Organize training for staff involved in the sentinel surveillance network |  |  |  |  |  |  |  |  |  |  |
|  | Produce the tools |  |  |  |  |  |  |  |  |  |  |
|  | Strengthen the epidemiological surveillance system (based on the sentinel sites) |  |  |  |  |  |  |  |  |  |  |
|  | Strengthen and support the network of peripheral laboratories (sentinel surveillance) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | AEFI monitoring and reporting |  |  |  |  |  |  |  |  |  |  |
|  | Reread the provisions and directives on pharmacovigilance and AEFI surveillance |  |  |  |  |  |  |  |  |  |  |
|  | Retrain the Pharmacovigilance Committee |  |  |  |  |  |  |  |  |  |  |
|  | Strengthen/support the AEFI reporting network |  |  |  |  |  |  |  |  |  |  |
|  | Advocacy, communication and social mobilization |  |  |  |  |  |  |  |  |  |  |
|  | Put the subcommittees in place for the process of introducing the new vaccine |  |  |  |  |  |  |  |  |  |  |
|  | Update the communication plan |  |  |  |  |  |  |  |  |  |  |
|  | Develop advocacy activities at the highest level of the Government for mobilizing resources |  |  |  |  |  |  |  |  |  |  |
|  | Train the community health workers and health personnel at all levels in interpersonal communication |  |  |  |  |  |  |  |  |  |  |
|  | Develop social mobilization and communication activities in the communities |  |  |  |  |  |  |  |  |  |  |
|  | Officially launch pneumococcal immunization in Mauritania |  |  |  |  |  |  |  |  |  |  |
|  | Monitor and supervise planned advocacy and communication activities |  |  |  |  |  |  |  |  |  |  |

**9. BUDGET: COSTS AND FINANCING FOR THE INTRODUCTION PLAN**

The largest challenge for the immunization program in Mauritania is still the matter of financing for the operational activities given the country’s geographical configuration.

With a vast territory of more than 1 million km2 as described above, with slightly less than 20% of land that is habitable, the implementation of immunization activities must deal with the costs of the advanced and mobile strategies that are considered most appropriate in a country in which the culture of nomadism is heavily entrenched.

Hence, the analysis of the trends in vaccine coverage in Mauritania over the last 10 years shows that each time that substantial resources were provided to support vaccine distribution throughout the country, and that advanced and mobile strategy activities were carried out, the results were significant.

This was true for the DPT3 vaccine coverage, included in the indicators required to reach the HIPC Initiative completion point in 2002.

In 2010, the lack of financial resources allocated to health in general and to immunization in particular caused a drastic drop in DPT3 vaccine coverage rates that fell back below 70%, with high figures of unvaccinated children.

The Mauritanian authorities became aware of this situation after a joint GAVI-WHO-UNICEF mission in October 2010.

After this mission, resources earmarked for immunization were released from the national budget and resulted in clear progress, because the implementation of the activities profited from the opportunity of the child survival strategy supported by UNICEF and the organization of the African immunization week resulted in a clear improvement of Penta 3 vaccine coverage, which now stands at roughly 70% just for the first six months of the year.

Outlook:

* For 2012, with the health system strengthening funds that GAVI provided, which will be used to carry out the activities in 9 of the 14 Districts (Moughataa) with poor performance, to which should be added the immunization strengthening services funding received from GAVI as a reward for 2010, a significant improvement in program performance is expected.
* With the introduction of pneumococcal vaccines and Rotavirus, scheduled for the second half of 2012 and the second half of 2013 respectively, total program costs should increase significantly, from about USD 32 million to over 57 million in late 2014.
* The largest expenditure items are expenses for distributing the vaccines and implementing the advanced and mobile strategies.
* The impact of introducing new vaccines will nonetheless be major, because it will amount to 9% of the total cost of the program in 2015 versus 2% in 2012.
* As for the co-financing of the new vaccines, Mauritania, which joined the initiative for vaccine independence in the early 2000s, will have no difficulty since each year, the budget line item for vaccines and immunization materials will be given the resources necessary to cover requirements in traditional vaccines and co-financing.
* To lower the cost of transporting the vaccines, which is a major expenditure item as well, the authorities plan to replace the fleet of automobiles with partner support for the Moughataa ands Wilaya in 2012 for a total amount of roughly USD 14 million.

In sum, with the improvement in Mauritania’s economic situation due to the diversification of the economic base in 2011 with an outlook for further improvement in 2012, and the re-energizing of financial cooperation with the emerging countries and other partners, including GAVI and the World Bank, the country has a good opportunity to introduce the pneumococcal vaccine, requested from GAVI with greater success to effectively contribute to achieving Millennium Development Goal 4: reduce child mortality.

