Comprehensive Multi Year Plan for Immunization (2011-2015)

Democratic People's Republic of Korea

Final Version

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Preface

Introduction of EPI has shown appreciable results during the last 15 years, since the commencement of the expanded program of immunization in 1997. The success story of eradicating smallpox and the recent success in polio eradication efforts have been very encouraging, as has been the increased coverage of routine immunization coverage in the last 5 years. However, we shall have to cover a long distance in completely eradicating vaccine-preventable diseases from the country.

In order to give the desired thrust to the EPI, the government of DPR Korea is committed to making available the necessary resources for improving the managerial capacity of the personnel involved and logistical supports coupled with appropriate research initiatives. The Multi Year Plan document is intended to guide those who implement the Programme to provide vaccination to every child in the country. It also spells out the strategies for providing efficient and sustainable immunization services to the community.

This document is also aims at informing immunization managers and implementing agencies about the need for monitoring and strengthening the processes at all levels, thereby focusing attention on achievable goals.

Acronyms and Abbreviations

AD	Auto-destructive syringe
AEFI	Adverse Events Following Immunization
AFP	Acute Flaccid Paralysis
BCG	Bacille Calmette-Guerin; vaccine against tuberculosis
CBR	Crude birth rate
CRS	Congenital Rubella Syndrome
DPT	Diphtheria-Tetanus-Pertussis combination vaccine
DPTHepB	Diphtheria-Tetanus-Pertussis-Hepatitis B combination vaccine
EPI	Expanded Programme in Immunization
GAVI	Global Alliance for Vaccines and Immunization
GIVS	Global Immunization Vision and Strategy
HAEI	Hygienic & Anti-Epidemic Institute
Hep B	Hepatitis B
Hib	*Haemophilus Influenzae* type B
ICC	Inter-agency Coordinating Committee
IEC	Information, Education and Communication
IMR	Infant Mortality Rate
IPC	Interpersonal Communication
IPV	Inactivated Polio Vaccine
JE	Japanese encephalitis
MDVP	Multi-Dose Vaccine vial Policy
MLM	Mid-Level Manager
MMR	Measles, Mumps and Rubella vaccine
MoPH	Ministry of Public Health
MR	Measles and Rubella vaccine
MV	Measles vaccine
MYP	Multi-Year Plan
MTSP	Medium Term Sector Plan
NCL	National Control Laboratory
NITAG	National Immunization Technical Advisory Group
NGO	Non-Governmental Organization
NNT	Neonatal Tetanus
NRA	National Regulatory Authority
OPV	Oral Polio Vaccine
ORS	Oral Rehydration Solution
PCV	Pneumococcal vaccine
RIMS	Routine Immunization Monitoring System
SIA	Supplementary Immunization Activities
SOP	Standard Operating Procedures
TT	Tetanus Toxoid vaccine
UNICEF	United Nations Children's Fund
VPD	Vaccine Preventable Disease
VVM	Vaccine Vial Monitor
WHO SEARO	South-East Asia Regional Office of the World Health Organization

Executive Summary

Introduction
The immunization programme of DPR Korea is implemented through the routine health system and the target age group is vaccinated with all vaccines according to the free medical care system in DPR Korea. The national EPI team has prepared a five year plan of EPI (2007-2011) [1] based on the "Public Health Law of DPR Korea" adapted in the 6th Supreme People's Assembly in 1980. This plan provides the framework on which activities should be planned to achieve the objectives of DPRK's goal of immunization within the coming five years, as well as the providing guidance for the introduction of new vaccines. This is therefore the second Multi Year Plan for Immunization (2011 – 2015), and is designed to synchronize with planning targets of the MDG year 2015, as well as with the planning cycle of the Medium Term Plan for the Development of the Health Sector in DPR Korea (2011 – 2015).[2]

Process of Plan Development
This plan development was undertaken initially over a 3 week period in October 2010, and was reviewed over a subsequent 3 month period. The following processes were undertaken to develop this plan:

(a) Literature Review of immunization and health systems strengthening regionally and in DPR Korea
(b) Review of immunization data through in country information, joint reporting data, GAVI reporting processes
(c) Field consultations
(d) Consultative workshops with national managers and development partners in the areas of situation analysis, activity setting and costing
(e) Development of a draft strategic framework and plan for presentation at an ICC meeting
(f) Internal MOPH and Departmental review
(g) Regional Review through UNICEF and WHO SEARO (December – January 2011)
(h) Plan finalization

Situational analysis
Figure 1 below summarizes the main achievements of the national program in the last 5 years. Despite these program gains and evidence of impact in terms of reductions in the incidence of vaccine preventable diseases, DPR Korea is still confronted by significant programmatic and health system constraints. Although program performance is high, validation of reduction in the incidence and prevalence of target diseases will be difficult without strengthening of disease surveillance systems. Training, supervision and monitoring and reporting systems are also reported to have insufficient quality. Sustainability is challenged by high proportion of internationally funded program. Although the foundations of a vaccine industry exist, there have been insufficient resources to develop this sector. This includes the institutional strengthening of regulatory authorities to oversee the local production of vaccines (NRA & NCL). Despite having one of the highest human resources to population ratios in the region, and with an extensive network of health facilities, there are important barriers to health system performance including limitations with transport, communications and provision of basic administrative and essential drug and equipment support for health services management and delivery systems.

Figure 1 Main Achievements 2007 – 2010

Main Achievements 2007 - 2010

1. Introduction hepatitis B Birth Dose vaccine in 2004
2. Increase in immunization coverage (DPT3) from 82% in 2006 to 93% in 2009 (although reduced number of children vaccinated due to changing birth cohort denominators as identified in the 2008 census report)
3. Maintenance of polio free status since 2006
4. Introduction of measles vaccine 2nd dose in 2007
5. Successful nationwide measles campaign following an outbreak in 2007
6. Extension of refrigerated cold chain systems to county level by 2010
7. Conducting of national surveys for cold chain and EPI coverage surveys in 2008 which have provided the basis for improvements in quality of immunization services
8. Development of a revised cold chain policy (including development of a national inventory on cold chain and transport) and a revised national immunization schedule in 2009

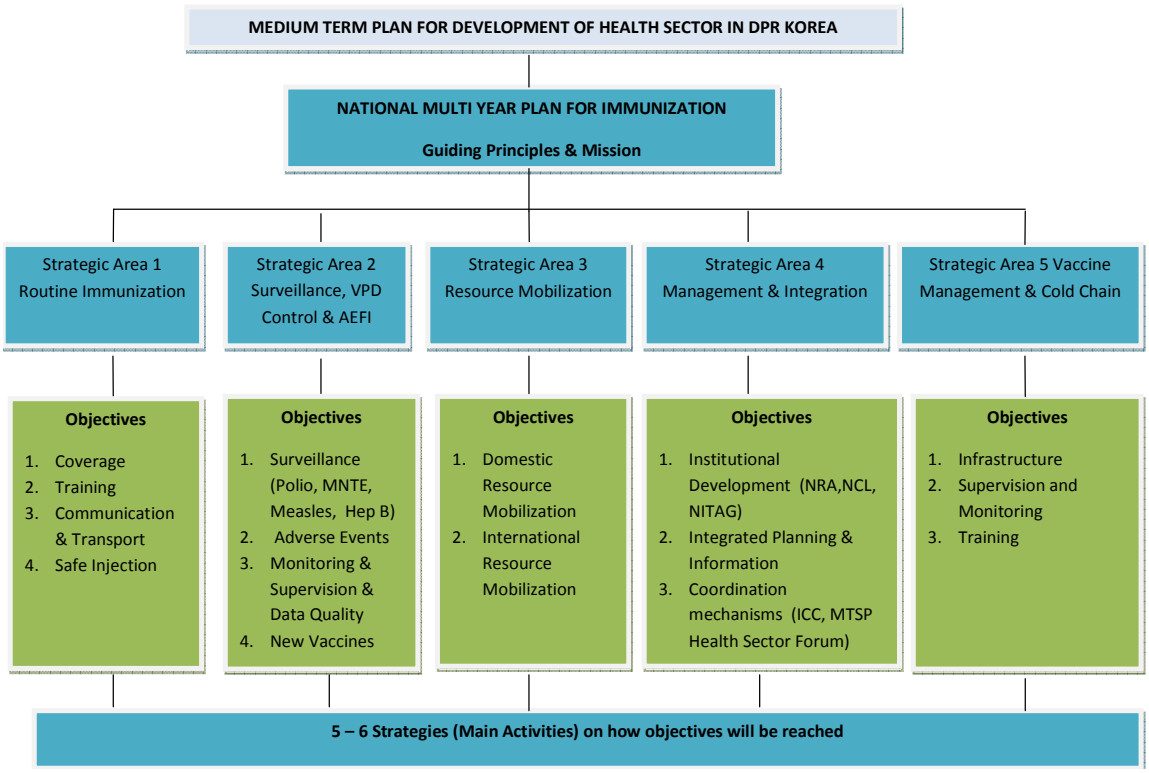
EPI Goal and Strategic Framework

The goal of the national program is to provide high quality immunization service to all target population in order to prevent mortality, morbidity and disability from vaccine preventable diseases. Guiding principles include the following:

- To provide best quality of immunization service to all target children and women according to the national immunization schedule.
- To provide equity in the vaccine distribution, cold chain management and supervisory practice in order to maintain equally high immunization coverage all over the country
- To ensure standard operating procedures in the procurement, storage and distribution of vaccines including vaccination in order to secure the quality and safety of vaccination
- To make better use of routine health system established in the country, to encourage the household doctors to fulfill their responsibilities and to ensure the financial sustainability

A strategic framework was developed for the plan that outlines five strategic areas, as well as objectives and strategies and main activities for each of the areas (refer to figure 2).

Figure 2 Strategic Framework Multi Year Plan



Main Targets, Objectives and Strategies

Main targets are described in figure 2, and refer to the various disease control and elimination goals that have become possible due to extension of the immunization schedule (measles second dose) and continuing high immunization coverage. As is evident from these targets, a focus on maintaining high coverage and strengthening and developing of surveillance systems will be central targets for the multi year plan.

Figure 2 Summaries of Main Targets

Main Targets 2011 – 2015

To achieve Measles Elimination by 2015
Increasing Routine coverage (DTP3) to 97% between 2011 and 2015
Maintain elimination status of maternal neonatal tetanus and remain polio-free
Reduce Hep B sero-prevalence in under 5 cohort
Reduce incidence of rotavirus diarrhoea, pneumonia and meningitis due to Hib disease, JE encephalitis and congenital rubella syndrome

Figure 3 below outlines the main strategies of the program, which reflect the focus in the plan on (a) strengthening routine immunization and surveillance for control and elimination of target diseases,(b) institutional development for technical and regulatory oversight of the program, (c) consolidating as well as further developing the vaccine management and cold chain system, and (d) promotion of financial sustainability through development of the national vaccine industry.

Figure 3 Summaries of Main Strategies

Main Strategies 2011 - 2015

1. Strengthening health systems (transport, communications, surveillance, planning and supervision), including close coordination with GAVI health system strengthening program
2. New vaccine and underutilized vaccine introduction
3. Improved monitoring and reporting and integrated micro-planning and supervision (including introduction of data monitoring charts and data quality self assessment)
4. Improving immunization and vaccine safety through strengthening AEFI systems, NRA development and review of injection safety policy and guidelines
5. Establishment of sentinel surveillance for meningitis, encephalitis, diarrhoea, pneumonia and CRS (congenital rubella syndrome)
6. Capacity building and guideline updates for AEFI, VPD surveillance (measles, tetanus)
7. Capacity building through middle level management training (MLM), practice training and supportive supervision (including national EPI training centre)
8. Institutional development for technical regulation, guidance and oversight (NRA, NCL, NITAG) and development of the national vaccine industry)
9. Strengthened sector coordination, technical cooperation and international partnerships
10. Improved financial sustainability through establishment of national immunization fund and line item for immunization budgets in the national health plan and budget (MTSP)

Costing and Financing of the National Program

The estimated costs of the program for the five year period are $104 million. Between 2011 and 2015, the share of the immunization budget attributable to vaccine and logistics is projected to increase from 33% to 54% (due to new vaccine introductions). The current costing profile in this plan assumes introduction of DTP-Hep B-Hib (pentavalent) vaccine in 2012, MMR and rotavirus vaccine in 2013, and JE vaccine throughout the plan period. International financing (GAVI) increases sharply between 2010 and 2015. The funding gap is mainly in the program support areas of surveillance, financing of MMR and JE vaccines, transport capital and program management. These financing gaps for program management (also including areas such as capacity building and NRA/NCL and vaccine industry development) are critical given that these areas will be essential to regulate and oversee introduction of new vaccines. Main sustainability strategies focus on national institutional strengthening and vaccine industry development, continued integration of EPI services with the health system, and development of a national immunization fund.

Introduction

Immunization is one of the most cost-effective interventions for disease prevention. Traditionally, the major thrust of immunization services has been reduction of infant and child mortality. However, vaccines like hepatitis B are administered in infancy and can give life long protection against liver cancer and other complications of hepatitis B infection in adults. Immunization delivery is also a vehicle for health promotion and other health services addressing morbidity of public health significance in all age groups. Immunization is thus not simply an item of national expenditure but truly one of national investment.

Purpose of document

This comprehensive multiyear plan (cMYP) is essential for three main reasons.

1. Provide a framework on which to plan activities to achieve the five specific objectives of immunization policy of DPRK:
    i. Increasing the accessibility/availability/coverage of immunization services.
    ii. Ensuing the quality and reliability of immunization services
    iii. Increasing the demand for immunization service
    iv. Monitoring diseases incidence and programme performance
    v. Mobilizing resources to sustain and improve immunization services
2. Avail opportunities to introduce emerging newer vaccines
3. The success of the EPI must be used as an opportunity to expand, where feasible, other public health interventions such as promotion of Maternal Neonatal & Child health care, breastfeeding, oral rehydration solution (ORS), and vitamin A prophylaxis etc.

The document sets out the mid-term (2011-2015) goals, related objectives, indicators, strategies and associated costs.

The document is organized according to the strategic areas as identified in the framework in figure 2.

Process of Plan Development

This plan development was undertaken initially over a 3 week period in October 2010. The following processes and steps were undertaken to develop this plan:

(a) Literature Review of immunization and health systems strengthening in DPR Korea
(b) Review of immunization data through national health information, joint reporting and GAVI reporting processes
(c) Field consultations
(d) Consultative workshops with national managers and development partners in the areas of situation analysis, activity setting and costing
(e) Development of a draft strategic framework and plan for presentation at an ICC meeting
(f) Internal MOPH and Departmental review
(g) Plan finalization

It is proposed that during the plan finalization period (November 2010 to February 2011) internal review is undertaken within the country and the document is circulated to WHO and UNICEF regions for further review and editing. Costing of the plan was undertaken utilizing the costing guidelines provided by WHO and UNICEF.[3] Review by development partners was undertaken through the ICC mechanisms. Data provided through the Joint Report Forms and Census data 2008 provided the basis for all population projections.

2. Background to the Health System and Immunization

International Health Context

Global Immunization Vision and Strategy: In 2005, WHO and UNICEF developed a global immunization vision and strategy (GIVS) for the period 2005 to 2015. The four strategic areas of GIVs are as follows:

1. Protecting more people in a changing world
2. Introducing new vaccines and technologies
3. Integrating immunization, other linked interventions and surveillance in a health system context
4. Immunizing in a context of global interdependence

Each strategic area lists a set of main strategies, which have been taken into consideration in the design of the strategic framework of this plan.

