Government of People's Republic of Bangladesh

Comprehensive Multi-Year Plan

of the National Immunization Program of Bangladesh 2011 – 2016

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May 2011

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Acronyms

AEFI	Adverse Events Following Immunization
BCG	Bacillus Calmette-Guerin (tuberculosis vaccine)
BDT	Bangladesh Taka (national currency unit)
BMMS	Bangladesh Maternal Mortality Survey
CAO	Chief Accounts Officer
C&AG	Comptroller and Auditor General
CGA	Comptroller General of Accounts
CMMU	Construction Management and Maintenance Unit
CPTU	Central Procurement Technical Unit
CRS	Congenital Rubella Syndrome
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DPs	Development Partners
DPT or DTP	Diphtheria-Tetanus-Pertussis vaccine
DQA	Data Quality Audit
DT	Diphtheria-Tetanus toxoids
DTaP	Diphtheria-Tetanus-acellular Pertussis vaccine
EPI	Expanded Programme on Immunization
ESP	Essential Service Package
EVSM	Effective Vaccine Store Management
FAPAD	Foreign Aided Project Department
FSP	Financial Sustainability Plan
FVC	Full Vaccination Coverage
FWC	Family Welfare Centre
GAVI	Global Alliance for Vaccines and Immunization
GoB	The Government of Bangladesh
HCP	Health care providers
HepB	Hepatitis B vaccine
HFWC	Health and Family Welfare Centre
Hib	Haemophilus Influenza type b (disease or vaccine)
HLC	High Level Committee (Multi-Sectoral)
HMIS	Healthcare Management Information System
HNP	Health, Nutrition and Population
HNPSP	Health, Nutrition and Population Sector Programme
ICC	Inter-Agency Coordinating Committee
IMED	Implementation Monitoring and Evaluation Division (of the Ministry of Planning)
LLP	Local Level Planning
MDVP	Multi-Dose Vial Policy
MICS	Multiple Indicator Cluster Survey
MMR	Measles, Mumps and Rubella vaccine
MOHFW	Ministry of Health and Family Welfare
MTBF	Medium Term Budgeting Framework
MTEF	Medium Term Expenditure Framework
NCIP	National Committee on Immunization Practice
NID	National Immunization Day(s)
NIP	National Immunization Programme
OPV	Oral Polio Vaccine
PHC	Primary health care
PPC	Programme Preparation Cell
PSO	Programme Support Office
PWD	Public Works Department

SIA	Supplementary Immunization Activity
SWAP	Sector-Wide Approach
TC	Technical Committee
Td	Tetanus and Diphtheria Toxoid for adults
UHS	Upazila Health System
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VPD	Vaccine Preventable Disease
VVM	Vaccine Vial Monitor
WB	World Bank
WHO	World Health Organization

Executive Summary

Immunization has been one of Bangladesh's greatest public health success stories. It has prevented an estimated 2 million deaths from 1987-2000, and continues to prevent approximately 200,000 deaths each year. However, in order to ensure that all children of Bangladesh benefit equitably from this intervention, a strategic, i.e., long-term approach to planning and implementation is essential.

This comprehensive Multi Year Plan (cMYP) provides a framework to plan activities to achieve important objectives of the national immunization program, as contained in the national health policy. This plan sets out the medium-term (2011-2016) strategic goals of the immunization program, the related objectives, indicators, milestones, key activities and the associated costing and funding plan.

Bangladesh cMYP for the immunization program is based on the Global Immunization Vision and Strategy (GIVS) - ratified by the World Health Assembly in May 2005. The approach involved three-steps: (a) identifying the key issues, (b) developing the plan, and (c) articulating the implementation, monitoring and evaluation approaches.

Key findings of situational analysis

An extensive situation analyses showed that the country has made significant progress in some key socio-demographic indices. The infant mortality rate, for example, has declined from 97.5 per 1000 live birth in 1991 to 52.0 per 1000 in 2007. However, about 27% of the people live in urban areas (in 2006, the urban population was about 34.6 million) and the number of slum dwellers in urban areas has also increased from 7 million in 1985 to 12 million in 1999, and this poses special challenges for immunization services. Analyses of the significant barriers and enablers of an effective immunization program in Bangladesh are summarized in the table below.

