KINGDOM OF CAMBODIA

NATION RELIGION KING

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Ministry of Health
National Maternal and Child Health Center
National Immunization Program

CAMBODIA National Immunization Program Strategic Plan 2008 – 2015

Phnom Penh
First version: February 22nd, 2008
First update: September, 2008
Second Update: April 2011

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FOREWORD

The National Immunization Program, Ministry of Health, Cambodia collaborated with partners (WHO, UNICEF and PATH) and NGOs that support the National Immunization Program such as CARE, RHAC, RACHA, USAID, JICA, GTZ, WB, ADB, UNFPA, BTC, ARC, URC and SCA to develop the Multi Year Plan for National Immunization Program in Cambodia 2008-2015 based on the existing Multi year Plan 2006-2010 to ensure an effective and coordinated response to improve child survival and child health in the country through provision of optimal immunization services against vaccine preventable diseases.

The multi year plan for immunization and upcoming operational plans supports the directions of the Regional Child Survival Strategy, Cambodian Child Survival Strategy, Millennium Development Goals and Cambodian Development Goals and Health Strategic Plan 2 (HSP 2).

The goal is to attain a better quality of life for all Cambodian Children by improving immunization coverage, and thereby controlling, eliminating or eradicating all vaccine preventable diseases targeted by the National Immunization Program. The strategy includes four strategic areas: (1) Service Delivery and monitoring, (2) Surveillance and Disease Control (3) Logistics, Communication and Training and (4) Health System and Program Management.

This Multi Year Plan for National Immunization Program in Cambodia 2008-2015 has been jointly reviewed by the National Immunization Program Management team and National Immunization Program partners (WHO and UNICEF).

A wider consultation on key objectives and strategies has also been undertaken with regional representatives of WHO and UNICEF and sub nationally with provincial and District Health Departments during a mid term review in August 2007 which has provided the opportunity for input of the MYP into the next health sector planning strategy 2008 – 2015.

The cMYP and costing tools has been updated by the NIP in consultation with partners in April 2011 to incorporate the changed necessary for the introduction of a 2nd dose of measles vaccine in 2012.

Phnom Penh, September 22nd, 2008
Updated April 2012

Professor Eng Huot,

Secretary of State

Ministry of Health

List of Acronyms

AFP : Acute Flaccid Paralysis
HIS: Health Information Systems
AEFI: adverse events following immunization
CBAW: Child-bearing age women
CDHS: Cambodia Demographic and Health Survey
CIP: Coverage Improvement plan
CIPS: Cambodia Inter-census Population Survey
CBAW: Child bearing age women
FIC: Fully Immunized Child
GNI: Annual per capita Gross National Income
Hib: Haemophilus Influenzae type B
HSP: Health Sector Strategic Plan
ICC: Interagency Coordinating Committee
IMCI: Integrated management of childhood illnesses
ISS: Immunization Services Support funding window of GAVI Alliance
JICA: Japanese International Cooperation Agency
JRF: Joint Reporting Form
NIP: National Immunization Program
NSDP: National Strategic Development Plan
ME: Meningoencephalitis
MNTE: Maternal and Neonatal Tetanus Elimination
MOH: Ministry of Health
MPA: Minimum Package of Activities
OD: Operational Districts for delivery of health services. Different from administrative districts.
TWG: Technical Working Group
VPD: Vaccine preventable diseases
MCV1: First dose of measles containing vaccine
USD: United States Dollar
WB: The World Bank

EXECUTIVE SUMMARY

Since 2000, the important health gains have been achieved through expansion of immunization services with more children being immunized than ever before against 7 vaccine preventable diseases (VPDs) leading to significant decline in incidence of VPDs. Increasing numbers of women of child bearing age and their infants are also being protected against tetanus during the neonatal period. Two Demographic Health Surveys (CDHS) conducted between 2000 and 2005 have demonstrated a 26% increased in fully immunized children. A preliminary report of coverage in the 2010 DHS survey demonstrates a further coverage rise to 79 for fully immunized child, and increase from the 67 % in the 2005 survey.

Many factors attributed to the improvement in immunization coverage. *Immunization program specific factors* included increased financing *from* GAVI, NGOs and Government for community based outreach, social mobilization and communication activities, and the increased accountability by PHDs for performance. *Health system factors* included expansion of the health coverage plan with establishment of a network of over 956 health centers across the country. Finally, *socio economic factors* such as improved transport and communications, increased literacy and economic growth also helped.

The overall goal of the NIP is to *improve child survival and health and support achievement of Millennium Goals 1 (Poverty Reduction) and 4 (Child Mortality Reduction) by controlling, eliminating, or eradicating all vaccine preventable diseases targeted by the National Immunization Program*. The NIP proposes 13 objectives in the areas of service delivery, logistics and training, disease control, and program management.

These objectives shall be achieved through a range of *routine immunization strategies* focusing on the needs of specific population groups – the high risk, hard to reach and accessible populations. Services at the fixed site (i.e. at health facilities) will be strengthened with use of outreach services to reach hard-to-reach populations. *Programmatic strategies* will focus on resource co-ordination and mobilization (vaccine and operational financing), decentralization (PHD accountability), capacity building (surveillance, planning, and immunization technique) and by building demand through application of multiple channels of communication (community health volunteers, service delivery and media). *Health system strengthening strategies* will include closer linkages between the EPI program and midwifery, strengthening of integrated micro-planning systems at district level and below, investment in transport capital, promotion of health centre utilization and reaching to high risk populations for the Ministry of Health minimum package of primary care services.

Major milestones in the year 2015 planning period include increasing DPT3 coverage up to 90%, strengthening/establishing surveillance for vaccine preventable diseases including new vaccines, maintenance of polio free status and identifiable progress towards elimination neonatal tetanus in 2008 (to less than 1 case of NT per 1,000 live births), measles elimination in 2012 (to less than 1 case confirmed per 1 million population) and hepatitis B control as major public health problems by the year 2012 (to less than 2% carrier rate for children at 5 year age), Strengthening research and surveillance for new interventions, including evaluation and introduction of new vaccines such as against Japanese encephalitis, Haemophilus influenzae type B (Hib), pneumococcal infections.

Major outcomes expected by the year 2015 are improvements in immunization coverage for all vaccines included in the schedule and measurable reductions in childhood mortality in support of Cambodian Goals of Poverty Reduction and Millennium Development Goal Achievement by the Year 2015. The following two pages summarize key content of this plan.

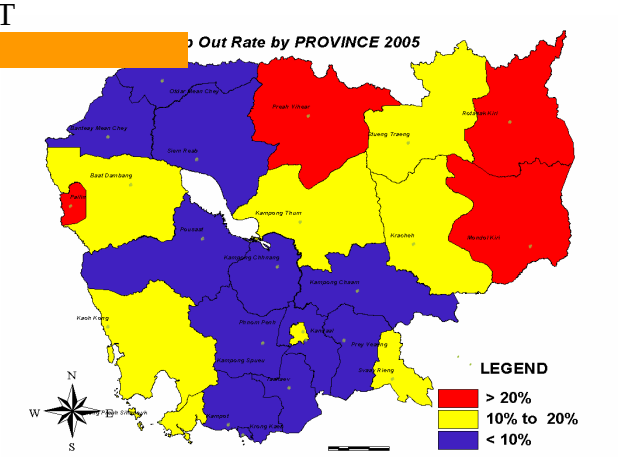
IMMUNIZATION MULTI YEAR STRATEGIC PLAN

2008 - 2015 CAMBODIA INFORMATION SHEET

Country Background 2007

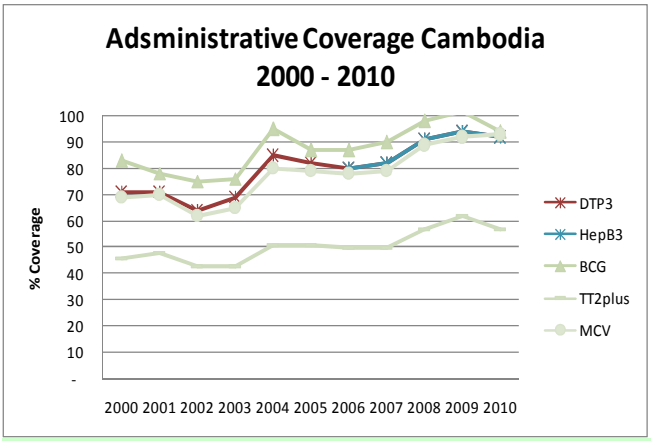
Total population	14,363,519
Birth Cohort	385437
Population growth (%)	2.30%
Infant Mortality Rate, CDHS, 2005	66
GNI per capita, (2006)	$480
% Population Urban	20%

Cambodia NIP Goal: To improve child survival and health and support achievement of Millennium Goals 1 (Poverty Reduction) and 4 (mortality reduction) by controlling, eliminating, or eradicating all vaccine preventable diseases targeted by the National Immunization Program



Situation Analysis

Immunization Coverage 2000 - 2010 (JRF)



Baseline Indicators, 2007

Baseline	Result	Source
Hep B Sero Prevalence Age 5	3.50	NIP Survey 2005
Hep B Birth Dose within 24 hours	25%	JRF 2008
DPT-Heb3 Coverage	82%	JRF 2008
Suspected Measles cases	394	JRF 2008
Laboratory Confirmed Measles	8	JRF 2008
Neonatal tetanus cases	50	JRF 2008
TT2 Pregnant Women	50%	JRF 2008
DPT1-DPT3 Drop Out	5.7%	JRF 2008
BCG Measles Drop Out	6.5%	JRF 2008
Fully Immunized Child	66%	DHS 2005
DPT Hepatitis B Wastage	26%	JRF 2008

Major Barriers to Improving Coverage:

Service Accessibility Barriers

Communication - High risk and remote populations required targeted communication strategies. Health education and communication with local authorities is critical to raise awareness of the population of the services that facilities provide. But currently, there is no government budget source to finance village based social mobilization of health education (NIP MYP 2008-2015). Demand creation is an area of priority and urgency for MCH programs, but this problem may persist in the absence of health financing initiatives, given the significant percentage of the population living below the poverty line. Low demand, on the other hand, is the result of low quality of service delivery. Outreach activities conducted with limited support from the village health support group and local authorities due to no financial support of incentive or budget for organizing regular meeting (with exception of areas where there are NGOs support).

Surveillance – Surveillance has been strengthened in recent years, but there is a need to integrated VPD disease surveillance, and improve coverage monitoring in high risk areas. Guidelines and implementation of adverse events following immunization needs to be improved.

Services Delivery – There is high dependence on outreach services (80%) as a service delivery strategy. There is high drop out in remote area provinces and pockets of unimmunized in high density provinces. High risk populations (slum, ethnic group and remote areas) on occasions have high drop out / low coverage. In terms of service accessibility barriers, there are significant regional imbalances in health facility utilization. The main determinants of variations of program coverage are related to socio economic factors. The basic problem is low utilization of both minimum package of activities (MPA) and complementary package of activities (CPA) for referral hospital.

Logistics – Waste management and cold chain systems have been strengthened in recent years, but improvements are required for maintenance systems. Vaccine management at middle level management also needs to be strengthened in coming years.

Program Management – Sub national accountability for program performance needs to be decentralized to Provincial level.

New Vaccines - The burden of disease for some vaccine preventable diseases is not known well enough. More information is required to support country decision making about new and underutilized vaccines (Hib, JE, RV) with CDC.

A major constraint is sustaining social mobilization finance support for fixed site utilization.

Unresolved issues related to human resources in Cambodia include staff motivation, quality of performance, productivity and distribution by geographical area. Persistent low wages have continuously undermined all efforts to improve human resources management and performance in the public sector. Since 1996, there has been a 10% decrease in the number of midwives and 5% decrease in the Ministry of Health (MOH) workforce. In 2005, it was estimated that 78% of health centres had staff with updated midwifery skills (Child Survival Strategy 2007). There are 146 health centers that do not have a midwife and 532 health centers that do not have the benefit of the services of a secondary midwife.(JAPR 2007) It is therefore critical to provide human resource to these health centers to ensure that quality MCH services could be available to women in these localities (JICA Draft Report Strengthening MCH Service performance in Cambodia).

The HSS 1 Rapid Assessment has indicated that in some areas absence of a midwife is still a major barrier to access. A recent Midwifery Review has indicated that 51% of health centers remain without a secondary midwife and current competency levels are below 70% for all competencies observed.

Strategic Plan Objectives

SERVICE DELIVERY
To improve routine immunization for children under 1 year of age
To ensure that all immunization is given safely/waste is disposed appropriately

DISEASE CONTROL
To maintain polio free status until the time of global eradication
Achieve maternal neo natal tetanus elimination by 2008 (Less than 1 case per 1,000 live births per Operational District)
To effectively reach measles elimination by the year 2012 (Less than 1 case per 1 million population)
To control hepatitis B disease by reducing carriage in new infants to less than 2% for children 5 years of age by 2012

PROGRAM MANAGEMENT
To ensure that AEFI guidelines and monitoring systems are in place
To strengthen country decision making for new interventions by strengthening research and surveillance of new vaccine preventable diseases
To increase community participation in immunization at local authority/decision maker level (advocacy) and community level
To improve vaccine management through provision of adequate functional cold chain equipment, reduction of vaccine wastage and increased efficiency of vaccine delivery and usage
To build the capacity of PHD, OD and facility managers
To fully equip all health facilities and management levels with functional transport and maintenance systems by the year 2010
To secure national budget for vaccine and operational financing

Program Milestones / Targets

2006: JE sentinel surveillance (with CDC)
2007: Measles campaign completed (<5)
2007: Outside the cold chain and < 24 hour hepatitis birth dose guidelines disseminated
2007: National /Provincial AEFI committees
2007: Develop national guidelines for fixed site integrated with other national programs
2008: Finalize Measles Elimination Plan
2008: Neo Natal Tetanus Elimination
2009: Tetanus validation survey
2009: Analysis of 2 years data of JE
2010: EPI Review and CDHS
2011: Measles campaign completed (<5)
2012: Introduction of 2nd dose of measles vaccine
2011: Hep B Sero Survey Conducted
2012: Measles Elimination
2012: Hepatitis B disease carriage 2%
2015: EPI Review and CDHS

Routine Immunization Strategy

Promote and expand a ***fixed site strategy for*** accessible pop.
Implement ***coverage improvement strategy*** in high un-immunized/drop out population
Conduct ***health outreach strategy*** in remote population
Conduct ***immunization campaigns*** in selected high risk pop.
Conduct ***Private Sector collaboration strategy*** in urban pop.
Apply ***application of a midwife strategy for birth dose hepatitis B for*** population born outside facilities.
CBAW pop.strategy by improved registration/communication
Apply ***integrated planning and management strategy*** at District level support coverage other ***child survival intervention***
Strengthening demand for immunization by using a wide channel of ***communication strategies*** *(media, local authority, VHV)*

Management Strategies

Establish national and provincial ***AEFI response systems*** & committees
Strengthen ***active case finding*** in hospitals and community
Improve integration of EPI micro-planning with child survival strategy, & PHD, OD, HC ***planning & management***
Ensure co ordination of NGO resources
Strengthen role of VII system, and identify additional bi lateral ***vaccine finance***
Improve access to ***operational finance*** for basic health services and social mobilization
Support ***decentralization*** by promoting accountability for performance by the PHD

1.0 BACKGROUND

The population of Cambodia is estimated to be 14.4 million in 2007. Administratively Cambodia is divided into 24 municipalities and provinces, 185 districts, 1609 communes, and 14,073 villages[1]. The population is predominantly rural (80%). Table 1 outlines main demographic indicators.