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**10. MONITORING AND EVALUATION OF THE INTRODUCTION PLAN**

To ensure timely monitoring of the introduction process for the new pneumococcal vaccine into the routine EPI, the following measures will be put in place:

* Supervision activities will be strengthened at every level of the system and must be carried out beginning in the first quarter after the vaccine is introduced.
* Monitoring will also be on the ICC meeting agendas.
* Coordination meetings will be organized in the Wilaya ands Moughataa.
* Progress will be analyzed through the monthly activity reports of the Moughataa, the monthly and quarterly summaries of the Wilaya and the national compilations.
* An evaluation of the introduction process will be performed 6 months after startup to learn useful lessons and take the most appropriate actions to remedy any malfunctions that were identified in time.
* A joint Ministry of Health-WHO-UNICEF report and an annual situation report will be produced and disseminated.
* The pneumococcal vaccine will be included with each vaccine coverage survey.

**11. CONCLUSION**

The introduction of the pneumococcal vaccine into the routine EPI program in the 2012-2015 cMYP, in addition to the country’s effort to control measles and eliminate neonatal tetanus will contribute favorable to achieving the objectives in the strategic plan to fight poverty. The 2006-2015 national health policy, and in the long run, achieving MDG 4 will improve child survival and will be in the interest of the people of Mauritania.

12. ANNEXES

ANNEX 1: Analysis of storage capacities available at the intermediary depots

|  |  |  |  |
| --- | --- | --- | --- |
| Total population,  Wilaya base year  2010 | | Net cold chain availability capacity (liters) | |
| Positive Negative | |
| Hodh Echagui | 356,970 | 379 | 181 |
| Hodh El Gharbi | 268,940 | 173 | 159 |
| Assaba | 307,107 | 108 | 0 |
| Gorgol | 307,673 | 216 | 0 |
| Brakna | 313,117 | 100 | 126 |
| Trarza | 340,009 | 322 | 0 |
| Adrar | 88,155 | 69 | 0 |
| Nouadhibou | 100,799 | 46 | 138 |
| Tagant | 97,127 | 47 | 284 |
| Guidimakha | 225,270 | 193 | 14 |
| Tiris Zemmour | 52,127 | 210 | 290 |
| Inchiri | 14,578 | 262 | 0 |
| Nouakchott | 707,596 | 108 | 145 |
| TOTAL 3,179,468 2233 1337 | | | |

• ***Analysis of storage capacities in view of the required needs with the introduction of new vaccines***

***o Central depot***

Table 20 Positive central depot storage capacity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Formulas 2010 2011 2012 2013 2014 2015 | | | | | | | |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 6,678 | 7,790 | 9,743 | 15,393 | 20,305 | 22,006 |
| B | Positive existing total net capacity in liters | *#* | 5,621 | 5,621 | 5,621 | 12,764 | 12,764 | 12,764 |
| C | Estimated minimum number of shipments required for the actual cold chain capacity | *A/B* | 1.2 | 1.4 | 1.7 | 1.2 | 1.6 | 1.7 |
| D | Annual number of shipments | *Based on the national plan for vaccine shipments* | 2 | 2 | 2 | 2 | 2 | 2 |
| E | Difference (if applicable) | *((A/D) - B)* | -2,282 | -1,726 | -750 | -5,068 | -2,612 | -1,761 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | $54,286 | 0.0 | 0.0 |

Table 21: Negative storage capacity at the central depot

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formula | 2010 | 2011 | 2012 | 2013 | 2014 2015 | |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 726 | 1,078 | 1,166 | 1,272 | 1,368 | 1,484 |
| B | Positive existing total net capacity in liters | *#* | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 | 3,125 |
| C | Estimated minimum number of shipments required for the actual cold chain capacity | *A/B* | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 2 | 2 | 2 | 2 | 2 | 2 |
| E | Difference (if applicable) | *((A/D) - B)* | -2,762 | -2,586 | -2,542 | -  2,489.00 | -  2,441 | -2,383 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

***B. Intermediate depots***

***Positive storage in 2010***

Table 22: Positive storage capacity of regional depots in 2010

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH ECHARGUI | HODH EL GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 206 | 154 | 176 | 176 | 177 | 192 | 60 |
| B | Positive existing total net capacity in liters | *#* | 379 | 324 | 108 | 216 | 277 | 322 | 69 |
| C | Estimated minimum number of shipments required for the actual cold chain capacity | *A/B* | 0.5 | 0.5 | 1.6 | 0.8 | 0.6 | 0.6 | 0.9 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -328 | -286 | -64 | -172 | -233 | -274 | -54 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 62 | 61 | 131 | 32 | 15 | 399 |
| B | Positive existing total net capacity in liters | *#* | 108 | 108 | 324 | 210 | 277 | 108 |
| C | Estimated minimum number of shipments required for the actual cold chain capacity | *A/B* | 0.6 | 0.6 | 0.4 | 0.2 | 0.1 | 3.7 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
|  |  |  |  |  |  |  |  |  |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -93 | -93 | -291 | -202 | -273 | -8 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