	Key Barriers	Key Enablers
Immunization program –Specific Issues	**Access to immunization and other health services**	
	• Sustaining outreach supervisory visits due to inadequate staff, logistics and funds • Vacant posts, especially at lower levels • Unavailability of proper primary health care delivery system (infrastructure) at city corporation level. • Pockets not covered by Upazila Health Complexes or remote wards within administrative borders of Upazila with inefficient logistical support	• Availability of wide network of Community Clinics and Outreach Sites to support immunization services in rural areas • Strong linkage with communities • Motivated and committed staff at service delivery level • Availability of review meetings at all levels • Availability of regular supportive supervision mechanism from higher levels • Availability of trained manpower, many

Key Barriers	Key Enablers
	of whom have had MLM training • GAVI ISS funds for staff recruitment at lower levels
Immunization Coverage and Performance	
• Complete immunization coverage among under one year, at national level is 75% • Low TT5 coverage (53%)among child bearing age women • 163/64(20%) districts having less than 80% coverage for DPT3 and 11/64 (17%)for Measles • High staff turnover in some districts • Non availability or underutilization of the following vaccines in the National EPI schedule which are proven to be capable to reduce the current childhood morbidity and mortality in Bangladesh: Pneumococcal, Rotavirus, Rubella, Measles-2, dT, Hepatitis-B birth dose.	• Implementation of TT-5 dose schedule • 39/64 districts high-performing districts • Consistent national BCG coverage more than 95% • Improving OPV3 coverage (96% in 2009) • Possibility to finance introduction of new antigens via GAVI and commitment of the GoB to co-finance new vaccines
EPI Logistics	
• Lack of training for technical EPI staff at all levels. • Inadequate cold chain storage capacity for new vaccines at all the levels	• Availability of computerized logistics management system • Trained logistics staff in most districts • Logistics reporting, requisition, and distribution mechanism in place
Injection Safety	
• Non availability of safe and environmental friendly waste disposal system for disposal of EPI	• Use of AD syringes for all vaccination • Local production of AD syringes

	Key Barriers	Key Enablers
	waste	• AEFI surveillance system in place
	Accelerated Disease Control • Possibility of Polio importation from neighbouring countries • Need to put extra effort to maintain MNT elimination status due to high percentage of home deliveries (80%) • Still Significant measles morbidity and mortality prevailing in the county	• High quality and high coverage SIAs • Good routine coverage • Strong active EPI surveillance system with high consistently quality indicators
	Financing • Funding gap likely, with the end of GAVI Phase II support • Resource requirements especially for new vaccines introduction	• GoB support for immunization through the HNPSP • Opportunities for EPI funding through GAVI Phase II and HSS facilities as well as other donor facilities
Sectoral / Other External Issues	• Lack of focal person from Government side for active VPD disease surveillance at District, Upazila and City Corporation levels • Relatively high vaccine wastage • Poor coverage of AEFI surveillance	• Strong government commitment to immunization and child health • Availability of Global and national goals and initiatives that relate to immunization • Improving communication networks and internet facilities that may facilitate better information transmission and communication between all levels • Increasing macro-economic status of Bangladesh

Developing the Plan

The major elements of this multi-year plan are the mission, goals, strategic objectives, key activities, and the costing / financing plan. These were developed based on the situation analyses, including the global goals and national priorities.

The mission of the immunization program during the period 20011 – 2016 is as follows:

To reduce the burden of vaccine preventable diseases through high-quality immunization services and SIAs, using currently available vaccines & new and underused vaccines, in such a way so that the overall health system could be strengthened.

The principles that would guide the efforts to accomplish this mission are *Quality and safety* – to *ensure* immunization services based on best practices; *Maximal coverage and reach - t*o overcome access barriers at all levels; *Equity and gender equality - t*o give priority to the underserved and hard-to-reach and high risk groups; *Sustainability through technical and financial capacity building and Excellence in Program Management – to ensure effective* use of resources following result-based principles and evidence-based practices.

