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# North Sudan EPI Comprehensive Multi- Year Plan

**2011 - 2015**

Khartoum

Updated, Feb. 2011

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## LIST OF ACRONYMS

ACSD	Accelerated Child Survival and Development
ACSI	Accelerated Child Survival Initiative
AD	Auto -destruct
AEFI	Adverse Events Following Immunization
AFP	Acute Flaccid Paralysis
ANC	Antenatal care
BCG	Bacille Calmette and Guirene
BMS	Bacterial Meningitis Surveillance
C4D	Communication for Development
CAH	Child and Adolescent Health
CCEM	Cold Chain Equipment Management
CDC	Communicable Diseases Control
CHPs	Community Health Promoters
CHWs	Community Health workers
cMYP	Comprehensive multi-year plan
CPA	Comprehensive Peace Agreement
DG	Director General
DQA	Data Quality Audit
DQS	Data Quality Self assessment
DTP	Diphtheria Tetanus Pertussis vaccine
EH	Environmental Health
EMR	East Mediterranean Region
EPI	Expanded Programme on Immunization
EVSMI	Effective Vaccine Store Management Initiative
GAVI	Global Alliance for Vaccines and Immunization
GDP	Gross Domestic Product
GHE	Government Health Expenditure
GIVS	Global Immunization Vision and Strategies
GoS	Government of Sudan
Hep B	Hepatitis B Vaccine
Hib	Haemophilus Influenzae type B
HRL	High Risk Localities (Districts)
HSS	Health System Strengthening
IACC	Inter-Agency Coordinating Committee
IEC	Information Education Communication
ISS	Immunization Services Support
ITD	Intra-typic differentiation
KAP	Knowledge, Attitude and Practice
LB	Live Births
MCH	Mother and Child Health
MCV	Measles Containing Vaccine
MDGs	Millennium Development Goals
MDVP	Multi-Dose Vial Policy
MLM	Mid Level Management
MNT	Maternal and Neonatal Tetanus
mOPV	monovalent Oral Polio Vaccine
MOU	Memoranda Of Understanding
NGOs	Non-governmental Organizations
NIDs	National Immunization Days
NITAG	National Immunization Technical Advisory Group
NMoF	National Ministry of Finance



NMoH	National Ministry of Health
NNT	Neonatal Tetanus
NRA	National Regulatory Authority
NUVS	New and Underused Vaccine Support
OPV	Oral Polio Vaccine
PAB	Protection At Birth
PCV10	Pneumococcal vaccine 10 serotypes
Penta	Pentavalent vaccine (DTP-Hep B-Hib)
PHC	Primary Health Care
QSI	Quality of the System Index
RED	Reaching Every District
RH	Reproductive Health
SAGE	Strategic Advisory Group of Experts
SHHS	Sudan Household Health Survey
SIAs	Supplementary Immunization Activities
SMoH	State Ministry of Health
SNID	Sub-National Immunization Day
SOO	State operations Officer
SOPs	Standard Operating Procedures
SWOT	Strengths Weaknesses Opportunities Threats
THE	Total Health Expenditure
TT	Tetanus Toxoid vaccine
UNICEF	United Nations children's Fund
VF	Verification Factor
VMW	Village Midwife
VPDs	Vaccine Preventable Diseases
WCBA	Women of Child Bearing Age
WHO	World Health Organization
WPV	Wild polio virus
YF	Yellow Fever



## 1- PREAMBLE

This is an updated version of the comprehensive multi-year plan (cMYP) for the Expanded Programme on Immunization (EPI) for the period 2011-2015. It had been developed in an inclusive process where senior EPI at central and states, planning directorate staff, partners such as WHO and UNICEF were fully involved.

Although the previous cMYP covered the year 2010, the programme requires a plan that is valid for a longer period of time to facilitate the application to GAVI New and under used vaccines window of Support (NUVS) for the introduction of new vaccines (pneumococcal, rotavirus, Mening A conjugate vaccines, Yellow Fever, etc) into the EPI program in Sudan..

The cMYP was formulated following a detailed situation analysis of the national immunization programme, the political and economic context and all were guided by the national immunization policy and the 25-year strategic plan of the National Ministry of Health. It was also developed in line with the Global Immunization Vision and Strategies (GIVS) taking into consideration the remaining and new challenges.

## 2- BACKGROUND

Sudan is characterized by a strategic geographical location, that links the Arab world to Sub Saharan Africa, and it shares its borders with 7 countries, where the Sudanese population and those of the neighbouring countries move freely across these borders. The northern part of the country is an extension of the Sahara Desert, the central part is a dry savannah area and the southern part has a typical tropical rainforest climate. Climatic factors can contribute to humanitarian emergencies related to drought and flooding, and ecological factors expose much of the population to major infectious and parasitic diseases. Difficult access to some areas, rural-urban migration, natural disasters, the longstanding civil war and limited resources had a significant impact on the provision of immunization services. As a consequence there are wide variations within the country in delivery of services, vaccination coverage and disease incidence.

By closing the recent referendum in January 2011, Southern Sudan has split as a separate country. The Republic of Sudan remains with 15 states.

Reconstruction and development are needed as well as humanitarian assistance in the health and nutrition sectors, particularly in newly accessible and war affected areas. Poor coordination and weak local capacity are seen as the main challenges facing the health sector development in the post conflict setting

### 2.1-Population Size and Demographic Characteristics:

In 2008, a population census was conducted and the total resident population was reported to be 30.9 million. The rural population represents about 65%, while nomads represent 10%. 43% of the population are less than 15 years of age. The population is unevenly distributed in the 15 States, the majority are concentrated in 6 States of the Central Region with a mean population density of 10 people per square kilometres, increasing to 50 in the agricultural areas. Natural disasters and conflict resulted in high rates of rural-urban migration.

The infant mortality rate according to Sudan Household Health Survey (SHHS) in 2006 was 81 per thousand live births. The cohort of surviving infants in 2008 is estimated to consist of 1.12 million children. An estimated 5.2 million children are under 5 years of age. According to the 2009 health statistical report the main causes of death among children under five were Septicaemia (18%), pneumonia (11%), malnutrition (11%), Diarrhoea & gastroenteritis (6%), Malaria (5%), Dehydration (5%) and CSM (4%).



## 2.2- Economic Situation:

Sudan has had to navigate a challenging course over the past few years, with any competing objectives. These include implementing various peace agreements with limited resources and maintaining macroeconomic stability in the face of rapidly changing economic landscape. Economic growth has been strong by regional standards in the last few years, but is vulnerable. Increases in oil production and international crude prices have bolstered gross domestic product (GDP) growth, which stood around 10.2 percent last year (2008), and agriculture and the country's expanding services sector have the potential to further underpin the economy. Agriculture represents the largest share of GDP, at roughly a third, though down from 42 percent of GDP in 2000. Foreign investment and rising domestic demand have spurred growth in the construction and service sectors.

The fiscal position in the post-CPA period has deteriorated, however, reflecting both revenue shortfalls and expanding expenditures. Domestic debt has also worsened. Recent increases in world food prices have put upwards pressure on inflation and poses a real risk to the macro-fiscal stability of the country. Oil markets are volatile and to ensure the stability needed to reduce poverty, prudent expenditure management and balanced growth in non-oil sectors is essential<sup>1</sup>.

**Table 1: Selected aspects of health financing in Sudan**

Indicator	Value
Total expenditure on health as percentage of gross domestic product	3.3%
General government expenditure on health as percentage of total expenditure on health	29.8%
Private expenditure on health as percentage of total expenditure on health	70.2%
General government expenditure on health as percentage of total government expenditure	4.3%
External resources for health as percentage of total expenditure on health	6.5%
Social security expenditure on health as percentage of general government expenditure on health	16.3%
Out-of-pocket expenditure as percentage of private expenditure on health	100%
Per capita total expenditure on health at average exchange rate (US\$)	39
Per capita total expenditure on health at international dollar rate	68
Per capita government expenditure on health at average exchange rate (US\$)	12
Per capita government expenditure on health at international dollar rate	20

Source: <http://www.who.int/nha/>

Although no data are available on household health spending, it is estimated that total out-of-pocket expenditures are double or even more than total government health spending (2.3% of GDP). In addition, spending on health services abroad was reported to be substantial.

## 2.3- Administrative Division:

Decentralization was introduced in 1994 as a system of governance compatible with the needs of the multi-ethnic and multi-cultural society of Sudan. The system is founded upon a multi-tier government: National, state and local governments (Districts) which are called localities.

<sup>1</sup> (World bank, UN, Third consortium: Joint Staff Assessment report, May 2008)



The administrative division in Sudan has changed from 88 Districts in 2005 to 135 Districts in 2008 and 157 in 2010. The situation is in continuous change every year responding to political, economical and cultural needs.

There is an uneven distribution of financial resources and manpower between different states and between rural and urban settings. The constant change in number of districts is creating a major challenge to the national immunization programme. As a sequence of this increase every year the programme is requiring extra trained human resources, financial and logistic support.

## 2.4- Health Services Organisation:

In Sudan there are 15 State Ministries of Health (SMoH); one Ministry in each State. The National Ministry of Health (NMoH) is responsible for the development of national health policies, strategic plans, monitoring and evaluation of health system activities and external relations. The SMoHs are mainly responsible for policy implementation, detailed health programming and project formulation. Each state ministry of health consists of the main technical directorates namely preventive medicine, primary health care and curative and hospital directorates.

Health services are provided by different partners. In addition to National & state ministries of health these are the armed forces, universities, the private sector (both for profit and non-for-profit) and civil society. However, many of these are performing in isolation due to an ill defined managerial system for coordination and guidance. The main problems of the organizational structures in the governmental health services at different levels are the rigidity of the organizational structure and poor coordination between departments.

The National Ministry of Health experienced marked reforms in its directorates during 2002. Even though, its system is still unable to ensure integration of programmes between different directorates. Both evidence based decision-making and better collaboration needs to be promoted. Decentralisation and bottom-up approaches have been promoted in the health sector: The execution and implementation of promotional, preventive and curative activities have been shifted from the national to the state authorities.

The National Health Insurance Scheme, introduced in the mid 1990s, its coverage increases from about 8% in 2002 to 29% of the population by end of 2008, mostly government employees, but also poor families, families of martyrs and students. User fees for government health services were introduced in the mid 1990s, including exemptions for vulnerable groups and for emergency services and casualties. Government policies in recent years have encouraged the growth of the private sector. However, this sector is concentrated in urban and better off rural areas and invests mainly in clinics and hospitals.

The health system suffered severe loss of human resources and uneven distribution. Health facilities are not equally distributed, and gaps need to be reduced in order to increase access in the under-served areas and communities.

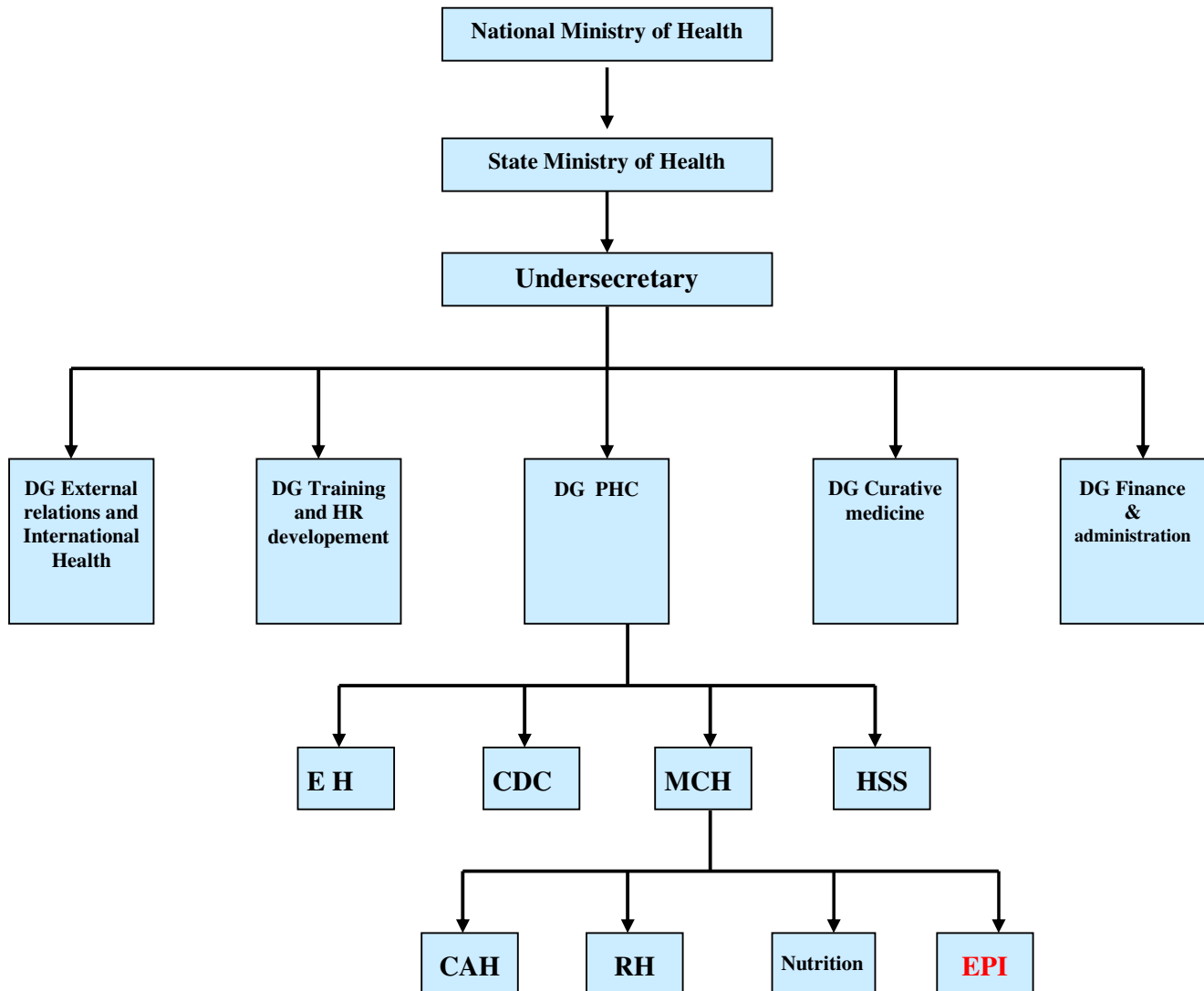
This cMYP plan is in line with the 25 strategic plan of National MoH which is explicit about the place of immunization in improving health outcomes. This strategic plan, sets **three** explicit objectives for the EPI, which high immunization coverage, achieve polio certification and maintain polio free status, and eliminates measles.





### 3- EPI SITUATION ANALYSIS 2006-2008

#### 3.1- EPI Organization in the National Ministry of Health (NMoH):



The expanded programme of immunization is part of the National Ministry of Health, It lies under the the primary Health care Directorate (PHC) which in turn under the Undersecretary.

At state level The EPI is under the supervision of SMoH, Director General and PHC directorate.