***Positive storage in 2011***

Table 23: Positive storage capacity of regional depots in 2011

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH ECHARGUI | HODH EL GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 236 | 183 | 205 | 205 | 205 | 227 | 62 |
| B | Positive existing total net capacity in liters | *#* | 379 | 324 | 213 | 216 | 277 | 322 | 69 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.6 | 0.6 | 1.0 | 0.9 | 0.7 | 0.7 | 0.9 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -320 | -278 | -162 | -165 | -226 | -265 | -54 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | $1,563 | $2,859 | 0.0 | 0.0 | 0.0 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 69 | 69 | 152 | 38 | 15 | 465 |
| B | Positive existing total net capacity in liters | *#* | 108 | 108 | 324 | 210 | 277 | 1671 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.6 | 0.6 | 0.5 | 0.2 | 0.1 | 0.3 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -91 | -91 | -286 | -201 | -273 | -1,555 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | $1,610 | 0.0 | 0.0 | $29,252 |

***Positive storage in 2012***

Table 24: Positive storage capacity of regional depots in 2012

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH  ECHARGUI | HODH EL  GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 294 | 226 | 252 | 259 | 259 | 286 | 73 |
| B | Positive existing total net capacity in liters | *#* | 379 | 324 | 413 | 416 | 277 | 322 | 69 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.8 | 0.7 | 0.6 | 0.6 | 0.9 | 0.9 | 1.1 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH  ECHARGUI | HODH EL  GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -306 | -268 | -350 | -351 | -212 | -251 | -51 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | $1,196 | $1,196 | 0.0 | 0.0 | 0.0 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 88 | 88 | 191 | 47 | 19 | 580 |
| B | Positive existing total net capacity in liters | *#* | 108 | 108 | 324 | 210 | 277 | 1671 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.8 | 0.8 | 0.6 | 0.2 | 0.1 | 0.3 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -86 | -86 | -276 | -198 | -272 | -1,526 |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Positive storage in 2013**

Table 25: Positive storage capacity of the regional depots in 2013

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH ECHARGUI | HODH EL GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 468 | 353 | 405 | 405 | 416 | 450 | 114 |
| B | Positive existing total net capacity in liters | *#* | 579 | 524 | 413 | 416 | 477 | 522 | 174 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.8 | 0.7 | 1.0 | 1.0 | 0.9 | 0.9 | 0.7 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | **-462** | **-436** | **-312** | **-315** | **-373** | **-410** | **-146** |
| F | Estimated cost of expansion | *US $* | $1,196 | $1,196 | 0.0 | 0.0 | $1,196 | 0.0 | $1,042 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 139 | 138 | 301 | 76 | 29 | 918 |
| B | Positive existing total net capacity in liters | *#* | 213 | 213 | 324 | 210 | 277 | 1671 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.7 | 0.6 | 0.9 | 0.4 | 0.1 | 0.5 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | -178 | -179 | -249 | -191 | -270 | -1,442 |
| F | Estimated cost of the expansion | *US $* | 1,042 us$ | 1,042us$ | 0.0 | 0.0 | 1,196us$ | 0.0 |

**Positive storage in 2014**

Table 26: Positive storage capacity for regional depots in 2014

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH ECHARGUI | HODH EL GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 616 | 461 | 536 | 536 | 542 | 587 | 151 |
| B | Positive existing total net capacity in liters | *#* | 779 | 524 | 613 | 616 | 677 | 722 | 174 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.8 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.9 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | **-625** | **-409** | **-479** | **-482** | **-542** | **-575** | **-136** |
| F | Estimated cost of expansion | *US $* | $1,196 | 00 | $1,196 | $1,196 | $1,196 | 1,196 us$ | 0.0 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 184 | 174 | 387 | 93 | 35 | 1,215 |
| B | Positive existing total net capacity in liters | *#* | 213 | 213 | 524 | 210 | 277 | 1671 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.9 | 0.8 | 0.7 | 0.4 | 0.1 | 0.7 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | **-167** | **-170** | **-427** | **-187** | **-268** | **-1,367** |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | $1,196 | 0.0 | 0.0 | 0.0 |