National Objectives, Strategies and Key Activities 2011-2016

During the six-year period, 2011 – 2016, the major strategic objectives and strategies are as follows:

Objective 1. Improve immunization coverage among children under one and child bearing age women, namely

1) At least 90% fully immunization coverage among under one children at national level and 85% full immunization coverage at district level.

2) TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.

In view of reaching this objective (with 2 sub-objectives), further improvement and expansion of the EPI during the coming years is mandatory. This may include setting new feasible targets, researching new techniques and exploring the means to be more effective, equitable and efficient service delivery at all levels.

Failure to reach expected immunization coverage targets in Bangladesh EPI are related to a number of programmatic factors, such as often limited capacity of the especially vaccinators at the rural settings, non-availability of proper primary health care delivery system (infrastructure) at urban settings, lack of social mobilization, lack of supportive supervision, lack of mechanism to address immunization needs of slum areas (where rapid population migration regularly taking place) & difficult to reach areas in the in rural settings .

To address the above mention programmatic factors, following broad Strategies are incorporated into the cMYP

- Implement RED strategy in every district, giving special emphasis to the low coverage areas
- Establishment of proper primary health care delivery system at city cooperation level
- Incorporate regular supportive supervision at each level
- Strengthen coordination with development partners and local NGOs/CBOs
- Strengthening of coverage and VPD surveillance system in all districts
- Ensure sufficient, timely and potent vaccines and quality injection devices available at all level with no stock out
- Periodical review of the National EPI program performance at each level and take timely and appropriate measures accordingly.

- Develop & implement staff recruitment plan with budget.

Objective 2. Maintain polio free status

By effectively implementing Acute Flaccid Paralysis (AFP) Surveillance, conducting supplementary OPV vaccination (NIDs/SNIDSs), mop-up OPV campaigns, and maintaining high routine OPV coverage Bangladesh managed to maintain the polio free status since 2006. In the presence of on-going polio outbreaks in neighbouring India and presence of few districts with relatively low OPV coverage, Bangladesh need to put extra effort to intensify the above strategies in coming years to maintain the polio free status in the country.

Objective 3. Maintain maternal and neonatal tetanus elimination status

Achieved elimination status of MNT in Bangladesh (2008) is a major public health success, but significant challenge remains to maintain this status especially due to the fact that 80% of deliveries still taking place outside the institutions. Other than that TT complete coverage (TT5) among child bearing age females remain around 53%. In view of maintaining this MNNT elimination status, following broad Strategies are incorporated into the cMYP

- Maintain high coverage of TT5 among childbearing age women
- Maintain high TT protection at birth
- Intensify current NT surveillance
- Introduce Td among school age children

Objective 4. Achieve national level 95% measles coverage and reaching measles elimination status by 2016

In 2009, EPI programme has managed to reach national level measles-1 coverage among infants over 90%, still 11 out of 64 (17%) districts reported measles coverage less than 80%.

Over the last few years Bangladesh EPI programme managed to control the morbidity and mortality associated with measles up to a significant level by maintaining high coverage of measles-1 among infants, immunizing 35 million children from age 9 months to 10 years during the measles catch up programme in 2006 and immunizing all children aged nine months to sixty months during measles follow-up campaign in year 2010. To achieve the measles elimination status by 2016, Bangladesh EPI programme need to intensify the measles control activities in coming years. For that, following broad Strategies are incorporated into the cMYP

- Maintain high MCV1 coverage among infants with special emphasis to the low coverage districts
- Intensity measles surveillance
- Introduction of Measles 2nd dose to the EPI schedule

Objective 5. Prevention of diseases protected by new and underused vaccines

Bangladesh Government and EPI programme is planning to introduce Pneumococcal vaccine, Rota vaccine, Birth dose of hepatitis B vaccine, second dose of measles vaccine and Td vaccine in to the national EPI programme in coming years with GAVI support. To achieve this objective following broad Strategies are incorporated into the cMYP