### 3.2- Routine Immunization of Children:

The EPI strives to complete vaccination of children before their first birth day according to the following national schedule:

<b>Table 2</b>						
<i>Vaccine</i>	<i>EPI immunization schedule (2010)</i>					
	Birth	6 weeks	10 weeks	14 weeks	9 months	18 months
BCG	☺					
OPV		☺	☺	☺		
DTP-HepB-Hib		☺	☺	☺		
HepB	☺					
Measles					☺	☺
Rota virus (planned 2011)		☺	☺			
PCV10 (planned 2012)		☺	☺	☺		
Mening A vaccine (planned 2013/2014)					☺	
Yellow Fever vaccine (planned 2014/2015)					☺	

Note: Green font for new vaccines that will be added to the existing schedule after 2010. The introduction of birth dose of HepatitisB and 2<sup>nd</sup> dose of measles depend on the availability of vaccines.

#### Tetanus Vaccination for Pregnant Women

The EPI policy is to give tetanus vaccination to all pregnant women. In addition to routine vaccination conducted in the health facilities, maternal and neonatal tetanus (MNT) campaigns are conducted in high risk districts targeting all women of child-bearing age (15-45 years).

<b>Table 3</b>			
<b>Tetanus vaccination schedule (2010)</b>			
<b>Dose</b>	<b>Schedule</b>	<b>Dose</b>	<b>Schedule</b>
TT1	At first contact	TT4	After one year
TT2	After one month	TT5	After one year
TT3	After six months		

Based on the in-depth situation analysis, the updated cMYP (2011 – 2015) was established in discussions and deliberations of senior EPI and planning staff together with full involvement of key partners namely UNICEF and WHO. Priorities and major objectives were set with participation and



consultations of representatives of EPI staff at subnational levels as well. The plan takes the previous EPI Five-Year Plan 2006-2010 forward, especially what was stated for the last year 2010. Remaining problems from the previous plan are carried into the new one in addition to emerging new challenges

Annual work-plans with integrated and consolidated activities will be developed on the basis of this cMYP for each of the years 2011 through 2015. The cMYP has to be regarded as “work in progress” which needs to be revised on an annual basis in light of new developments in the field and/or possible changes in financial contributions from both the Government of Sudan and international donors.

A detailed overview of performance indicators of the routine EPI services in Sudan is provided in the following table:

<b>Table 4</b>						
<b>System Components</b>	<b>Suggested indicators</b>	<b>2006 (93 Didtricts)</b>	<b>2007 (98 Didtricts)</b>	<b>2008 (135 Didtricts)</b>	<b>2009 (143Didtricts)</b>	<b>2010 (157 Didtricts)</b>
<b>Routine Coverage</b>	DTP3 Coverage	84.7%	91%	93%	91%	95.1%
	% Districts with DTP3 > 80%	72%	77.6%	85.9%	81%	88.5%
	% Districts < 50%	6.5%	2%	3%	4%	2%
	% health facilities that provide immunization services	68%	74%	76.5%	75%	74%
	% Districts using EPI monitoring charts	100%	100%	100%	100%	100%
	% population covered by fixed immunization services	40%	32%	36%	37.3	40%
	% population covered by outreach services	29%	38%	35.7%	36.2	33%
	% population covered by mobile services	26%	28%	26.1%	26.5	27%
	% population living in inaccessible areas	4.8%	2.4%	2.2%	2.2%	2.2%
	DPT1- DTP3 drop out rate	11%	9.5%	8%	7%	8%
	% Districts with DPT1/DTP3 drop-out rates > 10%	47.3%	42.9%	34.1%	34.3%	31.2%
	% Districts with good access DTP1 > 80%	89% (84)	93% (92)	84% (114)	90%(129)	95.5%(150)
	% implementation of the planned fixed site sessions	95%	95%	93%	105%	95%
	% implementation of planned outreach sessions	85%	90%	93%	97%	99%
	% implementation of planned mobile sessions	73%	74%	61%	80%	86%
<b>New Vaccines</b>	% Districts introducing new vaccine	100%	99%(1 NOT ACCESSIBLE)	98.5%(2 NOT ACCESSIBLE)	NA	NA
	Birth dose of Hep. B vaccine	No	No	No	No	No



	Intention to introduce Yellow Fever vaccine	partially	partially	partially	partially	partially
	Intention to introduce booster doses	Yes	Yes	Yes	Yes	Yes
Routine Surveillance	Existence of different surveillance systems	Yes	Yes	Yes	Yes	Yes
	Completeness of reporting	100%	93%	100%	100%	100%
	Timeliness of reporting	85%	56%	55%	61%	85%
	Use of surveillance data at District level	Yes	Yes	Yes	Yes	Yes
Cold chain/ Logistics	Existence of renewal plan for the cold chain	No	No	Work in progress	Yes	Yes
	% Districts with less than 80% cold chain functionality	43.8%	25.4%	37%	22%	20%
	% Districts reporting stock-out	16%	11%	2.9%		
Immunization safety and Waste Management	% Districts that have been supplied with adequate No. of AD syringes for all routine immunization	100%	100%	100%	100%	100%
	Existence of an AEFI surveillance system	yes	yes	Yes	Yes	Yes
	Availability of waste management plan	yes	yes	Yes	Yes	Yes
	% Districts implementing waste management measures ('burn and bury')	100%	98%	98%	100%	100%
Vaccine supply	% government contribution to vaccine cost	0%	0%	Cofinance for new vaccines & Injection supplies	Cofinance for new vaccines & Injection supplies	Cofinance for new vaccines & Injection supplies
	Any stock-out at national level during last year	NO	NO	NO	NO	NO
	% Districts keeping vaccine stock records	100%	100%	100%	100%	100%
	% Districts with DPT vaccine wastage > 25%	0	0	0	0	0
Communication	Existence of communication and social mobilization plan as an integral part of the microplans	No	yes	Yes	yes	Yes
	% funds deducted for routine communication and	No	No	4%	4%	5%



	<b>social mobilisation</b>					
<b>Financial sustainability</b>	Government contribution to total EPI costs	49.5%	38.1%	20.7%	21%	23.4%
<b>Management planning</b>	Are a series of District indicators collected regularly at national level?	Yes	Yes	Yes	Yes	Yes
	% Districts with microplans	100%	98.9% (1 not accessible)	98.5 (2 not accessible)	98.6 (2 not accessible)	100%
<b>Research/studies</b>	Number of vaccine-related studies conducted	2	6	1	2	5
<b>NRA</b>	Number of functions conducted	0	0	0	0	0
<b>National IACC</b>	Number of meetings held last year	3	2	2	2	2
<b>Human resources availability</b>	% health facilities with at least one vaccinator	100%	100%	100%	100%	100%
	health workers/vaccinators per 10,000 population	1	1	1	1	1
<b>Transport/Mobility</b>	% Districts with adequate transportation (one vehicle)	65%	63%	59%	64%	59%
<b>Linking to other Health Interventions</b>	Immunization services systematically linked to delivery of other interventions (Malaria, Nutrition, Child health etc)	Nutrition	Nutrition	Nutrition & ACSI	Nutrition & ACSI	Nutrition & ACSI
<b>Programme Efficiency</b>	Timeliness of disbursement of funds to Districts	91.7%	0% NO GAVI FUND	0% NO GAVI FUND	0% NO GAVI FUND	100%
	% Districts with trained operation officers (MLM)	100%	69%	80%	61%	51%
	% Districts visited at least once per year	48%	46%	34%	39%	46%
	Vaccine wastage monitoring at national level for all vaccines?	BCG 43.8%, OPV 5.9%, DPT 14.6%, MEASLES 30.4%, TT 34.7%,	BCG 40.5%, OPV 16.3%, DPT 10.7%, MEASLES 39.2%, TT 24.2%, HEPB 3.5%	BCG 41.5%, OPV 27.3%, (DPT+DTP-HepB-Hib) 5%, MEASLES 29.7%, TT 32.8%	BCG 41.5%, OPV 27.3%, (DPT+HepB-Hib) 5%, MEASLES 29.7%, TT 32.8%	BCG 41.5%, OPV 27.3%, (DPT+HepB-Hib) 5%, MEASLES 29.7%, TT 32.8%



		HEP2.8				
	% system wastage	1.7%	0.01%	1.3%		
	% Districts with Quality System Index > 80%	42%	53%	41%	57%	57%
	% Districts with a Verification Factor < 0.8	98%	100%	93%	100%	96%

\* Hep B in 2006 then DTP-HepB-Hib in 2008

### 3.3- Summary of EPI progress up to2010

Sudan EPI had a lot of achievements through the previous cMYP period but still there are areas that need improvements.

The following are what had been done regarding objectives of the previous plan:

- 1- DTP3/Penta 3 reported coverage rate for all states was 95% by end of 2010 which exceeded the target of 93%.
- 2- Regarding the objective of achieving polio certification: endemic virus had been eradicated since 2001 but importation had occurred in 2004/5 and again in 2008 and 2009. The Certification document was accepted by the RCC in October 2010.
- 3- For eliminating Maternal and neonatal tetanus: still not achieved and more work need to be done to reach and verify elimination status.
- 4- In regard to measles elimination: it was partially achieved where catch up and regular periodic follow up campaigns were conducted and measles case bases surveillance is well established over the 15 northern states.
- 5- New and underutilized vaccines; Sudan has successfully introduced Penta-valent vaccine in 2008 in all 15 states with a high coverage rate as mentioned in point 1 above. Sudan as a member state in the EMR has joined the BMS and Rotavirus surveillance network in mid 2007. Since its establishment, the system has been improved to give evidence based data for Rotavirus GE and BMS. The data collected and analysed by the programme is used to monitor the trend in both diseases and also it will serve as a baseline data to measure the impact of the related vaccines. The following selected indicators reflect the situation of BMS and Rota surveillance status in the country:
  - *Proportion of rotavirus gastroenteritis among reported gastroenteritis in under 5 yrs children from selected sites is 36%*
  - *Proportion of Pneumococcal meningitis among reported bacterial meningitis in under 5 yrs children from the selected sites is 18%.*
  - *Proportion of Nisseria meningitidis meningitis among reported bacterial meningitis in under 5 yrs children from the selected sites is 80%*
- 6- In the area of routine Vitamin A supplementation; this was well covered during National Immunization Days (NIDs) for under 5 children with a coverage of 100%. Plans yet to be developed for routine Vit A supplementation to the target group after cessation of NIDs.
- 7- Lastly for the Immunization safety objective: there is a functioning Adverse Events Following Immunization (AEFI) surveillance system in all 15 northern states



### 3.4- Achievements regarding the Global Immunization Vision and Strategy

During the past planning period some progress has been achievement in regards to the the GIVS, this can be summerized as follows;

- 1- Protecting more people in a changing world: there was clear increase in vaccination coverage from 81% in 2005 to 95% by end of 2010. Measles follow up campagins with its high coverage provided a second opportunity for children in the age group 9 months to 5 yrs.
- 2- Introducing new vaccines and technology: successfully EPI has introduced Hepatitis B vaccine during 2005-2006 and introduced the pentavalent vaccine in 2008 in all the 15 Northern states. In 2009, Sudan applied for Rotava and Pneumo vaccines, which were approved by GAVI.
- 3- Intergating immunization and linked interventions in the health system context: during 2007 and 2009 and for the first time in Sudan, Accelerated Child Survival Initiative campagins were conducted in collaboration with MCH directorate. It included 5 interventions namely Deworming, Vitamin A supplementation, measles, OPV and health education messages (handwashing, breast feeding) while selected states were also given extra interventions such as iodine and iron/folate supplementation to target groups.
- 4- Immunizing in a context of global interdependence: The national Immunization programme has formulated in 2009 its National Immunization Technical Advisory Group (NITAG) which recommended the introduction of Rotavirus and Pneumococcal vaccines. Sudan, being a GAVI-eligible country, will apply for GAVI's support for these two vaccines. The government of Sudan has been financing 75% of routine injection supplies costs since 2006 and in 2008 it contributed to the co-financing of Pentavalent vaccine and its injection supplies. Immunization is high in the government's agenda as reflected by the fact that immunization coverage is one of the major indicators discussed in the Minister's cabinet and after the introduction of these two vaccines the government will contribute around \$2.4 million as a cofinance share. This partnership with GAVI Alliance and other donors will facilitate move towards achieving MDGs.

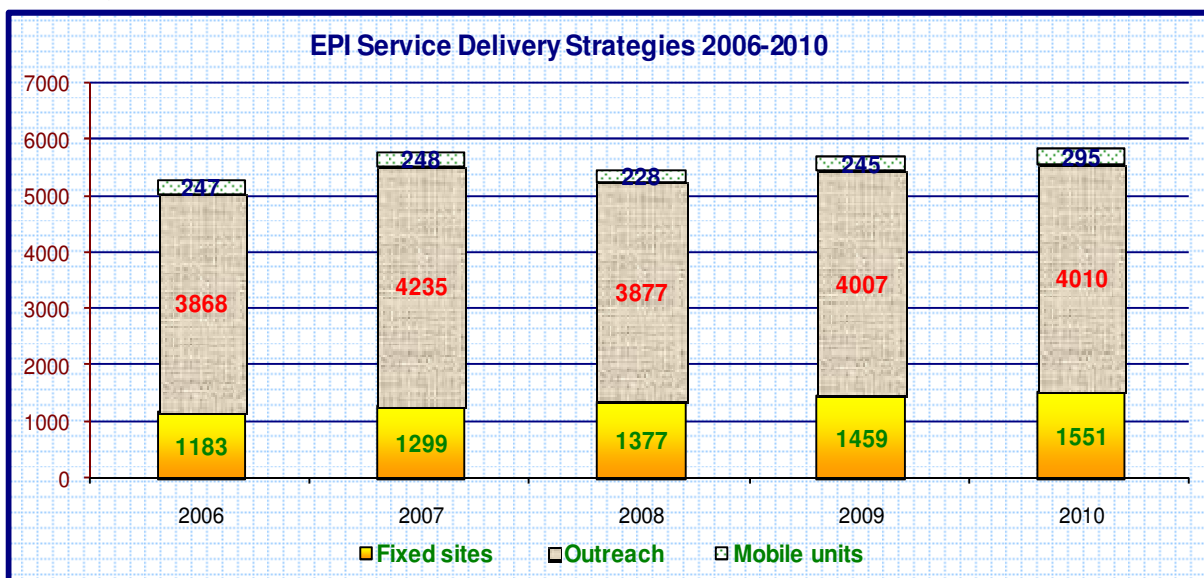


### 3.5 Service Delivery and Programme Management

#### 3.5.1- EPI Service Delivery

There was also an expansion in the fixed EPI delivery network. During the period 2006 to 2008 fixed EPI sites increased by 16%. A generous contribution from UNICEF in area of cold chain equipment has resulted in increase of fixed sites from 1299 in 2007 up to 1551 in 2010, however, outreach and mobile activities were affected during the same period because of delay in transferring GAVI reward for 2007.

Figure (1)



The txt and graph has to be updated up to 2010.

#### 3.5.2-Routine Immunization Coverage

Overall coverage increased significantly over the past 3 years as seen in the following table;

Table 5

Coverage achievements by antigen 2006 – 2010								
	BCG	OPV1	OPV2	OPV3	DTP1	DTP2	DTP3	Measles
2006	78%	95%	87%	85%	95%	87%	85%	76%
2007	85%	100%	94%	91%	100%	94%	91%	80%
2008	85%	101%	96%	92.2%	101%	96%	92.8%	80%
2009	86%	98%	92%	91%	98%	92%	91%	83%
2010	91%	103%	98%	95%	103%	98%	95.1%	86.3%

Source: EPI Statistics Department.