Table 1: Demographic Indicators in Cambodia

Demographic Indicators	*Amount*	*Source*	*Year*
Total Population	*13,388,910*	*Census*	*2008*
Average annual population growth rate	*1.54*	*Census*	*2008*
% Urban Population	*19.5%*	*Census*	*2008*
Number of Village	*14,073*	*Census*	*2008*

1.1 Socio and Economic Features

Cambodia is one of the poorest countries in south-east Asia. The periods of war and internal conflict (1970-1993) severely destabilized health infrastructure and services. Recovery was set further back in the 1990s by political upheaval and regional recession. The Paris Peace Agreements of October 1991 enabled peace and stability to be progressively re-established, allowing focus on longer – term development. Despite significant progress, major disparities continue between urban and rural living standards (e.g. .56% of urban versus 11% of rural households use electricity as their main source of light) Poverty remains high, with more than 35% below the poverty line and 15% in extreme poverty. This poverty is also largely rural, with over 90% of the poorest living in rural areas. Limited linkages to the domestic economy, limited access to basis services, landlessness, environmental degradation, and low literacy exacerbate poverty.

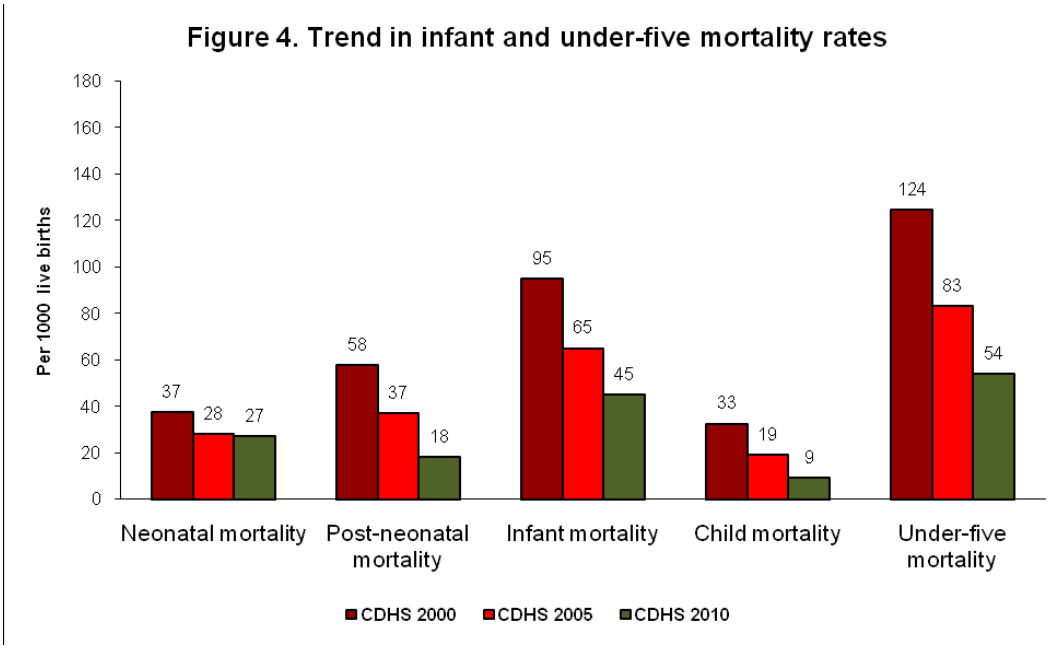
Cambodia gross domestic product (GDP) was estimated at a baseline figure of $480 in 2007, but had increased to US $ 610 per capita in 2009[2]. Development assistance remains high at around UD$ 39 per capita. Bilateral and multilateral organization, UN agencies, international NGOs, Local NGOs and private sector organizations support development initiatives throughout the country.

Table 2: Socio-Economic Indicators in Cambodia

Socio-Economic Indicators	*Amount*	*Source*	*Year*
Gross domestic product (GDP) per capita	*USD 480*	*WB*	*2007*
Health Expenditure (% of GDP)	*10.14%*	*MTEF*	*2005*
Households with electricity as main source of light (%)	*Urban 56/ Rural 11*	*CIPS*	*2004*
Adult literacy rate (%)	*female 64/male 85*	*CIPS*	*2004*
School enrolment (%)	*female 55/male 63*	*CIPS*	*2004*
Completed primary school (%)	*female 19.5/male27.3*	*CIPS*	*2004*
Migration (%)	*Urban-Rural 69*	*CIPS*	*2004*

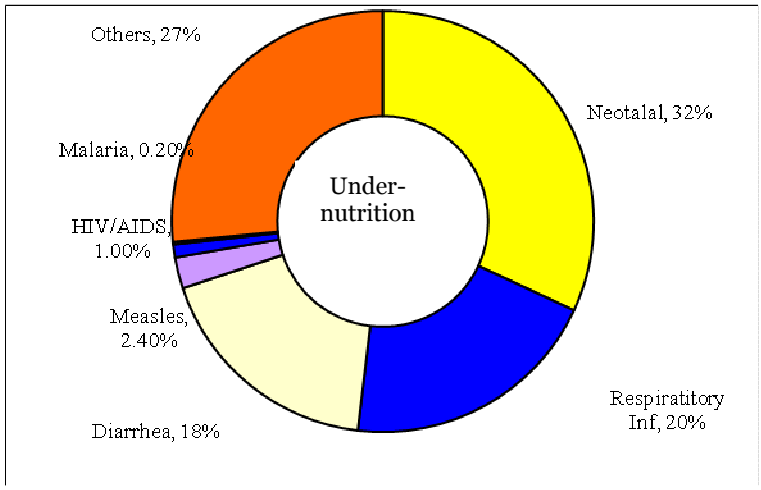
[1] *Cambodia Demographic Health Survey 2000*
[2] *2009 GNI from World Development Indicators, World Bank, as published in September 2010*

1.2 Health Status of Children



Recently released data from the CDHS 2010 has demonstrated sharp declines in infant and child mortality as demonstrated in the figure above.[3] Under 5 mortality has declined from 124 per 1000 live births to 54 per 1000 in a 10 year period. Population-based data on causes of death are not available in Cambodia. Recent child and neonatal health data from the WHO Western Pacific Region on causes of death in 0-4 year old children show diarrrhea and pneumonia as main causes of child death beside neonatal causes (figure 1) .

Figure 1 – Percentage of Under 5 Deaths by Cause Western Pacific Region [4]



In response to the above, the Ministry of Health has developed a 5 year child survival strategy which includes 5 strategic areas and a list of "scorecard" interventions, which includes a plan to scale up measles and tetanus coverage close to elimination status by 2010.[1]

1.3 Health System Structure

Since 1994, health sector reforms have begun the process of establishing a comprehensive basis for the Ministry of Health to address population health issues. As part of health sector reform (HSR), Operational Districts (ODs) have been created as the units responsible for

[3] MOH Report CDHS 2005
[4] Child Survival Strategy Western Pacific Region

providing health services to the population. ODs are different from the administrative geopolitical units. Often they combine parts of different administrative districts.

The health system in Cambodia is divided into three levels: Central, Provincial and Operational District including health centres and referral hospitals. The Central level consists of two training institutions, two institutes, six national centres and eight national hospitals. The Provincial level consists of 24 Provincial Health Departments and four regional training centres. There are 77 Operational Districts, which will manage over 956 Health Centres (HC). Recent re-organization of the health system based on criteria of population and accessibility has resulted in a more decentralized approach to service planning and delivery. The Operational District is the new focal point for service management, providing a comprehensive approach to primary care. Health Centres overseen by the Operational District provide a Minimum Package of Activities (MPA), including preventive, promotive and curative services.

Subsequent to health sector reform, the MOH developed a new planning system in 2002 and drafted the National Health Sector Strategic Plan (2003 – 2007) which identifies 6 key areas of work including health service delivery, health financing, human resource development, institutional development, quality improvement and behavior change. Under the new planning system, health systems at all levels, including national health programs, share common strategic areas, planning formats, and planning tools and follow the same annual and three-year planning cycle. This new immunization strategic plan will be an input to the development of the new Health Strategic Plan (HSP 2) 2008 – 2015. It will also align with the National Strategic Development Plan (NSDP) 2006 – 2010 of the Royal Government of Cambodia.

1.4 The National Immunization Program

The History of the NIP

The government of Cambodia, since 1986, through funding support from UNICEF has started implementing the expanded program for immunization (EPI) and all program activities have reached all provinces across the country by 1998. Early 1999 immunization for tetanus was also provided to pregnant women. In 1995 a polio eradication team was established to speed up the activities of polio eradication. At the same time, the Ministry of Health has developed the national immunization program (NIP) in order to integrate the expanded program for immunization and the polio eradication into a single structure.

Policy Context of the NIP

The NIP has developed a *comprehensive policy framework* on the main components of immunization. The policy covers immunization schedule, safe injection practices, cold chain management, and waste management. Immunization services in the public sector is provided free of charge. Private sector immunization is common, and in 2005 the NIP developed quality standards and guidelines for private sector immunization practice.[5] The NIP since 2003 has also developed *annual operational plans* and three year rolling plans for the central program. At the sub national level, immunization planning is integrated with Provincial, District and health centre plans according to the planning system of the Ministry of Health.

Immunization is also a key component of the *child survival strategy* of the Ministry of Health, with maternal neonatal tetanus elimination (MNTE) and measles elimination being

[5] NIP/PATH Study on Private Sector Immunization in Cambodia

two of the "scorecard interventions" for promotion of child survival.[6] Regionally, WHO has set *regional targets* for measles elimination and hepatitis B control.[7] Globally, WHO and UNICEF have developed a Global Immunization Vision and Strategy (GIVS) which has identified 4 strategic areas for immunization up the MDG target date of 2015. They are as follows:

Strategic Areas I: Protecting more people in a changing world

Strategic Areas II: Introducing new vaccines and technologies

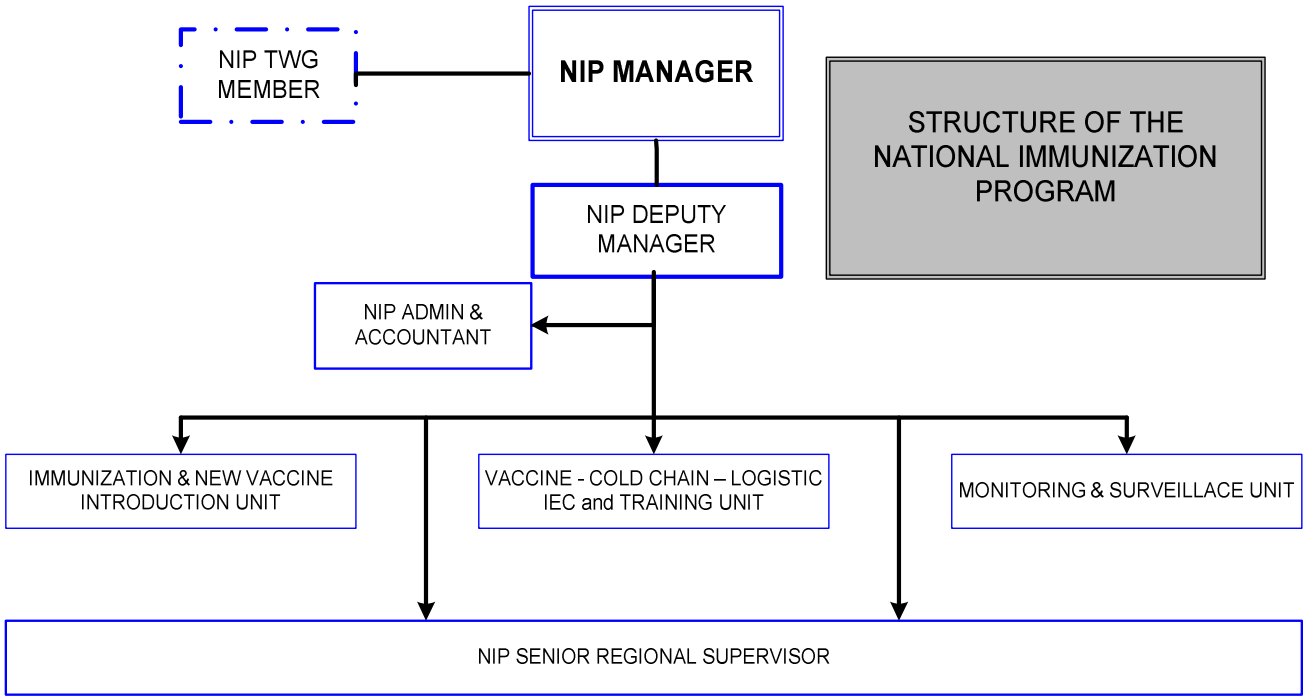
Strategic Areas III: Integrating immunization, other linked health interventions and surveillance in the health system context

Strategic Areas IV: Immunizing in the context of global interdependence

Immunization activities also relate to higher level national and global goals outlined in the *Poverty Reduction Strategy Paper* and the *Millennium Goal 1* (poverty reduction) and *Millennium Goal 4* (reduction in child mortality by 2/3 rds between 1990 and 2015).