**Positive storage in 2015**

Table 27: Positive storage capacity for regional depots in 2015

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | HODH ECHARGUI | HODH EL GHARBI | ASSABA | GORGOL | BRAKNA | TRAZA | ADRAR |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 662 | 506 | 571 | 571 | 587 | 634 | 164 |
| B | Positive existing total net capacity in liters | *#* | 779 | 524 | 613 | 616 | 677 | 722 | 174 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.8 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | **-614** | **-398** | **-470** | **-473** | **-530** | **-564** | **-133** |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Formulas | DAKHLET NOUADHIBOU | TAGANT | GUIDIM AKHA | TIRIS ZEMMOUR | INCHIRI | NOUAK CHOTT |
| A | Annual requirements positive volume, including new vaccine (PCV13) in liters | *Figure obtained by multiplying the total number of doses of vaccine by the volume occupied by the packaging of each dose* | 201 | 185 | 432 | 109 | 35 | 1,317 |
| B | Positive existing total net capacity in liters | *#* | 213 | 213 | 524 | 210 | 277 | 1671 |
| C | Estimated minimum number of shipments required for the actual capacity of the cold chain | *A/B* | 0.9 | 0.9 | 0.8 | 0.5 | 0.1 | 0.8 |
| D | Annual number of shipments | *Based on the national plan for vaccine distribution* | 4 | 4 | 4 | 4 | 4 | 4 |
| E | Difference (if applicable) | *((A/D) - B)* | **-163** | **-167** | **-416** | **-183** | **-268** | **-1,342** |
| F | Estimated cost of expansion | *US $* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Negative storage**

Table 28: Negative storage capacity and regional depots investment cost

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| WILLAYA 2010 2011 2012 2013 2014 2015 | | | | | | | |
| Adrar | Gap, requirements and exisitng storage capacity  age existante | 5 | 8 | 9 | 10 | 11 | -25 |
| Estimated cost of the expansion | - | - | - | - | $1,610 | - |
| Assaba | Gap, requirements and exisitng storage capacity | 19 | 28 | -194 | -191 | -189 | -185 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |
| Brakna | Gap, requirements and exisitng storage capacity | -126 | -116 | -114 | -111 | -109 | -106 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Gorgol | Gap, requirements and exisitng storage capacity | 19 | 28 | -193 | -191 | -189 | -185 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |
| Guidimakha | Gap, requirements and exisitng storage capacity | 14 | 21 | -14 | -11 | -10 | -7 |
| Estimated cost of the expansion | - | $1,610 | - | - | - | - |
| Hodh El Chargui | Gap, requirements and exisitng storage capacity | -159 | -148 | -146 | -142 | -140 | -136 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Hodh El Gharbi | Gap, requirements and exisitng storage capacity | -273 | -265 | -263 | -261 | -259 | -256 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Inchiri | Gap, requirements and exisitng storage capacity | 1 | 1 | 2 | 2 | 2 | 2 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Nouadhibou | Gap, requirements and exisitng storage capacity | -139 | -136 | -135 | -134 | -133 | -132 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Nouakchott | Gap, requirements and exisitng storage capacity | -102 | -81 | -76 | -69 | -64 | -56 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Tagant | Gap, requirements and exisitng storage capacity | -284 | -281 | -280 | -279 | -279 | -277 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Tiris Zemour | Gap, requirements and exisitng storage capacity | -249 | -247 | -247 | -246 | -246 | -245 |
| Estimated cost of the expansion | - | - | - | - | - | - |
| Trarza | Gap, requirements and exisitng storage capacity | 21 | 31 | -191 | -187 | -185 | -181 |
| Estimated cost of the expansion | - | $521 | - | - | - | - |

.

Table 29: Requirements in cold chain equipment at the national and regional level for 2011-2015

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Willaya | Type  of device | 2011 | 2012 | 2013 | 2014 | 2015 |
| Adrar | Refrigerator |  |  | MK304 |  |  |
| Assaba | Refrigerator | MK304 |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Brakna | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Gorgol | Refrigerator |  | HBC-340 |  | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| Guidimaka | Refrigerator |  |  |  | HBC-340 |  |
| Freezer | V 170 GE |  |  |  |  |
| Hodh El  Chargui | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Hodh EGarbi | Refrigerator |  |  | HBC-340 |  |  |
| Nouadhibou | Refrigerator |  |  | MK304 |  |  |
| Nouakchott | Refrigerator | Positive cold room-5m3 |  |  |  |  |
| Tagant | Refrigerator |  |  | MK304 |  |  |
| Trarza | Refrigerator |  |  | HBC-340 | HBC-340 |  |
| Freezer | HBD 286 |  |  |  |  |
| National | Refrigerator |  |  | Positive cold room-30m3 |  |  |

Table 30: Investment costs at regional and national levels– 2011 -2015

|  |  |  |
| --- | --- | --- |
| **Type of material** | **Number** | **Cost** |
| V 170 GE | 1 | $1,610 |
| TFW800 | 3 | $8,576.40 |
| HBC-340 | 12 | $14,352 |
| MK304 | 4 | $4,166.40 |
| Positive cold room-5m3 | 1 | $29,251.99 |
| Positive cold room-30m3 | 1 | $54,286.43 |
| TOTAL |  | $112,243.22 |

1. [↑](#footnote-ref-1)
2. MICS 2007 [↑](#footnote-ref-2)