In line with achieving the WHO EMRO regional objective of reaching all districts with  $\geq 80\%$  DTP3 coverage, the number of districts (localities) achieving this benchmark has increased as shown in the following table:

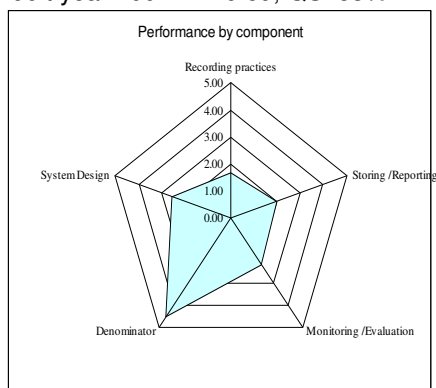
<b>Table 6</b>				
<b>Increase in DTP3 coverage in accessible Districts from 2006 to 2010</b>				
	<b>Number of Districts with coverage <math>\geq 80\%</math></b>	<b>Number of Districts with coverage 50-79%</b>	<b>Number of Districts with coverage <math>&lt; 50\%</math></b>	<b>Total # of Districts</b>
<b>2006</b>	<b>67 (72%)</b>	<b>20</b>	<b>6</b>	<b>93</b>
<b>2007</b>	<b>77 (78%)</b>	<b>18</b>	<b>2+1 not accessible</b>	<b>98</b>
<b>2008</b>	<b>116 (86%)</b>	<b>14</b>	<b>4+1 not accessible</b>	<b>135</b>
<b>2009</b>	<b>116 (81%)</b>	<b>19</b>	<b>6+2 not accessible</b>	<b>143</b>
<b>2010</b>	<b>139 (88.5%)</b>	<b>15</b>	<b>3</b>	<b>157</b>

**Source:** EPI Annual reports

This achievement has been further supported by the improved information system for immunization data which was verified by passing the Data Quality Audit (DQA) in 2004 with a verification factor (VF) of 0.96 and a quality of the system index (QSI) of 91%. The following figures show the improvements of the EPI reporting and information system between 2001 and 2003:

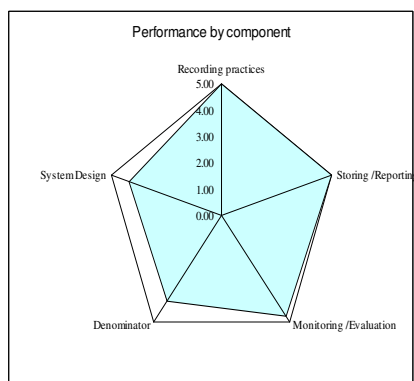
**Figure (2)**

Audit year 2001: VF 0.69, QSI 53%



Source: DQA report 2002

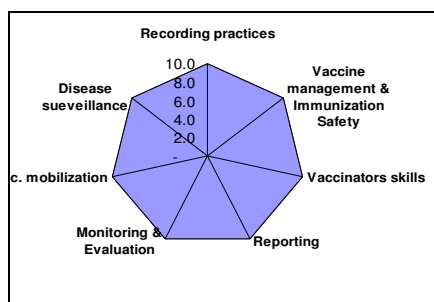
Audit year 2003: VF 0.96, QSI 91%



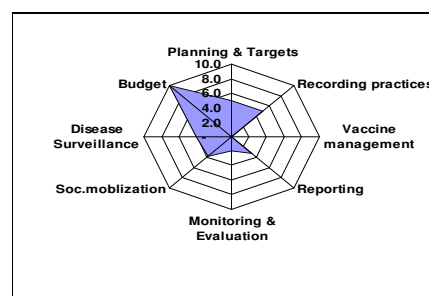
Source: DQA report 2004

Although there is clear progress in Number of Districts achieving more than 80% there is still wide variation between and with in states regarding coverage and drop out rates, this may impose a considerable challenge for the programme to deal with it during the next 5 years. For this reason the programme has established an internal quality data audit using the DQS tool at all levels. The following figures show examples from facilities and localities:





Loc DQS (Good performance)



Loc DQS ( poor performance)

### 3.6- Accelerated Disease Control Initiatives update the indicators up to 2010

Situational analysis by accelerated disease control initiatives in Northern Sudan

Table 7						
System Components	Indicators	2006	2007	2008	2009	2010
Polio	Non-polio AFP rate	2.3	2.7	2.6	3	2.8
	NIDs: # Rounds % Coverage	# 4 100%, *103%, 98% & 100%	#5 *101%, *101%, 98%, *102%, *102%	#3 *103%, 99%, *103%	#5 101%, 103%, 99%, 102%, 104%	#3 102%, 96%, 99%
	SNIDs: # Rounds Coverage	0	#1 88%	#2 97%, *101%	#2 100%, 107%	#1 100%
	Mop up Campaigns	1 101%	0	2 100-103%	0	0
MNT	TT2+ coverage	42.6%	46%	44%	44%	45.5%
	% Districts reporting > 1 case of neonatal tetanus per 1000 live births	1.1%	1.02%	0.74%	0.69%	3.8%
	SIAs in high-risk areas	Yes (6 loc in 3 states, 1st & 2nd Round only)	No	Yes -3rd round for the 6 Districts, - 1st Round 20 loc in 3 states)	Yes -2nd round for the 20 locality, 85%	3 <sup>rd</sup> Round in 11 locality 86%
Measles	Measles coverage	76%	80%	80%	83%	86.3%



	Number of outbreaks reported	1	1	1	1	5
	Catch- up campaign: Coverage	Yes in West Darfur	0	Yes 97%	No campaign	No campaign
	Age group	Coverage 75% 9m-15 y		9m-15yrs		
	Follow up campaign Coverage	0	Yes in 6 states 96%	Yes in 9 states 98%	No campaign	Yes 6 states 95%
	Age group		9m-5y	9m-5y		9 m – 5 yr

\*Coverage estimates above 100% are due to old census data (1993) and population movement as a result of conflict in South Sudan and Darfur areas.

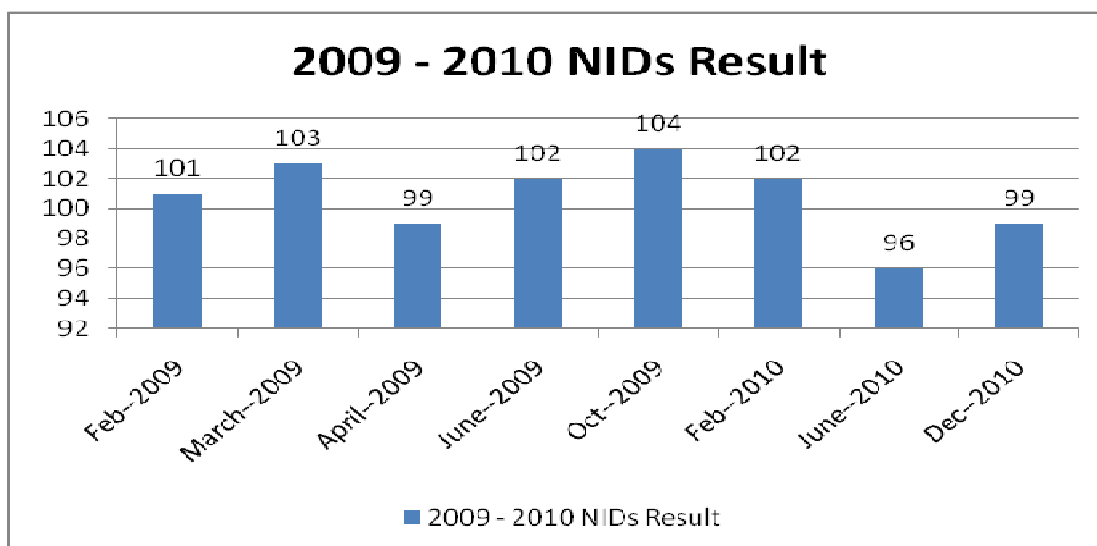
### 3.6.1-Polio Eradication Programme in Sudan:

Polio eradication programme is integrated with the expanded Programme on Immunization. It is highly supported by WHO, UNICEF and donors community. The two main components of the programme are the acute flaccid paralysis (AFP) surveillance system and supplementary immunization (SIAs) campaigns. The campaigns are conducted either to boost the immunity of the children or to stop the imported poliovirus circulation. The AFP surveillance performance indicators have reached the certification standard since 2001. These indicators remained above the target for the subsequent years.

During the period of the last EPI multiyear plan, Sudan has been affected by several wild poliovirus importations. The first one was in September 2007, which fortunately affected only one child in South Darfur. This importation was a real test for the national plan of preparedness and response to the wild poliovirus importation. The poliovirus was detected early (within 5 days of onset) and the response was early (within 15 days from receiving the confirmation result). According to the genomic sequencing, the source of importation was Chad. The possible route of entry was the nomads who move between Chad and Sudan. The size of the SIAs response was adequate (in 2007, three rounds of mOPV targeted 6.1 million children). The year 2008 witnessed two new episodes of poliovirus importation from Chad. The SIAs response was three NIDs rounds. This response stopped the circulation. In 2009 the SIAs were continued in order to boost the immunity of children. A third poliovirus importation occurred in the first quarter of 2009. The poliovirus moved from the Southern Sudan to affect one child in Khartoum State and four children in Red Sea State. The cases in Red Sea were among a group of people who complacent to immunize their children since birth. The immunization response was initiated immediately after the appearance of the first case in February 2009. The campaigns continued until the end of 2010.

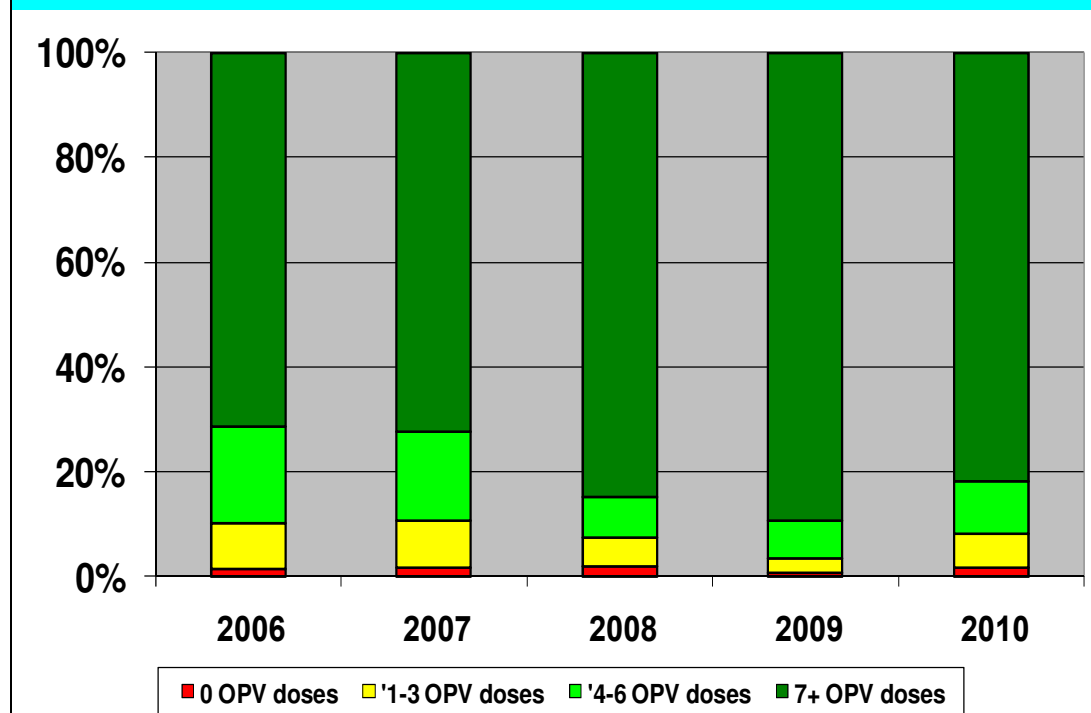
**Figure (3):**





As seen in the following graph, the number of OPV received by the non-polio AFP cases, the immunity level among children showed very good progress during the last five years. The proportion of children less than 60 months who received 4 OPV doses was above 80% since 2006.

**Figure 4. Percent distribution of AFP cases < 60 months by number of OPV doses, North Sudan 2006-2010**



The programme is supported by an accredited poliovirus laboratory. The lab has obtained the WHO accreditation since 2000.

### 3.6.2-Measles elimination



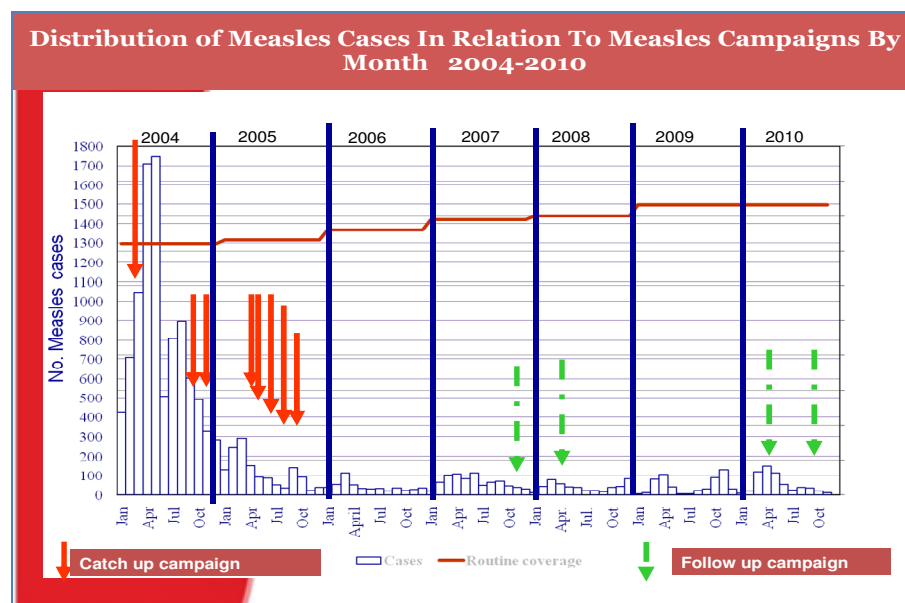
Prior to the introduction of measles vaccine in the Expanded Program on Immunization, measles was a leading cause of childhood morbidity and mortality.

The Regional Committee for the Eastern Mediterranean Region resolved in 1997 to eliminate measles from the region by 2010, which was not achieved and extended to 2015. EMR countries were divided into a measles control and a measles elimination group according to their measles epidemiology and control status, with Sudan placed in the elimination group

Sudan implemented catch-up and follow up campaigns in the period 2004-2010. These series of campaigns have had a substantial impact on the reduction of measles morbidity as illustrated in the figure below:



**Figure (5)**



Accordingly Sudan moved to the 2nd step in elimination (case based surveillance) as all EMRO countries.

Case based surveillance was established and implemented in all states with the laboratory as an integral part for establishing effective measles surveillance

With the help of laboratory analyses data is generated to identify population at risk and supports in monitoring and evaluating program activities, and guide policy decisions.

Since 2007 the surveillance was strengthened and most of the surveillance indicators were met the standards requirement (>80%) and the virus was isolated from a circulating point of an outbreak in West Darfur state and it was B3 and D4.