The Structure of the NIP

The structure of the central level NIP is outlined below:



At the Provincial level, central supervisors interact with the Provincial Health Director and the MCH/EPI manager. At the OD level, programs are managed by the OD Director and District MCH/EPI manager. At the service delivery point, immunization services are provided as part of a MPA that include maternal and child health services and communicable disease control activities health centre staff (midwives and nurses) under the direction of the

[6] MOH / WHO Draft Child Survival Strategy Phnom Penh 2005
[7] Report of Technical Advisory Group WPRO Beijing 2005

health centre chief[8]. 80% of immunizations are provided in villages through outreach services, often in collaboration with local authorities, NGOs and village volunteers.

Important milestones in the development of the NIP are outlined below:

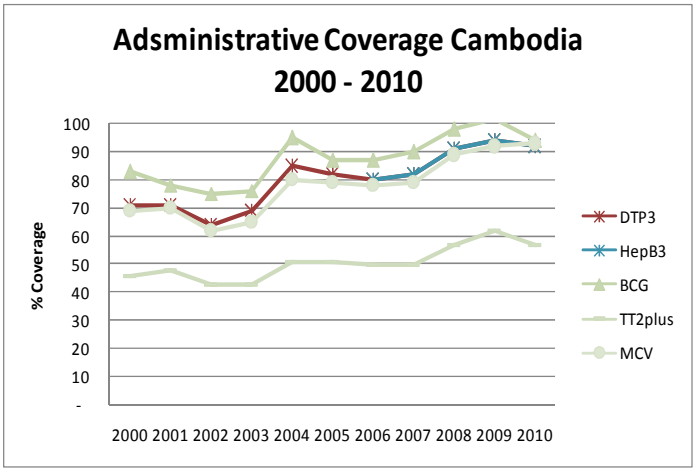
- The last laboratory-confirmed case of *poliomyelitis* was detected in March 1997 and Cambodia was certified polio free in 2000.
- Beginning in 1996, *Vitamin A* capsules have been offered to children aged 12-59 months during selected supplementary OPV immunization rounds. Between 2001 and 2004, Vitamin A and deworming were integrated into measles supplementary immunization campaigns.
- Between 2000 and 2005, *hepatitis B vaccine as DPT-HepB combination vaccine* was introduced successfully into the national program with a 4 dose schedule including delivery of a birth dose (with monovalent hepatitis B vaccine) to infants less than 7 days old.
- *Measles elimination* activities were accelerated through routine and campaign immunization effort. There were 1156 reported measles cases in 2010, resulting in the implementation of a nationwide measles campaign in 2011 targeting all infants from 9 to 59 months. Administrative reported coverage for MCV1 has been between 89% and 93% for the last 3 years (2008-2010)
- *Neonatal tetanus* campaigns were conducted in 52 high risk districts with also sharp declines in reported numbers of cases. Immunization campaigns in the remaining high risk districts are being conducted in 2011 prior to planned validation of elimination in 2012.
- Nationwide introduction of *pentavalent vaccine* in 2010
- Introduction of *Japanese encephalitis* vaccine in 3 provinces in 2010
- In 2005, Cold chain *was significantly strengthened with* every health centre equipped with gas/electric powered refrigeration systems (RCW-50EG).
- Introduction of *safe injection policy and strategy in* 2001.
- *Waste management* facilities have been established in most operational districts, and auto disposable syringes and safety boxes are now used for all vaccinations.
- In 2003, a *national communication strategy* was developed, and increased involvement of local authorities in promotion of immunization in both rural and urban areas.
- Routine immunization program activities have been accelerated by a range of service delivery strategies including *coverage improvement planning (CIP), fixed facility utilization, high risk campaigns* and *NGO co ordination.* Many of the latter activities have resulted from support through GAVIs Immunization Systems Strengthening finance which commenced in 2002.
- Initiation of hospital based surveillance for acute meningoencephalitis in 2006. This provided data for decision making for introduction of JE, and other new vaccines.
- Initiation of hospital based rotavirus sentinel surveillance in 2005. Will generate data for decision-making for introduction of rotavirus vaccine.
- Implementation of an EPI Review in 2010 with the major recommendation developed to design and implement a reaching every community strategy to reach high risk groups including remote and mobile populations and the urban poor.

[8] MOH Outreach Guidelines

2.0 SITUATION ANALYSIS

2.1 Immunization Coverage

Figure Immunization Coverage 2000-2010 [9]



The following tables and graphs outline the evolution of immunization coverage between 2000 and 2010. Coverage surveys and an independent data quality audit by GAVI in 2004 indicate high levels of accuracy between reported and actual immunization coverage.

Household coverage surveys (card + history) have been conducted since 1997. The Asian Development Bank (ADB) conducted household coverage survey in 10 rural operational districts in 1997 and 2001 (Shwardz and Bhushan, 2004). Two CDHS surveys have been conducted in 2000 and 2005.

Two rounds of National Health Survey *(NHS)* were conducted in 1998 and 2002. *PATH* recently conducted a 30-cluster coverage survey in two operational districts in 2003. The official coverage data in 2000 - 2003 is within 10 % of coverage calculated on the basis of surveys, and in 2005, the difference further narrowed to 3-5% (Table 3).

Table 3: Result of coverage survey in Cambodia (1997 – 2010)

Vaccine	*ADB 1997*	*NHS 1998*	*CDHS 2000*	*ADB 2001*	*NHS 2002*	*CDHS 2005*	*CDHS 2010*
BCG	72	66.7	71.4	89.9	77.9	91.4	94.3
DPT3	39	46.5	48.5	66.8	53	78.3	84.8
Measles	30	49.5	55.4	70	56.5	76.9	81.9
Fully Immunized	30.9	38.9	39.9	56.7	41.6	66.6	78.8

The rise in coverage between 2005 and 2010 coverage surveys (12% increases for FIC) is potentially attributable to a range of factors. Some of these are *immunization program specific factors*, such as the use of GAVI finance for outreach and communication activities, the coordination of NGO support and increased accountability by PHDs for performance. *Health system factors* include expansion of the health coverage plan with establishment of a network of over 965 health centers across the country. *Socio economic factors* operating, such as improved transport and communications, increased literacy and economic growth also helped.

[9] Source – Joint Report Form WHO & UNICEF

2.2 Surveillance and Disease Control

2.2.1 Reported cases and incidence of EPI – target diseases

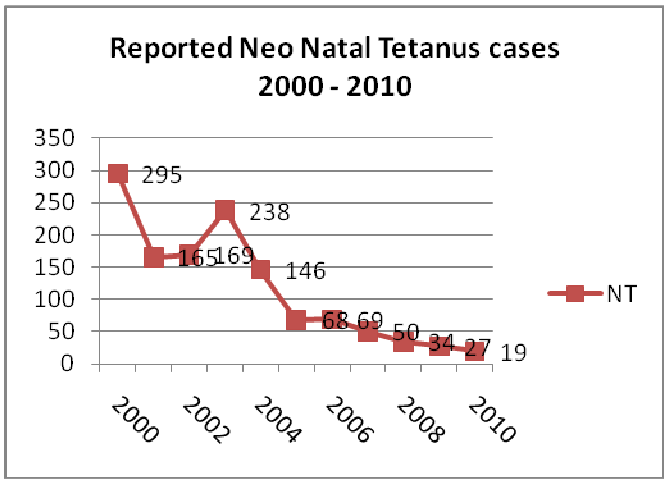
The incidence of vaccine preventable diseases declined sharply in last decade. (Table 4) The last case of wild *poliovirus* in Cambodia was in March 1997, which was also the last case of Western Pacific Region. 3 cases of vaccine derived polio virus were detected in a low coverage areas in the capital city in 2005 – 2006. Also measles surveillance has been improved since measles catch-up campaigns were conducted nationwide during 2001-2005[10]. Overall between 2000 and 2010, there has been a sharp reduction in *measles incidence*. However, there was an outbreak of measles in 2010, where 1156 confirmed cases were reported. Improved diphtheria and pertussis surveillance has demonstrated the first laboratory confirmed cases in 2004, which suggests continued circulation of *diphtheria and pertussis* in the low DPT3 coverage areas in Cambodia. There have been sharp reductions in *neo natal tetanus* cases since introduction of an elimination strategy in Cambodia in the last 5 year plan. A *Hepatitis B* sero survey was conducted in 2003 indicating an 11% Hep B Surface Antigen positive sero prevalence in adults and 3.4% sero prevalence in the under 5 age group. [11] A similar result for the children at 5 years of age was identified in a nationwide survey in 2005.[12]

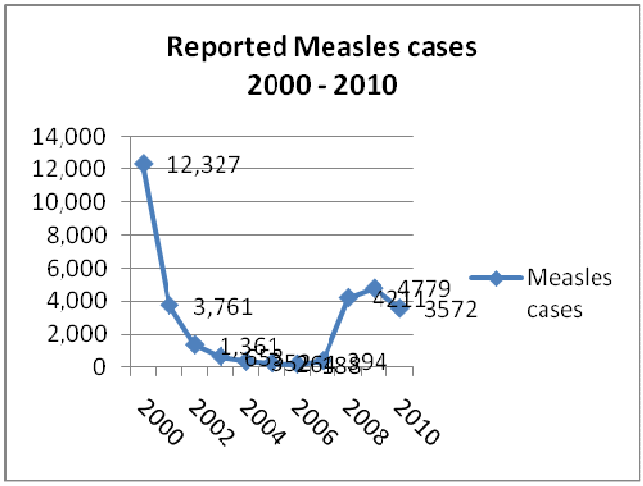
Table 4: Reported cases and incidence of EPI – target diseases

Reported and Lab Confirmed	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***	***2007***	***2008***	***2009***	***2010***
Diphtheria (Lab Confirm)	*0*	*0*	*0*	*0*	*4 (1)*	*0*	*0*	5	7	3	3 *(0)*
Measles (Lab Confirm)	12,327 *(78)*	3,761 *(157)*	1,361 *(85)*	653 *(84)*	352 *(32)*	264 *(3)*	188	394	4211	4779 *(95)*	3572 *(451)*
Pertussis (Lab Confirm)	2,068	4,714	320	281	66 (4)	462 *(43)*	474 *(83)*	561	1212	513 *(15)*	372 *(22)*
Polio (Lab Confirm)	*0*	*0*	*0*	*0*	*0*	*2 (VDPV)*	*1 (VDPV)*	0	0	0	0
NT	295	165	169	238	146	68	69	50	34	27	19
Rubella										4779 *(528)*	3572 *(85)*
JE (Lab Confirm)										193 *(23)*	122 *(41)*

[10] *Annual questionnaire on Immunization Activities in WPR 2003*
[11] *NIP/PATH/AIHI Hepatitis B Sero Survey 2003*
[12] *NIP / WHO Draft Report Sero Survey Hepatitis B*

***Figures –Measles and Neonatal Tetanus Reported Cases*[13]**





2.2.2 Progress in strengthening of Surveillance System

The figure below summarizes progress in surveillance between 2000 and 2007.

Summary of Progress 2000 – 2007 Surveillance

- ⇨ The AFP rate was 2.99/100,000 in 2001, and was 2.14/100,000 in 2007. 2 vaccine derived polio cases were detected in 2005 and early 2006.
- ⇨ Neonatal tetanus surveillance has been strengthened since 2001. Since then, case detection has ranged from a high of 238 cases in 2003 to 50 cases in 2007.
- ⇨ Data Quality Audit – 98% verification of reports between health centres and national level in 3 districts in 2002. Very close match between DHS survey 2005 and routine health Information data. A 10% gap is evident between DHS reported coverage for measles and HIS data in the 2010 DHS Survey. The primary issue appears to be the lack of certainly as to the true denominator, particularly at the operational district level. A system of data quality self assessment was introduced in 2011 in 10 HSS districts.
- ⇨ AEFI System has been established. Case reports are unchanged between 2001 (61) and 2007 (53).

The following headings summarize strengths and weaknesses of the NIP surveillance systems for vaccine preventable diseases.

Strengths of Surveillance Systems:

- Improved quality of case investigation and laboratory testing for measles & rubella and other VPDs
- Improved understanding of community, clinician and local authority of surveillance
- Research has been undertaken of hepatitis B sero prevalence
- Establishment of sentinel hospital surveillance system for meningoencephalitis and rotavirus.

[13] *NIP Reported 2000-2006*

Weaknesses and constraints of Surveillance Systems

- Active case finding in hospitals and the community needs to be improved
- Potential under reporting of measles cases, due to lack of clinician understanding of case definitions of "rash" and "fever" and other VPDs.
- Potential under-reporting of neonatal deaths.
- Late reporting and feedback on reportable VPDs.
- Problems in transport and collection of specimens from remote areas.
- Limited IEC materials on vaccine preventable diseases
- Lack of clear AEFI guidelines and response system
- Need for strengthening of reporting of coverage/monitoring and reportable diseases in high risk areas (slums/ethnic groups).

New vaccines surveillance: Acute Meningo-encephalitis and rotavirus

Hospital based sentinel surveillance system was established in 2005 in 5 hospitals for acute ME. The initial results show about 15-18% of acute ME cases attributable to JE, consistent with a range of earlier studies conducted in Phnom Penh, Siem Reap and Takeo that indicated that 20-30% of all encephalitis cases are attributable to the virus. In terms of *haemophylus influenzae B*, a study conducted at Khanta Bopha Hospital indicates that 49% of the bacterial meningitis cases in children under the age of 2 are attributable to this agent.

In addition to sentinel ME surveillance, hospital-based rotavirus surveillance has been established in National Pediatric hospital since 2005. Initial results indicate that 40 to 50% of < 5 year old childhood admissions are attributable to rotavirus, consistent with regional country assessments. These sentinel surveillance systems needs to be continued and further strengthened to generate required information for evidence-based decisions about vaccine introduction and post-introduction impact assessments. Issues of affordability and cost effectiveness also need to be considered.