The Global Alliance for Vaccine and Immunization is expanding the capacity of countries globally to accelerate the introduction of new and underutilized vaccines, as well as to strengthen immunization and health systems. DPR Korea has availed itself of these opportunities through the following:

1. Introduction of hepatitis B vaccine (2003)
2. Introduction of safe injection devices (2003)
3. Introduction of hepatitis B Birth Dose (2004)
4. Immunization Services Strengthening support (2006)
5. Health system strengthening support (2007)
6. Introduction of measles second dose vaccine (2008)

Ongoing international support through GAVI is available potentially for introduction of underutilized vaccines such as Haemophylus Influenza B vaccine (HIB) as well as new vaccines such as rotavirus and pneumococcal (PCV) vaccines.

International technical guidance is provided in country through the country offices of UNICEF and WHO, with significant financial contributions also being made by UNICEF for immunization commodities and operations (see financing strategic area for details).

International Commitments: DPRK's longstanding pledge to universal and free health care has been reaffirmed through the adoption of a number of international instruments and the international goals and targets of major conferences over the past decade. As a State Party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), the DPRK recognizes the right of everyone to the enjoyment of the highest attainable standard of physical and mental health. The recent accession to the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW) in early 2001 affirms the government's legally binding commitment towards guaranteeing women's reproductive rights as well as recognizing that women's equal social and biological status underpin good health. The DPRK's notable commitment to reproductive health rights is further demonstrated by its adoption and partial implementation of the platform of action of the International Conference on Population and Development (ICPD) in 1994.

Country Context

The Democratic Peoples' Republic of Korea (DPRK) lies in the North Eastern part of Asia, covering 122,762 square kilometers and has land borders with China and Russia to the North with a demilitarized zone to the south. DPRK has a homogenous population who speak one national language. In 2008, the National Census[4] identified that 490,000 new infants will be born from an estimated total population of 24, 052,231 (with annual growth rate of .54%).[5] About 61% of these infants will live in urban areas. Basic indicators from the

census[6] are outlined in Table 1.

Table 1 Demographic Indicators National Census 2008

Basic Indicators	Census 2008
Average life expectancy at birth	69.4 years
Male life expectancy at birth	65.6 years
Female life expectancy at birth	72.9 years
Crude birth rate	14.4 per 1000
Crude death rate	9.0 per 1000
National population growth rate	0.54%
Total fertility rate	2.00 per woman
Population under 5 years	5.7%
Population under 15 years	23.2%
Population 60 years and over	13.1%
Urban population	60.6%

The country is administratively divided into 10 Provinces and 206 cities or counties. Cities are further administratively split into dong and counties into Ri. DPRK is committed to the philosophy of Juche [7], and as such DPRK has largely relied on its own strengths and resources for its development.

The Health System in DPR Korea – Opportunities and Constraints

Universal and free health care is guaranteed in the country's Constitution of 1960 and the Public Health Law of 1980. The Public Health Law particularly emphasises commitment to a health care system that is equally preventative and curative and gives special priority to the needs of women and children. The Government's policy objective in the 1950s and 1960s was to rapidly expand health services for the majority of the population and this was achieved in the 1970s. The main policy objective then shifted to reducing inequities in health care provision and services for farmers and remote rural areas were developed. Remarkably, universal access to health care was achieved by the 1980s. With the planned expansion of the health services completed, the 1980 law on public health marked a further shift in policy towards developing the quality of the health care system and emphasising prevention. The main policy objective of improving quality remains the same to this day. The Ministry of Public Health is directly in charge of implementation of the Public Health Policy including vaccine production and immunization services.

Structure of the Health System

There is a central Ministry of Public Health which reports to the cabinet of the DPRK. The MOPH is responsible for treatment, prevention and central and specialist hospitals. Sub nationally there are Health Bureaus at Provincial People's Committee, Health department at County People's Committee and Ri.

The immunization program is managed nationally through the Central HAEI, which has the responsibility for managing immunization in addition to a range of other CDC and prevention programs. In support of the overall technical guidance to the system, there are reported to be 228 HAEI across the country

The delivery system is also supported by an extensive network of health facilities including 1575 County and Ri Hospitals and 6263 Ri Clinics and Polyclinics.[8] The section doctor system provides integrated first line preventive and curative services for 100 to 150 households. There are approximately 50,000 section doctors in DPRK, all of whom are medically trained. The facilities are run by a total of 215,727 trained health staff. On this basis, DPR Korea has the second highest health staff to population ratio in the region.[9] There is a very high delivery rate of infants by trained medical staff (99%) and most births take place in ri hospitals and clinics, followed by county hospitals. The overall rate of deliveries in facilities has been recently assessed as 89.3%.[10] The system of health management in DPR Korea is based on centralized planning models.

Despite the impressive human resource distribution and network of health system infrastructure, the country is confronted by significant health system barriers to improved performance. Most of these constraints relate to the recurrent resourcing of health commodities and operations. A recent health sector analysis in DPR Korea (as part of the costing for the national health plan) projected costs of $454 million for priority health interventions over the coming 5 year period, of which $303 million (67%) is currently unfunded. Lack of resource mobilization has resulted in chronic and critical shortages in essential supplies, essential medicines and equipment, safe transfusion and laboratory services, and severe limitations in communication and transports logistics for health referral. Despite the large numbers and equitable distribution of the health care workforce, capacity for delivery and management have been identified, particularly in relation to health management (data management and analysis) and planning and maternal and child health care. [11]

Medium Term Plan for the Development of the Health Sector in DPR Korea 2010 - 2015

In 2009 and 2010, the Medium Term Plan for the Development of the Health Sector in DPR Korea (MTSP) was developed. This plan provides the overall framework for program planning and directions. EPI activities are integrated within the communicable disease control strategic area of the plan. Main program strategies and costs have already been integrated into the sector plan. Of particular relevance to immunization are the proposals to increase immunization coverage to >97% for all antigens by 2015, and to scale up the IMCI strategy to 100% of counties in the same year.

Priority actions identified in the MTSP for immunization include the following:

1. To strengthen the capacity of vaccine factories including NRA and NCL to produce vaccines of high quality and sufficient quantity.
2. To improve the organization of immunization services to cover the whole population including new-born and pregnant women, [through support for surveillance, cold chain and logistics, vaccines, , IEC and other operational costs] [introduction of new vaccines like Hib, Rotavirus and pneumoccocal vaccines]
3. To establish and operate an EPI database through extension of computer network from central to county level.

A national monitoring and evaluation framework also identifies indicators and targets that are specific to EPI performance, including reducing under five child mortality from 26.7 in 2008 to 16 per 1000 by 2015, maintaining measles coverage at 98% and increasing DPT-Hepatitis B vaccine coverage from 92% in 2009 to 97% in 2015. The introduction of pentavalent and rotavirus vaccines were included in the costing of the MTSP.

Immunization System in DPR Korea

A vaccine production unit was set up in 1946, as the need and demand for vaccination was more than the capacity of this units, additional units have been built and their capacities was also expanded which resulted in production of ten different vaccines including those against tuberculosis, poliomyelitis, tetanus, diphtheria, pertussis, measles and Japanese encephalitis. However, due to certain factors including natural disasters, vaccine production stopped or was ceased in some cases since 1995.

According to the “Public Health Law” adapted in the 6th Supreme People’s Assembly in 1980, the country commenced to organize immunization activities.

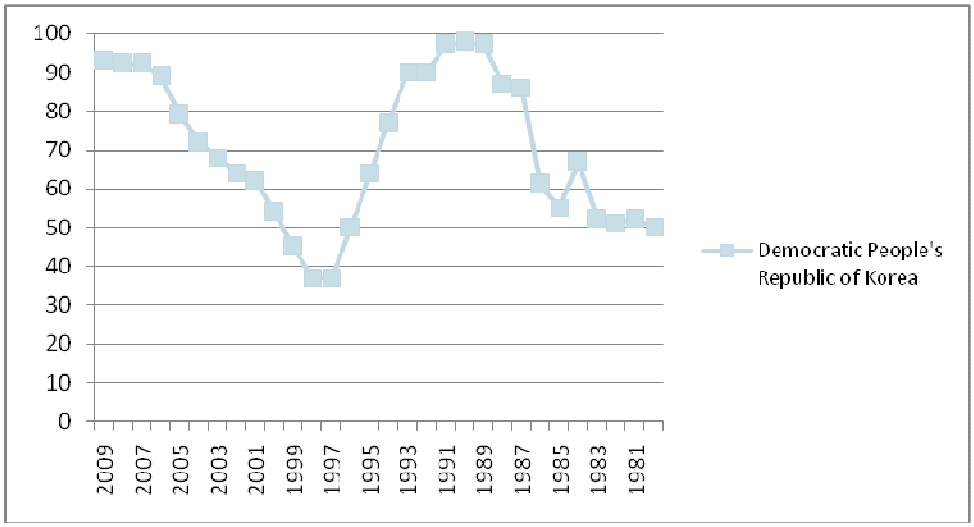
To strengthen the National Immunization Programme, the government requested for the support of the international health agencies (UNICEF, WHO). Since 1997 UNICEF and WHO are providing support especially in the form of vaccines, cold chain equipment, transport, technical assistance and local human resource capacity building.

There are three overall functions that relate to the structure of the immunization system. These are technical guidance, delivery systems and logistics management. The network of Hygiene and Anti Epidemic Institutes

(HAEI) from central to county level provides the overall technical guidance (including surveillance and response) for communicable disease control including vaccine preventable disease. Provincial and County Health Bureaus and vaccination units at County and Ri clinics provide front line immunization services. Logistics and supplies are managed through the network of central, provincial and county medical warehouses.

As can be seen from figure 5, significant public health gains have been achieved from improved immunization coverage. DPR Korea had conducted "National Immunization Days" for OPV since 1997 along with routine immunization. As a result no wild polio cases have been reported since 1996 and the country has maintained polio free status since 2006. The absence of neo natal tetanus cases in the country in recent years, 97% of deliveries by trained health staff and 92% TT2 coverage indicates that the country has likely maintained maternal and neonatal elimination status. More than 98% coverage of 2 doses of measles, 99% coverage in the measles catch-up campaign in 2007 indicates country has met the goal of measles elimination. As figure 5 below demonstrates,[12] DPR Korea has made substantial gains in immunization coverage in the last 30 years. The steep decline in the mid 1990s represents the era of economic adversity and natural calamity that resulted in a worsening of many health indicators, with subsequent period demonstrating the trend in gradual recovery in immunization coverage.

Figure 5 % DPT3 Coverage 1980 – 2009 DPR Korea [13]



An immunization survey conducted in 2008 confirmed the high rates of immunization in DPR Korea. Table 2 below describes results for the coverage survey.

Table 2 Coverage Survey Results 2008 [14]

Vaccine	Coverage			
	Crude		Valid* and FIC by 52 weeks**	
	Percent	95% CL	Percent	95% CL
BCG	96.9	95.3, 98.5	96.9	95.3, 98.5
DPT3+Hep B3	92.0	89.7, 94.3	91.5	89.1, 93.9
OPV3	99.3	98.5, 100.0	98.7	97.6, 99.8
Measles	99.2	98.4, 100.0	99.2	98.4, 100.0

The *immunization service delivery system* is based on the functioning of the household doctor system and the delivery of services by the fixed facility mode on set immunization days in each Ri and County. This means that the vast majority of vaccinations are provided in clinic and hospital settings.[15]

The *current immunization schedule* is described in the table below.

Table 3 Current Immunization Schedule

Vaccine	1st Dose	2nd Dose	3rd Dose	Geographic Area	Target Group
BCG	B			National	New Born < 24 hours
DTP-Hepatitis B	W6	W10	W14	National	1,5 month; 2,5 mo and 3,5 months after birth
Tetanus Toxoid	M3	M4		National	Pregnant women. Within I trimester-I dose and 1 month after I dose
Hepatitis B vaccine	B			National	New Born < 24 hours
Oral Polio Vaccine	W6	W10	W14	National	1,5 month; 2,5 mo and 3,5 months after birth
Measles Vaccine	M9	M15		National	I dose-9 months; II dose-15 months

Medium Term Plan for Immunization 2007 – 2011

As assessed by improvements to immunization coverage and reductions in vaccine preventable disease, the last multiyear plan has largely been successful in achieving its objectives. Major milestones achieved in the last plan are described below:

- Maintenance of polio free status since 2006
- Increase in immunization coverage (DPT3) from 82% in 2006 to 93% in 2009 (although reduced number of children vaccinated due to changing birth cohort denominators as identified in the 2008 census report)
- Introduction of measles vaccine 2nd dose in 2007
- Introduction hepatitis B Birth Dose vaccine in 2004
- Extension of refrigerated cold chain systems to county level in 2010
- Successful nationwide measles campaign following outbreak in 2007 for 6 months-45 years with 100% coverage
- Conducting of national surveys for cold chain and EPI coverage surveys in 2008 which have provided the basis for improvements in quality of immunization services (see strategic area 5 for details)
- Introduction of JE vaccine and implementation of campaign strategies for prevention of JE in targeted areas.

Main challenges for implementation in the last plan that will require resolution in the second cMYP 2011 – 2015 have been identified as the following:

- Sustaining and improving vaccine management and cold chain systems
- Building capacity for cold chain maintenance and vaccine management following the transition of management of these systems to medical warehouses in 2007, and following on from vaccine introduction and new cold chain installation
- Improving the quality of disease surveillance, AEFI and monitoring and report systems
- Establishment of National Immunization Technical Advisory Group (NITAG) to give guidance on EPI programming and strategies
- Developing institutional oversight for introduction of new vaccines (including AEFI systems)
- Improving the quality of service delivery and management through implementation of middle level management and immunization practice training programs.
- Development of the national vaccine industry

Multi Year Plan for Immunization DPR Korea 2011 - 2015

Goal and Guiding Principles

EPI Goal: To provide high quality immunization service to all target population in order to prevent mortality, morbidity and disability from diseases those are preventable through the optimum use of vaccines currently available.

Guiding principles:

3.2.1 To provide best quality of immunization service to all target children and women according to the national immunization schedule.

3.2.2. To provide equity in the vaccine distribution, cold chain management and supervisory practice in order to maintain equally high immunization coverage all over the country.

3.2.3 To ensure standard operating procedures in the procurement, storage and distribution of vaccines including vaccination in order to secure the quality and safety of vaccination

3.2.4 To make better use of routine health system established in the country, to encourage the household doctors to fulfill their responsibilities and to ensure the financial sustainability

3.2.5 To strengthen, maintain and manage the existing state of EPI on vaccination, distribution and storage of vaccines, injection safety etc.

Strategic Framework

The strategic framework for immunization was developed based on a review of the previous multiyear plan (2007 – 2011) conducted in 2010. The strategic framework in particular reflects 2 main theme areas that resulted from the situation analysis. These main theme areas include strengthening health information systems in support of routine immunization improvements and new vaccine introduction (strategic areas 1 and 2) and resource mobilization and management (strategic areas 3 and 4). and the requirement for. Recent developments if the cold chain and vaccine management system in the last plan period have also resulted in an emphasis in this plan in strategic area 5 (Vaccine Management and Cold Chain).