Table 8. Measles surveillance indicators 2007-2010

<b>Measles Field Surveillance Indicators 2007 - 2010</b>				
<b>Indicators</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Rate of Non- Measles Cases/100,000pop	2.47	1.6	1.3	2.3
Confirmed	315	31	20	18
Clinically Diagnosed	178	10	13	11
Lab confirmed		21	7	7
% samples for serology	75	95	96	91
% Adequacy of samples	100	93	98	98
% Notification<7 days of rash onset	100	100	94	93
%Investigated within 48 hrs	75	93	96	99
% results reported to EPI =< 7 days from received	100	95	97	79
(%) Proportion of localities that reported at least one suspected case with blood sample		19.5	34%	34%



To move further steps towards measles elimination Strengthening routine infant immunization with measles vaccination is a must and reaching 90% coverage MCV1 in all districts. The programme has achieved more than 80% measles coverage rate for consequent 3 years (2008-2010). However, the programme has not yet reached the elimination vaccination target of 95% in each district.

### **3.6.3- Maternal and Neonatal Tetanus:**

Neonatal tetanus has remained a major public health problem in Sudan and its elimination a real challenge. Despite previous attempts to accelerate the MNTE in the late 1990s, very little progress was achieved. The results of the Sudan Household Health Survey (SHHS) 2006 indicated high mortality in the neonatal and post natal periods: 41/1000 LB, 40/1000 LB respectively. This high proportion of neonatal deaths in the first 4 weeks of life indicates poor pregnancy and pregnancy related care with a significant number attributed to neonatal tetanus.

Due to several challenges including unavailability of funds delayed the implementation of the required TT vaccination in the high risk localities. Another factor contributed to the slow progress toward NTE is low coverage of antenatal care and most of the deliveries are happening in houses.

### **3.6.4- Accelerated Child Survival Initiative:**

During May 2008, for the first time in Sudan and in line with the Millennium Development Goals (MDGs); the expanded programme on immunization, in collaboration with other PHC programmes (Nutrition, CAH, Malaria, and Bilharzia control programme), successfully conducted an accelerated child survival jump start. In the subsequent years pulse campaigns known as Child Health days (CHDs) were jointly conducted with other vaccination activities.

A package of interventions was provided to under five years children. It included Measles vaccine, polio vaccine, Supplementation of vitamin A, Lipidol (Iodine supplementation), Albendazole (deworming), distribution of Long Lasting Insecticide Treated Nets and health awareness messages.

Based on the accumulated experience of vaccination personnel, EPI took the lead in the coordination, planning, implementation and evaluation of these campaigns.

## **3.7- VPDs Surveillance**

At present, information on health and disease indicators, including Vaccine Preventable Diseases (VPDs), is collected by different departments in the MOH according to their mandate.

The Directorate of Epidemiology is responsible for the collection, tabulation, analysis and distribution of epidemiological information on all diseases. This directorate identified lists of communicable diseases to be reported and all health professionals are required to report cases of these diseases. Diagnoses are based solely on clinical criteria. Under-reporting occurs in the whole country, there are problems of timely delivery of reports, poor local utilization of collected data, and lack of a proper feedback system. The basic and continuing training for statistics clerks is deemed inadequate.

The Directorate of Health Statistics runs a separate health information system to collect data on communicable and non-communicable diseases through monthly reports which are sent from health care facilities to the National Ministry of Health.

EPI established the AFP surveillance system. The purpose of the system is to document the interruption of wild poliovirus in the country. Since then, the system could achieved performance indicators at the level of certification. The AFP rate kept continuously above 2 per 100,000 while the



national adequate samples collection rate is maintained above 90% for the last ten years. Active surveillance visits have been made to the different monitoring sites in all states, representing about 95% of the visits planned. These visits have greatly contributed to upgrading the performance and following up the indicators at the different states, Districts and reporting sites. The system enabled the early detection of imported viruses and thus effective mopping up vaccination were done in good time.

Based on the success of the AFP surveillance system, measles and neonatal tetanus surveillance was integrated with the AFP surveillance system. The measles surveillance was established as case-based surveillance since 2006.

Data collection on other VPDs is provided monthly from the Districts to the state and ultimately to federal level. Specific guidelines for each disease was developed and distributed to all states.

As the surveillance system is getting maturation, an AEFI system was established in EPI. A national protocol was developed and distributed to states' EPI officers. The notification of serious events are immediately required.

Since 2007, case based surveillance of Rota virus and bacterial Meningitis BMS in under 5 years children was established in 8 paediatric hospitals in order to detect and document the circulating strains for new vaccines and to serve as a baseline data to assess the impact of introduction of these vaccines and during this planning cycle one of the big challenges in surveillance will be the integration of this system into the VPDs surveillance. Another challenge for VPDs surveillance is establishment of community surveillance for NNT as most of NNT cases die before they are presented to health facilities.

### **3.8- Other EPI Components**

#### **3.8.1- New Vaccines**

Within the previous 5-year plan, Sudan EPI had successfully introduced hepatitis B vaccine in 2006 in all Northern States. In January 2008 the DTP-HepB,Hib combination vaccine (Penta valent vaccine) has been introduced also in all Northern states. By the end of December 2010 high coverage was achieved (95%).

In anticipation of further potential vaccines to be included in the EPI and in line with the regional WHO EMR immunization goals, burden of disease estimates related to, diarrhoea caused by rotavirus, and meningitis caused by *Streptococcus pneumoniae* and *Neisseria meningitidis* had been started in 2007. The data available by the end of June 2009 shows 36% as proportion of rota virus cases out of the total reported gastroenteritis cases, 18% as proportion of pneumococcal meningitis cases out of the total reported bacterial meningitis cases and 71% as proportion of *Neisseria meningitidis* cases out of the total reported bacterial meningitis cases. This data was used for the application for Rota virus, pneumococcal and Mening A vaccines. The country experience with the last Yellow Fever outbreak in 2005 gave a good justification to introduce Yellow Fever vaccine. The MOH is decided to conduct a mass vaccination campaign against Yellow Fever and later to introduce the Yellow Fever vaccine in the routine vaccination programme in selected areas.

The burden of disease estimates related to congenital rubella syndrome and pneumonia caused by *Streptococcus pneumoniae* had not been implemented due to financial and logistics problems which will be addressed during the coming years.





### 3.8.2- Immunization Safety

Over the past years the Federal Ministry of Health has introduced Auto Destruct (AD) syringes for immunization purposes as well as safety boxes for the collection and disposal of used injection equipment with UNICEF and GAVI support. AD syringes and safety boxes are distributed bundled with the vaccines to the states, and are available and used in almost all centers. All health centers burn safety boxes either in the general waste disposal area or in drums and bury the remains. All health service staff is guided to follow this burn & bury procedure for health care waste disposal.

A new department was established at the EPI directorate in 2004, concerned mainly with safety of immunization and surveillance of adverse events following immunization (AEFI) and a coordinator has been appointed. A system to routinely report adverse events following immunizations (AEFI) has been established in the Sudan in 15 states. AEFI are reported during routine & campaigns activities. Three types of reporting are implemented , Immediate reporting for any serious events following immunization, weekly zero reporting to the EPI with AFP Zero Reports and monthly reports comprising all events (minor & major). The present EPI manual contains information for vaccinators on the AEFI for all routine vaccines and the appropriate procedures to follow in cases of their potential occurrence.

In 2007-2008 4 severe local reactions had been reported in 8 states, 6 abscesses in addition to 2 accidental events. 24 cases of AEFI were reported in 2010, 3 cases were serious events but it had no impact on vaccine introduction

### 3.8.3- Training and Capacity Building

In order to raise the technical capacity of EPI staff, training guidelines and manuals were prepared properly in 2003 and updated in 2005 and 2007 to accommodate all the new techniques and information concerning the introduction of new vaccines (Hep.B and Penta valent vaccines).

Many training courses had been conducted in 2006 – 2008 for EPI operations officers at all levels and the vaccinators at the immunization delivery sites.

All training material and registration documents will be updated again to include the Rota, Pneumococcal, Mening A and Yellow Fever vaccines.

### 3.8.4- Microplanning

As part of RED approach, the microplans of all accessible Districts (156 out of 157 districts) have been prepared since 2003 and annually updated by the District operation officers. These microplans are the basis of the annual plans at state and federal EPI.

### 3.8.5- Human Resources Management

A major issue in human resources management are insufficient salary levels and poor incentives, causing a high turnover and brain drain to other more financially rewarding posts. To reduce the negative impact, the EPI has come up with a system of incentives:

- *At federal level, the EPI has incorporated as part of its benefits structure subsidization of training (obtaining university degrees and attending short courses as well) to retain medical doctors and public health officers.*
- *At states level: there, was scheme is financed through GAVI and provides small monthly incentives to state EPI Operation officers based on agreed performance in achieving certain targets, but for financial reasons this project stopped during the last few years.*



- *For Districts, the incentive consists of training for mid-level management in the areas of vaccine management, and planning issues.*



### **3.8.6- Costing and Financing:**

Main partners of the EPI are WHO, UNICEF and some major NGOs. These partners provide technical and financial support to the programme for routine services as well as for the supplementary immunization activities. WHO's support includes deployment of international and national experts at different locations and co-coordinators at both federal and state levels. WHO further supports the AFP surveillance network, NIDs for polio eradication, training, and other routine and supplementary activities. UNICEF provides vaccines bundled with AD syringes and safety boxes for routine and campaign use. The Fund further supports polio NIDs, as well as MNT and other routine EPI activities (e.g. social mobilization and cold chain).

The EPI received GAVI ISS support since 2002 -2010. GAVI support was used for routine activities and it supported the phased introduction of new hepatitis B vaccine starting in 2005 and DTP\_HepB-Hib in 2008 as well. The Government is mainly responsible for payment of the permanent EPI staff at all levels (National, state, District, health unit), and supporting the programme with transportation and other logistical issues; also since 2006 National government took over the cost of injection supply, and since 2008 co-financed the cost of pentavalent vaccine and showed commitment to support additional new vaccines such as Rota, PCV, Mening A conjugate and Yellow Fever vaccines.

### **3.8.7. Advocacy and Communication**

The EPI Social Mobilisation Section is active primarily during the accelerated disease control campaigns. At the federal, state and Districts levels the section plays a major role in communication and attracting the community towards immunization days. In routine EPI services, communication activities are very poor especially in targeting reduction of drop-out rates and missed opportunities and this is mainly due to lack of funds for routine activities.

During the previous planning cycle, a workshop was conducted for training of social mobilization focal persons at state level. The workshop concluded certain recommendations. Some of those recommendations focused on evaluation of reasons that prevent mothers from coming to the vaccination centres through appropriate Knowledge, Attitude and Practice (KAP) studies. The workshop also recommended to develop communication plans for each state according to its social context. The planning of social mobilization activities at District level is one of the components of the routine micoplan.

EPI has established associations of 'Friends of Immunization' in some states in an attempt to collectively engage NGOs, religious leaders, and the private sector to support immunization services, create community demand and to encourage community participation in planning and monitoring of these services.

Annual celebration of immunization week started in Sudan since 2007 in month of July, In the last two years EPI celebrated the immunization week in April along with other EMR countries and other WHO regions.

### **3.8.8- Supplies, Cold Chain and Logistics**

#### **Cold Chain**



Between 2001 and 2004, the programme had completed the rehabilitation of the central cold store with introduction of advanced technologies for vaccine stock management (VSSM tool), temperature and electricity monitoring and control. Also during 2003 and 2004, the programme started the rehabilitation of the cold chain in the states resulting in an improvement of cold chain functionality from 50% in 2001 to 80% in 2004 which is maintained at this level up to 2010.

The cold chain operates in all states with cold stores at various levels. The central vaccine store in Khartoum comprises a total of 13 walk-in cold chambers, 11 of which operate at +4°C (160 cubic meters) with annual capacity of 64,000 liters, and 2 operate at -20°C (37 cubic meters). The central store thus provides adequate storage space for present and future needs for all infants vaccines as well as for potential booster doses. It is estimated that the capacity will be adequate for all supplementary immunization activities for the next 10 years. During the past few years, cold rooms have been installed in all 15 states. All state level cold chambers are of a standard design, and have a storage.

During 2008, the central cold store was certified under the WHO-Unicef Effective Vaccine Store Management Initiative (EVSMI) to be the 4<sup>th</sup> store world wide that received this certificate and the second in EMR. In 2009 an award of excellence from GAVI was given to for the effective cold store and vaccine management system in Sudan.

As a step in the preparation for the introduction of new vaccines a new cold room with storage capacity of 24,800 Litre was installed in the central cold store, also an assessment of the storage capacity needs at state and District level was done and accordingly 16 refrigerators were distributed to the states in addition to rehabilitation activities at state level.

Again for the introduction of the new coming vaccines with its large volume; a reassessment for the existing storage capacity and estimation of needed cold chain equipments was done at all levels of one big cold room at central level (i.e. 10,000L storage capacity will be installed) and another big cold room of 17,000 liters will be installed in Khartoum state, UNICEF and WHO have committed themselves to pay the cost (\$80,000 – \$100,000). At subnational levels the existing cooling (2 – 8) capacity is enough. During meningitis and yellow fever vaccination campaigns in phases, no major gap was estimated where the pack up storage capacity in the central medical stores will be used. According to CCEM conducted in 2008 a renewal plan to replace existing refrigerators and cold rooms is planned during the coming 5 years (addressed in equipment needs calculation in the cMYP 2011 - 2015 costing tool).

## **Vaccine Wastage**

Wastage rates indicators are regularly monitored at all levels. Health facility monthly reports contain basic information to calculate this indicator. Supervisors check the vaccine wastage during their visits and, the importance of reducing wastage rates is emphasised in programme planning at all EPI levels. The open vial policy is known and in use for OPV and TT. As a general rule, all health facilities provide BCG and Measles vaccines on fixed days in order to reduce wastage. Pentavalent monovalent vaccine has helped a lot in vaccinating children as soon as they present themselves to health facilities and wastage was kept just below 5%.