2.2.3 New Plan Focus for Surveillance and disease control

There is a strong focus in surveillance strategies in the new plan on integration of vaccine preventable disease surveillance, improving coverage monitoring and case response, strengthening approaches to adverse events following immunization, improving active case finding and establishing and strengthening surveillance for new vaccines (HIB, pneumococcus, JE, Rotavirus, and HPV).

Measles Elimination (including introduction of a routine 2nd dose of measles vaccine)

The Ministry of Health in Cambodia has committed to achieving the goal of measles elimination by 2012. One of the key activities is organization of measles SIA targeting children 9-59 months in 2011. Coverage reached in the campaign was 95 %. Over the last 3 years (2008-2010) routine administrative coverage for measles vaccines has ranged between 89% and 92%. Preliminary findings of a DHS survey conducted in 2010 have confirmed a measles coverage rate of 81.9%.

In line with the WPRO goal of achieving measles elimination and technical recommendations from WHO, the introduction of a 2nd dose of measles vaccine is planned for the beginning of 2012. This will replace the need for regular measles supplementary immunization campaigns and ensure that 95% population immunity of each birth cohort is achieved and maintained in every district. The immunization

schedule will be adjusted so that the first dose continues to be provided at 9 months of age, and the second at 18 months of age.

Other strategies to achieve implementation of the measles elimination goal are as follows:

1. To develop or strengthen measles surveillance systems and laboratory confirmation of cases to ensure that all suspected cases of measles are detected, investigated, with blood samples taken and tested at an accredited WHO laboratory.
2. Implementation of a "Reaching Every Community Strategy" to accelerate immunization coverage in those communities with the lowest immunization coverage (mobile populations, remote populations, ethnic minorities and migrants, the urban poor)
3. Targeted sub national measles SIAs in high risk communities that continue to achieve sub national routine measles coverage with both the first and second dose.
4. Introduction of a system of school entry checks for children to ensure that they are fully immunized with all antigens.

A detailed introduction plan for the 2nd dose of measles vaccine is annexed to this cMYP.

Maternal and Neo Natal Tetanus Elimination

NIP is planned to develop a neo *natal tetanus elimination plan* with proposed target date for MNTE elimination by 2008. The new plan will classify districts and health centers into high, medium and low risk categories. Activities will include supplementary immunization activities (SIAs) in high risk areas, and high risk population group (e.g. CBAW working in the factory who missed the opportunity for vaccination in their villages);, promotion of community awareness on prevention of MNT; and strengthening surveillance activities in medium to low risk districts. Efforts will be made to scale up registering of CBAW, as well as the promotion of the "protected at birth" indicator for tetanus prevention. Validation of elimination is intended to occur in 2012 following the conducting of SIA activities in the remaining high risk districts in 2011 (validation is defined as 1 tetanus case per 1000 live births).

2.3. Service Delivery

2.3.1. New Vaccine Introduction – Strengths, Weaknesses and New Plan Focus

Program Weaknesses/Constraints:

The main weaknesses and constraints of new vaccine introduction are outlined below:

- Currently HepB birth dose vaccine is given within 7 days and most of them received before 24 hours after birth.
- It is difficult to control payment for vaccination by the midwife strategy; allowing the midwife to deliver Hep B birth dose vaccine when deliver a baby at home.
- There are management and logistical difficulties associated with keeping Hep B vaccine outside the cold chain

- It is not clear how waste management of A-D syringes will be managed by midwives
- Delivery rates by Traditional Birth Attendants remain very high

Program Strengths:

The NIP commenced introduction of Hepatitis B Birth Dose in 2004. Initially, the strategy focused on health facility administration of the birth dose. But given the very low rate of delivery in public facilities (<10%), the program was expanded to outreach health services. By the end of 2005, coverage of birth dose reached 28%, only 2% lower than the expected target. The introduction of combined vaccine proceeded smoothly, and by the end of 2005, 100% of districts were reached with the combined vaccine. There was no decline in coverage associated with the new vaccine introduction effort. There is minimal gap in gender disaggregated coverage rates, with 2010 DHS survey findings demonstrating that female DPT3 coverage rates (85%) were only slightly higher than the coverage rates for males (84%) (DHS Survey 2010). Also, starting in 2010, gender specific immunization cards are being used that have the relevant growth charts for males and females.

New Plan Focus - Hepatitis B:

WPRO now has a regional target to reduce transmission of the hepatitis B virus to children aged 5 to less than 2% by 2012. Hepatitis B sero surveys conducted provincially in 2001 and nationally in 2005 indicate a baseline sero-prevalence in this age group of 3.5%. In order to reach the target of 2%, WPRO is now proposing coverage targets for reaching infants within 24 hours of birth. For this reason, the NIP is now proposing the introduction and trial of midwife strategy (administration of birth dose by midwives during home deliveries). An additional advantage is that, given that hepatitis B is a heat stable vaccine; there are additional opportunities for midwives to carry this vaccine outside the cold chain.

NIP managers have observed high demand from the public for hepatitis B birth dose vaccine. Introduction of the vaccine is also seen as an opportunity to improve the fixed facility immunization strategy. Given the high rate of deliveries in the private professional medical sector, particularly in urban areas, there are also opportunities seen by managers to Introduce the vaccine into this sector.
There is now a focus in this new strategic plan on widening access to a timely birth dose through adoption of a midwife strategy and promotion of guidelines for administration of the vaccine with 24 hours post delivery.

2.3.2 Fixed Facility Strategy –Strengths, Weaknesses and New Plan Focus

Fixed facility Strengths

A fixed facility immunization strategy has been implemented by the NIP in collaboration with WHO and PATH and GAVI over the last 3 years. In 2006, the strategy was expanded to 154 facilities. Early results indicate no decline in coverage, reduced vaccine wastage and increased health centre utilization.
Overall strengths of the strategy can be summarized as follows:

- Reduced workload during outreach for health workers
- Increased community awareness of health center services
- Closer communication between HC and Community/local authority
- Increase in utilization of other health service interventions at health centres
- The strategy promotes sustainability in health services delivery

- There is reduced vaccine wastage
-

Weaknesses/Constraints of Fixed Facility Strategy

However, some weaknesses and constraints have been experienced with the fixed strategy. The strategy is not suitable for expansion to remote areas or areas with complicated village geography. Some health centre staff has incentive for outreach activities, and loses these incentives with introduction of the fixed strategy.

A major constraint is sustaining social mobilization finance support for fixed site. Health education and communication with local authorities is critical to raise awareness of the population of the services that facilities provide. But currently, there is no government budget source to finance village based social mobilization of health education.

To date, the fixed strategy has been focused on immunization. However, to function in a sustainable way, the strategy needs to incorporate other MPA and child survival interventions. This participation is necessary in order to provide a consistent approach to health centre utilization. It should also be recognized that implementation of a fixed strategy does not imply the cessation of health outreach services – its imply means obtaining a better balance between service delivery at fixed facilities and through village outreach.

New Plan Focus – Fixed Facility Strategy

In this new strategic plan, there will now be a focus on widening the fixed facility strategy, and strengthening links between this strategy and the child survival strategy and IMCI. This supports one of the 4 key strategic areas of GIVS – strengthening links between immunization and other components of the health system.

2.3.3. Coverage Improvement Planning Strategy – Strengths, Weaknesses and New Plan Focus

Strengths of CIP

This strategy was introduced in Cambodia following a Reaching Every District Planning meeting conducted in early 2003 by the NIP, WHO and UNICEF. The strategy is based on micro-planning, strengthened supervision and contract agreements. Increased coverage was obtained from 10 out of 12 districts in the first year. The advantages of the strategy are that health centres can develop a detailed costed micro-plan for their catchment area.

Weaknesses/Constraints of CIP

But some ODs have undertaken CIP but the coverage was not improved. This is due to the fact that there is on occasions lack of monitoring and responsibility from the PHD and ODs, and some ODS were not able to set up micro-planning processes. Additionally, there is remains the problem of sustainably financing incentives for health workers to reach the most difficult to access areas.

New Plan Focus – Reaching Every Community

In this new strategic plan, there will therefore be a focus on strengthening of micro-planning processes that includes a wider package of interventions and a focus on high risk areas. *An*

EPI Review conducted in 2010 established that there were specific population sub groups that were at higher risk of un-immunized status. (EPI Review 2010) These include migrants, mobile populations, remote area residents, urban slum dwellers and ethnic minorities. The most recent 2010 Demographic health survey data demonstrates a 31% gap in immunization coverage for children whose mother has the lowest education level compared to children of mothers with the highest education level. (DHS Survey 2010) Based on this assessment, the NIP is proposing to develop a "Reaching Every Community Strategy" in 2011 in order to strengthen micro-planning and communication strategies to increase coverage up to 95%.

2.3.4 Supplementary Immunization Activities (SIAs) – Strengths, Weaknesses and New Plan Focus

In the period 2000 to 2011, immunization campaigns were conducted for polio, neonatal tetanus and measles elimination/control. Following the detection of vaccine derived polio cases in 2005/2006 (2 cases), > 95% coverage was received following 3 rounds of campaign.

Tetanus toxoid campaigns were conducted 3 rounds in 52 ODs and 244 factories (approximately 1.3 million CBAW). A sharp decline in reported neo natal cases has been reported. There are difficulties associated with the fact that there is no health centre system for registering / recording CBAWS. Between 2001-2004 *measles campaigns* were conducted across the country (also including Vitamin A and Mebendazole). > 95% coverage for measles has been obtained and there has been a sharp decline in disease incidence. There has been good participation from local authorities in support of these campaigns.

In this new plan, *there will be a focus* on adapting routine strategy (fixed, CIP, Campaign) to the specific population characteristics (accessible populations, remote populations, at risk populations, clusters of un immunized or high drop out populations, women of child bearing age, infants born outside institutions). There are also opportunities to support improved coverage of other child survival interventions, through support for integrated planning and management at District level and below.

Progress 2000 – 2007 Service Delivery Immunization

- ⇨ More children are being immunized in Cambodia than ever before, and disease incidence has sharply declined
- ⇨ A wider range of service delivery strategies have been applied, each adapted to specific population groups
- ⇨ Integration of campaign activities have taken place with other interventions
- ⇨ Improvements in collaboration with the PHD and with NGOs means the NIP can program activities in a more efficient (reduced resource overlap) and effective (wider reach) manner
- ⇨ The further development of the health system (numbers of health centres) also serves to widen the reach of the immunization program

2.4. Logistics, Communication and Training

2.4.1 Cold Chain– Strengths, Weaknesses and New Plan Focus

In the last 5 years, there have been significant improvements to *logistics* for immunization. A national policy for safety injection has been developed and syringes and safety boxes have been developed. An incineration waste management system has also been introduced. However, 33% of districts do not have incinerators, and transport distances for delivery of the safety boxes to incinerators are sometimes too large.

In terms of *vaccine management*, stock cards have now been merged with physical stock, but there is still lack of attention to vaccine management. Vaccine wastage is not calculated at sub national and facility level. At the central level, monitoring between the Central Medical Store (which manage the cold room) and the central NIP needs to be strengthened.

In terms of *cold chain management*, there is now adequate gas and electricity in most locations and enough storage capacity. However, there is lack of maintenance skill at all levels, and there is no system from the PHD for repairing refrigeration systems.

The last cold chain assessment was undertaken in the late 2009. This assessment The EVSM 2009 reported major improvements in the Cambodian Cold Chain system since the last EVSM in 2003. These improvements include the following:

- Completeness of vaccine arrival reports for international shipments
- Regular calculation of vaccine volume estimates and required store capacity
- Installation of 3 new cold rooms and one new freezer room
- Regular and reliable delivery of stock to provinces
- Very good stock forecasting and procurement
- Implementation of new computerized stock management program since 2006

Main recommendations in the 2009 the vaccine management assessment were:

- Train customs staff in the handling of vaccines
- Train all staff of CMS on the new international shipping temperature indicators
- Train more CMS staff on the handling of vaccines according to WHO and UNICEF guidelines.
- Introduce the manual recording of all temperature recordings on a daily basis according to WHO guidelines
- Introduce a monthly temperature records review system
- Conduct annual temperature recording device validations
- Introduce the new Fridge-tag and Freeze-tag to all cold/freezer rooms
- Prepare and introduce a system and guidelines for the handling of discarded vaccines

Key recommendations have been incorporated into the 2010 work plan of NIP and follow-up will be going on. Cambodia is planning to undertake an Effective Vaccine Management (EVM) assessment in late 2011 or early 2012.

An assessment of cold chain storage capacity has demonstrated that adequate storage space is available to accommodate new and underutilized vaccines including penta-valent vaccine and measles second dose vaccine.

In terms of logistics, *the focus in this new plan* will be to develop replacement systems for the 2000 to 2005 investments in cold chain and waste management, and to develop guidelines and accountability for maintenance of these new systems.

2.4.2. Communication – Strengths, Weaknesses and New Plan Focus

A *National Communication Strategy* for immunization has been has been disseminated, but in relation to communication, there is lack of research and evaluation capacity. There is also lack of emphasis on communication strategies for high risk and hard to reach groups. However, important developments have taken place in gaining local authority support for routine and campaign immunization efforts. Although a system for responding to adverse events exists, it requires a significant degree of program strengthening at national and sub-national level.

The DHS 2005 survey indicates there is little difference in coverage between rural and urban populations. However, coverage differences between educated and less educated population are substantial.[14] Recent surveys have demonstrated that face to face education is a critical requirement for reaching high risk and rural populations.[15] Many of the high risk areas of Cambodia for vaccine preventable disease include remote areas, urban slums and ethnic minorities. Education strategies need to be adapted to the specific conditions of these social groups.

The NIP and partners (e.g. UNICEF & PATH) have assisted with advocacy for EPI with local authorities. However, follow up action on the advocacy has not been clearly defined. Local authorities also assisted significantly with immunization campaigns. It is likely that in coming years the power and influence of local authorities over health issues is likely to increase.

The focus in this new plan between 2008 and 2015, the NIP will strengthen linkages between the public health sector and local authorities in support of routine immunization, improve the guidelines and implementation of adverse events response and develop a more focussed communication strategy for at risk groups.