This comprehensive multi-year plan is organized for each of the 5 strategic areas according to the following structure:

1. Strategic Area Goal and Main Targets
2. Situation Analysis According to each Objective
3. Immunization System Objectives
4. Targets, Main Strategies and supporting activities for each objective

Strategic Area 1 Routine Immunization

Goals and Targets Routine Immunization

Strategic Area 1	Routine Immunization	2011	2012	2013	2014	2015
Goal	To improve the organization of immunization services to cover the whole target population including new born and pregnant women [through support for surveillance, cold chain and logistics, vaccine supply and IEC]					
Targets	1. To achieve > 97% coverage for DPT3 Hep B by 2015 (Medium Term Strategic Plan for the Development of the health Sector in DPR Korea)(MTSP)					
	2.To sustain 98% coverage for MCV1 and MCV2 (2 doses)					
	3. To narrow the disparities in provincial DPT3 coverage from the current 8.5% to 4% by 2015					
Objectives						
Coverage	*To ensure that regular quality immunization sessions are planned and held*					
	Prioritization of populations not easily accessible and living in more remote areas					
Training	*To ensure that at least 75% of household doctors and 50% of immunization managers have been provided with updated training in immunization by 2015*					
Communication	*To promote widespread support by all families and communities for EPI and to ensure that all eligible children and pregnant women are immunized*					
Safe Injection	*To ensure the implementation of safe injection practices and waste disposal at all locations*					

Immunization Targets

Table 4 Immunization Results and targets 2006 – 2015

RESULTS 2006 – 2009					TARGETS 2010 - 2015					
Vaccine	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
BCG	99%	97%	97%	98%	98%	98%	98%	98%	98%	98%
DPT3	82%	92%	92%	93%	94%	94%	95%	96%	96%	97%
OPV3					94%	94%	95%	96%	96%	97%
Hep B3	96%	92%	92%	92%	94%	94%				

Hep B 0 < 24 hours				98%	98%	98%	98%	98%	98%	98%
Measles 1	97%	99%	98%	98%	98%	98%	98%	98%	98%	98%
Measles 2			98%	98%	98%	98%	98%			
JE					90%	90%	90%	90%	90%	90%
TT2+ Preg.Woman	90%	91%	91%	91%	92%	93%	93%	93%	93%	93%
MMR								98%	98%	98%
Pentavalent (DPT, Hep B, Hib)							95%	96%	96%	97%
Rotavirus								96%	96%	97%

Situation Analysis Routine Immunization

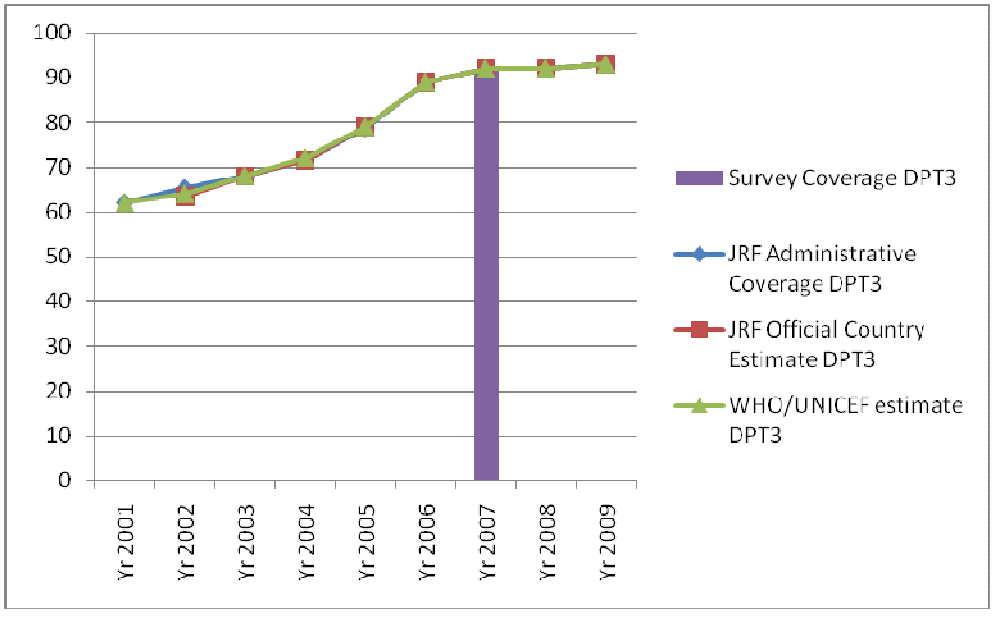
Routine Immunization Coverage

The main impacts of routine immunization are measured in terms of mortality reduction and reductions in the incidence of vaccine preventable diseases. These are studied in more detail in strategic area 2. The main outcomes of the EPI programme are measured in terms of antigen coverage and drop-out rates.

(1) Antigen coverage rates are a measure of "access" to immunization services
(2) Drop-out rates indicate service utilization and are useful to consider when prioritizing improvements for "acceptability" of services.

As outlined earlier, since 1981, gradual improvements have been demonstrated in EPI coverage. As the graph below further demonstrates, closer examination reveals increases in DPT3 and measles vaccination in the last plan period. A national cluster survey conducted in 2008 confirmed high coverage rates. Figure 6 below demonstrates the match between administrative and survey data.

Figure 6 DPT3 Coverage and Survey Results 2001 – 2009

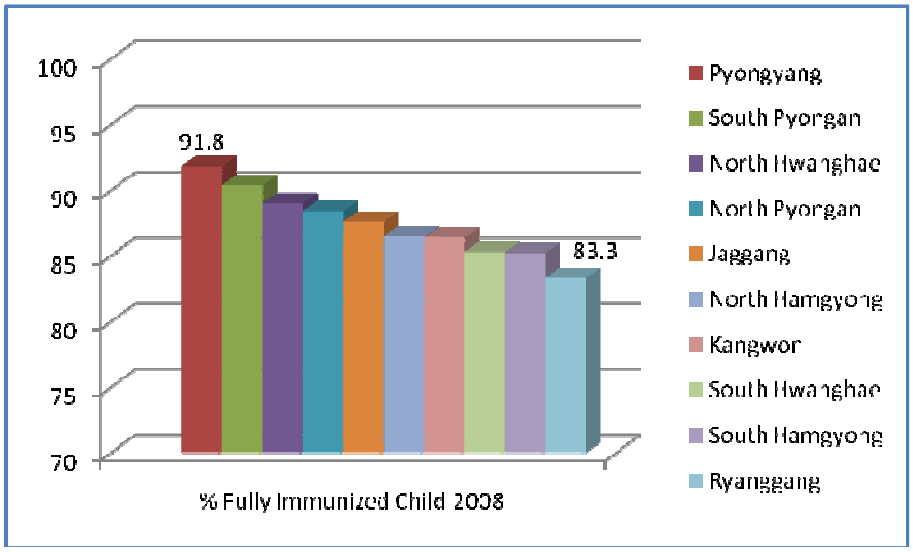


Nevertheless, the coverage survey did detect some significant ranges in provincial immunization coverage

which are demonstrated in figure 7 below.

The immunization coverage survey demonstrated that there is high quality of immunization services, as judged by the fact that there are no significant differences demonstrated between crude and valid coverage. In regard to timeliness of vaccinations, for some children, DPT-Hep B and OPV were not given at the recommended target ages although the delays were less than 8 weeks.

Figure 7 % Fully Immunized Child by Province 2008 Coverage Survey [16]



In terms of *immunization drop out*, although rates for measles BCG drop out are negligible, dropout rates for BCG and DTP Hep B 3 are higher, with the overall rate being 5% and with a range of 3% to 8%.

Table 5 Drop Out Rates BCG DPT3 – Hep B 3 2008 Coverage Survey

Province	BCG	DPT3+Hep B3	Drop Out Rates
Jaggang	96	92	3
Pyongyang	98	94	4
South Pyongan	98	94	4
North Pyongan	97	92	5
Kangwon	96	91	5
Ryanggang	96	91	5
North Hwanghae	98	92	6
North Hamgyong	97	90	7
South Hamgyong	97	89	7
South Hwanghae	97	89	8
All (weighted mean)	97	92	5

Management of data and information for planning and surveillance is noted to be a particular concern and will be considered in detail under strategic area 2.

Vaccine Preventable Disease

The increase in coverage in recent years in DPR Korea has resulted in reductions in most vaccine preventable diseases. The following data between 2004 and 2009 describes the reports of VPDs through the Joint Reporting Form (JRF) system of WHO/UNICEF.

Table 6 Reported VPDs 2004 - 2009 DPR Korea [17]

Vaccine Preventable Disease	2004	2005	2006	2007	2008	2009
Measles	0	0	0	3550	82	0
Tetanus	0	0	0	0	0	0
Rubella	507	123	101	101	72	09
Diptheria	0	0	0	0	0	0
Pertussis	1930	493	409	1250	395	8
Japanese Encephalitis (lab confirmed 2009)					124	10

Objectives, Targets and Actions Routine Immunization Coverage

Objectives	2011	2012	2013	2014	2015	Activity Details
To ensure that regular quality immunization sessions are planned and held						
Targets						
100% counties achieve DPT3 coverage of >90%						
100% of counties have BCG measles drop out of < 5%						
Strategies						
Prioritization of counties with the highest numbers of unimmunized children & lowest coverage:	X	X	X	X	X	Provinces will undertake situational analysis/review on a quarterly basis of poorly performing counties in terms of coverage and drop-out rates, identify bottlenecks and take necessary action through strengthened micro-planning, prioritized training, and strengthened supervision practice. At the central level, a line list of counties will be identified according to numbers of un-immunized children from the previous year and according to % coverage

Objectives	2011	2012	2013	2014	2015	Activity Details
Prioritization of populations not easily accessible and living in more remote areas:	X	X	X	X	X	Extra efforts will be made at the provinces to identify and serve that population who live in areas which are underserved. These efforts will include identification of appropriate outreach sessions coordinated by the county and PHC level doctors in consultation with EPI doctors. Household doctors could be mobilized for the mobile session on the days when no fixed-day service is being provided. The outreach session should be supervised by health bureau officers. Additional efforts will be made to sustain high coverage of BCG and Hepatitis B within 24 hours at Ri and County level through strengthening cold chain capacity
Integrated Micro-planning	X	X	X	X	X	Microplanning has strengthened the polio eradication process, which can also be used for routine immunization (mapping areas of underserved populations, session planning and county workplan). The EPI will provide updated guidelines for microplanning and assist counties to implement it. Every site providing immunization services will devise and implement annual microplans. Microplans will include aspects of vaccine delivery and transport within the provinces and counties.
4. Missed opportunities, reducing drop-outs	X	X	X	X	X	(a) Together with enhancing communication between service providers and mothers (including strategy on "communication for development") this approach aims to reduce the number of drop-outs

Objectives	2011	2012	2013	2014	2015	Activity Details
	X	X	X	X	X	(b) Health facilities: Every contact of health care system with children of vaccination age will be used to enquire about the child's vaccination status. Vaccines will be administered where applicable, provided the minimum interval between doses is respected. Possible reasons for non-vaccination shall be identified and addressed. Supervisors will coordinate and ensure administration of DPT and TT as per the national schedule.
	X	X	X	X	X	(c) Registration: All administrated doses of vaccines will be recorded in the immunization register and the immunization card. Doses given outside the target age will be registered on the immunization card of the child as well as in the separate column in the immunization register. PHC units and nurseries will keep the immunization cards of the children and it should be sent to another unit when the family of the child changes their residence, which will then be registered in the new PHC unit or nursery. Moreover, cost effective public health interventions such as Vitamin A and deworming will be recorded in the immunization card

Situation Analysis Immunization Training

At all levels of the health system, problems have been identified with higher turnover of immunization management and delivery staff. Although training programs have taken place in the last plan period, there is an established need to to develop a more effective training system in order to ensure the quality and availability of immunization services. There is also concern that there is currently a lack of a system for follow up of training. A National training centre needs to be established to coordnate this effort and to provide a sutiable location for conducting training programs. Middle Level Training programs are a high priority (vaccine management, surveillance, supervision, monitoring and data management). However, in order to conduct MLM programs across the country, core MLM trainers need to be developed. This will also facilitate extension of training for immunization in practice. This will need to be supplemented by a system of training follow up.

Objectives, Strategies, and Actions Immunization Training

Objectives	2011	2012	2013	2014	2015	Activity Details
To ensure that at least 75% of household doctors and 50% of immunization managers have been provided with updated training in immunization by 2015						
Targets						
EPI MLM training has been conducted in 50% of counties by 2015						
Immunization training for practitioners has been conducted in 75% of Ri by 2015						
A Training centre for EPI has been established by 2012						
Strategies						
Training of Trainers for MLM Training (international training for SLM and some MLM)		X				A team of senior level managers (SLM) and some provincial managers should have access to international "training of trainers" in MLM, with particular focus on vaccine management and cold chain, supervision, surveillance and planning
Develop an national immunization training plan as an outcome of the MLM training		X				
Conduct Middle Level Management Training		X	X	X	X	Middle level management training should be conducted in a phased manner across 10 provinces and 208 counties (HAES and Medical Warehouse and Public Health Bureau staff).
Immunization in practice training for household doctors	X	X	X	X	X	A training package for household doctors has been developed and includes a module on EPI. This training program could be implemented either (a) by SLM at the EPI training centre or (b) at province level by SLM and MLM
Conduct follow up of trainees through supportive supervision	X	X	X	X	X	The MLM training should include a component of supportive supervision. This should be implemented as a follow up to the training programs to ensure knowledge and skills are put into practice and to continue with on the job training

Objectives	2011	2012	2013	2014	2015	Activity Details
Design, construct and establish a National Training Centre for Immunization		X				It is proposed top establish a national training centre for implementation of the national training strategy for immunization. The national training centre is expected to have a training room, audio visual equipment, room, library, and training materials. As part of this initiative, a national training immunization strategy will be developed with an operational plan (including implementation of improved training methodology)

Situation Analysis Transport and Communications

The lack of adequate transport and communication systems have been identified in various health system assessments as being one of the main factors in the under performance of the health system. Mobility of health staff and transportation of vaccines is constrained by limited access to transport. Less than 60% of counties have motorcycles.[18] A "bottleneck analysis conducted by the Government of DPRK in collaboration with UNICEF and development partners noted similar gaps in health systems development. [19] In the previous EPI Plan (2007 – 2011) the National Immunization program noted that there is insufficiency of finance for transportation of vaccines and maintenance of the cold chain. Logistical weaknesses include lack of transport capital and financing of operational costs. This affects service delivery as well as the operation of the waste management system. [20]

Some of these issues have been addressed in the 2007 – 2011 plan period, particularly in relation to procurement of cold chain truck centrally and pickup trucks provincially in order to transport vaccines. Additionally, transport procurements for lower level facilities are proposed to be procured through GAVI HSS. Nevertheless, managers report that this supply falls well short of actual needs. Field visits undertaken for development of this plan confirm that lack of transport and communication infrastructure is a major constraint in terms of reaching harder to reach areas for follow up of drop out and investigation of disease reports, as well as for travelling to counties for monthly meetings and vaccine transport. In the medium term health sector plan developed in 2010, the MOPH reports that only 30% of counties have the essential transport and communications system to operate the health referral system. Based on this assessment, infrastructure development for transport and communications should be a main area for development in the next plan, and indicates how developments in the immunization system are linked closely to wider strengthening of health system infrastructure in DPR Korea.