## 3.9-SWOT analysis of EPI programme

### 3.9.1- EPI System components

**Table 9: SWOT analysis of EPI system components**

System components	Strengths	Weaknesses	Opportunities	Threats
Service delivery and Programme management	<p>Effective EPI management system in place.</p> <p>Adoption of bottom up approach in planning</p> <p>Accumulative experience on District micro-planning since 2002.</p> <p>Presence of motivated, dedicated staff and trained qualified MLMs</p> <p>A functioning network of more than 1300 fixed immunization sites and around 4000 out reach posts</p> <p>Successful implementation of Reaching Every District (RED) approach since 2003.</p> <p>Successful introduction of new vaccines into the schedule</p>	<p>Shortage of human resources (vaccinators) and turnover of qualified personnel.</p> <p>High dependence on mobile activity in some states (&gt;60%)</p> <p>Dependency on acceleration campaigns to reach coverage targets in some states</p> <p>Around 24% of existing PHC facilities are not providing immunization</p> <p>Disparities within and between states in regard to coverage and drop-out rate.</p> <p>Insufficient transport for EPI activities at District level</p> <p>(31%) districts are of poor utilization (drop-out rate of &gt;10%) and 5 % districts of poor access (first dose coverage is less than 80%)</p>	<p>Global initiatives (e.g. GAVI, ACSD)</p> <p>- Integration with other PHC programmes</p> <p>- Availability of a sufficient number of national and international NGOs</p> <p>- Contribution of oil revenues to national economy.</p>	<p>Recent International economic crisis</p> <p>- Poor governmental contribution and over dependence on external resources</p> <p>- Ongoing Darfur conflict, internal displacement and population movement (Accessibility to insecure areas)</p> <p>- Unstable Federal organization and administrative structure</p> <p>- Delayed transfer of GAVI fund due to US sanctions against hard currency transfer to N. Sudan</p>
Vaccine supply, quality and logistics	<p>Certified national cold store under Effective Vaccine Store Management initiative (EVSM).</p> <p>Presence of functioning cold chain at national and state levels.</p> <p>Satisfactory vaccine management system.</p>	<p>Poor Maintenance system</p> <p>Shortage of trained qualified technician</p> <p>Aging cold chain equipments</p> <p>Inadequate and untimely supply of spare parts</p>	<p>GAVI NUVS/HSS.</p> <p>Expansion of electricity network following construction of Merrowi Dam which is supposed expands electricity net work to cover the whole country with a more reliable source of power.</p>	<p>War and theft</p>



	Availability of national data (Cold Chain Equipment Management) CCEM assessment) for all levels			
Surveillance	<p>Presence of sensitive AFP surveillance system</p> <p>Successful integration of measles case-based surveillance into AFP surveillance</p> <p>Presence of an accredited lab for Polio and measles surveillance</p> <p>Establishment of Rota virus and bacterial meningitis surveillance BMS</p> <p>Establishment of AEFI surveillance in all 15 northern states</p>	<p>Rapid turn over of medical staff working in sentinel sites</p> <p>Weak awareness of medical professionals about reporting AEFI</p>	<p>Presence of regional/global network for Bacterial Meningitis/Rota surveillance systems.</p> <p>Global trend towards evidence-based decision-making (SAGE recommendations)</p>	<p>Donor fatigue</p> <p>Phasing out of GAVI ISS beyond 2010</p>
Advocacy and communication	<p>High level of political commitment achieved</p> <p>Establishment of EPI friendship societies/ associations in some states</p>	<p>Political commitment not translated into financial support.</p> <p>Weak implementation of social mobilization strategies at service delivery level</p> <p>Poor involvement of private sector</p> <p>Poor involvement of PHC communication personnel in Routine EPI activities</p> <p>Weak community demand</p> <p>Inadequate use of evidence-based interventions,( e.g. Communication for development C4D)</p> <p>Low priority of resource's allocation for routine social mobilization activities</p>	<p>Wide spread presence of NGOs and Civil societies at community level.</p> <p>Re-establishment of Community Health workers (CHWs)/Community Health Promoters (CHPs).</p> <p>Wide and popular radio broadcast and availability of community radio listening groups supported by UNICEF.</p> <p>Advanced communication network in the country.</p>	<p>Anti-immunization activists.</p> <p>Public access to AEFI information</p>



### 3.9.2 Disease elimination/eradication Initiatives (Polio, Measles, and MNT)

Table 10: SWOT analysis of disease elimination/eradication initiatives				
Disease elimination/eradication Initiatives:	Strengths:	Weaknesses:	Opportunities:	Threats
<ul style="list-style-type: none"> <li>- Polio Eradication Initiative</li> <li>- Measles Elimination</li> <li>- MNT Elimination</li> </ul>	<p>Availability of SIAs dedicated mass of volunteers all over the country.</p> <p>Capacity to reach different communities/households in short period of time</p> <p>Accumulated national and international experience.</p> <p>Availability of a mass of International and National experts</p>	<p>Presence of pockets of susceptible children (Immunity gaps)</p>	<p>Community acceptance to additional doses</p>	<p>Presence of endemic countries and frequent importations.</p> <p>Misconceptions regarding TT vaccination in campaigns</p>

#### 3.9.3-Problems/Remaining challenges:

- Achievement and Sustainability of 95% routine National and district Immunization coverage.
- Poor Utilization and accessibility to sustained immunization services in some areas in the country.
- 
- Shortfalls of fund and logistic support.

#### 3.9.4-Future challenges:

- Introduction of new vaccines (Pneumococcal, Rota virus, Mening A conjugate and Yellow Fever vaccines).
- Enhancement of Surveillance of diseases targeted by the new vaccines.
- Achievement of global/regional disease eradication and elimination targets.



## **4- THE COMPREHENSIVE MULTI-YEAR NATIONAL IMMUNIZATION PLAN 2011-2015**

### **4.1-Vision statement:**

Provide equitable access for children, women of childbearing age (WCBA) and through out the life-course of population at risk to existing and new vaccines, and other interventions that lead to reduction of morbidity and mortality from vaccine preventable diseases in Sudan .

### **4.2-Mission:**

To achieve at least 95% coverage for all antigens and 70% coverage for WCBA with TT2+ coverage in order to reduce maternal, child & target population ill-health, disability and deaths attributable to vaccine preventable diseases.

### **4.3 - Programme objectives and mile stones**

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

1. To achieve and sustain 95% coverage of the third dose of Penta-valent vaccine and 70% TT2+ nationally.
2. To increase and sustain Penta 3 coverage by improving both access and utilization of immunization services all 157 districts.
3. To maintain Sudan polio-free
4. To achieve and maintain Measles elimination.
5. To contribute to and maintain NNT elimination.
6. To reduce morbidity and mortality caused by Rota virus, N. Meningitis, S. pneumonia and Yellow Fever.
7. To strengthen Surveillance system of VPDs/AEFI.
8. To enhance surveillance of diseases (Rota GE, Bacterial Meningitis and Yellow Fever) prevented by new vaccines in the selected sentinel sites
9. To strengthen Programme managerial capacity.
10. To ensure sufficient fund for EPI activities.





**Table 11: Programme objectives and mile stones**

Problem identified	Objective	Mile stones	Global/Regional targets	Order of Priority
Poor Utilization and access to sustained immunization services in some areas in the country (49 districts with > 10% DOR).	To increase and sustain Penta 3 coverage by improving both access and utilization of immunization services in the remaining 49 low performing districts	<p>2011: 20% (10) of low performing districts will achieve good access and utilization and penta3 coverage of &gt;80%</p> <p>2012: 40% (20) of low performing districts will achieve good access and utilization and penta3 coverage of &gt;80%</p> <p>2013: 60% (30) of low performing districts will achieve good access and utilization and penta3 coverage of &gt;80%</p> <p>2014: 80% (40) of low performing districts will achieve good access and utilization and penta3 coverage of &gt;80%</p> <p>2015: 100% (49) of low performing districts will achieve good access and utilization and penta3 coverage of &gt;80%</p>	All Districts to achieve and maintain Penta 3 coverage of >80%	1
Presence of surveillance gaps affecting evidence based decisions.	To Fill the gap in VPDs/AEFI Surveillance in order to reach and maintain 80% or more of all surveillance indicators	<p>Involvement of District Operations officers (DOOs) in VPDs/AEFI/Community surveillance</p> <p>By 30% in 2011, By 45% in 2012, By 60% in 2013, By 75% in 2014. By 90% in 2015</p>		1
Policy and Programme managerial gaps resulting in poor use of evidence, poor advocacy and communication.	To strengthen Programme managerial capacity	<p><u>Use of evidence</u></p> <p>2011; 100% of SOOs trained on identifying problems and on Problem Solving Approach</p> <p>2012: 50% of SOOs be able to conduct operational researches</p> <p>2013;100% of SOOs be able to conduct operational research</p> <p>2014; 100% of SOOs trained how to identify and use evidence on immunization</p> <p>2015 Maintain 100% of SOOs capacity to use evidence-based approach</p> <p><u>Advocacy and communication:</u></p> <p>2011: 15% of locality operation officers trained on advocacy and communication</p> <p>2012; 30% of LOOs trained on</p>		2



		advocacy and communication 2013; 45% 2014; 60% 2015; 75%		
Shortfalls of fund and logistic support.	To ensure sufficient fund for EPI activities	<p>2011: 100% co-finance, 5% of traditional vaccine cost and 2% of operational Programme cost is covered by national government</p> <p>2012: 100% co-finance, 10% of traditional vaccine cost and 4% of operational Programme cost is covered by national government</p> <p>2013: 100% co-finance, 15% of traditional vaccine cost and 6% of operational Programme cost is covered by national government</p> <p>2014: 100% co-finance, 20% of traditional vaccine cost and 8% of operational Programme cost is covered by national government</p> <p>2015: 100% co-finance, 25% of traditional vaccine cost and 10% of operational Programme cost is covered by national government</p>		1
Diseases' burden of Yellow Fever, GE, Pneumonia and bacterial Meningitis due to YF virus, Rotavirus, S. Pneumoniae and N. Meningitidis respectively is on the top priority list of morbidity and mortality in Sudan.	To reduce morbidity and mortality of under 5 children caused by YF, Rota virus, S. Pneumoniae and N. Meningitidis.	<p>2011: Rota virus vaccine introduction in the 15 states with coverage of second dose equal to 45% (introduction in the second half)</p> <p>2012: Mening A conjugate vaccine introduction in the form of mass campaign (&lt;30 years of age) with 95% coverage.</p> <p>2012: Pneumococcal vaccine introduction in the 15 states with coverage of third dose equal to penta3 (95%)</p> <p>2013 95% Coverage of 2nd dose of Rota vaccine and 95% coverage PCV. Conduct mass vaccination campaign against Yellow Fever (9 m - 60 years of age) with 95% coverage..</p> <p>2014: Introduction of Mening A conjugates vaccine into routine EPI.</p> <p>2015: Introduction of YF vaccine into routine EPI in high risk states and maintain 95% coverage of all newly introduced vaccines.</p>	WHO recommendation on global use of Rota, PCV, meningitis A conjugate and YF vaccines	1



Enhancement of Surveillance of diseases targeted by the new vaccines.	To strengthen Surveillance of diseases targeted by the new vaccines in the selected sentinel sites.	2011: 80% surveillance indicators 2012: 80% 2013: 90% 2014: 90% 2015: 100%	Achieve regional targets of BMS and Rota virus surveillance Network	2
Achievement and Sustainability of 95% National Immunization coverage.	To achieve and sustain 95% coverage of the third dose of Penta-valent vaccine and 80% TT2+ nationally	2011: 95% Penta3 coverage 52% TT2+coverage 2012: 95% Penta3 coverage 59% TT2+coverage 2013: 95% Penta3 coverage, 66% TT2+coverage 2014: 95% Penta3 coverage 73% TT2+coverage 2015: 95% Penta3 coverage 80% TT2+coverage	Penta 3 coverage of not less than 95%	1
Achievement of global/regional disease eradication and elimination targets	To the country polio-free status	2011: containment of laboratory WPV and sustained interruption of transmission 2012: Sustain absence of (WPV) transmission 2013: Sustain absence of (WPV) transmission 2014: Sustain absence of (WPV) transmission 2015: The country is certified Polio free	Polio eradication by 2015	1
	To achieve and maintain Measles elimination.	2011: 50% of outbreaks have < 10 cases per outbreak 2012: 80% outbreaks have < 10 cases per outbreak. 2013: All outbreaks have < 10 cases per outbreak 2014: Measles incidence will be reduced to less than 1 case per million population. 2015: Indigenous virus transmission has been stopped and measles elimination target reached	Measles elimination by 2015	1
	To contribute and maintain NNT elimination.	2011: 75 High Risk Districts (HRL) Not yet eliminating NNT (<1/1000LB) 2012: 55 HRL Not yet eliminating NNT (<1/1000LB) 2013: 35 HRL Not yet eliminating NNT (<1/1000LB) 2014: 15 HRL Not yet eliminating NNT (<1/1000LB) 2015: All Districts eliminating NNT	NNT elimination by 2015	2



#### 4.4- Programme strategies and key activities 2011-2015.

Based on the current status of the programme and with respect to fore-mentioned objectives, a list of the proposed strategies and key activities is developed in the below table. A timeline for their implementation over the next five years is being developed annually. Strategies and activities are listed in the sequence of the 10 national objectives given above

**Table 12: Programme strategies and key activities**

Objective	Strategies	Key activities	Indicators
1- To achieve and sustain 95% coverage of the third dose of Penta-valent vaccine and 70% TT2+ nationally	Implement RED strategies which include:	Preparation of District micro-plans	Proportion of children under one year vaccinated with the third dose of pentavalent vaccine
	-Planning and management of resources	Availing sufficient and adequately paid staff	
		Training of staff at various levels	
	Sustaining out reach services	Organizing study tours internally and externally	Proportion of pregnant women vaccinated with TT2+
		Provision of vaccines and cold chain Provision of transport Provision of staff per-diems Provision of Immunization records and registers	
	Supportive supervision	Strengthen the use of Data Quality Self assessment (DQS) supervisory tool	
		Conduct joint supervision with other health department	
	-Monitoring for action	-Avail guidelines and forms for data collection -Analysis of data and feedback -Information sharing mechanism	
		-Regular advocacy activities among community leaders - Expansion of EPI Friendship societies -Establishing new partnership with civil societies/popular groups -Development of Information, Education, Communication (IEC) materials -Organizing awareness campaign	
	-Linking with community* (this will tackle social mobilization activities related to all objectives)		



		-Regular inter-personal communication activities at service delivery level.	
	Reduce drop out rate	-Strengthening defaulter tracing system. -Reduce missed opportunities	
	Linking with other health interventions	-Establishing appropriate mechanism for coordination -Piggyback of EPI interventions on other departments' interventions and vice versa.	
2- To increase and sustain Penta 3 coverage by improving both access, utilization of immunization services in the remaining 49 low performing districts	Re-establish out reach services	Provision of sufficient fund for out reach activities Advocacy visits by federal staff with top officials in concerned Districts and their respective states for securing fund and minimize turn over of staff	Proportion of Districts with good access & utilization & penta3 coverage >80%
	Re-establishment of defaulter tracing system	Train DOOs on advocacy and communication  Based on available guidelines each vaccination post prepare a monthly list of defaulters  Conduct home visits as planned  Utilization of CHWs/CHPs to increases community awareness about Immunization and completing scheduled doses	% DOR
	Implementation "Hit and Run" campaigns in the security compromised areas	Open a channel of communication with effective armed group through local leaders and UN agencies  Involvement of National and international NGOs working in these areas	
3- To maintain the country polio-free status	High quality SIAs (ie all indicators are 95% or more)	Update SIAs manuals	# of Polio cases  OPV coverage rate >95% by finger marking during SIAs  <i>Surveillance indicators included in objective 3</i>
		Update Micro-plans at all levels	
		Conduct NIDs/SNIDs	
	Enhanced AFP surveillance	Receive zero reports with 90% or more completeness and timeliness	
		Conduct high quality active surveillance	
		Complete all documentation required for certification	