- Strengthen coordination with development partners, local NGOs/CBOs, institutions
- Establishment of surveillance system for diseases covered by new antigens.
- Introduction of new vaccines according to the planned timeline
- Ensure the future financial sustainability

Objective 6. Ensure safe injection practices and waste disposal

For the last few years Bangladesh EPI programme exclusively use AD syringes for all EPI vaccinations. When we consider the number of antigens administered, reported number of AEFI seems to be far less than the expected. Though under HPSP and later HNPSP, government of Bangladesh identified medical waste management as a priority area, still there is no proper EPI waste management mechanism in place. Majority of the Upazila use pit burning method to dispose medical wastes. To address this important area in future, following broad Strategies are incorporated into the cMYP.

- AEFI surveillance system strengthened
- Implementation on national plan on sharp and waste management for EPI waste
- Strengthen AEFI surveillance system
- Ensure injection safety

Resource requirements and financial sustainability

Total resource requirements of the NIP is estimated as 1,358.4 million US$ in 2012-2016. Almost the half of this amount will be spent on vaccines (649 million US$) and injections supplies (114.9 Million US$) for routine immunization. Resource requirements for Supplementary Immunization Activities are estimated as 54 million US$ for the same period.

The NIP is primarily funded by the Government from the state budget and Pooled Funds (31% and 38% of the total financing of routine immunization correspondingly). GAVI's contribution is estimated at the level of 25% of the total financing of routine immunization (in case new vaccine support is provided for Measles 2nd dose, PCV and Rota).

The funding gap with secure and probable funds is approximately 4% of the total resource requirements in 2012-2016. There is no funding gap related to vaccine and injection supplies.

The NIP cost per DTP3 child increases from $36.3 in 2009 to $82.6 in 2016. At the same time, resource requirements for routine immunization as percentage of Total Health Expenditures decrease from 4.9% in 2009 to 2.8% in 2016. It does not exceed 12% of the Government's total health expenditures and constituted less than 0.3% of GDP for the projected period.

Therefore, the financial sustainability interventions would be focused to ensure mobilization of adequate resources for programmatic activities and necessary upgrade of logistical infrastructure. The microeconomic outlook shows that there are enough reserves in the country to ensure financial sustainability provided that support from EPI partners continues.

Section I. Situational Analysis

This section examines the current status, performance challenges and gaps that formed the basis for the strategies and key activities contained in this plan. It outlines the socio-demographic and health sector contexts, and the status of the immunization program components and the immunization program initiatives.

A. Country profile

A.1 Basic facts

Bangladesh is located in South Asia, bordered by Bay of Bengal, Myanmar and India. It is located within Geographic coordinates: 24 00 N, 90 00 E. Most of Bangladesh lies within the broad delta formed by the Ganges and Brahmaputra rivers and is exceedingly flat, low-lying, and subject to annual flooding that often hampers access to affected communities and immunization service delivery.

GDP per capita (in current US$) amounted to 580 in 2009 as a result of 5.7-6.6% annual growth in last 4 years (World Bank). Annual inflation (consumer prices) declined to 5.4 in 2009% after reaching 8.9-9.1% level in 2007-2008. GNI per capita was 590 US$ in 2009 (World Bank).

A.2 Socio-demographic status

Bangladesh is one of the most densely populated countries in the world, with a surface area of 147,570 sq. km and the population is 146.19 million as of 2009. The country is home to about 3.6 million children under 1yr (i.e., 2.5% of population), to 18.9 million, under 5 year age (12.9% of total population) and to 36.2 million women of child bearing age (24.7% of total population).