Objectives, Strategies and Actions Transport and Communications

Communication	2011	2012	2013	2014	2015	Activity Details
To promote widespread support by all families and communities for EPI and to ensure that all eligible children and pregnant women are immunized						
Targets						
100% of infants have immunization cards						
100% of counties have IEC materials available for distribution on the benefits of immunization and AEFI						
Strategies						
Production and distribution of immunization cards	X	X	X	X	X	Immunization cards are kept at the Ri facilities for children. Regular supply of the immunization cards should be provided over the plan period. The cards will need to be updated to include new vaccine introductions and information in Vitamin A and deworming for children aged 0-59 months.
Production and distribution of IEC materials on immunization	X	X	X	X	X	New IEC materials will need to be developed for new vaccine introduction. This will include posters, leaflets and radio messages. Monitoring charts for Ri clinics will also need to be printed and distributed. Develop an immunization communication strategy (communication for development)
Production and distribution of IEC materials that includes information on AEFI	X	X	X	X	X	As above
Conducting health education sessions for mothers on immunization day	X	X	X	X	X	The following three activities outline communications activities that are integrated with service delivery, and which should be reinforced through supportive supervision
Adequate communication of session planning to the population and local authority by Ri health staff	X	X	X	X	X	
Peoples health committee is involved with supervision and organization of immunization days	X	X	X	X	X	

Transport	2011	2012	2013	2014	2015	Activity Details
To improve the mobility of health managers and health staff in support of improved delivery and supervision of immunization services						
Targets						
Motorcycle transport is available for AES at 100% counties by 2015						
100% of Ri have bicycle for immunization outreach by 2015						
Strategies						
Procurement, provision of motorcycles to 100% of counties by 2015	X	X	X	X	X	Increased mobility is required for surveillance through HAES and supervision of cold chain and vaccine management systems from the medical warehouses.
Procurement and provision of bicycles to 100% of Ri by 2015	X	X	X	X	X	

Situation Analysis Safe Injections

Auto disposable syringes were first introduced into the national program in 2003 and our now provided with all immunizations in DPR Korea. Safety box systems are used, with waste being dispsoed of by burn and bury method. The quality of the disposal and incineration methods is unclear. In the new plan, a review of safe injection practices policy and procedures sshould be conducted, and injection safety training integrated into MLM and immunization practice training, reinforced by programs of supportive supervision.

Objectives, Strategies and Actions Safe Injections

Safe Injection	2011	2012	2013	2014	2015	Activity Details
To ensure the implementation of safe injection practices and waste disposal at all locations						
Target						
100% of county and ri are implementing safe injection policy (use of AD syringe and safety box for routine immunization and safe disposal of waste).						
Strategies						
Procurement and distribution of AD syringes and safety boxes	X	X	X	X	X	AD syringes and safety boxes are currently being utilized across the country for immunization services. The existing policy of safe injection will need to be reinforced through supportive supervision and immunization training.
Follow up (supervision) of implementation of guidelines on safe injection and waste disposal	X	X	X	X	X	Consideration will need to be given to placement of incinerator systems for disposable of immunization waste according to the latest WHO standards

Strategic Area 2 Surveillance, Accelerated VPD Control and New Vaccines

Goals and Targets Surveillance and New Vaccines

Strategic Area 2	Disease Control	2011	2012	2013	2014	2015
Goal	Achieve measles elimination status and maintain polio free and maternal neonatal tetanus elimination (MNTE) status					
Targets	Polio-free status is maintained					
	Maintain MNTE status					
	Achieve measles elimination by 2015					
	Introduce at least 3 new or underutilized vaccines in the next plan period (Pentavalent vaccine, rotavirus vaccine and MMR vaccine)					
Objectives						
Surveillance	*Strengthen monitoring and use of accurate, complete and timely data on vaccine-preventable diseases and antigen coverage and drop-out rates by counties*					
VPD Diseases	*To maintain polio free status* *Maintain Maternal and neonatal elimination status* *To achieve measles elimination by 2013* *Reduce chronic HBV infection rate among children <5 years of age*					
AEFI	*To assure immunization safety by strengthening a monitoring system for reporting and responding to AEFIs*					
New Vaccines	*To protect target groups from vaccine preventable diseases(rotavirus, Hib, rubella, JE, mumps disease) through introduction of new and underutilized vaccines*					

Situation Analysis Surveillance, Monitoring and Reporting

Consultation undertaken for the development of this plan indicates there are quality issues with the functioning of the current surveillance, monitoring and reporting system. Common difficulties expressed with the quality of surveillance, monitoring and reporting include the following:

- Difficulties with transport and communication infrastructure mean that there are delays in submitting of reports and undertaking response.
- There is lack of updated reference materials and guidelines on surveillance, reporting and monitoring
- Knowledge of the household doctors on case definitions of VPDs requires regular updating

With respect to monitoring and reporting, even though there are specific reporting days and monthly meetings at County level, and a regular system of supervision, the following constraints were noted with the monitoring and report system:

- There is no documented system for recording completeness and timeliness of reporting.
- There is a reported lack of case report and investigation forms at Ri level in some locations.
- The use of immunization monitoring charts are not in place at management or service delivery level as yet
- There is no line listing at national level of counties with targets populations, numbers of unimmunized or % coverage

Although there are systems and guidelines in place for monitoring, surveillance and reporting, it is reported by managers that these systems will require updating. Immunization cards are retained at the Ri health facilities, and will also require updating to take into account plans for introduction of new vaccines

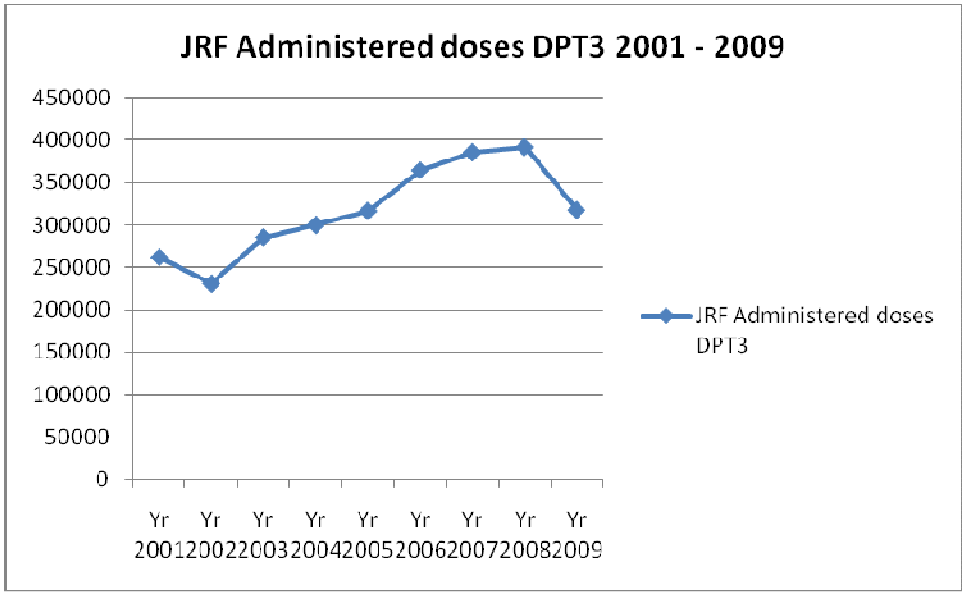
A system of monthly, quarterly, and zero-case reporting for communicable diseases exists at all levels of the system. Once again, managers and development partners expressed the view during the development of this plan that this area of monitoring and reporting will require a program of quality improvement in the next plan period.

A review of the surveillance and reporting systems in 2008 noted that there was an acute shortage of stationary noticed at all levels and that communication system is only by telephone now. [21] There is also lack of line listing of VPDs, and consolidation analysis at each level of the system (see strategic area 4 for more details on developments of integrated surveillance systems).

There is also concern expressed about the quality of data reporting. A system of monthly meetings at County level exists whereby immunization data is reported. A coverage survey was implemented in 2008. As figure * below indicates, the change in census population denominator resulted in a sharp drop in reported DPT3 numbers immunized in 2009, indicating that prior to this census, there were problems with the quality of data recording and reporting.

There are however, no data quality self assessment [22] methods implemented in DPR Korea as yet. Additionally, at facility and management level, the system of immunization monitoring Charts has not as yet been established. During activity planning as part of the development of this plan, managers expressed interest in introducing both of these systems in the next plan period in order to improve data monitoring (analysis), reporting and quality.

Figure 8 Trends in Doses of DPT3 Administered 2001 - 2009



In the next plan period, a wide range of activities will be required to strengthen surveillance monitoring and reporting which include the following:

- Integrated supervision guidelines and checklists
- Scaling up of integrated surveillance systems (see strategic area 4 for more detail)
- Introduction of data monitoring charts at management and facility level
- Introduction of systems of data quality self assessment
- Provision of adequate stationary and computerizing data management

Objectives, Strategies and Actions Monitoring and Reporting

Monitoring & Reporting	2011	2012	2013	2014	2015	Activity Details
Strengthen monitoring and use of accurate, complete and timely data on vaccine-preventable diseases and antigen coverage and drop-out rates by counties						
Targets						
Extension of electronic reporting system to all counties by 2012 provinces by 2012						
70% of monitoring reports received by counties that are complete						
70% of monitoring reports received by counties that are received on time						
70% of counties have adequate number of monitoring and case report forms available for health facilities						
Strategies						

Phased introduction of electronic reporting system county to national level	X	X	X	X	X	A routine immunization monitoring system (RIMS) has been developed. This system incorporates elements of VPD cases, mapping, database and analysis. All reporting from the county level and above will be done electronically with key standardized tools that can be easily analysed at the county level. The proposal is to commence at the central and provincial level and thereafter extend to the counties. Monitoring data will be provided to counties by the Ri during monthly meetings.

Monitoring & Reporting	2011	2012	2013	2014	2015	Activity Details
Increase accuracy and use of data at local levels Ri to County levels:	X	X	X	X	X	The county level will be the unit for surveillance and outbreak control. The County EPI officer will be responsible for surveillance activities; assisted by either a county level epidemiologist, statistician for action at the local level. Together with supportive supervision, monthly feedback from center to province, province to county and county to health facility levels should increase motivation for reporting accurately. Supportive supervision visits by supervisors using a standardized tool will help minimize over-reporting, identify area-specific problems and find local solutions. Additional strategies will include introducing monitoring charts, measurement of timeliness and completeness of reporting, and ensuring availability of immunization report forms, case report forms and surveillance guidelines at Ri level
Laboratory confirmation and strengthened linkage with surveillance	X	X	X	X	X	Laboratory diagnostic support will be provided through a network of currently available institutions and by establishing additional facilities. This will ensure prompt feedback to field investigators as well as to counties, provinces and national level authorities. Introduce weekly reporting from county laboratories to Provincial AEHI and monthly reporting from the provincial HAEI to the central HAEI
Handbook/Guidelines on surveillance, monitoring and reporting of VPDs	X					Reference materials will be developed and updated on VPD surveillance and AEFI including monitoring and reporting. The information will be disseminated to all Ri.
Introduce a system of data quality self assessment using WHO guidelines in order to improve the quality of the reporting and monitoring system		X	X	X	X	In order to address the well documented problem of quality of data management, a system of data quality self assessment will be introduced (refer to DQS guidelines WHO).
Integrated supportive supervision guidelines and checklists		X				Supervision guidelines are available for each technical program. Integrated systems of supervision should be introduced including integrated supervision checklists
Introduce coverage monitoring charts at all levels of the health system according to WHO/UNICEF guidelines (MLM/IIP)		X	X	X	X	Introduction of coverage monitoring charts at management and service delivery levels of the health system to improve monitoring and reporting of coverage rates and immunization drop out rates

Capacity building (MLM and IIP) on monitoring, reporting and supportive supervision		X	X	X	X	The initiatives above will be reinforced through MLM and programs of supportive supervision (see strategic area 1)

This area of the plan focuses on the specifics of disease elimination control and surveillance. The two critical factors in reaching disease elimination goals are maintaining high coverage and having in place an effective VPD surveillance system. Both of these considerations will be foundations of the multi year plan 2011 – 2015. The surveillance status of each of the main vaccine preventable diseases is outlined in more detail below, commencing first with polio eradication.

Polio Eradication

The last wild polio case in DPR Korea was reported in 1996. Other countries in the Region have experienced importation and circulation of wild polio virus over the past couple of years (Bangladesh, Indonesia, Myanmar and Nepal).[23] While the risk for importation and circulation remains low in DPR Korea, as long as there is endemic circulation in the Region, DPR Korea remains at risk for an importation of wild poliovirus.

Data available through WHO SEARO indicates that DPR Korea has been maintaining the coverage of the third dose of oral polio vaccine (OPV3) above the recommended 80% for the last 4 years. There are two surveillance indicators for monitoring polio eradication: 1) non-polio AFP rate and 2) percentage of adequate stool specimens collected. DPR Korea has been achieving above the 80% target level for percentage of adequate stool specimens collected for the last 4 years (i.e. Percentage with 2 specimens 24 hours apart and within 14 days of paralysis onset). Although the non-polio AFP rate has been maintained at > 1 per 100,000 under 15 population for the last 4 years, the results have not been consistently maintained at the recommended level of 2 per 100,000 under 15 population . [24]

Objectives, Strategies and Actions Polio Eradication

Polio Eradication	2011	2012	2013	2014	2015	Activity Details
To maintain polio free status						
Targets						
AFP surveillance is increased to at least 2 non polio AFP cases per 100,000 population under 15 years						Conduct regular province/county analysis of data to review progress and in order to take corrective action
80% of AFP cases sampled with adequate stool samples						
Strategies						
Routine Immunization program strengthening (see Strategic Area 1)	X	X	X	X	X	As per routine immunization strategy, but also include (d) Regular province/county analysis of data to review progress and prioritization of corrective action taken by counties.
Polio Eradication	2011	2012	2013	2014	2015	Activity Details
Maintain surveillance standards against global certification indicators and	X	X	X	X	X	(a) AFP and virological surveillance conducted by government and national polio surveillance programme, WHO-SEARO and polio laboratory network. (b) Establishment of network for reporting cases of AFP (c) Clinical investigation and stool examination of all AFP cases (d) Sustaining the WHO accredited laboratory network for isolation of wild poliovirus from the stools of AFP cases and contacts (e) Management of AFP case data with regular analysis at the provincial and county levels to measure the progress in polio eradication and to guide supplementary immunization activities. (f)Preparing annual updates for containment activity and certification of Polio eradication. (f) Vaccine procurement and supply under the existing EPI through the government.
Development of a polio re-importation response plan		X				

Maternal and neo Natal Tetanus

Protected at Birth (PAB) refers to the proportion of births that are protected against tetanus as a result of maternal immunization. This indicator reflects the tetanus immunization received by the mother throughout her life rather than simply the TT immunizations received during the current pregnancy. The 2009 estimate by UNICEF/WHO is for DPR Korea for protected at birth is 91%. The vast majority of deliveries take place in facilities (86.9% in urban areas and 83.9% in rural areas) and in the care of skilled health staff (99%).[25] As there are variation in location of delivery rates between urban and rural areas, there are still likely to be pocket areas (remote areas) in the country where rates of home delivery are higher and vaccination rates lower.

There have been zero reported cases for tetanus in the last 10 years. Discussions during this situation analysis heightened the need for strengthened surveillance of neo natal deaths and follow up case investigation. Regular district data reviews should occur to ensure MNT elimination is maintained and corrective action taken if necessary.

For this to take place, surveillance system will need to be strengthened, and high risk areas for transmission (areas with higher home delivery rates and lower coverage) will need to be identified and monitored.

To prolong the duration of protection against tetanus, the addition of a tetanus-containing vaccine boosters should be considered for school age children (4 to 7 years) and adolescents.