		Invite WHO consultant for polio laboratory accreditation	
		Provision of necessary equipments for polio lab to perform Intra-typic differentiation(ITD)	
		Produce quarterly AFP bulletin	
		Involvement of community volunteers in AFP reporting	
4-To achieve and maintain Measles elimination.	Provide second opportunity for measles vaccination for < 5yrs children	Conduct measles follow up campaigns in the 15 states	Rate of confirmed measles cases/1000000 population  <i>Surveillance indicators included in objective 3</i>
		Introduce measles second dose in routine schedule provided routine measles coverage is >80% for three consecutive years.	
	Strengthen measles case-based surveillance	Preparation of preparedness plan to predict measles outbreaks	
		Investigate all out breaks by an experienced team	
		Provide basic and refresher training for surveillance officer/focal persons	
		Provision of lab equipments for measles virus isolation	
	Achieve and maintain 95% or more for measles coverage among infants	see activities under objectives 1 & 2 (coverage)	
5-To contribute to and maintain NNT elimination	TT routine vaccination of pregnant women	see activities under objectives 1 & 2 (coverage)	Rate of NNT/1000LB  <i>Surveillance indicators included in objective 3</i>
		Expanded use of Protection At Birth (PAB)	
	High quality SIAs in HRLs	Update SIAs manuals	
		Update Micro-plans at all levels	
		Conduct MNT campaigns in all high risk Districts	
	Integrated NNT surveillance with AFP	Develop manual for case based NNT surveillance	
		Train of AFP personnel on NNT reporting and investigation	
	Community Based Surveillance in HRL that completed MNT campaigns(ie 3 rounds)	Develop manual for community surveillance	
		Involve community volunteers/CHP for reporting of NNT cases	
		Training of Volunteers (CHWs & CHPs)	



6- To reduce morbidity and mortality of targeted population caused by YF virus, Rota virus, S. Pneumoniae and N. Meningitidis.	Introduction of new vaccines (Rota virus vaccine, PCV, Mening A conjugate and Yellow Fever vaccines.	Revision of training material and guidelines including AEFI Update of immunization registers and records Develop, print and distribute IEC materials and organize social mobilization/sensitization campaigns Training of EPI staff - Post introduction evaluation	
7-To Fill the gap in VPDs/AEFI Surveillance in order to reach and maintain 80% or more of all indicators of	Building capacity for the surveillance	- Update and distribution of surveillance Manuals -Maximize utilization of existing AFP surveillance staff -Involve DOOs in VPDs surveillance Conduct Basic and refresher training for DOOs and focal persons at reporting sites Complete basic training of surveillance officers on AEFI - Involvement of National Regulatory Authority (NRA) in AEFI surveillance - Establish post marketing surveillance system - Training on AEFI causality assessment	Attaining performance indicators according to elimination/eradication targets
	Involvement of medical professional in AEFI	Conducting orientation sessions for medical professionals about all surveillance issues Training of medical professional on reporting and investigation of AEFI Printing and distribution of formats and manuals	
	Active AEFI surveillance	-Development of Standard Operating Procedures (SOPs) -Train Surveillance officers - Conduct active visits to sentinel sites	
8-To enhance Surveillance of diseases targeted by the new vaccines	Integration of surveillance of diseases prevented by new vaccines into VPDs surveillance	Preparation of integrated surveillance guidelines/manuals Provide basic and refresher training for surveillance officer/focal persons Provision of lab equipments for sentinel sites	Use of VPDS'surveillance performance indicators mentioned above.
9-To strengthen Programme managerial capacity	Evidence-based management	Train SOOs on Problem-Solving Approach. Train SOOs on Operational research and use of evidence	



		on immunization.	
	Completing missing systems in the Programme (e.g. cold chain maintenance)	Develop effective cold chain maintenance system -Improve procurement system in order to have cold chain spare parts in time	Cold chain maintenance system developed  # of new partners involved in IACC  # of Memoranda Of Understanding (MOU) signed
	Building partnerships with NGOs and civil societies	Establish coordination and information sharing mechanisms with partners(PHC programmes, NGOs and other health related departments Use of PHC staff in immunization activities in selected areas at service delivery levels Develop MOU with civil society organizations to promote vaccination	
	Strengthening the role of IACC and enhance inter-sectoral collaboration	Add new influential members to IACC Revise and update mandate Conduct regular quarterly meetings Develop SOP	
	Evidence- based management	- Train SOOs on Problem Solving Approach Train SOOs on operational research and use of evidence on immunization	
10-To ensure sufficient fund for EPI activities	Completing missing systems in the Programme (eg: cold chain maintenance, Building partnerships with NGOs and civil societies.	-Develop effective cold chain maintenance system -Improve procurement system in order to have cold chain spare parts in time  Establish coordination and information sharing mechanisms with partners(PHC programmes, NGOs and other health related departments Use of PHC staff in immunization activities in selected areas at service delivery levels Develop MOU with civil society organizations to promote vaccination	% contribution to traditional vaccines'cost.  % contribution to new vaccines'cost.





		Mobilize GoS fund to cover the new vaccines co-financing.	
		Conduct regular follow-up meetings with concerned financial departments in NMoH and FmoF	
		Mobilize and involve new national and international donors	
		Conduct national resource mobilisation workshop	
		Prepare and submit appropriate funding proposals	
	Equitable resource allocation to various EPI component	Fair allocation of budget for each EPI component	



## 4.5- Cost and Financial Analysis of cMYP 2011-2015

### 4.5.1- Notes/ assumptions relating to costing calculations

- Source for Sudan macroeconomic indicators was Sudan National health accounts 2008, except for TGE as % of THE which is from [www.who.int/nha/countries](http://www.who.int/nha/countries) site. The last projection year was 2007.
- The source of:
  - *Vaccines prices per dose are the vaccines prices sheet in the cMYP costing tool version 2.5*
  - *Cold chain equipment cost for the year 2010 is UNICEF/Sudan EPI project officer.*
- *Vaccines cost and cost of vaccine clearance, storage and delivery is calculated using the EPI logistics' forecasting tool*
- **Demographic data projection:**

Census population data 2008 is not used for the targeted population in this planning cycle for the following reasons:

- 1- In 2009 EPI technical group compared census population data for states with the population projections of the previous year using the last central bureau of statistics-UNDP Sudan population data sheet, 2004; most of the states had census population figures less than projected population.
- 2- As there are no new population data sheets released since 2004, these indicators were used to calculate Surviving infants from the census population and compare it with the first dose of pentavalent coverage achieved (as an indicator for access) and Polio campaigns 2008 coverage results. Also it was found that census population 2008 is less than vaccinations of first pentavalent vaccine in 60% of the states (9 states).

Decision was made to use operational figures that depend on comparing the annual state achievement (Penta 1 coverage) for the previous year with the projections made for the coming year, the greater figure will be taken as the surviving infants' denominator for the New Year.

The EPI technical group decision was based on the fact that it is better to plan for more children so as not to have vaccine stock-outs or missed children than to plan on a figure that can be lower than what actually exists.



#### 4.5.2-Base line year 2010

##### Cost analysis

During 2010 the total expenditure on Expanded Immunization program (Immunization specific) was US\$34.6 million with 59.2% (20.5 Million) covered the routine expenditure and 40.8% for supplemental activities. In other words, out of each 10 dollars; 5.9 dollars were spent on routine immunization.

In per capita terms the cost of routine immunization was U\$0.6, and if we looked at the cost per DTP 3 child it was US\$18.7 which is considered to be average compared to other countries.

Table 13: Baseline year cost analysis	
Baseline Indicators	2010
Total Immunization Expenditures	\$34,616,560
Campaigns	\$14,111,963
Routine Immunization only	\$20,504,597
per capita	\$0.6
per DTP3 child	\$18.3
% Traditional Vaccines and supplies	10.0%
% National funding	2.7%
% Total health expenditures	0.6%
% Gov. health expenditures	1.6%
% GDP	0.02%
Total Shared Costs	\$679,884
% Shared health systems cost	2%
TOTAL	\$35,296,444

As clear from table 13; expenditure on routine immunization constituted 0.6% of estimated total health expenditure and only 0.02% of the GDP.

Total shared cost was US\$679,884, thus raising the total expenditure on immunization to US\$35.3 .

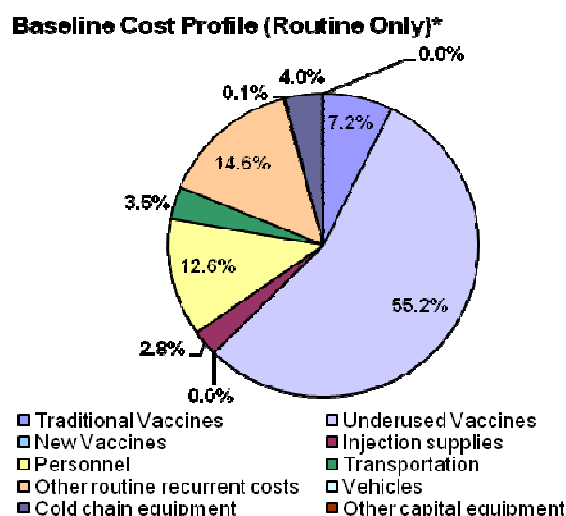
In **routine expenditure** the major cost driver was vaccines cost (traditional & underused) amounting for 62.4% (US\$12.8 million) of total routine expenditure, this is mainly due to the cost DTP-Hep-Hib which required US\$ 11.3 million.

Personnel cost ranked the second after vaccines constituting 12.6% (US\$2.6million), followed by overhead and maintenance12.3% (US\$2.5 million), then come the other routine recurrent costs 5.8% included maintenance and overhead, training, IEC/social mobilization, surveillance and program management.

Remaining cost was the cost of capital (cold chain equipment, vehicles and other equipments) (4.1%) and procurement of injection supplies (2.8%)

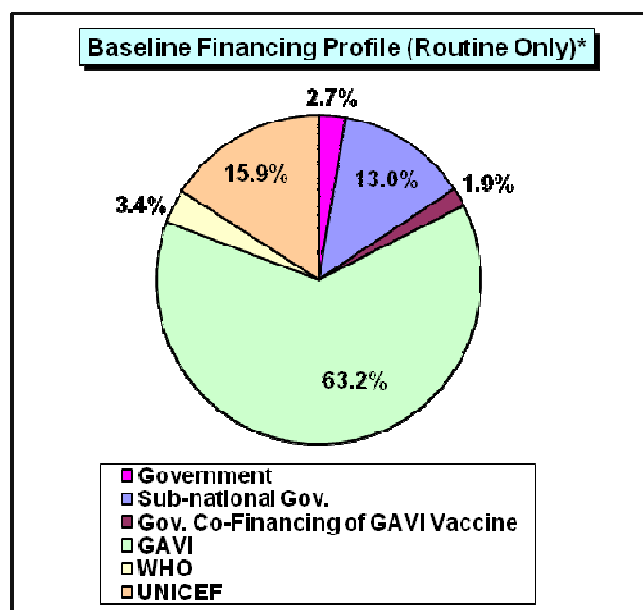
#### Figure (6)





## Baseline year financing

Figure (7)



\*Immunization specific routine expenditure.

From the above figure GAVI is the major financing source for routine immunization during 2010 covering mainly underused vaccines cost and outreach activities. UNICEF ranked the second funding source as it covered the cost of traditional vaccines, injection supplies, in addition to part of the training and social mobilization activities and most of cold chain maintenance.

Sub-national government as the third funding source had covered 13% (US\$2.6 Million) of total EPI expenditure. This was mainly to cover salaries of full EPI workers.

National government financing was 4.6% of routine expenditure 2010 placing it in the fourth rank. This fund covered the co-finance of DTP-HepB-Hib vaccine mainly but also covered Salaries for full EPI workers at national level and purchase of some cold chain equipment

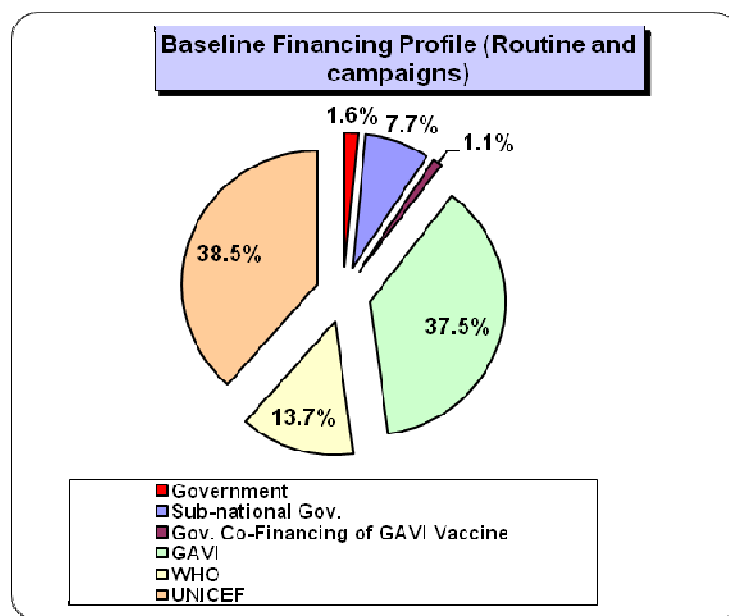
WHO covered 3.4% of total 2010 expenditure; funding disease surveillance and part of training and program management activities.



Table 14: Future resource requirements 2011-2015

The above financial picture will change if we included supplemental immunization activities as seen in figure (8) below.

Figure (8)



UNICEF became the major funding source (38.5 %), while GAVI stepped back to be the second funding source contributing (37.5%) covering the above mentioned routine line items.. WHO moved to be the third financing source during 2010 due to their major contribution to the operational cost of campaigns. Government (both national and sub national) ranked the last as they didn't have any recognizable contribution to campaigns cost.

#### 4.5.3- Future resource requirements, financing and gap analysis 2011-2015

In order to achieve the national objectives mentioned in previous chapters, there would be a significant increase of expenditure as explained below;

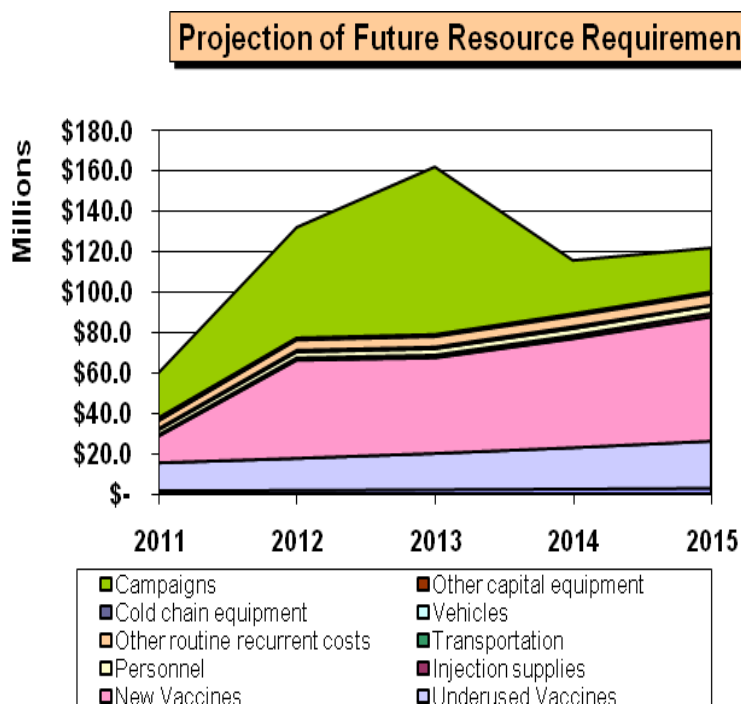
##### Future resource requirements

As seen in the below table; a resource envelope of U\$595.7 million will be needed over the plan period, with an annual average of U\$119,2 million which is much more than that in the baseline year (U\$34.8 Million). This increase is mainly due to the planned introduction of new vaccines (Rota, Pneumococcal and Meningitis A conjugate and yellow fever campaigns).