2.4.3 Training – Strengths, Weaknesses and New Plan Focus

EPI staff *training programs* in recent years have supported new vaccine introduction, cold chain management and safety injection. However, more effort is required at integrating training and taking a more systematic approach to training needs analysis. There is a high turnover of staff, and training programs (middle level management and immunization in practice) need to keep pace with these staff changes. *The focus of training* in the new plan will be on middle level management and immunization practice, with training programs targeted to new staff and staff not trained in the last 5 years.

[14] Ministry of Planning DHS Survey Cambodia 2005
[15] PATH – KAP Study Immunization 2002. See also American Red Cross KAP Study 2005

Progress 2000 – 2006 Communication, Logistics, Training

- ⇨ % Districts now have adequate cold chain equipment has increased from 18% to 100%
- ⇨ % Districts with AD syringes has increased from 0% to 100%
- ⇨ % Districts with adequate disposal and incineration system has increased from 5% to 100%
- ⇨ Vaccine wastage has been reduced from 70% of DPT/DTP-HepB , 65% of TT,90% of BCG , 80% of Measles and 60% OPV in 2001 to 40 % of DPT-HepB, 47% of TT, 86% of BCG , 75% of Measles and 40% of OPV in 2006
- ⇨ A strategic Plan for communication was developed first in 2004

2.5 Health System and Program Management

2.5.1 Health Financing – Strengths, Weaknesses and New Plan Focus

In terms of *Vaccine Financing,* the capacity of RGC for provision of vaccine is still very limited. However, the government is increasing the national budget for vaccine procurement. International financing for immunization is still increasing. But there is concern that the VII system for procurement is still too complicated and causes delay in financing.

In terms of Infrastructure finance, the main issue is recurrent financing of maintenance for logistics systems. Government has committed to financing of gas supply for cold chain, but some provinces are still not accepting responsibility for this. The MOH needs to ensure there is a budget line for gas and recurrent costs. The main issue for transport is recurrent funding for fuel to travel. In some locations staff uses their own transportation. In some remote areas requiring water transport, there is lack of transport for outreach altogether.

Operational Financing of basic health services presents continuing constraints. Following the 10 km decree limiting outreach per diems below 10 kms from a facility, there remains a lack of operational budget for outreach and a lack of strategy for financing of social mobilization. Government financing for operational costs are actually decreasing (Decree limiting travel less than 10 kms since 2005). However, there is good support from partners/NGO to finance and assist outreach.

When government budgets are available, they are frequently late and create uncertainty for planners. There is also limited support from government for financing of emergencies or campaigns (not flexible). Sometimes there is a lack of coordination/collaboration between national programmers and NGOs. Outreach is then funded separately causing lack of efficiency with outreach.

In the new plan, there will be a focus on strengthening the VII mechanism to support vaccine financing as well as the identification of an additional bi lateral donor to support vaccine financing. Access to operation costs will be improved through enhanced NGO co ordination and the promotion of greater PHD accountability for the financing of the operational costs of immunization.

2.5.2. Human Resource – Strengths, Weaknesses and New Plan focus

Human Resources: In many places EPI activity is assured and human resource shortage is not as acute as for reproductive health with lack of midwives. However, some health centres do not have enough staff, and cannot do outreach and fixed site at the same time. In these situations, staff cannot undertake all tasks (cold chain, vaccine management etc). There is also a huge problem of distribution of staff. There is significant over-representation of all health professions in Phnom Penh and in most provincial towns, leaving rural and remote areas under-staffed with many staff under-qualified.

At PHD and Central level, staff quantity and quality are good, but there is only one OD EPI manager (population catchments 100,000). Turn-over of staff is a particular issue at HC level, and requires constant orientation of new staff by the NIP. Midwives need to be trained especially for Hepatitis Birth Dose, BCG and TT. This is important issue for integration of EPI with MCH.

In general staff has good technical and management skills, but there is real problem with motivation. Coverage increased after 2002 with good resources coordination between Govt, GAVI and NGO. These funds were used to provide incentives for staff to reach targets according to a micro-plan and performance agreement.

In the new plan, there will be a focus on strengthening links between immunization and EPI, capacity building of midwives in the area of immunization, and the application of performance based strategies to raise immunization performance.

2.5.3. Health Planning & Information – Strengths, Weaknesses and New Plan focus

In terms of *health planning*, an integrated planning system has been developed by the Ministry of Health. However, planning still often takes place on a vertical program basis, and there is limitation in capacity of district and facility managers to develop needs based and integrated micro-plans based on the MPA. In terms of *service delivery models,* there is a high dependence on health outreach to achieve program objectives. This has resulted in the new focus to develop fixed site utilization for the MPA. Equally, there are high risk and remote areas that will require application of health outreach and community based programs.

Staff lack capacity for management of information for planning purposes. Staff are good at collecting data but not at analyzing it and using it to develop a good plan. This also effects vaccine management in terms of reducing wastage.

Although there has been progress in the last 5 years, links between community and health are still not strong enough (births and deaths registration). However, in the past 5 years, local authorities have improved data collection on the population (for example commune and village data book).

Data quality is greatly improved. Surveys have shown close accuracy between reported and actual coverage. However, this does not mean that the information is well used for planning or mobilizing resource and finance from the government. Sometimes the flow of information is slow - data flow needs to increase (reporting process). The NIP and MOH still has some parallel systems for reporting. This is because the NIP needs more detailed information for planning purposes.

More recent survey data through the DHS survey 2010 does raise concerns however regarding `the quality of reported data. There is a 10% gap between reported measles coverage and coverage as reported by the DHS survey, and a 9% gap in DPT3 reporting. Action is being undertaken by the Ministry of Health to improve data quality. In 10 health system strengthening districts (GAVI supported) a strategy for health system data quality self assessment (including EPI) is being trialed with a view to national scale up of the approach.

In the new plan, there will be a focus on supporting links between immunization and other interventions through strengthening of integrated micro-planning at District level and below, and by building the capacity of OD and HC managers to analyze data for planning purposes.

2.5.4 Decentralization & the Private Sector – Strengths, Weaknesses and New Plan focus

Regional supervisors have improved the communication between the central NIP and the provinces. Their supervision is still necessary to provide additional advice and training to the lower levels and give motivation to the health workers at Health Centre level. NIP needs to promote accountability for performance to the PHD, OD and health centre level. As discussed above, the power of local authorities is increasing, but the role of commune councils is not yet clear in relation to health sector provision and management.

Research in 2005 has indicated that the private sector is playing a substantial role in immunization especially for birth dose but the issue of low quality and low regulation (does not follow policy). Guidelines have now been developed for pilot partnership at 12 clinics.

In the new plan, the NIP will continue to maintain links with local authorities and strengthen accountability for performance at PHD and OD level.

2.5.5 NIP Program Management – Strengths, Weaknesses and New Plan focus

Logistics management has improved (cold chain, wastage, safety injection, wastes management. The Technical Working Group (TWG) is functioning effectively. But the ICC needs strengthening. It requires more high level input. At central level, planning functions are also very good. Multi Year Plans for immunization have been developed with financial sustainability planning. A regional supervision system has also improved the performance of central supervisors. At the Provincial level, functions of provincial level supervisors need to be defined more clearly, and management support for district EPI supervisors will be required. *The new plan* will focus on strengthening the capacity of middle level managers at PHD and OD level, particularly in relation to health planning and logistics management.

The Health System – Summary of New Plan focus:

Based on the above strengths and weaknesses/constraints, the NIP recently identified health system strengthening opportunities in the progress report to GAVI.[16] These were identified as:

[16] MOH/NIP 2005 GAVI Progress Report MOH Phnom Penh 2005

1. Strengthened planning and delivery of minimum package of activity (MPA) of primary health care services to underserved or high risk areas
2. Promotion of health centre utilization for MPA
3. Strengthening of decentralized health planning (including building capacity for use of health information in the local area)
4. Support for health education / communication strategy for MPA in areas of low service access
5. Support for increased delivery by midwife (including increased post natal care coverage and birth dose hepatitis B/BCG)

A recent annual health sector program review prioritized the IMCI strategy and distribution of midwives in Cambodia as being key areas of focus for the health sector in coming years.

In the coming 8 years, opportunities will be sought by the NIP to strengthen links between the national program and the health system, in order to use the success of EPI to support other child survival interventions, while at the same time promoting sustainability of EPI through closer co ordination with other national programs and delivery interventions.

The HSS program in 10 operational districts supported by GAVI is focusing on strengthening on immunization and maternal and child survival services (for the continuum of care) through an internal contracting model. This strategy is linked to Health Sector Plan 2 and health Sector Support program of the Ministry of Health.

3.0 GOALS AND OBJECTIVES

3.1 Goal of The National Immunization Program

To improve child survival and health and support achievement of Millennium Goals 1 (Poverty Reduction) and 4 (mortality reduction) by controlling, eliminating, or eradicating all vaccine preventable diseases targeted by the National Immunization Program

3.2 Objectives Of National Immunization Program

3.2.1. Service Delivery

1. To improve routine immunization for children under 1 year of age in year 2015 as follow :

- Hepatitis B birth dose (< 24 hrs) 80%
- BCG 100%
- DPT-Hepatitis B3 95%
- OPV3 95%
- Measles (2 dose) 95%
- Fully immunized 90%
- Protected at Birth (PAB) for NT 80 %

2. To introduce new and underutilized as justified by disease burden

- Introduce JE vaccine in 2009 in three pilot provinces
- Introduce Hib containing pentavalent vaccine (DPT-HepB-Hib) by 2010

- Introduce measles second dose by 2012
- Evaluate other new vaccines (e.g. pneumococcal vaccine, rotavirus vaccine, HPV vaccine) for potential introduction by assessing their disease burden, and economic valuations.

3.2.2. Surveillance and Disease Control

3. Strengthen surveillance for routine vaccine preventable diseases by maintaining standard indicators of surveillance for AFP and fever and rash
4. To maintain polio free status until the time of global eradication
5. Achieve maternal neo natal tetanus elimination by 2012
6. To achieve measles elimination by the year 2012
7. To control hepatitis B disease by reducing carriage in new birth cohorts to less than 2% by 2012
8. Finalize AEFI guidelines and monitoring systems by 2008 (completed in 2010)
9. To strengthen country decision making for new vaccines by strengthening/establishing research and surveillance of new vaccine preventable diseases (HIB disease, pneumococcal disease, JE, Rotavirus, etc)

3.2.3. Logistics, Communication and Training

10. To increase community participation in immunization at local authority/decision maker level (advocacy) and community level, especially in high risk areas.
11. To improve vaccine management through provision of adequate cold chain equipment, reduction of vaccine wastage and the safe immunization with appropriate waste disposal.

3.2.4 Health System and Program Management

12. To improve the capacity of PHD, OD and facility managers regarding technical and management functions
13. To increase secured national budget for financing of vaccine and operational costs

4.0 STRATEGIES OF NATIONAL IMMUNIZATION PROGRAM

4.1 Service Delivery

1. ROUTINE IMMUNIZATION

Objective	*Summary*	Means of Verification
OBJECTIVE 1	*To improve routine immunization for children under the age of 1 by the year 2015 (see targets)*	• *CDHS 2010, 2015* • *EPI Review 2010, 2015*

STRATEGIES	⇨ Promote and expand a *fixed site strategy* in accessible populations, and strengthen the health system through integration with other national programs
	⇨ Implement coverage improvement strategy in populations with high numbers of un-immunized in the last quarter of each year.
	⇨ Conduct integrated health outreach strategy in low access or remote populations
	⇨ Conduct immunization campaigns in selected high risk or hard to reach area
	⇨ Implement a Private Sector collaboration strategy in urban populations
	⇨ Expand access to a Hepatitis B Birth Dose and post natal care through application of a midwife strategy for populations where births take place outside institutions
	⇨ Enhance access for women of child bearing age to tetanus immunization, by improving registration through improved co operation between local authorities, health centre managers and VHVs.
	⇨ Support improved coverage of other child survival interventions, through support for integrated planning and management at District level and below.
	⇨ To design and implement a reaching every community strategy for improved access to immunization by high risk sub population groups by the end of 2011

4.2 Surveillance and Disease Control

4.2.1 Polio Eradication

Objective	*Summary*	Means of Verification
OBJECTIVE 2	*Maintenance of polio free status until the time of global eradication*	• *National Certification Committee* • *WHO-UNICEF Report*
STRATEGIES	⇨ Strengthening AFP surveillance ⇨ Maintain high OPV coverage < 5 years of age in high risk area ⇨ Increase OPV coverage through routine immunization (see strategies under objective 1)	

4.2.2.Maternal Neo Natal Tetanus Elimination

Objective	*Summary*	Means of Verification
OBJECTIVE 3	*Achieve maternal neo natal tetanus elimination by 2012.*	*Validation by WHO in 2012*
STRATEGIES	⇨ Reinforce integration neo natal tetanus surveillance with VPD surveillance system through strengthening report of neonatal death, improving the quality of investigation, data collection and analysis. ⇨ Improved registration systems (CBAW) for TT immunization status ⇨ Strengthen Protected at Birth (PAB) classification of tetanus prevention ⇨ Increase TT2+ for PW and CBAW through routine strategies and targeted SIAs. ⇨ Data collection and analysis of risk to identify high risk health center and villages in each OD.	