Objectives, Strategies and Actions Maternal and Neo Natal Tetanus Elimination

Tetanus Elimination	2011	2012	2013	2014	2015	Activity Details
Maintain Maternal and neonatal elimination status						Elimination is defined as fewer than one case of neonatal tetanus per 1000 live births in each district (counties
Targets						
Less than 1 NNT case per 1000 live births in each district						)
Maintain of TT2 coverage of > 90%						
Maintain rate of facility deliveries at > 85%						
Strategies						
Promotion of high routine immunization coverage (see strategic area 1), especially in counties with higher rates of home delivery (high risk approach)	X	X	X	X	X	Ensure that TT is offered at all antenatal sessions and routine immunization sessions. Provide two doses for the first pregnancy (with immunization card) and further doses according to the national schedule. The overall coordination of NNT elimination will be the responsibility of the national NNT coordinator. In order to adopt a high risk approach in preparation for validation survey for tetanus elimination, a line list of counties should be drawn up based n current immunization coverage rates and rates of home delivery.
Promotion of clean delivery practices	X	X	X	X	X	Report NNT cases from every health facility and establish NNT as a reportable disease. NNT will be included with weekly AFP in active surveillance and zero reporting. Case investigations for hospital-based cases and cases in high-risk areas especially. Targeted action will be around reported and investigated cases by improving and promoting routine TT immunization for pregnant women and clean deliveries in the community concerned. 4 Safe delivery practices will be coordinated with the treatment and prevention department of MoPH.
Reinforcement of neo natal death reporting and NT case investigation and follow-up, especially in higher risk county and Ri	X	X	X	X	X	As Above

Tetanus Elimination	2011	2012	2013	2014	2015	Activity Details
Conduct annual district data reviews to identify potential risk areas		X				
Review feasibility of including tetanus-containing vaccine boosters for school-age children and adolescents			X			(including consider modifications to immunization schedule for two additional opportunities for tetanus vaccination

Measles Elimination and Rubella Control

In the previous plan (2007 - 2011) it was reported that coverage rate of >95% is maintained all over the country, and that no case of measles had been reported since 1986. The plan also noted that the measles laboratory network was not fully established and active surveillance needs to be strengthened. However, in 2007 there was a measles outbreak with 3550 reported cases, most of who were in the older age groups. By February 2007 over 3,600 people in 30 of the DPRK's 204 counties had been affected, including two adults and two infants, who died. Subsequent to this, an immunization campaign was conducted in 2008 (with over 16 million children and adults between 6 months – 45 years were vaccinated)[26] and a measles second dose was introduced in 2009 (15 month old children). The 2009 Joint Report form records coverage rates of 98% for measles 1 and 2, and although there were 64 clinically suspected cases in 2009, none were tested positive for measles or rubella.

DPR Korea is currently part of the regional laboratory surveillance network for both polio and measles. As a performance indicator for measles, it is recommended by WHO for countries with an elimination goal to have a reporting rate of ≥2 non measles suspected measles cases/100 000 population per year at national level. At sub national level, the rate should be at least ≥2 non measles suspected measles cases/100 000 population per year. in at least 80% of counties. Currently, with 65 suspected non measles cases reported in 2009, this rate is now .27/100,000 population nationally.

As DPR Korea is now in a strong position for eliminating measles given that 2 doses of measles vaccine are included in the schedule and coverage is > 95%, so surveillance systems must be strengthened in the coming plan period. (Elimination is defined as the absence of endemic measles cases for a period of 12 months or more, in the presence of adequate surveillance).[27] Areas for strengthening include monitoring, reporting, supervision, training, laboratory strengthening. A contingency fund for measles supplementary immunization activities are also included in the costing of this plan should this be required. This plan period could also provide the opportunity for development of systems to monitor congenital rubella syndrome (as part of an overall system for integrated surveillance of measles and rubella as per guidelines of WHO for countries that are approaching elimination). [28]

Objectives, Strategies and Actions Measles Elimination and Rubella Control

Measles Elimination	2011	2012	2013	2014	2015	Activity Details
To achieve measles elimination by 2013						
Targets						
To achieve measles elimination by 2015						The definition of Elimination: The absence of endemic measles cases for a period of 12 months or more, in the presence of adequate surveillance.
To maintain >95% coverage of MCV1 and MCV2						
To maintain measles coverage at > 90% in 100% of counties						
Serum samples adequate for detecting measles IgM collected in at least 80% of suspected cases measles cases						
At least two non measles suspected measles case reported per 100 000 population per year in at least 80% of counties (or equivalent, as used for AFP surveillance)						
At least two non-measles suspected measles cases per 100,000 population nationally.						
Strategies						
Promotion of high routine immunization coverage (see strategic area 1), with focus on two doses of measles vaccine and > 95% coverage	X	X	X	X	X	
Providing second dose of measles vaccine through routine second dose/follow up immunization campaigns;	X	X	X	X	X	

Measles Elimination	2011	2012	2013	2014	2015	Activity Details
Improving measles surveillance, including tracking and investigation of suspected measles outbreaks;	X	X	X	X	X	At least 80% of all reported suspected measles cases should have had an adequate investigation within 48 hours of notification. Specimens adequate for detecting measles IgM should be collected from at least 80% of suspected measles cases and laboratory tested in a WHO accredited laboratory. Genotype of measles virus of all confirmed cases should be established to certify elimination of indigenous circulation
Improving case management including administration of vitamin A.	X	X	X	X	X	
Ensure there is in place a system and guidelines for Identification and notification of suspected measles cases (including updating of national surveillance guidelines and dissemination to RI levels)		X	X	X	X	This activity will included MLM and immunization in practice training, reinforced by programs of supportive supervision. All household doctors should be informed of the case definitions and procedures for reporting and response. Adequate case report forms will need to be provided for the Ri level. National guidelines should be updated in conformance with recently published guidelines for measles and rubella surveillance and outbreak response (SEARO)
Conduct surveillance capacity building programs on case based surveillance, reporting, and response for suspected measles cases		X	X	X	X	As above.

Measles Elimination	2011	2012	2013	2014	2015	Activity Details
Develop a detailed plan to document measles elimination and sustained measles elimination.by 2011		X				The elimination plan should detail strategies for: (a) Improving and sustaining routine immunization coverage; (b) Providing second dose of measles vaccine through catch-up immunization campaigns and routine second dose/follow up immunization campaigns; (c) Improving measles surveillance, including tracking and investigation of suspected measles outbreaks and investigating suspected cases from institutions; (d) Improving case management including administration of vitamin A. and (e) strengthening the surveillance system, and details of the monitoring and report system. A sero survey could be considered to validate elimination (along with assessment of surveillance system) Consideration could also be given in the plan to development of strategies for **integration of rubella surveillance** with measles surveillance, and establishment of sentinel sites for monitoring of congenital rubella syndrome (CRS). Sero surveillance for rubella will also be considered.

Hepatitis B Control

The true prevalence of chronic hepatitis B infection in DPR Korea is unknown, but a WHO consultant estimated a prevalence of 12% in 2001. [29] According to the national hepatitis B control plan, one half of all chronic hep B infections is likely to occur through the perinatal/vertical route, one quarter among children and adolescents through person-to-person exchange of blood or body fluids through close contact at home, and the last quarter through unsterilized medical equipment and sexual contact.

Hepatitis B vaccine was introduced into the National Expanded Programme on Immunization (EPI) in 2004, with the assistance of the Global Alliance for Vaccines and Immunization (GAVI), initially in monovalent presentation and later as the tetravalent presentation DPT-HepB. In accordance with WHO recommended strategies for hepatitis B control in hyper-endemic countries like DPR Korea, an additional dose of mono-valent hepatitis B vaccine administered at birth (HepB0) was also introduced in 2004. [30] In late 2010, the first phase of a national campaign to vaccinate all 6 – 17 year old children in the country commenced and is expected to be completed in May 2011.

In the next plan, it is proposed to maintain high routine immunization coverage, and to administer a timely birth dose. The extension of the refrigerated cold chain to the Ri level is also considered in the plan, which will provide more capacity to provide the birth dose in the 24 hour timeframe post delivery. As the vast majority of births occur in health facilities in DPR Korea, there is a reasonable chance that the control objective of less than 2% chronic carriers in the under 5 age group could be achieved in the next plan period (although no regional target has been set as yet)). A national sero survey of the under 5 age group sero prevalence survey could be considered in order to assess the effectiveness of the current hepatitis B control strategy. The policy review and capacity building programs for injection safety could also assist with implementation of the hepatitis b control strategy. An “outside the cold chain policy” for administration of hepatitis B Birth does is also a policy option that could be explored in the next plan period. A decision will be made on this policy during the coming plan period.

Objectives, Strategies and Actions Hepatitis B Control

Hepatitis B Control	2011	2012	2013	2014	2015	Activity Details
Reduce chronic HBV infection rate among children <5 years of age						
Targets						
Reduction of HepB surface antigen in children less than 5 from estimated pre vaccination time of 12% to 2% by 2014						
Maintenance of 4 doses of hepatitis B above 90% for children under the age of 1						
Strategies						
Strengthen routine immunization services to achieve and sustain at least 90% coverage with four doses of hepatitis B vaccine by one year of age in each birth cohort. At least 90% coverage to be achieved in each county	X	X	X	X	X	
Strengthen the system to deliver a timely scheduled birth dose (within 24 hours of birth), with the target to reach at least 90% of births at each sub-national level and at the national level.	X	X	X	X	X	The extension of the refrigerated cold chain capacity to 25% of Ri in more difficult to access areas is considered in this plan. Implementation of an "outside the cold chain policy" for hepatitis B monovalent vaccine could also be an option.
Focus on high risk counties with lowest immunity (coverage) against Hep B	X	X	X	X	X	This is consistent with other areas of the plan. To raise coverage above the targeted 95%, it will be necessary to have a line list of counties with highest numbers of unimmunized and/or low coverage. These counties should be targeted for capacity building, supervision and resources to increase coverage.
Institute catch-up immunization for high risk groups (commencing with 6 - 17 year old vaccine campaigns) and consider introduction of vaccine programs for other high risk groups)	X	X	X	X	X	Other risk groups could include women of child bearing age and the health workforce
Capacity building (including laboratory at National Hepatitis B prevention Institute)		X	X	X	X	A national sero survey should considered at some stage in the plan period to assess whether control objectives are being met (Under 5 children Hep B surface antigen)

Situation Analysis AEFI

A system for monitoring adverse events following immunization exists in DPR Korea, but managers report that the quality of the system requires strengthening. At WHO, generic guidelines for management and response for AEFI also exist, but these have not yet been adapted for country application [31]

Given that it is proposed that 3 or 4 new or under- utilized vaccines will be introduced in the next plan period, it will be essential to strengthen the system in addition to strengthening the institutions that provide oversight for vaccines quality and decision making (AEFI committees and NRA, NCL, NITAG capacity development – see strategic area 4).

Main activities in the coming plan period will include guideline revision and development and capacity building programs for managers and health staff (MLM and IIP), and production of IEC materials on AEFI

Objectives, Strategies and Actions AEFI

AEFI	2011	2012	2013	2014	2015	Activity Details
To assure immunization safety by strengthening a monitoring system for reporting and responding to AEFIs						
Targets						
National guidelines on AEFI updated and distributed						
AEFI investigation team established in each county and AEFI review committee established in each province						
Strategies						
Review and strengthen report and response systems for AEFI	X					There are currently generic WHO guidelines and local report forms. The AEFI system needs to be updated. TA, assessment and national workshop will be required to improve the quality of the AEFI system, especially given introduction of new vaccines.
Establish / strengthen national AEFI committee or equivalent	X					This activity is linked to strategic area 5, in particularly to oversight provided through the NITAG, supported by a strengthened NRA
Training for support of AEFI system, and registration and reporting and response system (guidelines exist but needs updating)	X	X				AEFI training can be integrated into MLM and immunization in practice training programs.

Situation Analysis New and Under-Utilized Vaccine

Haemophilus Influenza type B (Hib)

DPR Korea is one of seven countries in the region that has not yet introduced Hib vaccine. There are currently no surveillance systems in place to assess the burden of disease, although WHO estimates of disease are estimated to be 24,936 cases per year and 751 **deaths (contrasting with 40,007 deaths and 1428 deaths for pneumococcal disease)**.[32] A proposal for introduction of pentavalent vaccines including Hib was developed in 2009 but not submitted for review due to lack of clarity regarding processes for co financing of vaccines. In this plan, introduction of the vaccine is proposed for 2012. As yet, surveillance systems (sentinel surveillance for meningitis and pneumonia) for this vaccine preventable disease are not yet in place.

Rotavirus

WHO recommends that rotavirus vaccine for infants should be included in all national immunization programmes. In countries where diarrhoeal deaths account for ≥10% of mortality among children aged <5 years, the introduction of the vaccine is strongly recommended.[33]Regionally, sentinel surveillance sites have been established for Rotavirus in Bangladesh, India, Myanmar, Nepal and Sri Lanka. Bangladesh has included the introduction of the vaccine in the 2011 (cMYP 2010). However, no country in the region has as yet introduced the vaccine. There is no DPR Korea specific data available on the burden of rotavirus diarrheal disease. Vaccine introduction should be linked to other diarrhoeal disease interventions that include improvements in hygiene and sanitation, zinc supplementation, community-based administration of oral rehydration solution and overall improvements in case management. Introduction for 2012 is included in this plan with details below. As yet, surveillance system (sentinel site) is not in place for rotavirus disease.

Measles Mumps Rubella Vaccine

As the second doses of measles has been introduced, and there is immunization rates of > 95% for two doses, DPR Korea is on track for measles elimination, which provides a good opportunity for rubella control. Between 2004 and 2008, there was a range of 84 to 504 reported cases of Rubella. In 2009 there were no reported clinical cases. 18 cases of mumps were reported in the WHO/UNICEF Joint Reporting Form of 2009. As yet, no surveillance system for monitoring of Congenital Rubella Syndrome exists. The following requirements would need to be put in place in order to introduce MMR vaccine at 15 months of the age in the immunization schedule:

(a) Strengthening of case based surveillance using consistent national case definition
(b) Commencement of CRS surveillance
(c) Maintenance of high coverage of MMR

Sentinel Surveillance systems for CRS and vaccine introduction for MMR are both proposed in this plan period. The 3 year period between 2010 and 2013 is considered as providing sufficient time for establishment of surveillance systems, and further consideration of the questions regarding cost and disease burden.

Japanese Encephalitis Vaccine

Regionally, JE vaccine has been introduced in China, India, Nepal and Sri Lanka (SA 14 14 2 Live Vaccine). JE disease is also endemic in DPR Korea. The WHO/UNICEF Joint Reporting Form for 2009 reported 124 cases of JE in 2008. Currently there are no surveillance systems for JE. The Government of DPR Korea is currently reporting the production of live vaccine locally, and is aiming for vaccination of all new birth cohorts. In 2009, a campaign was conducted. In 2009 and 2010, with technical and financial support from PATH, 1.5 million doses of Japanese Encephalitis (JE) vaccine (live vaccine SA 14 14 2) were administered in a mass campaign for children (aged 12to 23 months and 4 to 6 years) in five targeted provinces and the city of Pyongyang. Live JE vaccine is now being produced in DPR Korea, and its is proposed that this capacity for local production of the vaccine be scaled up in the next plan period. As yet, there are no sentinel surveillance systems for JE disease (acute encephalitis syndrome). The Global level of WHO recommends

that surveillance for and reporting of JE should be performed within the context of integrated disease surveillance, and linked synergistically with similar surveillance activities, such as those for acute flaccid paralysis (AFP) or meningitis.[34]

Decision Making for New and Underutilized Vaccines

The critical factors for facilitating decision making on new vaccine introduction include disease burden, program capacity, vaccine efficacy, vaccine safety and affordability. Although these are challenging areas for DPR Korea, the priority areas for development include **disease burden**, **program capacity** and vaccine **safety.**

For disease burden, more investments will be required in surveillance systems for meningitis-encephalitis syndrome (acute encephalitis syndrome or "AES"), diarrhea and pneumonia. In terms of program capacity, monitoring, reporting, and supervision, and transport and communications are major challenges for program performance. In relation to safety factors, there are limitations in AEFI systems and institutional capacity of the NRA, NCL and NITAG that will require urgent attention in the next plan period (please refer to page 45 which has more detail on the roles of NITAG in new vaccine decision making). The role of the NITAG is particularly important in this regard, considering that its main function in many countries is to provide information to national governments so as to make evidence-based decisions regarding vaccine and immunization policy.