As clear from table below; there is some increase in routine required resources in 2011 compared to 2010 due to the planned introduction of rota vaccine in the second half of the year. While there is almost doubling of routine required resources during 2012-2015 compared with 2011 due to also planned introduction of pneumococcal vaccine in 2012 in addition to the newly introduced rota vaccine. There is an increase in total resources required during 2012-2013 compared to other years due to the planned meningococcal A campaign in 2012 and yellow fever campaign during 2013.

cMYP Component	2011	2012	2013	2014	2015	Total 2010 - 2015
	US\$	US\$	US\$	US\$	US\$	US\$
Vaccine Supply and Logistics	33,123,548	72,265,885	73,741,467	83,588,129	94,822,268	357,541,296
Service Delivery	3,533,148	3,789,974	4,058,559	4,338,139	3,840,760	19,560,581
Advocacy and Communication	233,206	247,277	145,210	162,925	182,802	971,420
Monitoring and Disease Surveillance	368,214	404,962	462,705	509,800	581,538	2,327,219
Programme Management	740,840	686,830	663,446	695,313	730,086	3,516,515
Supplemental Immunization Activities	22,086,683	54,539,462	82,697,479	26,330,667	21,592,017	207,246,307
Shared Health Systems	938,281	894,623	912,516	930,766	949,381	4,625,567
<b>GRAND TOTAL</b>	61,023,920	132,829,013	162,681,383	116,555,739	122,698,851	595,788,907
<b>Routine only</b>	38,937,238	78,289,551	79,983,903	90,225,072	101,106,835	388,542,600

**Figure (9)**



The above figure (9) shows the break down of required resource by category.

This routine resource requirement can be translated into \$ 63 per DTP3 child and 2 dollar per capita, this means 3.5 folds increase in cost per DTP3 child compared to baseline year.

### Financing and gap analysis

Looking at the financial profile for the plan period (see in the below table); the total secure funds are US\$ 281.8 million; with a funding profile as follows: GAVI the major funding source followed by UNICEF, then national government and subnational government. Lastly comes WHO as a funding source.

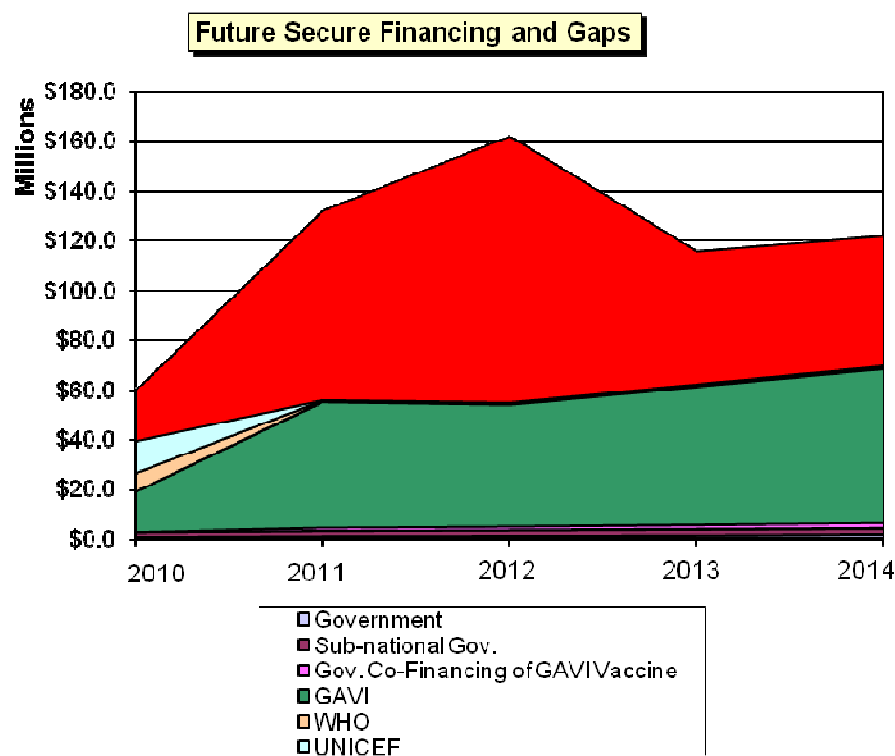


The funding gap when considering only **secure** funds will reach an average 53% of total resource requirements (see the table and figure Below);

<b>Table15 :Future resource requirement, secure financing profile and funding gap</b>						
<b>Resource Requirements, Financing and Gaps</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2011 - 2015</b>
<b>Total Resource Requirements (US\$)</b>	60,085,639	131,934,390	161,768,867	115,624,974	121,749,470	591,163,340
<b>Total Resource Requirements (Routine only) (US\$)</b>	37,998,956	77,394,928	79,071,388	89,294,307	100,157,454	383,917,033
Per capita	1.1	2.1	2.1	2.3	2.5	2.0
Per DTP3 child	32.9	65.3	65.0	71.4	78.0	63.0
<b>Total Secured Financing(US\$)</b>	39,399,669	55,834,281	54,820,884	62,162,607	69,604,492	281,821,933
Government	670,988	1,056,386	1,202,672	1,370,352	1,788,866	6,089,265
Sub-national Gov.	1,865,294	2,040,693	2,224,262	2,415,196	2,387,258	10,932,703
Gov. Co-Financing of GAVI Vaccine	201,290	1,064,665	1,018,070	1,185,196	1,432,275	4,901,495
GAVI	16,305,861	50,917,344	49,515,744	56,230,335	62,900,156	235,869,440
WHO	7,421,016	462,180	519,923	567,018	638,756	9,608,894
UNICEF	12,935,221	293,013	340,212	394,510	457,181	14,420,136
<b>Funding Gap (with secured funds only) (US\$)</b>	<b>20,685,969</b>	<b>76,100,109</b>	<b>106,947,984</b>	<b>53,462,367</b>	<b>52,144,979</b>	<b>309,341,407</b>
<b>Resource Requirements, Financing and Gaps</b>	<b>34%</b>	<b>58%</b>	<b>66%</b>	<b>46%</b>	<b>43%</b>	<b>52%</b>

Note:.. Costs not including Shared health system costs

**Figure (10)**



Composition of this funding gap is shown in table 16 below;

<b>Table 16: composition of funding gap considering secured funds only</b>						
<b>Composition of the funding gap</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Avg. 2010 - 2015</b>
Vaccines	86,410	198,216	34,096	517,631	741,825	1,578,178
Personnel	14,223	30,939	161,943	72,622	97,896	377,623
Transport	14,535	29,650	45,362	61,690	-	151,237
Activities and other recurrent costs	2,288,490	3,434,903	3,409,208	3,569,029	3,732,705	16,434,335
Logistics (Vehicles, cold chain and other equipment)	1,270,876	637,947	630,103	648,925	667,534	3,855,384
Campaigns	2,321,959	54,539,462	82,697,479	26,330,667	21,592,017	187,481,584
<b>Total Funding Gap</b>	<b>5,996,493</b>	<b>58,871,117</b>	<b>86,978,191</b>	<b>31,200,564</b>	<b>26,831,977</b>	<b>209,878,342</b>

Out of the funding gap; US\$ 187.5 Million (89.3%) are needed to cover campaigns cost. Other areas that have no secure funding source yet are the cost of overhead and maintenance, procurement of capital equipments especially cold chain and vehicles, and cost of the new vaccines

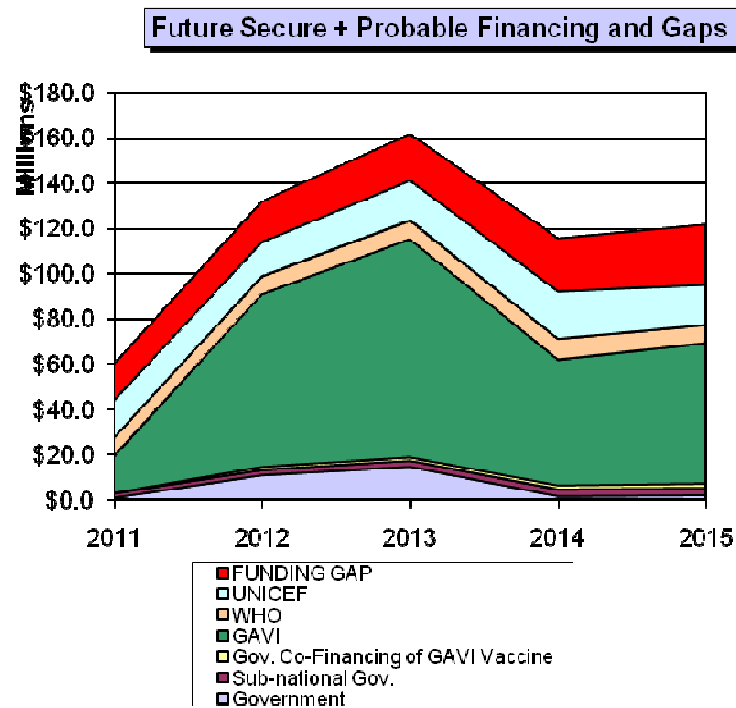
Then if we considered both secured and probable funds; the funding gap will drop dramatically to 18% as all partner are discussing that they are planning to continue covering what they used to cover in immunization but they cannot guarantee the availability of funds for 1or 2 years at maximum. See the below table

<b>Table 17:Future resource requirement, secure and probable financing profile and funding gap</b>						
<b>Resource Requirements, Financing and Gaps</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2011 - 2015</b>
<b>Total Resource Requirements (US\$)</b>	60,085,639	131,934,390	161,768,867	115,624,974	121,749,470	591,163,81340
<b>Total Resource Requirements (Routine only) (US\$)</b>	37,998,956	77,394,928	79,071,388	89,294,307	100,157,454	383,917,033
Per capita	1.1	2.1	2.1	2.3	2.5	2.0
Per DTP3 child	32.9	65.3	65.0	71.4	78.0	63.0
<b>Total Probable Financing(US\$)</b>	<b>4,639,207</b>	<b>58,045,849</b>	<b>86,313,992</b>	<b>30,034,009</b>	<b>25,422,617</b>	<b>204,455,674</b>
Government	10,232	9,622,358	13,141,001	29,400	41,233	22,844,224
Sub-national Gov.	100,355	249,515	490,984	527,075	599,030	1,966,961
Gov. Co-Financing of GAVI Vaccine	0	0	0	0	0	0
GAVI	0	25,738,992	47,503,659	0	0	73,242,651
WHO	718,098	7,347,302	7,684,906	8,606,803	7,303,706	31,660,815
UNICEF	3,810,522	15,087,681	17,493,441	20,870,731	17,478,648	74,741,023
<b>Funding Gap (with secured and probable funds) (US\$)</b>	<b>16,046,762</b>	<b>18,054,261</b>	<b>20,633,991</b>	<b>23,428,358</b>	<b>26,722,361</b>	<b>104,885,733</b>
<b>Resource Requirements, Financing and Gaps</b>	<b>27%</b>	<b>14%</b>	<b>13%</b>	<b>20%</b>	<b>22%</b>	<b>18%</b>





Figure (11)



In this way the gap will be composed of capital costs (Vehicles and other equipment) only. See table 18 below;

Table 18: composition of funding gap considering secured and probable funds						
Composition of the funding gap(US\$)	2011	2012	2013	2014	2015	2011 - 2015
Vaccines and injection equipment	0	0	0	0	0	0
Personnel	0	0	0	0	0	0
Transport	0	0	0	0	0	0
Activities and other recurrent costs	0	0	0	0	0	0
Logistics (Vehicles, cold chain ect)	1,270,876	627,052	630,103	648,925	667,534	3,844,489
Campaigns	0	0	0	0	0	0
<b>Total Funding Gap*</b>	<b>1,270,876</b>	<b>627,052</b>	<b>630,103</b>	<b>648,925</b>	<b>667,534</b>	<b>3,844,489</b>



### Government co-financing for under used and new vaccines:

During the period 2010-2015, the government share for under used and new vaccines will be US\$16.2 million with an average annual of US\$3.2 except for the first year where only Rota vaccine will be introduced and it would be in June, 2011

Detailed co-financing for each vaccine by year is in table 18 below

**Table 18: Government co-financing for under used and new vaccines 2010-2015**

GAVI Order of Vaccines	Vaccine	Classification	2011	2012	2013	2014	2015
			\$	\$	\$	\$	\$
1st Vaccine*	DTP-Hep B-Hib	Underused	1,224,545	1,386,768	1,638,161	1,935,127	2,285,927
2nd Vaccine	Rota vaccine	New	268,386	681,368	718,079	848,252	1,002,023
3rd Vaccine	PCV10	New		827,059	936,624	1,106,415	1,306,986
<b>TOTAL</b>			<b>1,492,931</b>	<b>2,895,195</b>	<b>3,292,864</b>	<b>3,889,795</b>	<b>4,594,937</b>

\* The 1st vaccine co-financed is calculated in this FSP as intermediate group according to GAVI distribution, while in the approval year the country was in the fragile group

### Government co-finance for Meningitis and Yellow fever campaigns

As GAVI will cover the vaccine and injection supplies cost and 0.3 Dollar per capita of the operational cost of Meningitis and yellow fever campaigns, the rest of the operational cost is going to be covered by the government which will amount 9.6 Million US\$ for Meningitis A campaign (2012) and 13.1 Million for Yellow fever (2013)



#### 4.5.4-Sustainability analysis

The annual resource requirement for routine immunization during the plan period will represent between 1-2.5% of the total expenditure on health, and between 2.5-6.8% of government expenditure on health. These needs are translated into an average US\$ 2.02 per capita which more than double the base line year. See table 19 below;

Table 19: Macroeconomic and Sustainability Indicators						
	2010	2011	2012	2013	2014	2015
<b>Reference</b>						
Per capita GDP (\$)	2,827	2,827	2,827	2,827	2,827	2,827
(THE per capita \$)	102	102	102	102	102	102
Population	34,733,535	35,678,287	36,648,737	37,645,582	38,669,542	39,721,354
GDP (\$)	98,188,230,092	100,858,949,950	103,602,313,389	106,420,296,313	109,314,928,373	112,288,294,424
(THE \$)	3,525,453,803	3,621,346,146	3,719,846,761	3,821,026,593	3,924,958,516	4,031,717,388
(GHE \$)	1,290,316,092	1,325,412,689	1,361,463,915	1,398,495,733	1,436,534,817	1,475,608,564
<b>Resource Requirements for Immunization</b>						
Routine and Campaigns (\$)	33,803,989	60,085,639	131,934,390	161,768,867	115,624,974	121,749,470
Routine Only (\$)	19,692,027	37,998,956	77,394,928	79,071,388	89,294,307	100,157,454
per DTP3 child (\$)	17.5	32.9	65.3	65.0	71.4	78.0
<b>% Total Health Expenditures</b>						
Routine and Campaigns	1.0%	1.7%	3.5%	4.2%	2.9%	3.0%
Routine Only	0.6%	1.0%	2.1%	2.1%	2.3%	2.5%
<b>Funding Gap</b>						
With Secure Funds Only		0.6%	2.0%	2.8%	1.4%	1.3%
With Secure and Probable Funds		0.4%	0.5%	0.5%	0.6%	0.7%
<b>% Government Health Expenditures</b>						
Routine and Campaigns	2.6%	4.5%	9.7%	11.6%	8.0%	8.3%
Routine Only	1.5%	2.9%	5.7%	5.7%	6.2%	6.8%
<b>Funding Gap</b>						
With Secure Funds Only		1.6%	5.6%	7.6%	3.7%	3.5%
With Secure and Probable Funds		1.2%	1.3%	1.5%	1.6%	1.8%
<b>% GDP</b>						
Routine and Campaigns	0.03%	0.06%	0.13%	0.15%	0.11%	0.11%
Routine Only	0.02%	0.04%	0.07%	0.07%	0.08%	0.09%
<b>Per Capita</b>						
Routine and Campaigns	\$0.97	\$1.68	\$3.6	\$4.30	\$2.99	\$3.07
Routine Only	\$0.57	\$1.07	\$2.11	\$2.10	\$2.31	\$2.52

As assumed in the tool if the country economic situation and its expenditure on health did not change so much during the plan period, the NMoH has to exert more efforts with the National Ministry of Finance (NMoF), UNICEF, WHO and other potential partners in order to secure sufficient resources to the EPI program in order to implement the cMYP. The IACC is expected to play a major role in this regard; otherwise coverage targets will be revisited.