- ⇨ Improve case response through promotion of reports of neo natal deaths/tetanus deaths (guidelines review, visit silent areas, refresher training, conduct communication response with reported case of neonatal tetanus)
- ⇨ Co ordination with MCH and child survival committee in relation to clean delivery
- ⇨ Apply high risk approach based on districts with low delivery by trained staff or ANC, low TT coverage and high reported cases of neo natal tetanus.
- ⇨ Focus supervision and routine strengthening planning on high risk districts
- ⇨ Develop targeted communication plan to reach all women of child bearing age
- ⇨ Develop and Review detailed tetanus elimination work plan in 2007-2009
- ⇨ Prepare country assessment for neo natal tetanus elimination in 2008
- ⇨ Implement TT SIAS in remaining high risk districts in 2011
- ⇨ Validate elimination in 2012

4.2.3 Measles Elimination

Objective	*Summary*	Means of Verification
OBJECTIVE 4	*To effectively reach measles elimination by the year 2012*	• *Receive WHO Certificate 2012*
STRATEGIES	⇨ Finalize detailed measles elimination plan in 2008 ⇨ Improve measles surveillance by improving coverage monitoring and active case finding (Expansion and enhancement of active case finding to all districts) ⇨ Increase and sustain 95% population immunity against the measles virus, by improving coverage of measles through routine immunization strategies (see objective 1 above) ⇨ Conduct SIA for all children < 5 in 2007 and 2011 ⇨ Introduce 2nd dose measles vaccine within the routine immunization schedule by 2011 (age 18 months) ⇨ Introduce school entry check nationally for immunization status by 2015 (to be piloted with the introduction of the 2nd dose of measles vaccine in 2012) ⇨ Target supervision and planning and SIAs to high risk communities, the under-immunized and isolated populations	

4.2.4Control Of Hepatitis B

Objective	*Summary*	Means of Verification
OBJECTIVE 5	*To control hepatitis B disease by reducing carriage in new birth cohorts to less than 2% by 2012*	• *Hep B Serological Survey in Year 2011*
STRATEGIES	⇨ Establish guidelines for delivery of hepatitis B birth dose (including health facility and home delivery within 24 hours) ⇨ Promote administration of birth dose by the midwife outside the cold chain ⇨ Design and implement outside the cold chain strategy based on WHO guideline	

	⇨ Development of collaboration strategy with private sector to administer birth dose in large maternity clinics ⇨ Ensure high coverage for DPT HEP B 3 through routine strategy (see objective 1) ⇨ Validate Hep B Sero prevalence in 2011

4.2.5 Adverse Event Following Immunization (AEFI)

Objective	*Summary*	Means of Verification
OBJECTIVE 6	*Ensure AEFI guidelines and monitoring systems are in place*	• *Guideline developed* • *Surveillance Report*
STRATEGIES	⇨ To operationalize the national AEFI Committee ⇨ Establish national guideline for AEFI surveillance and response and reinforce guideline implementation through supervision ⇨ Build management capacity for AEFI through improving skill of managers through supervision and training ⇨ Establish and operationally provincial AEFI Rapid Response Teams ⇨ Develop improved communication with Drug Control Committee MOH & WHO reference laboratory in relation to issues surrounding vaccine quality	

4.2.6. Surveillance for New Vaccines

Objective	*Summary*	Means of Verification
OBJECTIVE 7	*To strengthen country decision making for new interventions by strengthening/establishing research and surveillance of new vaccine preventable diseases (HIB, JE, RV)*	• *CDC Surveillance Report* • *Approval letter from decision making for new interventions*
STRATEGIES	⇨ Establish surveillance guideline for new vaccine preventable diseases (HIB, JE, RV) with CDC ⇨ Conduct economic analysis of benefits of new interventions ⇨ Assess affordability of new interventions	

4.3 Logistics, Communication and Training

4.3.1 Community Participation

Objective	*Summary*	Means of Verification
OBJECTIVE 8	*To increase community participation in immunization at local authority/decision maker level (advocacy) and community*	• *CDHS 2010, 2015* • *EPI Review 2010, 2015*
STRATEGIES	⇨ Strengthen utilization of communication strategies ⇨ Conduct assessment to identify the barriers for immunization in *selected high risk areas and d*evelop and implement health education strategy for high risk populations (face to face education strategies using local social networks)	

	⇨ Maintain electronic and print media approaches to communication ⇨ Strengthen role and responsibilities of local authorities through joint planning at all levels ⇨ Explore opportunity for MOH decision maker to support immunization

4.3.2 Injection Safety

Objective	*Summary*	Means of Verification
OBJECTIVE 9	*To ensure that all immunization is given safely and waste is disposed of appropriately*	• *EPI Review 2010, 2015* • *NIP Report*
STRATEGIES	⇨ Advocate to MOH to procure AD syringe and safety box ⇨ Improve network of incinerator and waste management system (including private sector pratice)	

4.3.3 Cold Chain and Vaccine Management

Objective	*Summary*	Means of Verification
OBJECTIVE 10	*Improve vaccine management through provision of adequate functional cold chain equipment, reduction of vaccine wastage and increased efficiency of vaccine delivery and usage*	• *EPI Review 2010, 2015*
STRATEGIES	⇨ Improve adequate functional cold chain equipment (including solar systems for remote health facilities) ⇨ Strengthens the implementation of MDVP by promotion of use of VVM ⇨ Improve and strengthen vaccine management system by through staff capacity building and adequate equipment supply (includes improvement of the Effective Vaccine Store Management (EVSM) for central and sub-national storage, computerization of PHD NIP level by 2008) ⇨ Develop cold chain improvement plans based on findings of vaccine management assessments in 2009, 2012 and 2015 ⇨ Assess cold chain capacity requirements for introduction of new and underutilized vaccines ⇨ Undertake the Effective Vaccine Management Assessment in early 2012	

4.3.4 Transport Systems

Objective	*Summary*	Means of Verification
OBJECTIVE 11	*To fully equip all health facilities and management levels with functional transport and maintenance systems by the year 2010*	• *NIP Transport Inventory*
STRATEGIES	⇨ Identify transport needs from financial sustainability plan ⇨ Submit proposals to government and international donors for financing of transport plan	

	⇨ Establish maintenance and monitoring system for transport plan

4.4 Health System and Program Management

4.4.1. Capacity Building

Objective	*Summary*	Means of Verification
OBJECTIVE 12	*Increase the capacity of PHD, OD and facility managers regarding technical and management functions*	• *EPI Review 2010*
STRATEGIES	⇨ Ensure 100% of positions are filled at all levels ⇨ Improve / develop manager skills at PHD, OD and HC level by supportive supervision and in service management training ⇨ Improve integration of EPI programming with child survival strategy and PHD, OD and HC planning (based on NIP plan with clear budget line) ⇨ Strengthen evaluation function of Manager at central NIP ⇨ Maintain data base on staff trained in middle level management (MLM) and immunization in practice (IIP) ⇨ Provide training in MLM and IIP to all new staff or staff who have not received training in the last 5 years. ⇨ Improve integration of EPI with MCH services through MOH contracting strategies (GAVI HSS and SOA) ⇨ Mobilize funds for immunization strategies through improved access to pooled funds for vaccines and operations (especially health outreach)	

4.4.2. Management

Objective	*Summary*	Means of Verification
OBJECTIVE 13	*Secure national budget for vaccine and operational financing*	• *WHO-UNICEF Report*
STRATEGIES	⇨ Conduct long term vaccine forecasting and financial planning ⇨ Advocacy for resource mobilization from national and international sources ⇨ Promote efficiency of the national program through (1) Co ordination of NGO investment for investment in operational costs and social mobilization (2) Vaccine wastage reduction and (3) promotion of fixed site ⇨ Ensure that annual national budget allocated to vaccines supply is fully used ⇨ Clarify functions of EPI managers at Provincial and District level ⇨ Promote integration of EPI with child survival strategy and the health system through integrated fixed site and outreach micro-planning.	

5.0 MONITORING AND EVALUATION

5.1 Research And Program Evaluation

Framework	*Timeframe*
Report on Results of JE Surveillance	*2008*
Validation of MNTE	*2012*
Validation of Measles Elimination	*2012*
Hepatitis B Serological survey	*2011*
Cambodia DHS	*2010, 2015*
EPI Review	*2010, 2015*

5.2 Baseline Indicators

Baseline Indicators(2007)	*Source of Data*
Hepatitis B Serological Prevalence among children at 5y = 3.4%	*NIP Serology Survey 2006*
Hepatitis B Birth Dose within 24 hours 25%	*JRF,2008*
DPT – Hepatitis B3 Coverage 78%	*CDHS 2005*
Diphtheria cases 5 cases	*JRF 2008*
Pertussis cases 561 cases	*JRF, 2008*
Measles Cases 394 suspected cases	*JRF, 2008*
Measles Coverage 1st Dose 77%	*CDHS 2005*
Neonatal Tetanus cases 50 cases	*JRF,2008*
TT2+ Pregnancy women 50%	*JRF,2008*
Protected at Birth against Neonatal Tetanus (PAB) 69%	*NIP Report 2005*
DPT-Hepatitis B1-3 Drop Out 5.7 %	*JRF,2008*
BCG – Measles Drop Out 6.5 %	*JRF, 2008*

Children Fully Immunized 66 %	*CDHS 2005*
Hepatitis B birth dose Wastage 17%	*JRF, 2008*
DPT Hepatitis B Wastage 26%	*JRF ,2008*
BCG Wastage 84%	*NIP Report 2007*
OPV Wastage 35%	*NIP Report 2007*
Measles Wastage 73%	*NIP Report 2007*
TT Wastage 45%	*NIP Report 2007*

5.3 Immunization Target For 2015

Hepatitis B Serological Prevalence among children at 5 years	**< 1 %**
Hepatitis B Birth Dose < 24 hours	**80%**
Pentavalent vaccine Coverage	**95%**
Measles vaccine 9 mths Coverage	**95%**
Measles vaccine 18 mths Coverage	**95%**
BCG Coverage	**100%**
Neonatal Tetanus cases	**< 1/1000 LB/district**
Measles Cases	**<1/1 Million total population**
TT2+ Pregnancy women	**80 %**
NIP Fully Immunized	**90%**
Hepatitis B birth dose Wastage	**10%**
Pentavalent vaccine Wastage	**5%**
BCG Wastage	**60%**
OPV Wastage	**25%**
Measles Wastage	**50%**

Table *: Year wise target for vaccine coverage rates during the plan period: 2008-2015

	2007 (Actual)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
# of births	409587	419126	361780	370318	379058	388003	397160	406533	416127
BCG%	85%	91%	92%	93%	94%	100%	100%	100%	100%
HepB birth dose<24hrs to 7 days%	53%	60%	65%	70%	75%	80%	>80%	>80%	>80%
DPT-HepB1/Hib1%	87%	90%	91%	92%	93%	95%	95%	96%	97%
DPTHepB3/Hib3%	82%	84%	86%	88%	90%	95%	95%	95%	95%
MCV1%	79%	82%	84%	86%	88%	95%	95%	95%	95%
MCV2%	-	-	-	-	-	95%	95%	95%	95%

5.4 Evaluation Process

This plan will be monitored and evaluated through the following processes:

1. Global strategies (GIVS) and regional disease elimination targets provide a framework for monitoring and evaluation of national program outcomes.
2. This NIP strategic plan will also be an input to the overall health strategic plan of the Ministry of Health (HSP 2) 2008 – 2015.
3. An annual and mid term program review will be undertaken by the NIP with provincial and operational health departments. This will be the means by which the

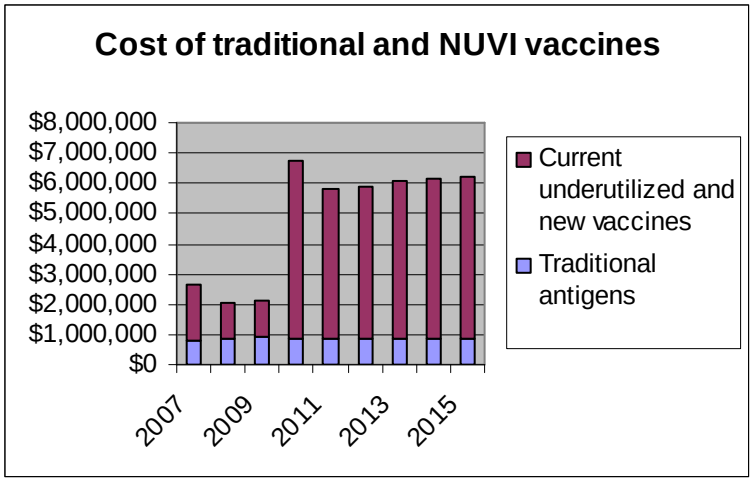
national strategic plan objectives and targets will link with provincial and district planning.

4. This strategic plan will be incorporated within the child survival strategy. Key interventions of the NIP strategic plan are part of the "scorecard interventions" of the child survival strategy.
5. This strategic plan will form the basis for developing annual operational plans for the national program.

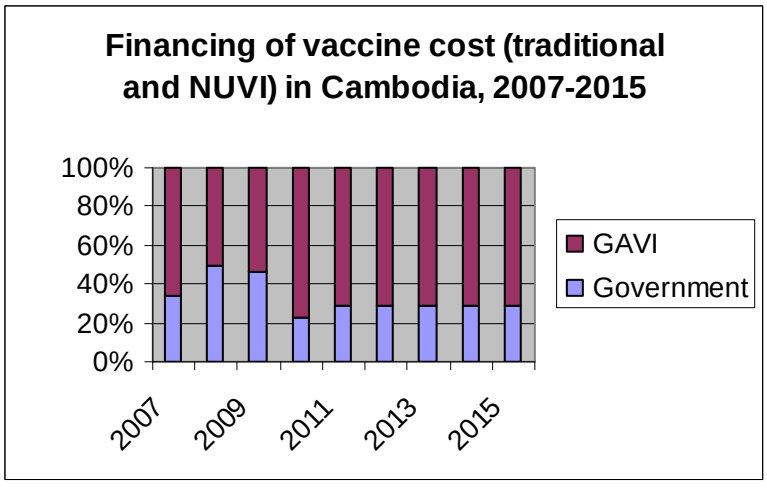
6.0 COSTING AND FINANCING: 2008-2015

This section provides estimates of the costs and financing scenarios for vaccines (routine and campaign), injection equipment and supplies, cold chain and transportation equipment and operational costs during 2007-2011. No costing analysis is done for salaries of health personnel and building of health facilities involved in delivering the immunization services, as this is beyond the scope of NIP program. A detailed Excel costing and financial worksheet accompanies this description to provide the formulas, assumptions and basis of different calculations.