For all new vaccine introductions, an introduction plan will need to be developed which should specify resources requirements, IEC strategy, storage capacity, training plan, systems for monitoring and response to AEFI and surveillance strategy for monitoring impacts of vaccine introduction.

Objectives, Strategies and Actions New Vaccine Introduction

New Vaccines	2011	2012	2013	2014	2015	Activity Details
To protect target groups from vaccine preventable diseases(rotavirus, Hib, rubella, JE, mumps disease) through introduction of new and underutilized vaccines						
Targets						
Pentavalent vaccine is introduced by 2012						
Rotavirus Vaccine is introduced by 2013						
MMR vaccine introduced by 2013						
Full capacity for local production of live JE vaccine by 2012						
Strategies						
Sentinel surveillance systems are developed at 4 or 5 sentinel sites for meningitis--encephalitis syndrome (acute encephalitis syndrome or "AES" (Hib/JE/Pneummo)	X	X	X			Investment is required for development of sentinel surveillance for meningitis encephalitis syndrome (acute meningo encephalitis reporting or AMES) according to WHO guidelines.[35] This will require (1) feasibility assessment (2) proposal development (3) resource mobilization (4) capacity building and laboratory equipping (5) development of standard operating procedures
Planning and Resource Mobilization - Develop Introduction Plan and GAVI Pentavalent vaccine proposal	X					An introduction plan and proposal will need to be developed. Main elements of the plan should outline human resource capacity, surveillance procedures., AEFI system, co financing strategy, cold chain storage space, training plan, technical and management oversight
Planning and Resource Mobilization - Develop Introduction Plan and GAVI Rotavirus vaccine proposal		X				As Above. A surveillance site and protocol for diarrhoeal disease surveillance should be established.
Planning and Resource Mobilization - Develop Introduction Plan and GAVI MMR vaccine proposal		X				See objective 1 for information on rubella surveillance

New Vaccines	2011	2012	2013	2014	2015	Activity Details
Develop local production capacity for Japanese encephalitis vaccine	X	X	X	X	X	Options for JE program include the following: (1) Inclusion of JE surveillance in sentinel site surveillance for Hib/Pneummo, JE (2) Strengthening NRA/NITAG capacity to ensure safe quality local production of JE vaccine (3) Identification of alternative sources for vaccine supply through GAVI later in the plan period
Strengthen AEFI report and response systems (see Objective 2)	X	X				See Objective 2 AEFI
Establish NITAG to provide strategic guidance on vaccine introduction , surveillance data and adverse events (see strategic area 5)	X	X				See Strategic Area 5
Build NRA capacity for oversight of vaccine procurement and licensing and quality assessment (6 essential functions of NRA see Strategic Area 5 for details)						See Strategic Area 5

Strategic Area 3 Resource Mobilization

Goals and Targets Domestic and International Resource Mobilization

Strategic Area 1	Domestic Resource Mobilization	2011	2012	2013	2014	2015
GOAL	To mobilize resources nationally to implement and expand the national immunization program					
Targets	% GDP allocated to health increased from 6.1% to 7% by 2015					
	To mobilize an additional X $ to implement plan activities for the national immunization program by 2015					
	To mobilize per capita expenditure on immunization from .3$ per capita to .6$ per capita by 2015					
	To extend the % allocated to immunization as a % of Total Health Expenditures from .6% to 1.5% by 2015					
Objectives						
National Resources	*Increase national government financial contribution to immunization services*					
International Resources	*Increase external resources available for building the capacity of the national EPI program and introduction of new vaccines*					

Situation Analysis Resource Mobilization

Between 2007 and 2011, DPR Korea was successful in mobilizing international resources for tetravalent vaccine, hepatitis B birth dose vaccine, measles 2nd dose for routine immunization, and JE and hepatitis B vaccines for mass campaigns. Given the success with this large scale resource mobilization, it is not unreasonable to expect that this record can be surpassed in the next planning cycle, especially given the ongoing support of GAVI for financing of new and underutilized vaccines.

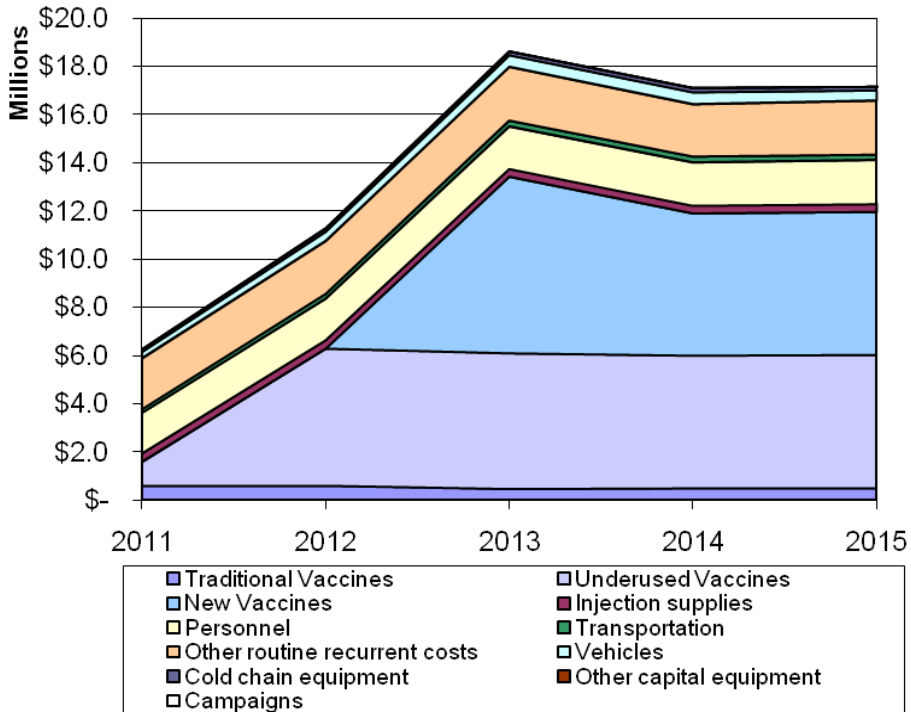
Costs of the National program

Baseline costs (2010) demonstrate overall per child DTP3 rates of $19.5. With the planned introduction of new and underutilized vaccines in the next planning cycle, in addition to the program costs associated with supporting these introductions, it is projected that the DTP3 cost per capita will increase in 2015 to $50 per child. The overall cost of the program is projected to increase from $6.3 million to $17 million (see figure below).

Table 7 Baseline Costing Indicators

Baseline Indicators	2010
Total Immunization Expenditures	$6,328,808
Campaigns	
Routine Immunization only	$6,328,808
Cost per capita	$0.3
per DTP3 child	$19.5
% Government funding	22.2%
% Total health expenditures	0.6%
% Gov. health expenditures	0.6%
% GDP	0.04%
Total Shared Costs	
% Shared health systems cost	
TOTAL	$6,328,808

Figure 9 National Program Costs by category 2010 – 2015



Between 2011 and 2015, the share of the immunization budget attributable to vaccine and logistics is

projected to increase from 33% to 54% (due to vaccine introductions). The current costing profile in this plan assumes introduction of pentavalent vaccine in 2012, MMR and rotavirus vaccine in 2013, and JE vaccine throughout the plan period. The peak in costs in 2013 is largely a result of the need to establish a buffer stock for new vaccines (rotavirus in particular), in addition to the additional costs of establishment of surveillance systems and other costs associated with introduction of new vaccines.

The total cost of the plan, and costs according to each category are displayed by year in table 8.

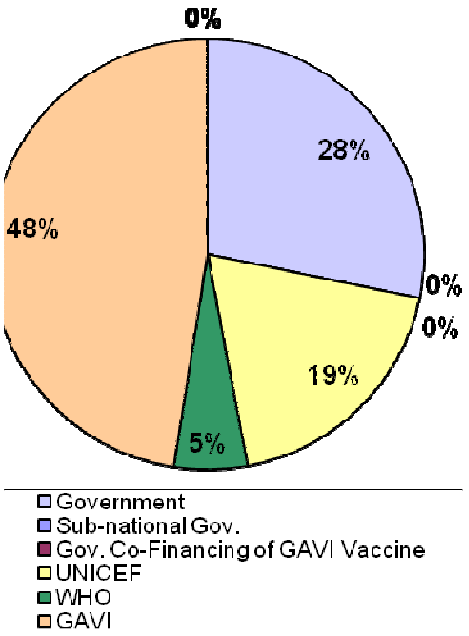
Table 8 National program Costs by category 2010 - 2015

	Costs	Future Cost Projections					
Cost categories	2010	2011	2012	2013	2014	2015	Total 2011 - 2015
	US$	US$	US$	US$	US$	US$	US$
Vaccine Supply and Logistics	$3,699,798	$2,415,850	$7,328,538	$14,627,579	$13,183,338	$13,186,618	$50,741,922
Service Delivery	$1,169,509	$1,872,677	$1,943,140	$2,003,087	$2,042,518	$2,053,242	$9,914,663
Advocacy and Communication	$0	$0	$43,697	$44,571	$0	$0	$88,268
Monitoring and Disease Surveillance	$1,189,500	$2,018,070	$1,990,805	$1,966,949	$2,006,288	$2,046,414	$10,028,526
Programme Management	$270,000	$467,201	$495,272	$510,483	$412,450	$420,699	$2,306,105
Supplemental Immunization Activities	$0	$1,023,664	$0	$0	$0	$0	$1,023,664
Shared Health Systems Costs	$4,699,026	$5,777,228	$5,892,772	$6,010,628	$6,130,840	$6,253,457	$30,064,925
	$11,027,833	**$13,574,689**	**$17,694,224**	**$25,163,297**	**$23,775,434**	**$23,960,429**	**$104,168,074**

Financing of the National program

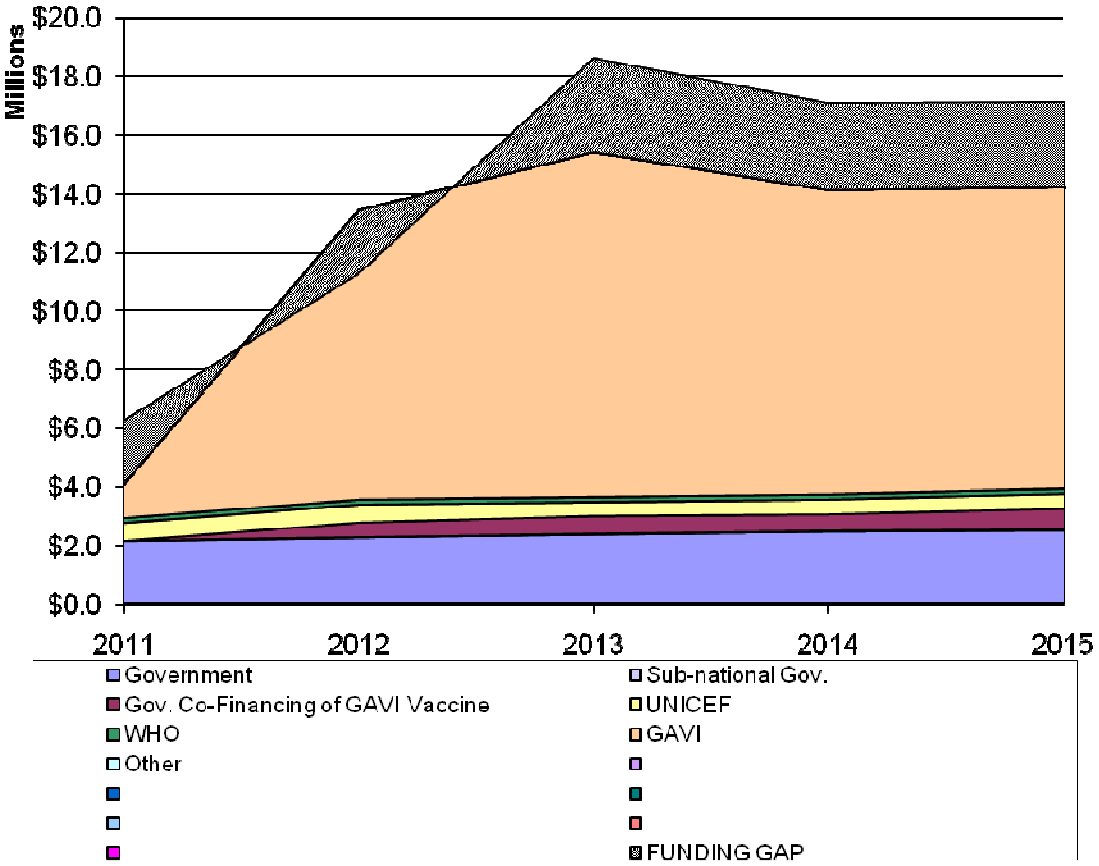
This financing profile will change significantly over the coming years as new and underutilized vaccine introduction funded by GAVI takes place. This will see a significant shift in the proportion of the national program that is internationally financed (particularly by GAVI). This is highlighted in the following figure, which outlines projected financing of the program from 2010 to 2015. Baseline financing of the program is demonstrated below.

Figure 10 Baseline Financing Profile (routine Only 2010)



International financing (GAVI) increases sharply between 2010 and 2015. The funding gap (see shaded area in figure 11 below) mostly exists in the areas of surveillance, financing of MMR and JE vaccines, transport capital and program management. The financing gaps for program management (particularly surveillance, supervision, capacity building and NRA/NCL and vaccine industry development) are critical given that these developments will be essential to regulate and oversee introduction of new vaccines. Developments in health system infrastructure (transport and communications) will also be essential to ensure the vaccines are delivered to the population.

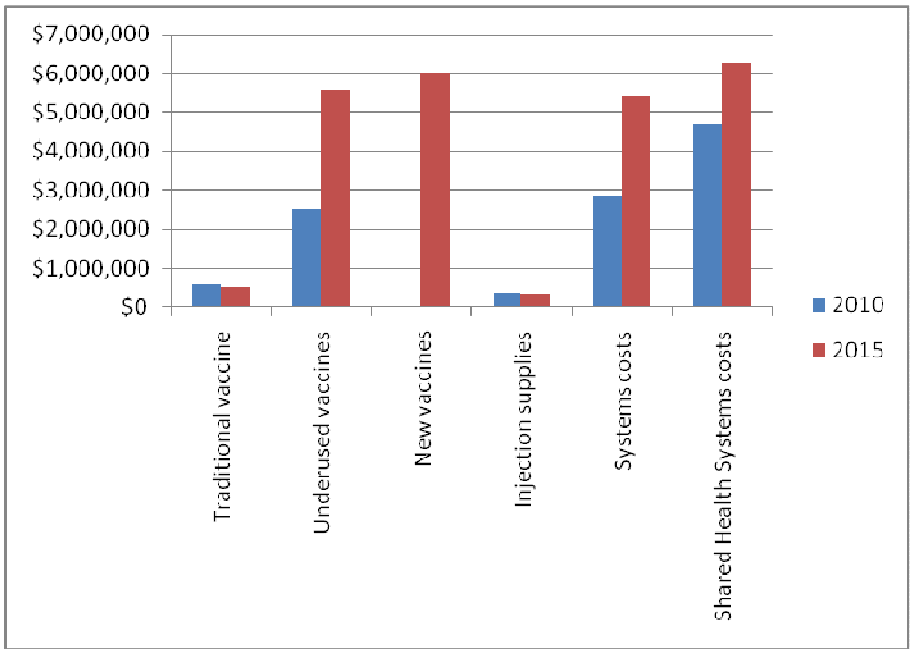
Figure 11 Probable Financing and Gaps 2010 - 2015



Main financing challenges for the MOPH and development partners in DPR Korea are illustrated in Figure 12. Planned introduction of MMR, rotavirus and pentavalent vaccines are adding significantly to overall program costs, particularly in relation to new and underutilized vaccines. It is important to note that system costs will need to rise alsi to take into account the need for strengthened management, supervision, capacity building and surveillance.