#### 4.5.5-Strategies towards Sustainability

The optimistic prognoses concerning economic development and allocation of more public resources to health sector will not contribute to secure enough financing from the local sources, considering other competing priorities in health care such as tertiary care and health infrastructure rehabilitation.

To achieve the best results based on the program strengths and underlying opportunities as well as overcoming any forthcoming risks, this plan includes a set of strategies based on the local context and program vision. Addressing the financial gap is a matter of primary importance.

The program strategies would be articulated upon the following:

##### 1- Strategies to increase efficiency/effectiveness of current EPI program.

- Considering that **vaccines** are the **major cost driver** of required resources major efforts will be directed towards improving vaccine wastage rates through adequate training for DOOs and health workers on vaccine management, MDVP and wastage control as well as increasing coverage.
- Raise funding and use a social mobilization/IEC approach to direct families to fixed sites to maximize use of existing immunization services.
- Transfer of skills and competences at the District levels through more training and increase technical capacities of Districts Operations Officers (DOOs) in vaccine management and implementation of all components of RED Approach especially in low performing localities.
- Continue use of DQS tool to improve data quality and enhance use of data timely especially at lower levels.
- Adequately equip the localities stores with reliable cold chain equipment based on CCEM data.

##### 2- Strategies to increase resource allocations:

- To introduce another budget line item in the plan of ministry of finance to cover the operational and development cost beside government co-financing of the Rota and Pneumococcal vaccines.
- Advocate for and ensure incremental increase in government contribution for program operational costs (2% annually),
- Obtain commitment from new and traditional donors to continue their support especially in the following areas; capital equipments, short term training and IEC/social mobilization.
- Using the cMYP to advocating more/new donor support (World Bank, JICA, private sector, etc) to ensure better commitment and support to immunization services and attaining MDGs. This support will be directed to capital investment especially cold chain and transport.
- Use opportunity of GAVI HSS to fund outreach activities and procure cold chain equipment to low performing localities in targeted states.

##### 3- Strategies to increase resource reliability

- To advocate and sensitize Districts on prioritization of EPI activities and use of local revenues and ensure availability of specific budget line items for the EPI program to finance their local activities.
- Advocate for better integration of resources and maximize use of shared cost and other existing opportunities.
- Add new influential members to IACC



**Table 20: Activities and indicators for follow up of financial sustainability strategies**

Target	Activity for which resources needed	Person for follow up	Indicators for follow up			
			Indicator	Freq of follow up	Value	
					Baseline	Target
Mobilize additional resources for EPI programme	Maintenance of Government support to vaccines	Federal Planning directorate & EPI manager	Annual budget (incremental 2% annually) for EPI Operational cost allocated	Yearly	0	2% annually
			EPI expenditure as proportion of total Health expenditure	Yearly	0.6%	2.4%
	Mobilize partner support, as planned	EPI focal points (WHO, UNICEF), & IACC	Partner support for vaccines secured for each coming financial year	Quarterly	100%	100%
	Injection safety support mobilized	EPI manager, and focal points	Proportion of injection safety funds secured for each coming financial year	Yearly	100%	100%
	Support for low performing districts from GAVI HSS	Planning directorate & EPI manager	Proportion of GAVI HSS allocated to immunization (outreach and cold chain)	Yearly	10%	50%
Capital investments ensured	Negotiations with specific partners (WB & JICA) to invest in EPI	EPI manager	Proportion of cold chain requirements as outlined in cold chain investment plan secured	Annually		100%
	Cold chain maintenance support ensured	Logistician s, EPI focal points	Proportion of cold chain maintenance requirements secured	Bi-annually	50%	90%
	Vehicles purchased and availed as required	Logistician s	Proportion of required vehicles purchased	Bi-annually	0%	100%
Program efficiency ensured	Implementation of the cold chain renewal and rehabilitation plan	EPI manager	Proportion of cold chain requirements as outlined in cold chain investment plan secured	Bi-annually	60%	90%
	Vaccine wastage monitoring and management processes	EPI manager	Vaccine wastage rate	Quarterly	0.5	< 5%
	Enhancement of MDVP Implementation	EPI manager	OPV & TT Vaccine wastage rate	Monthly	OPV 10.5% TT 15.1%	OPV 10.5% TT 15%



**Table 20: Activities and indicators for follow up of financial sustainability strategies**

Target	Activity for which resources needed	Person for follow up	Indicators for follow up			
			Indicator	Freq of follow up	Value	
					Baseline	Target
	Improvement in data collection, and use for routine program	EPI manager	Proportion of reports submitted in timely and complete manner	Monthly	90%	>90%
	Capacity building in service delivery at implementation level (RED approach)	EPI manager	Proportion of localities implementing all components of RED Approach	Quarterly	68%	100%



## 4.6- Monitoring and Evaluation of the Plan

The major guidelines that would ensure effective implementation, monitoring and evaluation of the cMYP are outlined below.

### Implementing the Plan

This multi-year plan for immunization shall be implemented as a component of the 25 strategic plan of National Ministry of Health. All departments at national level, states MOH and Districts shall ensure that they focus on the key strategic objectives and activities in their respective areas of responsibilities. Linkages with other key stakeholders and sectors as needed, in order to facilitate implementation of the activities contained in this plan.

As the immunization program creates value and impacts health status by effectively leveraging the human and organizational resources to conduct program processes, including service delivery, logistics, surveillance, this interaction create value to communities and other stakeholders. The continuous utilization of the services by stakeholders leads to increased coverage, reduction of disease burden and a strengthened health system.

Monitoring the progress of the implementation of planned activities is an essential component of the cMYP management process. The indicators for each strategic objective shall be monitored at all levels of operations, federal, state and district.

In order to institutionalize the monitoring process, annual objectives shall be developed during each year based on the cMYP and based on a review process, and this shall be the basis for development of the annual Action Plan and the Task Lists to be developed by focal persons / teams responsible for each activity area. The following management review mechanism shall be institutionalized:

- Monthly review meetings at districts and states levels
- Quarterly progress reviews by the IACC
- Mid-year progress reviews and annual reviews by national EPI
- NITAG meetings to follow up the new vaccines introduction and impact

Quarterly reviews shall focus on activity completion (Activity Performance Indicators) and expenditure, while the mid-year and annual reviews shall concentrate on the overall outcome objectives and the Key Performance Indicators outlined in this plan.

In order to evaluate progress toward achieving the objectives of this cMYP, the following evaluation mechanisms shall be implemented:

- Mid-term Evaluation
- Summative (or End of Plan) Evaluation

These evaluation exercise shall be conducted by independent groups and institutions recommended by the IACC. The summative evaluation process may be linked to a comprehensive Immunization programme review that would feed into the development of the next medium term strategic plan for immunization (2015 – 2020).



## Annexes

### Annex 1: Key activities timeline

Objective	Key Activities	2011	2012	2013	2014	2015
- To achieve and sustain 95% coverage of the third dose of Penta-valent vaccine and 73% TT2+ nationally	<b>Implement RED approach in all districts</b>					
	Preparation of District micro-plans					
	Availing sufficient and adequately paid staff					
	Training of staff at various levels					
	Organizing study tours internally and externally					
	Provision of vaccines and cold chain					
	Provision of transport					
	Provision of staff incentives					
	Provision of Immunization records and registers					
	Strengthen the use of Data Quality Self assessment (DQS) supervisory tool					
	Conduct joint supervision with other health department					
	-Availability of guide lines and forms for data collection					
	Analysis of data and feedback					
	-Information sharing mechanism					
	Regular advocacy activities among community leaders					
	Expansion of EPI Friendship societies					
	Establishing new partnership with civil societies/popular groups					
	Development of Information, Education, communication (IEC) materials					
	Organizing awareness campaign					
	-Regular inter-personal communication activities at service delivery level.					
	<b>Reduce drop out rate</b>					
	-Strengthening defaulter tracing system.					
	Establish missed opportunities reduction system					
	<b>Linking with other health interventions</b>					
	Establishing appropriate					





	mechanism of coordination with other health interventions					
	Piggyback of EPI interventions on other departments' interventions and vice versa.					
To increase and sustain Penta 3 coverage by improving both access, utilization of immunization services in the remaining 65 low performing districts	Re-establish out reach services					
	Provision of sufficient fund for out reach activities					
	Advocacy visits by federal staff with top officials in concerned Districts and their states for securing fund and minimize turn over of staff					
	<b>Re-establishment of defaulter tracing system</b>					
	Train DOOs on advocacy and communication					
	Based on available guidelines each vaccination post prepare a monthly list of defaulters					
	Conduct home visits as planned					
	<b>Implementation "Hit and Run" campaigns in the security compromised areas</b>					
	Utilization of CHW/CHP to increases community awareness about Immunization and completing scheduled doses					
	Open a channel of communication with effective armed group through local leaders and UN agencies					
	Involvement of National and international NGOs working in these areas					
To Fill the gap in VPDs/AEFI Surveillance in order to reach and maintain 80% or more of all indicators	<b>Building capacity for the surveillance</b>					
	Update and distribution of surveillance Manuals					
	Maximize utilization of existing AFP surveillance staff					
	Involve DOO in VPDs surveillance					
	Conduct Basic and refresher training for DOO and focal persons at reporting sites					
	Complete basic training of surveillance officers on AEFI (14%)					
	- Involvement of National Regulatory Authority (NRA) in AEFI surveillance					
	Conducting orientation session for medical professionals about all surveillance issues					



	Training of medical professional on reporting and investigation of AEFI					
	Training on AEFI causality assessment					
	Printing and distribution of formats and manuals					
	<b>Active AEFI surveillance</b>					
	Development of Standard Operating Procedures (SOPs)					
	Train Surveillance officers					
	Conduct active visits to sentinel sites					
To achieve a certification of polio eradication	<b>High quality SIAs and enhanced AFP surveillance</b>					
	Update SIAs manuals					
	Update Micro-plans at all levels					
	Conduct NIDs/SNIDs					
	Receive zero reports with 90% or more completeness and timeliness					
	Conduct high quality active surveillance					
	Complete all documentation required for certification					
	Invite WHO consultant for polio laboratory accreditation					
	Provision of necessary equipments for polio lab to perform Intra-typic differentiation (ITD)					
	Produce quarterly AFP bulletin					
	Involvement of community volunteers in AFP reporting					
To achieve and maintain Measles elimination.	<b>Provide second opportunity for measles vaccination for &lt; 5yrs children</b>					
	Conduct measles follow up campaigns in the 15 states					
	Introduce measles second dose in routine schedule					
	<b>Strengthen measles case-based surveillance</b>					
	Preparation of preparedness plan to predict measles outbreaks					
	Investigate all out breaks by an experienced team					
	Provide basic and refresher training for surveillance officer/focal persons					
	Provision of lab equipments for measles virus isolation					
To contribute to and maintain NNT elimination	<b>TT routine vaccination of pregnant women and High quality SIAs in HRLs</b>					
	Expanded use of Protection At					



	Birth (PAB)					
	Update SIAs manuals					
	Update Micro-plans at all levels					
	Conduct MNT campaigns in all high risk Districts					
	<b>Integrated NNT surveillance with AFP and Community Based Surveillance in HRL</b>					
	Develop manual for case based NNT surveillance					
	Train of AFP personnel on NNT reporting and investigation					
	Update AFP formats to include NNT(zero and immediate reporting)					
	Develop manual for community surveillance					
	Involve community volunteers/CHP for reporting of NNT cases					
	Training of Volunteers (CHWs & CHPs)					
To strengthen Programme managerial capacity	<b>Evidence- based management and completing missing systems in the Programme</b>					
	Train SOOs on Problem Solving Approach					
	Train SOOs on operational research and use of evidence on immunization					
	Develop effective cold chain maintenance system					
	Improve procurement system in order to have cold chain spare parts in time					
	<b>Building partnerships with NGOs</b>					
	Establish coordination and information sharing mechanisms with partners(PHC programmes, NGOs and other health related departments)					
	Use of PHC staff in immunization activities in selected areas at service delivery levels					
	Develop MOU with civil society organizations to promote vaccination					
	<b>Strengthening the role of IACC and enhance inter-sectoral collaboration</b>					
	Add new influential members					



	to IACC					
	Revise and update mandate					
	Conduct regular quarterly meetings					
	Develop SOP					
	<b>Filling staff gap</b>					
	Establish motivation system of staff to minimize turn over					
	Follow up the recruitment of new vaccinators					
	Develop redistribution plan for existing staff					
To enhance Surveillance of diseases targeted by the new vaccines	Preparation of integrated surveillance guidelines/manuals					
	Provide basic and refresher training for surveillance officer/focal persons					
	Provision of lab equipments for sentinel sites					
To ensure sufficient fund for EPI activities	<b>Strengthening resource mobilization and Equitable resource allocation to various EPI component</b>					
	Mobilize the government to increase its share in Operational cost of the Programme by 2%					
	Advocacy activities to increase the annual share of Government of Sudan (GoS) of 5% of traditional vaccine costs starting in 2010					
	Conduct regular follow-up meetings with concerned financial departments in NMoH and FMoF					
	Mobilize and involve new national and international donors					
	Conduct national resource mobilisation workshop					
	Prepare and submit appropriate funding proposals					
	Fair allocation of budget for each EPI component					
To reduce morbidity and mortality caused by Rota virus, S. pneumoniae, MENEGITIS a and yellow fever	<b>Introduction of new vaccines (Rota virus vaccine and PCV, MenAfrivac, YF</b>					
	Revision of training material and guidelines including AEFI					
	Update of immunization registers and records					
	Develop, print and distribute IEC materials and organize social					



	mobilization/sensitization campaigns					
	Training of EPI staff					
	Post introduction evaluations					
	Conduct Meningitis A campaigns for targeted groups					
	Conduct YF campaigns for targeted groups					
	Introduction of Meningitis A into routine services					
	Introduction of YF into routine services					



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