6.1 Vaccines for routine EPI programs



The total cost for three *traditional* antigens (BCG, measles, OPV,) for children under 1 years of age and for tetanus immunization for pregnant and CBAW as per the current immunization schedule in the base year 2007 is estimated to be about $771,692 per year (Table 3A-1, Annex 3) All the cost of these vaccines costs were financed by government of Cambodia in 2007. *Vaccine financing for the traditional antigens is secured from government funds for the duration of c-MYP.*



Among new planned introductions in the current MYP, Cambodia is planning to introduce pentavalent vaccine containing Hib antigen in 2010 and a 2nd dose of measles vaccine in 2012. The pentavalent vaccine will replace the current tetravalent vaccine (DPT-HepB), and will be introduced with GAVI Support. Support for introduction of JE vaccine is still unsecure. The cost of introduction of a second dose of measles vaccine (assuming price of one dose of $ 0.22 during the whole plan period) will range from $233,142 in 2012 to $250,041 in 2015 (these costs include vaccine and freight costs). The

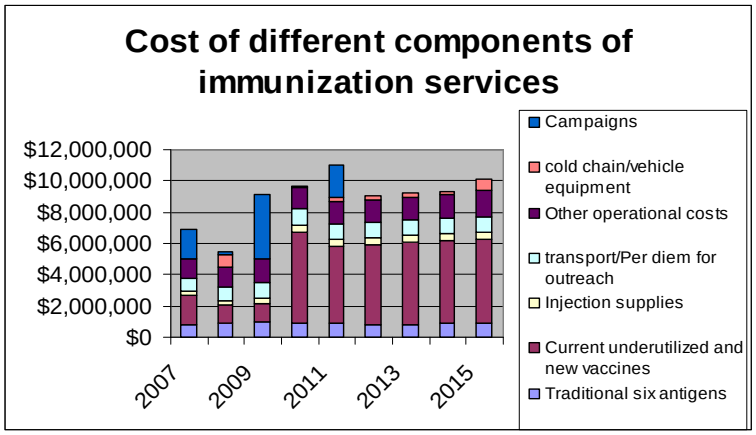
cost of the 2nd dose of measles vaccine will be fully support by GAVI, *with government continuing to fund the procurement of the 1st dose of measles vaccine during this period.*

6.2 Injection supplies

Cambodia introduced AD syringes with GAVI support in 2002. GAVI support expired in 2004. Since, then Cambodia is able to continue to use AD syringes with donor support, however, in 2007, *domestic funding was secured for this purpose along with the routine vaccines*. In addition to government, GAVI is another financing agency for injection supplies as the new vaccine (DPT-HepB-Hib and measles 2nd dose) comes bundled with AD syringes. The cost of injection supplies for routine vaccines was $244,042 in the base year (2007) and will increase to $407,890 in 2015.

6.3 Operational costs

Due to high reliance on outreach services, a very high proportion of operational costs are for payment of per-diems and transportation costs, most of which is currently funded by local and national governments, though some shortfall remain. In addition, the total cost is estimated assuming the current level of outreach, however, during the current plan, as explained earlier, efforts are being made to reduce reliance on outreach and promote more service delivery at health facility level by increasing community demand, extending cold chain to health centers, and incentives to health workers to operate health facilities.



Besides the operational costs for outreach, other operational costs include costs for short-term training, IEC/social mobilization, diseases surveillance, maintenance and overhead and program management. The maintenance and overhead costs are calculated at 10% of total capital cost of the equipment in the baseline and is increased by 2% each year to take into account any inflation. These costs are largely funded or can be funded through partner agency support.

6.4 Capital expenditures: cold chain equipment

The major capital expenditure items include cold chain equipment, vehicles and office equipment. Replacement of one WIC and addition of four WIC cold rooms is planned at national level, with provision of one additional MK304 refrigerator at provincial level. All the health centers got the refrigerators in 2005, and hence replacement is expected only from 2013 onwards**.** A provision is kept for replacement of 20% of RCW 50EG between 2013 and 2015, which will be decided on the basis of regular assessments from time to time.

Funding has been largely secured for this purpose from UNICEF and government of Japan for addition of two WIC cold rooms at national level and for addition of MK304 at provincial and OD level, and

for RCW50EG in 2008. The funding is being planned to be secured from UNICEF and JICA for other plans for replacement and addition, and is likely to be available.

6.5 Costs and financing of campaigns

Campaigns are planned for measles, MNTE and Japanese encephalitis (at the time of introduction). *However, all the campaigns will depend upon availability of external financing* from UNICEF, JICA or WHO or GAVI.

A MNTE campaign is planned in 2008 for CBAW working in factories who missed on TT vaccination provided in the villages. The total cost is estimated at $226,197 and will be financed by UNICEF.

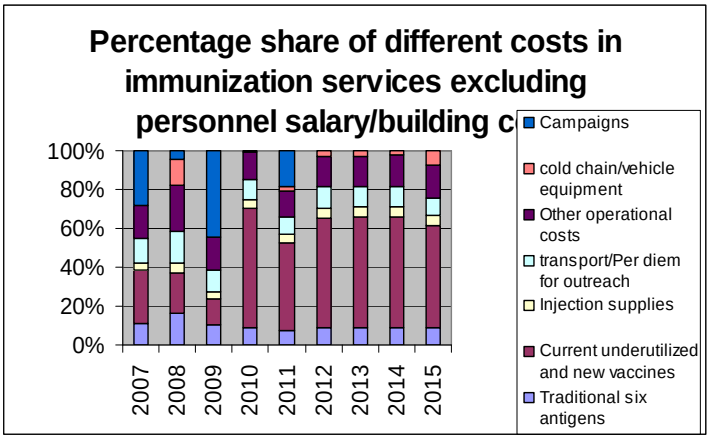
Measles campaign: While the funding for 2007 measles campaign has been secured from UN foundation, funding is still being discussed with JICA (for vaccine and injection supplies) and with UNICEF and WHO (operational costs) for the measles campaign planned in 2011 for the age group 9 months to 59 months. The total cost is estimated at about $2 million with the assumption of $0.80 per child in operational costs.

Japanese encephalitis: Campaign is planned in 2009, as part of JE vaccine introduction strategy for children 1-10 years of age. The cost is estimated at $4.1 million, but is currently unsecured.

Annex 3 provides the summary table for costing and financing of different EPI components.

6.6 Total cost and financing of delivery of immunization services

The estimated cost of delivering immunization services in Cambodia will increase from $7.1 million in 2007 (base line year) to more than $8.9 million in 2015 (but including immunization specific salary costs, transportation and per-diem cost of outreach services). The cost of new vaccines (hepatitis B, Hib and JE) will account for a major share of the cost. The major financing of the program will come from GAVI, government, UNICEF, JICA, and WHO.



7.0 Financial Sustainability Strategies

Government of Cambodia took over the funding of traditional vaccines in 2007, which will earlier supported by JICA. It also is a major financier towards salary of the staff , perdiem/transport cost of outreach services and operation and maintenance of cold chain and vehicles.
However, Cambodia still depends on external donors for new and underutilized vaccine (GAVI), replacement/expansion of cold chain equipment and vehicles (UNICEF and JICA), disease surveillance (WHO) and for campaign costs.

The current situation shows that Government of Cambodia is shouldering increasing responsibility with good financial sustainability strategies in place and all the funding needs except for JE vaccine

introduction and the campaigns are either secured or will be probably secured. The NIP along with the MoH will take a proactive role in recruiting and sustaining future financing.

Current ICC membership has been broadened and become more proactive in mobilizing future financing resource needs. Rigorous efforts are being made by the NIP on the side of improving vaccine management. The greatest challenge facing the NIP is to secure donors' commitment and diversify the donors' base. The National Immunization Program is committed to foster donor coordination through this multiyear plan.

7.1 Mobilize domestic financial resources

The Government of Cambodia is committed to increase its total health sector financing to meet its effort to strengthen the overall health system and to create greater sustainability in the health sector. This provides opportunities to increase government commitment for immunization services as well. Firstly, the government has already shown its commitment to vaccine financing by including a budget line to buy traditional vaccines (BCG, Measles, OPV and TT) in 2007 and is committed to provide cofinancing for pentavalent vaccine from 2010 at @0.20 per dose increasing to $0.30 between 2011 and 2015. Regular advocacy meetings will be held with Minister of Health and Minister of Finance to advocate for increase in financing of different costs associated with immunization services to reduce the donor dependence.

7.2. Increase and coordinate donor support for immunization services

Over the last five years there has been reliance on few donors (especially JICA, UNICEF and GAVI) for purchasing vaccine, injection supplies, operational costs for outreach, and cold chain equipment. Efforts will be made to expand and diversify the donor base to meet future immunization program costs. The NIP will actively recruit new donors and foster their longer term commitments. All the new donors will be made members of ICC and will be involved in overall oversight of the immunization program. The costing and financing needs of programs will be regularly updated and shared with all the members of ICC actively. The funding gaps in the programs will be communicated to all the donor agencies much in advance to increase the chances of securing the funding. Some donor agencies have given the indication to join in the contribution to immunization programme in Cambodia and it is hope that this cMYP will assist them to understand the magnitude of the challenge, and the importance of their continued support. In recent years (2010/2011), the national immunization program has been successful in mobilizing funding for outreach services and for immunization campaign through pooled fund mechanisms.

7.3 Increase fixed site service delivery

As shown in section 6, the major funding shortfalls are in outreach costs, which are relatively high due to very high dependence on outreach services to provide immunization to majority of the children with substantial underutilization of 956 health centers. Though some of the outreach will still be necessary to reach remote and disadvantage population groups, efforts will be made to reduce these costs by improving immunization services at health centers. In short-run, funds may be needed to increase community demand, IEC with community leaders, and saving from health facility may not be visible immediately, but will materialise in the long run, as shown by reduced cost of outreach and tranportion during subsequent years of multiyear plan. It will promote efficiency by reducing costs for outreach and transport for village based programs in accessible areas.

7.4 Increasing program efficiency

The program will increase efficiency through the following strategies:

Reduce wastage rates by improved vaccine management practices. Training have been conducted in cold chain and vaccine management in 2007 with more trainings planned during the current c-MYP.. In 2008 vaccine management will be monitored and steps taken to improve overall vaccine management through EVSM.

Reduce wastage rates by implementing the Multi Dose Vial Policy in all sites. Staff are to be trained and targets set in its use for fixed and outreach sessions.

Adhering to the principles and practices outlined in this cMYP is likely to improve the overall efficiency and productivity of the NIP thereby improving immunization coverage and the consequent reduction in vaccine preventable diseases.

7.5 Sharing the cost with other primary health care programs

To further optimize the operational costs, efforts will be made to optimize further health workers' time spent on different activities, and increased service delivery at the level of health facility. Many donors including World Bank and Asian Development Bank are working to strengthen primary health care services in Cambodia.

REFERENCES

- Preliminary Report of Cambodia Demography and Health Survey 2005
- WHO-UNICEF Guideline for developing a comprehensive Multi-Year Plan (cMYP) March 2006
- Immunization Summary 2006/UNICEF/World Health Organization
- Global Immunization Vision and Strategy 2006-2015/WHO/UNICEF
- WHO/UNICEF Joint Reporting Form 2006
- WHO/UNICEF Regional Child Survival Strategy/Accelerated and Sustained Action Towards MDG 4
- EPI Review in Cambodia 2005/NIP/WHO/UNICEF/PATH
- Comparative Analysis of Immunization Services in the Western Pacific Region/Result of WHO/UNICEF Joint Reporting Form for 2005
- National Strategy on Immunization in Cambodia/5-year work plan 2001-2005
- Operational Plan for 2007 & 3-Year Rolling Plan for 2007-2009/NIP/Khmer version
- Health Coverage Plan/October 1999/English & Khmer version
- National Strategy for Reproductive and Sexual Health in Cambodia 2006-2010/National Reproductive Health Program/MoH
- National Immunization Program Plan 2005-2007/NIP/MoH
- Cambodia Inter-Censal Population Survey 2004, General Report/NIP/UNFPA
- Progress Report to the Global Alliance for Vaccines and Immunization (GAVI) and the Vaccine Fund by the Government of Cambodia/May 2006
- Survey of Private Sector Immunization in Cambodia/NIP/MoH/November 2005
- Cambodia Demographic Health Survey 2000/Ministry of Planning/MoH
- Cambodia Demographic Health Survey 2005/Ministry of Planning/MoH
- Immunization Safety Surveillance/Guidelines for managers of immunization programmes on reporting and investigating adverse events following immunization/WHO
- National Policy on Primary Health Care 2000/Khmer version
- Deconcentrated Organizational Structure and Function/NIP/MoH
- Immunizing Children Against Hepatitis B/CVP at PATH
- Hepatitis B Introduction into Routine Immunization/NIP/CVP at PATH
- Training Curriculum on Hepatitis B Introduction into Routine Immunization for Health Center/NIP/MoH

- Immunizations and the Introduction of Hepatitis B Vaccine/July 2002/PATH
- Communication and Social Mobilization for Polio Eradication: Achievements, Remaining Challenges and the Way Forward/UNICEF India Country Office/Dec 2001
- Immunization Coverage Survey Year 2003/Kg. Cham & Kg. Chhnang PHD/PATH
- Hepatitis B Sero-Prevalence Study Rural Cambodia/Kg. Chhnang Province 2001
- General Population Census of Cambodia 1998/NIS/MoP/UNFPA
- Reclassification of Urban Areas in Cambodia/NIS/MoP/UNFPA
- First Revision Population Projections for Cambodia 1998-2020/NIP/MoP/UNFPA
- Cambodia Demographic and Health Survey 2000/NIS/UNFPA
- Cambodia Child Survival Partnership Progress Report 200 Ministry of Health of Royal Government of Cambodia
- Cambodia Demographic and Health Survey 2000

Annex 1: Current Immunization Schedule

Vaccine	Age of administration	Comments
BCG	Birth	
DPT-HepB-Hib	6 wk, 10 wk, 14 wk	Pentavalent vaccine introduced in 2010
TT	First contact pregnancy, +M1,+M6, +Y1, +Y1	A total of five doses are being recommended for CBAW.
Monovalent HepB	At birth	A policy of within 24 hours is promoted in line with recommendation of WHO, though provided upto 7 days of age if the infant cannot be contacted within 24 hours of birth
Polio (OPV)	6 wk, 10 wk, 14 wk	
Measles	9-11 months	A second opportunity to measles vaccination is provided through periodically scheduled campaigns, and a routine 2nd dose is planned from 2012
Japanese Encephalitis (live attenuated vaccine)	12 months, +1 year	Planned from 2010 in three provinces, provided resources can be mobilized and vaccine can be procured given lack of WHO prequalification as of now

Annex 2: Cold chain capacity In Cambodia

1.0 Analysis of current and future cold chain capacity to accommodate 2nd dose measles vaccine from 2012

1.1 The cold chain and vaccine distribution

The vaccine distribution system follow the national health system, in that vaccines are delivered through the levels of the health system in a sequential fashion from national to province (24) to operational district level (77) and then to health centers (956). While two shipments of vaccines are received at the national level, vaccine is shipped quarterly to all the provinces, which in turn ship to districts each month. Health centers also collect their vaccine needs on monthly basis from the ODs. A safety stock of 3 months is maintained at national level, 1 month at provincial level, and 2 weeks at OD and health center level. Most of the vaccinations are provided through health centers, with the exception of hepatitis B birth dose, which is also provided in hospitals at all levels.