Overall, program costs (including shared health system costs) are projected to increase from $11,027,833 in 2010 to $24, 102,307 in 2015. However, it should be considered that, although costs rise to $24 million by 2015, this is still highly cost effective given that total costs are only $1 per capita.

Figure 12 Comparison of 2010 and 2015 Program Costs cMYP DPR Korea



Financial Sustainability Strategies

As demonstrated by Figure 11, the planned increased investments of GAVI financing of new and underutilized vaccines places the country on a high level of financial sustainability risk. In order to manage this risk, the Government of DPR Korea is considering the following options which are outlined in figure 12 below.

Figure 13 Financial Sustainability Options

Financial Sustainability Options DPR Korea

1. Current costing and finance projections assume introduction of pentavalent vaccine with government co financing
2. Although this planning option remains open, the intent of the Government of DPR Korea is to develop its own local vaccine production capacity for DPT, Hepatitis B, JE and Hib vaccines.
3. A preferred option is therefore is to invest in the development of the local vaccine industry. This option will be kept open while the co financing policy of GAVI is being finalized.
4. This is the preferred option as it moves DPR Korea from a "consumption" model to a "development" model of international assistance.

The following sustainability strategies are proposed and are outlined below.

1. *Strengthening institutions and infrastructure for vaccine industry*: Details of this strategy are outlined in strategic area 4 of this plan. It is expected that development of NRA/NCL function will assist with the proposed development of local vaccine industry.

2. *Establishment of National Immunization Fund:* It order to reduce the risk of funds shortage in the event of vaccine stock out and disease outbreak, it is proposed to establish a national immunization fund (funded internationally) to establish a contingency fund for management of disease outbreaks and stock outs should they occur.

3. *Integration of EPI with the health system:* Strengthening of the health system is the foundation for improved immunization service delivery. Currently the immunization system is well integrated with the delivery system. However, this strategy will be strengthened through developments of integrated supervision, planning and surveillance systems.

4. *Ensuring Line Budgets in the Medium term Health Sector Plan:* Costing and sources of finance for immunization should be included in the medium term plan, so that resources can also be mobilized through health sector planning processes and coordination efforts (including proposed health sector forum).

5. *Expanding international cooperation partnerships:* DPR Korea has been successful in expanding international partnerships in relation to immunization. This strategy will be built on in the next plan with ongoing partnerships with UNICEF, WHO and GAVI, and potentially other international partners (PATH, CARITAS, IVI etc).

6. *Vaccine Co financing*: Other financing challenges will include co financing of new and underutilized vaccines. From 2012, approximately $600,000 per year will need to be mobilized by the Government of DPR Korea to co finance introduction. GAVI co financing policy is currently under review, and it is expected that a reassessment of the co financing strategy will be made in DPR Korea after this policy review is finalized.

Objectives, Strategies and Actions Domestic Resource Mobilization

Domestic Resources	2011	2012	2013	2014	2015	Activity Details
Increase national government financial contribution to immunization services						
Targets						
To implement co financing policy for DPR Korea according to GAVI rules and procedures by 2012						
To establish a national immunization fund by 2012						
Strategies						
Establish National Immunization Fund		X				Establish a contingency fund (buffer fund/revolving fund) to support emergency funding for vaccines procurements in the event of stock out and disease outbreak
Strengthen domestic vaccine industry (see strategic area 4)	X	X	X	X	X	Develop capacity of a sustainable national vaccine industry, commencing with development of NRA and NITAG capacity (see strategic area 4)
To increase levels of national financing of vaccines through implementing vaccine co financing strategies with international partners.		X	X	X	X	The GAVI co financing policy is currently being reviewed. It is expected that this policy will be implemented in 2012 with pentavalent vaccine introduction and in 2013 with rotavirus vaccine

Objectives Strategies and Actions International Resource Mobilization

International Resources	2011	2012	2013	2014	2015	Activity Details
Increase external resources available for building the capacity of the national EPI program and introduction of new vaccines						
Targets						
Increase the level of international financing form 2.1$ in 2010 to 10.3M$ in 2015						
Strategies						
Application to GAVI for new vaccine introduction		X	X			Applications to GAVI are expected in the next plan period for pentavalent vaccine and rotavirus vaccines. It is expected that also additional resources can be mobilized through NGOs (as CARITAS with hepatitis B and PATH with JE vaccines)
Coordination with existing international investors in immunization (UNICEF, WHO, GAVI)	X	X	X	X	X	Conduct regular consultations with UN and other international partners for mobilization of resources for EPI.
Mobilization of health system strengthening resources for strengthening of the immunization system and health delivery system	X	X	X	X	X	As the key to sustaining immunization is through health system strengthening, the national program will avail itself of the opportunity to mobilize resources for the immunization and health system through GAVI HSS, the HSS platform and bilateral support where possible.

Strategic Area 4 Management and Integration

Goals and Targets

	Management and Integration	2011	2012	2013	2014	2015
Goal	To strengthen integrated systems of coordination and management of the national immunization program, including expanding the functions of regulatory and technical oversight authorities					
Targets	To develop integrated supervision, surveillance and planning guidelines by 2013					
	To establish a National Immunization Technical Advisory Group by 2012 to provide strategic guidance on EPI programming					
	To upgrade the level of function of the NRA/NCL by 2012 to meet the requirements for a vaccine producing country					
Objectives						
Institutional Development	*To strengthen institutional capacity for scientific assessment of vaccine introduction and response to adverse events*					
Integration	*To promote integration of immunization services with other health care services*					
Coordination	*To improve the coordination of immunization program with the health system in order to ensure maximum efficiency and effectiveness of resource utilization and mobilization*					

Situation Analysis Institutional Development

There are significant program and scientific developments that are planned to be implemented in the plan period 2011 to 2015. These include attainment or maintenance of disease elimination (measles and tetanus), developments in the vaccine industry (JE vaccine), development of surveillance systems and introduction of up to 4 new or underutilized vaccines. Given the scope of this plan, there will need to be investment in institutional strengthening of technical regulation and oversight of the development of the immunization program in DPR Korea.

Firstly, a capable National Regulatory Authority is required, that can develop expanded functions according to WHO recommendations.[36] The six functions of NRA include

1. Marketing Authorization and licensing activities
2. Post-marketing activities including surveillance of adverse events
3. NRA Lot release
4. Laboratory Access
5. Regulatory Inspections
6. Regulatory oversight of clinical trials.

This body, in collaboration with a National Control Laboratory, could be active in licensing of vaccines,

making assessments of vaccine quality and assisting with monitoring adverse events following immunization. An assessment was undertaken of NRA and NCL functions in 2009 by WHO. An Institutional Development Plan (IDP) has been suggested as an outcome of this assessment. A more detailed and costed plan of action should be drawn for development of the NRA and NCL based on the requirement of this IDP.

Countries with vaccines procured by the UN only require the first two functions for the NRA – licensing and surveillance. But as is the case with DPR Korea which plans to restore its vaccine production capacity, all six functions will be required.

In terms of the history of vaccine production in DPR Korea, a vaccine production unit was set up in 1946. As needs increased, and demand for vaccination was more than the capacity of these units, additional units were built. This resulted in the production of ten different vaccines including those against tuberculosis, poliomyelitis, tetanus, diphtheria, pertussis, measles and Japanese encephalitis. However, due to certain factors including natural disasters, vaccine production has been limited since 1995.[37] The new vaccine factory was built with technical assistance from WHO. WHO also funded the purchase of Air Handling System and Electrical Boiler for the facility. It became functional in 2010. The new vaccine factory has improved GMP standard for vaccine production. It is the present intention of the Government of DPR Korea to re develop this industry further, for which a well functioning NRA and NCL will be required (see resource mobilization strategic area for more discussion of this in relation to financial sustainability). The key policy makers (Head NRA, Head NCL and Head Vaccine Factory) visited India for a first hand experience in vaccine production and regulation. This visit was supported by WHO. The delegation visited Serum Institute of India, NCL of India and NRA of India.

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Objectives Strategies, and Actions Institutional Development

Institutional Development	2011	2012	2013	2014	2015	Activity Details
To strengthen institutional capacity for scientific assessment of vaccine introduction and response to adverse events						
Target						
To establish a national technical advisory group on immunization by 2012						
To expand the functional capacity of the NRA for vaccines by 2012						
Strategies						
To strengthen the functional capacity of the National Regulatory Authority for oversight and regulation of the national immunization program (in line with WHO standards on the main functions of the NRA)	X	X				(1) Conduct a review of NRA function in DPR Korea (2) To develop recommendations on expanding functions of the NRA (3) To develop a capacity building program to strengthen the functions of the NRA
To reestablish the function of the National Control Laboratory	X	X	X	X	X	(1) A detailed needs assessment and redevelopment plan will be required for strengthening of the National Control Laboratory prior to detailed activity planning and costing

To develop terms of reference and establish National Immunization Technical Advisory Group (NITAG) to provide oversight of decision making on new vaccine introduction, AEFI response and ongoing efforts for disease elimination and eradication		X	X	X	X	This activity is line with regional initiatives to strengthen national institutional capacity for scientific oversight of vaccine decision making, surveillance, and response to adverse events. Activities could include feasibility assessment, study tours and national meetings on vaccines and immunization practice

Situation Analysis Integrated Planning, Surveillance and Supervision

Planning: The need has been identified in this plan development or strengthening of micro-planning processes especially from the County level. The health system strengthening proposal (GAVI) has commenced implementation in DPR Korea and to date has concentrated on strengthening of cold chain infrastructure, scale up of the IMCI strategy and the development of a Medium Term Plan for the health sector in DPR Korea (2010 – 2015). It is proposed that in coming years, support through HSS will be provided to develop guidelines and capacity for integrated health micro-planning at County level and below. The opportunity provided by HSS will be applied to strengthen the planning of EPI and related MCH health services. According to the DPR Korea HSS Plan, there is $518,000 available for surveillance systems development, and $945,000 available for management capacity building programs (planning, supervision and surveillance) over a three year period.[38] The strengthening of health sector planning processes will also provide the opportunity for closely linking developments in EPI planning and resource mobilization to similar developments in other areas of CDC and MCH strategic areas of the health sector plan.

Health planning is closely related to the development of health information, monitoring and reporting and surveillance systems. This being the case, planning guidelines developed through HSS will link closely to developments in these areas. Capacity for health planning will be developed through programs of middle level management training (MLM) and immunization in practice training.

Surveillance: A review of the immunization surveillance conducted by WHO in 2008 developed recommendations for surveillance which are included in the figure below.

Figure 13 Recommendations for Strengthening of Surveillance Systems in DPR Korea [39]

- Strengthen integrated surveillance of communicable diseases
- Case based surveillance needs to be commenced with clear case definitions
- Line lists for VPDs and other communicable diseases need to be maintained
- Data should be consolidated and analyzed at various levels of the system so that national line lists can be produced of VPDs
- There needs to be a standard set of diseases which are under surveillance at all times. Guidelines need to be created for Integrated (including VPD) Disease Surveillance.
- Strengthen the Laboratory network for IDS
- Forms for data collection need to be standardized at all levels. A simple effective way of transmitting case based data in addition to the routine reporting over telephone needs to be developed with available resources
- Training on surveillance standards and data analysis that is both generic and disease specific needs to be done. Interpretation and response mechanism needs to be instituted at all levels. General morbidly should also be analyzed and documented
- Feedback to the reporting source and supervisory visits to the county and lower levels needs to be done periodically and documented
- Standard surveillance manuals should be made available at all levels. WHO to share recent manuals with the

The development of surveillance capacity is a major of focus of this plan, especially given the intention to proceed with validation of elimination of tetanus and measles, and commencement of surveillance for acute encephalitis syndrome (AES), pneumonia and diarrhea (see strategic area 2). Areas for implementation in this plan will include scaling up of integrated disease surveillance system, implementation of training programs (MLM and practice) on surveillance, dissemination of guidelines (including case definitions),

ensuring adequate case report and information forms are available across the country (see figure for specific recommendations for action in the next plan).

Supervision: A current supervision system operates in DPR Korea based on systems of regular field visits and monthly meetings at the County level. There are checklists for supporting these visits. Consultations undertaken for the development of supervision systems highlight needs for development of guidelines and training programs (MLM) to improve the quality of supervision. As EPI is integrated within Ri health services and within CDC through the system of HAE institutes, it is recommended that guidelines for supervision, as is the case with planning and surveillance, should adopt an integrated approach in order to prevent fragmentation of management and delivery systems. In this plan, integrated supportive supervision guidelines will be developed and reinforced through programs of MLM training.

Objectives, Strategies and Actions Integrated Planning, Surveillance and Supervision

Integrated Management (HSS)	2011	2012	2013	2014	2015	**Activity Details**
To promote integration of immunization services with other health care services						
Targets						
Extension of the integrated surveillance system from 2 Provinces counties in 2011 to 10 Provinces in 2015						
To develop integrated planning and supervision guidelines for CDC and MCH by 2013						
Strategies						
Strengthening of integrated surveillance systems		X	X	X	X	The model of integrated surveillance is currently being developed through WHO in 2 provinces, and is expected to be scaled up to all provinces by 2015. Activities will focus on capacity building and supportive supervision, and improved monitoring and reporting (see also strategic area 2 on disease control and strategic area 1 routine immunization (MLM and IIP training)
Capacity building supported for integrated micro-planning at county level		X	X	X	X	This initiative is proposed through GAVI HSS to strengthen planning and management capacity at County level below. Activities will include guideline development on integrated micro-planning and management training
Strengthening of programs of integrated supportive supervision		X	X	X	X	This strategy is discussed also in strategic area 1 (supportive supervision). Supervision is essential for surveillance and vaccine management in particular. Activities will be focussed on development of integrated supportive supervision guidelines and checklists and reinforcement of guidelines through middle level management training. Activities through program reviews at Provincial and National level will also assist to develop a national monitoring and evaluation strategy for immunization (that includes supportive supervision and improved data monitoring)

Situation Analysis Coordination

The main mechanism for coordination for national and international resources for immunization is the ICC. The stated main functions of the ICC are to provide policy advice, act as an advisory board to the Government on matters related to EPI including, establish a forum for exchange of information and dialogue on global and national EPI status and support coordination of elimination activities in the country and mobilization and coordination of resources for implementation. It is expected that the NITAG will take up these policy advisory functions in coming years, with the ICC retaining core functions of resource mobilization and technical coordination for immunization. The Medium Term Plan for the Development of Health Sector in DPR Korea proposed the development of a Health Sector Forum in order to coordinate more broadly across the sector national and international resources for health.

Both of these mechanisms will be utilized in the next plan period to support coordination of resource mobilization and implementation, including oversight of GAVI and WHO reporting (annual progress reports and joint report forms)

Objectives, Strategies and Actions Coordination

Coordination mechanisms	2011	2012	2013	2014	2015	Activity Details
To improve the coordination of immunization program with the health system in order to ensure maximum efficiency and effectiveness of resource utilization and mobilization						
Targets						
ICC meetings are conducted 3 times per year						
Immunization issues are presented at health sector forum at least once a year						
Strategies						
Immunization Coordination Committee Meetings	X	X	X	X	X	Meetings are conducted at least 4 times a year, and include representations of MoPH, international organizations and other organizations supporting immunization.
Health Sector Forum	X	X	X	X	X	Annually, immunization issues are presented at a wider health sector forum so that government and development partners can identify program strengths and gaps in service delivery. The cMYP will also be closely linked to the multi year plan for the development of the health sector in DPR Korea (MTSP)
GAVI Processes	X	X	X	X	X	Annual Progress Reports are submitted to GAVI in timely manner with full participation of MOPH and development partners in oversight of GAVI financed programs.
WHO and International Health regulation processes						As part of DPR Korea's international obligations to international health regulations, the JRF information will be compiled each year and presented in a timely manner including submission of all notifiable communicable disease reports

Strategic Area 5 Vaccine Management and Cold Chain Systems

Goals and Targets Vaccine Management and Cold Chain

Strategic Area	Cold Chain Systems &Vaccine Management	2011	2012	2013	2014	2015
Goal	To ensure the quality and efficacy of vaccines by building the capacity of cold chain and vaccine management infrastructure and function					
Targets	Extension of refrigerated cold chain system to at least 25% of Ri by 2015					
	By 2015, in 100% of Province and County, there are upgraded skills training conducted for all Cold Chain Technician and vaccine managers in the medical warehouse system using updated standard operating procedures and guidelines.					
Objectives						
Management of Equipment and infrastructure	*To maintain an annual upgraded inventory of cold chain according to the levels of the network, allowing for new equipment, substitution, replacement, spare parts, fuel and others*					
Cold Chain Monitoring	*To ensure high-quality functioning of cold chain system and proper vaccine handling at all levels*					
Cold Chain and vaccine management Training	*By 2015, in 100% of Province and County, there are upgraded skills training conducted for all Cold Chain Technician and vaccine managers in the medical warehouse system.*					

Situation Analysis Vaccine Management and Cold Chain

The cold chain consists of walk in Freezer and walk in cooler at national level. Provincial level has walk in cold rooms with 10m3 storage space, which has capacity to store 3 months worth of vaccine stock. County level is provided with small size ice-lined refrigerators and deep freezers, which has capacity to store one month doses of their counties. Vaccine carriers were supplied to the Ri level. Vaccines are collected each month at the County and are transported in vaccine carriers for administration of vaccines on set immunization days in each Ri catchment area. For the outreach sessions, health workers carry the vaccines in the vaccine carriers with 4 ice packs.

In the last plan period, there were significant developments in the cold chain system. A national inventory of the cold chain was conducted which included a country wide survey of existing equipment.[40] The major

findings of the survey were as follows:

- much of the existing cold chain equipment is already old and likely to need upgrading and replacement in the very near future
- a significant amount is currently out of order and has been awaiting repair for long periods.
- limited numbers of motorised vehicles for vaccine distribution
- 40% found to be out of order, although most were only manufactured or supplied in 2006 or 2007
- less than 14% of all refrigerators and freezers had a thermometer
- totally inadequate numbers of voltage stabilizers and standby electric power generators being available for protecting the national cold chain.

A plan was proposed for implementation in three parts. The first part of the plan covering refrigerators recommends the replacement of much of the existing cold chain, the removal of all outdated and redundant items, expansion in the use of solar-powered equipment, and provision of walk-in cold rooms in place of current refrigerators for vaccine storage in the 8 largest provinces of the country. As of 2010, this part of the plan has largely been completed, with the walk in store rooms being installed in the 8 provinces. At central level, there is concern expressed regarding central level storage space, should both rotavirus and PCV vaccines be introduced in the new plan period.

In part 2 of the plan, new means of transport are recommended for vaccine distribution at both the county/city level and for the province level, with a 'motor-tricycle' favoured by the Ministry of Public Health proposed on a trial basis for county and city level, and a 4 wheel-drive pick-up vehicle with diesel-engine and a hard-covered luggage compartment proposed for the province level. This part of the plan has yet to be implemented. In part 3 of the plan, new types of temperature monitoring equipment are proposed in line with current recommendations from WHO, with greatly increased numbers of voltage stabilizers and standby electric power generators to ensure protection of the newly provided equipment and the national vaccine supplies. This part of the plan has yet to be implemented.

Additionally, recommendations are made in the cold chain review for establishing a central equipment maintenance function, with details given of physical facilities needed, the provision of tools, equipment and materials, an initial stock of essential spare parts, transport facilities and the proposed staff refresher training and upgrading.Other cold chain needs were established during consultations for development of this plan. As the current immunization schedule recommends, BCG and hepatitis B (1st dose) should be administered within 24 hours of birth. However, with the current vaccine management system, immunizations are normally given at the Ri level once per month on specific immunization days. In more inaccessible Ris where there are high rates of home delivery, there are therefore fewer opportunities for reaching infants with this vaccine within 24 hours. Managers are therefore recommending that these less accessible Ris have refrigerated cold chain systems installed in the next plan period.

As the Provincial and County levels of the cold chain system have recently been rehabilitated, more investment will be required in supervision and monitoring systems (including maintenance) from both central and provincial levels to ensure the effective functioning of the new system.

In 2007, responsibility for management of cold cahin systems shifted from the HAEI systems to the medical warhoues system managed through the Ministry of Public Health. This being the case, more emphasis will now need to be placed on devceloping capacity of the medical warhouse staff at central, provincial and county level to provide technical oversight for the cold chain and vaccine management system.

The vaccine request system is based on a centralised "push" system for vaccine supply. However, vaccine supply is based on the identification of target populations at the local level. These populations are estimated on an annual basis by the county and provided to the central level who then calculates the vaccine supply based on this assessment. Procurement of vaccines for routine immunization is undertaken centrally through UNICEF and GAVI support. Feedback with regard to the vaccine utilization and supply is sometimes not accurate, complete and timely, resulting in overstocking or undersupply sometimes at County and provincial levels. There is also a need for strengthening planning and logistics of vaccine distribution at the provincial and county level with efficient feedback mechanisms on utilization and future demand.

Objectives, Strategies, and Actions Vaccine Management and Cold Chain

Infrastructure

Equipment Management	2011	2012	2013	2014	2015	Activity Details
To maintain an annual upgraded inventory of cold chain according to the levels of the network, allowing for new equipment, substitution, replacement, spare parts, fuel and others						
Targets						
Maintaining 100% refrigerated cold chain facility of county and province						
40 % Ri have refrigerated cold chain facility by 2015						
Strategies						
Expand Central Medical Warehouse Storage Capacity		X	X			2 additional 30/40cm3 new walk in cold room at central level are requited in the coming plan to accommodate influenza vaccine and rotavirus vaccine. There is adequate storage space at other levels of the system.. A replacement plan and strategy will be implemented for all parts of the cold chain system
Strengthening of central equipment maintenance and supervision function	X	X	X	X	X	Provincial cold chain officers and technicians. Mobility needs to be improved. Pick up not enough - to ensure mobility, suggested - need transportation for field visit. For general surveillance for follow up.
Conducting WHO/UNICEF Effective Vaccine Management assessment		X	X	X		Conduct detailed vaccine management assessment in 2011 in order to plan in detail the extension of the refrigerated system Ri level (350 per year). The plan should detail the distribution of the system according to set criteria including population density and remote areas. This would also include EVM at national and provincial levels 2011 0 2013
Maintain the inventory of cold chain and transport systems						2 x15 cubic meters for refrigerated vehicles for CMW. The current truck does not have refrigeration (using cold boxes only) - current WHO vehicles are over 10 years old. Update inventory plan on cold chain and transport systems every year
Extension of refrigeration cold chain system to high priority Ri (or at Ri Hospitals)	X	X	X			Procurement of refrigeration systems to 25% of Ri by 2015

Equipment Management	2011	2012	2013	2014	2015	Activity Details
Strengthening cold chain supervision and monitoring systems (including maintenance) and provision of spare parts						Stable electricity 2 generators with capacity of 50 KWs - (diesel costs covered by Government)
						Provision of repair tool kits for each province and county for maintenance (and spare parts) with support of DPs on a needs basis.
Increase the mobility of vaccine managers and cold chain technicians in the medical warehouse system to enable the supervision, monitoring and maintenance system to operate effectively.	X	X	X	X	X	2 vehicles for central level and 1 for each province for M & E and surveillance. 1 additional refrigerated vehicle is required for or CMW
		X	X			8 10cms refrigerated vehicles to provincial level to at least 100% of provinces by 2015. The provinces are currently are using pick ups
		X				Stable electricity 2 generators with capacity of 50 KWs - diesel pay by govt.

Cold Chain and Vaccine Management Monitoring and Supervision

Monitoring and Supervision of Cold Chain System	2011	2012	2013	2014	2015	Activity Details
To ensure high-quality functioning of cold chain system and proper vaccine handling at all levels						
Targets						
100% of existing cold chain system is functioning at all levels at any point in time so as to ensure assured quality and potency of vaccines						
Strategies						
Development of Guidelines for supervision by medical warehouse staff at Provincial and County level for supervision and monitoring of cold chain system and vaccine management						See below
Development/upgrading of standard operating procedures for vaccine managers at Provincial and County Level						Standard operating guidelines/procedures need to be updated for managers at the medical warehouses for central, provincial and county level. These procures and guidelines (cold chain maintenance and vaccine management) should then be reinforced through MLM and practice training and supportive supervision
Establishment of an Information system for vaccine management and cold chain maintenance based on a computerized system						The information system of vaccine request and supply and monitoring wastage needs to be upgraded. As well as including in SOPs, the information system should be gradually computerized
Improving the mobility of the technicians and vaccine managers to supervise and monitor						Improved transport capital (cars centrally and province and motorcycles at county) will need to be procured to ensure the mobility of supervisors and of maintenance technicians.

Cold Chain and Vaccine Management Training

Training	2011	2012	2013	2014	2015	Activity Details
By 2015, in 100% of Province and County, there are upgraded skills training conducted for all Cold Chain Technician and vaccine managers in the medical warehouse system.						
Target						
By 2012, training modules (MLM, IIP) are upgraded with a focus on vaccine management and cold chain systems						
By 2012, there are upgraded guidelines and monitoring tools for cold chain technicians and vaccine managers.						
Strategies						
MLM Training	X	X	X	X	X	Before 2007, vaccine management was part of AES system, and after that it transferred to the medical warehouse system. The AES system coordinates vaccine requests and information, but MW system ensures supply and technically supervises the cold chain system. So with the change in the system of management in 2007, it is necessary to upgrade the technical competence of MW staff in cold chain systems and vaccine management. There are also inadequate tools for monitoring storage, supply and use of vaccines. \This being the case, more resources should be invested in training of staff, monitoring and supervision. Reference materials and guidelines need to be upgraded for vaccine managers.
Cold Chain Technicians Training	X	X	X	X	X	In addition to MLM training, specific technical training and updates will need to be provided for central level and provincial level cold chain technicians, particularly as much of the cold chain infrastructure is very new, and that there are also plans to extend the cold chain system to 25% of Ri.
Production of reference materials for vaccine managers		X				Standard operating procedure manuals need to be developed/updated and disseminated to all cold chain technicians and vaccine managers, particularly in relation to supervision and monitoring of the system.

Annex 1 Program Costs 2010 - 2015

	Costs	Future Cost Projections					
COSTS	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Total 2011 - 2015**
	US$	**US$**	**US$**	**US$**	**US$**	**US$**	**US$**
Vaccines (routine vaccines only)	$3,101,213	$1,593,069	$6,276,787	$13,406,580	$11,882,480	$11,946,645	$45,105,560
Traditional	$572,952	$602,618	$608,418	$472,844	$503,042	$505,759	$2,692,682
Underused	$2,528,261	$990,451	$5,668,368	$5,610,626	$5,481,405	$5,511,005	$23,261,854
New	$0	$0	$0	$7,323,110	$5,898,032	$5,929,882	$19,151,024
Injection supplies	$361,530	$332,324	$354,229	$347,466	$341,959	$343,805	$1,719,783
Personnel	$1,142,794	$1,701,167	$1,735,190	$1,769,894	$1,805,292	$1,841,398	$8,852,940
Salaries (EPI specific)	$789,871	$1,169,072	$1,192,453	$1,216,302	$1,240,628	$1,265,441	$6,083,897
Per-diems for outreach vaccinators	$0	$0	$0	$0	$0	$0	$0
Per-diems for supervision and monitoring	$352,923	$532,095	$542,737	$553,591	$564,663	$575,956	$2,769,043
Transportation	$26,715	$171,510	$207,950	$233,193	$237,226	$211,844	$1,061,724
Fix site strategy (incl. vaccine distribution)	$14,842	$95,283	$115,528	$129,552	$131,792	$117,691	$589,846
Outreach strategy	$8,905	$57,170	$69,317	$77,731	$79,075	$70,615	$353,908
Mobile strategy	$2,968	$19,057	$23,106	$25,910	$26,358	$23,538	$117,969
Maintenance and overhead	$76,112	$124,580	$177,765	$230,162	$284,584	$321,494	$1,138,585
Cold chain maintenance and overheads	$76,112	$124,580	$177,765	$230,162	$284,584	$321,494	$1,138,585
Maintenance of other capital equipment	$0	$0	$0	$0	$0	$0	$0
Building overheads (electricity, water…)	$0	$0	$0	$0	$0	$0	$0
Short-term training	$0	$105,101	$185,233	$162,407	$111,534	$113,764	$678,039
IEC/social mobilization	$0	$0	$43,697	$44,571	$0	$0	$88,268
Disease surveillance	$1,189,500	$2,018,070	$1,990,805	$1,966,949	$2,006,288	$2,046,414	$10,028,526
Programme management	$270,000	$362,100	$310,039	$348,076	$300,916	$306,934	$1,628,066
Other routine recurrent costs	$0	$0	$0	$0	$0	$0	$0
Subtotal Routine	**$6,167,864**	**$6,407,921**	**$11,281,695**	**$18,509,298**	**$16,970,279**	**$17,132,299**	**$70,301,490**
							$0
Vehicles	$76,000	$251,818	$377,540	$482,892	$492,550	$418,491	$2,023,291
Cold chain equipment	$84,943	$114,060	$142,217	$160,479	$181,765	$156,182	$754,703
Other capital equipment	$0	$0	$0	$0	$0	$0	$0
Subtotal Capital	**$160,943**	**$365,877**	**$519,757**	**$643,371**	**$674,315**	**$574,673**	**$2,777,994**
							$0
Measles SIA 10% Under 5 Contingency Fund	$0	$234,715	$0	$0	$0	$0	$234,715
Vaccines and Injection Supplies	$0	$57,496	$0	$0	$0	$0	$57,496
Operational costs	$0	$177,219	$0	$0	$0	$0	$177,219
Tetanus High Risk Area SIA 10 % CBAW	$0	$788,948	$0	$0	$0	$0	$788,948
Vaccines and Injection Supplies	$0	$199,604	$0	$0	$0	$0	$199,604
Operational costs	$0	$589,344	$0	$0	$0	$0	$589,344
Subtotal Campaigns	**$0**	**$1,023,664**	**$0**	**$0**	**$0**	**$0**	**$1,023,664**
							$0
Shared personnel costs	$4,699,026	$5,777,228	$5,892,772	$6,010,628	$6,130,840	$6,253,457	$30,064,925
Shared transportation costs	$0	$0	$0	$0	$0	$0	$0
Construction of new buildings	$0	$0	$0	$0	$0	$0	$0
Subtotal System Costs (Shared)	**$4,699,026**	**$5,777,228**	**$5,892,772**	**$6,010,628**	**$6,130,840**	**$6,253,457**	**$30,064,925**
	$11,027,833	**$13,574,689**	**$17,694,224**	**$25,163,297**	**$23,775,434**	**$23,960,429**	**$104,168,074**
Routine Immunization	**$11,027,833**	**$12,551,025**	**$17,694,224**	**$25,163,297**	**$23,775,434**	**$23,960,429**	**$103,144,410**
Supplemental Immunization Activities	**$0**	**$1,023,664**	**$0**	**$0**	**$0**	**$0**	**$1,023,664**

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