1.2 Cold storage capacity required per child (cm3) and implications for introducing a 2nd dose of measles vaccine from 2012

At the current immunization schedule, the total positive cold chain volume required for one child is 85 cm3 at national and provincial stores and 101 cm3 at OD and health center level following the introduction of pentavalent vaccine in 2010. The planned introduction of a 2nd dose of measles vaccine will impact the cold chain system at differently at the national and provincial/district/health center level.

At the national store, measles vaccine is stored at – 20C, and below this level at + 2 to +8 C. With the introduction of a 2nd dose of measles vaccine, the space required per child at the national level will increase for – 20C storage capacity, from 16.75 cm3 to 25.5 cm3, with no effect on freezing storage volumes below this level.

At the provincial level, the cold chain space required will increase for the + 2 to +8 C storage from 85 cm3 to 94 cm3. At the Operational District and Health Centre level, all vaccines are stored at +2 to +8C and the cold chain space required at this temperature will increase from 90 cm3 to 98 cm3.

Table 1 shows the detailed calculation of cold storage volume required per child with current schedule and with introduction of the 2nd dose of measles vaccine.

Annex 3 Cold Chain Requirements

Maximum packed volume per vaccine dose*					Packed volume per dose administered, cm3			Number of doses in immunization sch	
					Vaccine wastages rates Cambodia 2010	Packed volume, including wastage in stores*		at service delivery**	Per fully immunized child
Vaccine initials	Vaccine type	No. of doses per vial	Maxi packed volume per dose (cm3/dose) vaccines	diluents		-25 to -15℃	+2 to +8℃		Current immunization	With Measles 2nd Dose
						y	x	z	A	B
BCG	freeze-dried	20	1.2		78	-	5.5	5.5	1	1
HepB	liquid	1	18.0		10	-	20.0	20.0	1	1
Measles	freeze-dried	10	3.5		60	8.8	-	8.8	1	2
OPV	liquid	10	2.0		25	2.7	-	2.7	3	3
TT	liquid	20	2.5		25	-	3.3	3.3	2	2
DTP-HepB+Hib	liquid	1	16.8		5	-	17.7	17.7	3	3
Total -20 deg storage volume required per fully immunized child (FIC) in cm3 (at national store level)									16.75	25.5
Total +2 to +8C storage volume required per fully immunized child (FIC) in cm3 (at national store level)									85.17	85.17
Total +2 to +8 deg storage volume required per fully immunized child (FIC) in cm3 (at provincial store level)									85.17	93.92
Total -20C deg storage volume required per fully immunized child (FIC) in cm3 (at provincial store level)									8.00	8.00
Total +2 to +8 deg storage volume required per fully immunized child (FIC) in cm3 (at OD and health center level)									101.92	110.67

Source:* WHO Vaccine Volume Calculator 2009
** measles vaccine stored at - 20C at the national level and +2 to +8C at the provincial/OD and HC level

A detailed assessment was carried out at different levels and it was concluded that the current cold chain capacity at national, provincial and district level is either sufficient or surplus for the current vaccination schedule and for the inclusion of a 2nd dose of measles vaccine into the EPI schedule.

Annex 4 Vaccine Introduction Plan – Measles 2nd Dose

	Activity	Timeframe	Implementing organization	Co-operating organization	Budget & Sources
	1.Preparation of introduction of 2nd dose measles vaccine				
	Technical consultation with WHO for optimal timing of delivery of the 2nd dose	2011 (already occurred)	NIP	WHO	Zero budget
1.1	Assessment of the cold chain capacity at national, province, district, health center level and making necessary changes where required: national, province, district, health center	2011 Q2	NIP	Province and WHO/UNICEF/JICA	Already done. WHO/UNICEF/JICA
1.3	Revision of current schedule, preparation of instruction for use to follow- up. Print poster/wall charts showing new immunization schedule.	2012 Q1	MOH/NIP	WHO/UNICEF	1200 charts@$5= $6000 (from GAVI)
1.3	Letter from the Minister of Health to all Provincial and District Health offices and private medical clinics informing of the introduction of the new 2nd dose of measles vaccine and directive on activities to improve surveillance	2012 Q1	MOH/NIP	UNICEF, WHO, JICA	Zero budget activity
1.4	Vaccine needs forecasting for national stock replenishment twice a year at national store level. Additional training at vaccine distribution depot level in better vaccine needs forcasting.	2012 Q1/Q2	MOH	MOH, UNICEF Country Office Staff	$5000 external consultant for training (UNICEF)
1.6	Revision of the current reporting forms coverage data reflecting the addition of 2nd dose of measles vaccine, and printing of new reporting forms.	2012 Q1/Q1	MOH/NIP	WHO/UNICEF	6000 $ UNICEF/GAVI

	(revision of HIS reporting forms)				
1.7	Printing of new immunization cards for parents reflecting new 2nd dose measles vaccine schedule	2010 Q2/Q3	MOH/NIP	WHO/UNICEF	Alredy done
1.8	Receive procurement of 2nd dose vaccine from UNICEF through GAVI	March 2012	MOH/NIP	UNICEF	Zero budget activity
1.9	Start distributing the vaccine to vaccine distribution depots and other lower level health facilities to start administration of the 2nd dose of measles vaccine from 1 July 2012	May/April 2012	National medical store	UNICEF/JICA	Shared with other EPI vaccines
	2.Training, Information Education and Communication				
2.1	Two day National workshop for relevant national stakeholders and provincial staff briefing them on new measles vaccine schedule, and the importance of reaching all communities with immunizaiton services as a requirement for Cambodia to achieve and maintain measles elimination status	June 2012	MOH/NIP	WHO/UNICEF	$5000: GAVI sources (combined with mid-term EPI review meeting in 2012
2.2	Provincial workshops in all the 24 provinces briefing all the provicial stakeholders and district EPI managers	June 2012	MOH/NIP	WHO/UNICEF	$1000 per province*24=$24,000: GAVI sources
2.3	Training and supervision visit to all health centers by the persons trained at district level in the provincial workshop on all the new vaccine related issues	July – Sept 2012	Provincial/District EPI	WHO/UNICEF	$1000 each district=1000*77=$77,000 ($54,000 MOH and $22,500 GAVI)
2.4	Developing of training curriculum and materials for introduciton of new vaccine for the staff at different level: - Basic facts about measles disease—for parents and health workers	May to June 2012	MOH/NIP		$10,000: WHO

	- Basic facts about measles vaccine—for parents and health workers - Measles vaccine coverage and wastage monitoring - Injection safety and AD use - Immunization safety and AEFI surveillance				
2.6	Preparation of IEC materials—posters, brochures targetted to decision makers, health workers for display in health facilities and for parents' information	Feb to March 2012	MOH/NIP	UNICEF/WHO	$25000 from GAVI
2.7	Distribute IEC materials to all the health facilities down to health centers level	May to June 2012	MOH, deptt of health promotion/NIP	WHO, UNICEF	Opportunities should be utilized while organizing the lower level training programs
2.7	Implementation of the IEC programs through radio and television spot announcements	June/July 2012	MOH, deptt of health promotion/NIP MOH, deptt of health promotion/EPI	WHO/UNICEF	5000 $ GAVI
2.9	Inauguration function for new measles dose vaccine introduction at national and all the provincial level with sufficient media coverage	July 2012	MOH/NIP	MOH, provincial administration	$6000 ($200 for each 24 provinces and $1000 at national level
	3: Improvement of safe injection activity				
3.1	Activate national committee and sub national system and implement current AEFI guidelines	Jan 2012	NIP	WHO	Cost included along with other training materials
	4. Surveillance and monitoring				
4.1	Monthly coverage reporting from province and district immunization units, with monthly monitoring by the national EPI	2010-2015	MOH/NIP	Provinces/AHC	No budget activity

4.2	Update the case investigation form and measles surveillance database at the national level to give more timely and detailed information on measles cases within Cambodia.	2011 (in progress)	MOH, NIP, CDC	WHO	WHO
4.3	Continued strengthening of measles surveillance through joint supervisory and integration with the reaching every community strategy, and promotion of active searches in risk communities during outreach visits	2012- 015	MOH/NSO/NIP	WHO,	$40,000 WHO (annual)
	Continued support and collaboration with the National Measles laboratory at the National Institute of Public Health	NIP/NIPH	WHO		$ 7000 WHO (annual support)
4.4	Post measles 2nd dose introduction assessment	Dec 2012	MOH	Province and District Health Departments	$5000 WHO
	Pilot of school entry check for immunization status in three province (Phnom Penh, Kg. Cham and Battambang) in 2012 with a plan for national scale up from 2013 to 2015	Sept 2012	NIP	Select provinces	$20,000 GAVI
4.6	Yearly discussion and reviewing by the ICC the progress reports of new vaccine introduction activity	2010-2015	MOH	WHO, UNICEF Country Office Staff, JICA	No budget activity
4.7	Yearly submission of progress reports to the GAVI Secretariat	2010-2015	MOH	WHO/UNICEF	No budget activty

Annex 5: Summary costing by component NIP: 2007-2015

	Estimated costs per annum in US$ (,000)								
Cost category	**Base year (2007)**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2104**	**2015**
Routine Recurrent Cost									
Vaccines (routine vaccines only)	**$2,677,622**	**$2,016,775**	**$1,905,918**	**$5,785,197**	**$4,945,714**	**$4,602,330**	**$4,702,169**	**$4,812,093**	**$4,924,326**
Traditional vaccines	*$771,691*	*$885,068*	*$840,767*	*$775,750*	*$769,307*	*$923,203*	*$936,214*	*$957,261*	*$978,522*
New and underused vaccines	*$1,905,931*	*$1,131,706*	*$1,065,151*	*$5,009,448*	*$4,176,407*	*$3,679,126*	*$3,765,955*	*$3,854,832*	*$3,945,804*
Injection supplies	**$244,042**	**$295,022**	**$280,504**	**$323,869**	**$315,421**	**$380,323**	**$389,299**	**$398,486**	**$407,890**
Personnel									
Salaries of full-time NIP health workers (immunization specific	$177,854	$179,689	$183,283	$186,949	$190,688	$194,501	$198,391	$201,367	$204,387
Per-diems for outreach vaccinators/mobile team	$884,115	$901,797	$1,061,464	$1,026,797	$1,006,797	$996,797	$986,797	$976,797	$966,797
Training	$50,000	$99,086	$205,000	$70,000	$77,000	$162,000	$100,000	$115,000	$185,000
Social mobilisation and IEC	$77,000	$85,000	$115,000	$90,000	$70,000	$65,000	$65,000	$90,000	$55,000
Disease surveillance	$178,108	$202,000	$207,000	$197,000	$302,000	$202,000	$202,000	$202,000	$272,000
Program management & supervision/monitoring	387,057	403,198	470,112	497,837	456,412	475,880	496,284	527,671	590,088
Maintenance and overheads	$500,000	$510,000	$520,200	$530,604	$541,216	$552,040	$563,081	$574,343	$585,830
Subtotal Recurrent Costs	**$5,175,797**	**$4,692,567**	**$4,948,481**	**$8,708,253**	**$7,905,248**	**$7,630,871**	**$7,703,021**	**$7,897,756**	**$8,191,319**
Routine Capital Costs									
Vehicles	$0	$341,500	$0	$0	$0	$0	$207,015	$28,154	$272,813
Cold chain equipment	**$0**	**$411,850**	**$0**	**$39,015**	**$256,727**	**$245,186**	**$60,838**	**$172,848**	**$489,886**
Other capital equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal Capital Costs	**$0**	**$753,350**	**$0**	**$39,015**	**$256,727**	**$245,186**	**$267,853**	**$201,002**	**$762,699**
Campaigns									

Measles	$1,934,899	$0	$0	$0	$1,912,519	$0	$0	$0	$0
MNTE	$0	$226,197	$0	$0	$133,400	$0	$0	$0	$0
Japanese encephalitis	$0	$0	$0	$0	$0	$0	$4,129,623	$0	$0
Subtotal Campaign Costs	$1,934,899	$226,197	$0	$0	$2,045,919	$0	$4,129,623	$0	$0
GRAND TOTAL	**$7,110,697**	**$5,672,114**	**$4,948,481**	**$8,747,268**	**$10,207,895**	**$7,876,057**	**$12,100,497**	**$8,098,758**	**$8,954,018**

Annex 6: Financing NIP: 2007-2015

Total financing by agency	2007	2008	2009	2010	2011	2012	2013	2104	2015
Govt	$2,698,802	$2,860,759	$2,918,511	$3,114,638	$3,250,629	$3,377,946	$3,354,313	$3,426,027	$3,509,317
GAVI	$1,880,012	$1,199,890	$1,327,173	$4,970,166	$3,968,546	$3,822,201	$3,905,560	$3,986,065	$4,103,768
JICA	$0	$0	$0	$0	$680,602	$0	$0	$0	$0
UNICEF	$122,000	$1,101,743	$170,150	$119,458	$243,330	$116,577	$122,406	$154,426	$128,647
UN foundation	$1,934,899	$0	$0	$0	$1,283,512	$0	$0	$0	$0
WHO	$262,057	$289,698	$302,337	$282,973	$310,505	$229,928	$235,234	$245,418	$363,473
govt probable	$0	$0	$0	$34,069	$34,873	$35,696	$4,166,162	$37,401	$38,284
Unicef probable	$0	$0	$0	$0	$0	$245,186	$0	$201,002	$0
Unsecured	$0	$0	$0	$39,015	$256,727	$0	$267,853	$0	$762,699
Total	**$6,897,770**	**$5,452,090**	**$4,718,172**	**$8,560,319**	**$10,028,726**	**$7,827,533**	**$12,051,528**	**$8,050,340**	**$8,906,188**