Figure 1: Core demographic indicators (used for projections)

Indicator	Year	Value	Source
Population size	2009	146,191,325	WHO Annual EPI Reporting Form 2009. Primary source: Estimates based on 2001 census
Crude Birth rate	2007	26.1 per 1000 population	WHO Annual EPI Reporting Form 2009. Primary source: BDHS-2007
Infant Mortality Rate	2007	52 per 1000 live births	BDHS-2007
Maternal Mortality Rate	2008	3.48 per 1000 live births	SVRS-2008
Under five mortality rate	2007	65 per 1000 live births	BDHS-2007

Bangladesh has made significant progress in recent times in many of its social development indicators particularly in health. This country has made important gains in providing primary health care since the Alma Ata Declaration in 1978. All health indicators show steady gains and the health status of the population has improved. Infant mortality (from 97.5 per 1000 live births in 1991 to 41.3 per 1000 live births in 2008 according to MDG Bangladesh Progress Report 2009) and under-five mortality (from 151 per 1000 in 1991 to 53.8 per 1000 in 2008.) rates have all decreased over the last decades, with a marked increase in life expectancy at birth (56.1 in 1991 to 66 years in 2008) (for details see Annex 1 ": Trends in Childhood Mortality (MDG Bangladesh Progress Report 2009)" on page 72).

The maternal mortality ratio (MMR) declined from 574 in 1990 to 348 (SVRS, 2008) to 194 in 2010 (BMMS 2011). But some of this progress is uneven and there still exists inequalities between different groups and geographical regions. Much of this decline is attributed to success in fertility reduction and

gains in female literacy and increased age at first childbearing. Much work has been done in strengthening services for dealing with life-threatening emergencies during childbirth but much more needs to be done to reach MDG 5 target of 143 deaths per 100,000 live births by 2015.

Life expectancy at birth has continuously been rising (66.6 years BBS-SVRS 2008) from the level of 58 (1994). There has been considerable progress in reducing malnutrition and micro-nutrient deficiencies in Bangladesh. Percentage of children 1-5 years receiving vitamin-A supplements in last six months has increased from 73.3 (1999-2000) to 88.3 (2007).

Bangladesh has also witnessed rapid urbanization, with the urban areas growing at over 6% per annum during the last 30 years. About 27% of the people live in urban areas. In 2006, the urban population was about 34.6 million, and the number of urban poor has also increased from 7 million in 1985 to 12 million in 1999, and this has led to a large population of urban poor – posing special challenges to reach the urban poor with immunization services

The net enrolment rate in 2008 was 91.90% (93.3% for girls) and shows increase from 60.50% during 1990-95 and 87.2% (90.1% for girls) in 2005[1].

In 2007 the reported adult male and female literacy rates were 63.1% and 53.5% respectively, while the overall literacy rate was 58.3%. The recent EPI Coverage Evaluation Survey 2010 (CES 2010) revealed that 22% of surveyed mothers were illiterate and only 13% of mothers completed >=10 years of education.

Traditionally home deliveries are very common in Bangladesh. However, only in 5% of cases births were attended by skilled health personnel in the past (1990/1991) and a progress has been observed since then reaching 24% in 2009[2]. It remains still far behind the target set at the level of 50% in 2015.

B. Health system

Like most transitional societies, a wide range of therapeutic choices are available in Bangladesh, ranging from self-care to traditional and western medicine. The public sector is largely used for in-patient and preventive care while the private sector is used mainly for outpatient curative care. Primary Health Care (PHC) has been chosen by the Government of Bangladesh as the strategy to achieve the goals of “Health for all” which is now being implemented as Revitalized Primary Health Care.

Administratively, Bangladesh is divided into six Divisions (Dhaka, Chittagong, Rajshahi, Khulna, Sylhet and Barisal). Divisions are further divided into 64 Districts and 6 city corporations. The Districts are further divided into 482 Upazila (sub-districts) and 223 Municipalities. Each Upazila has several Unions (average 10; range 5-27), and each union consists of 3 Wards. The urban areas of the country are administered by Six City Corporations and Major Municipalities.

The primary care in the public sector is organized around the Upazila Health Complex (UHC) at sub-district level which works as a health-care hub. These Units have both in- and out-patient services and care facilities too. The public sector field-level personnel are comprised of Health Assistants (HAs) in each union and Family Welfare Assistants. The number of health assistants is determined according to the size of the population. The Health Assistants and Family Welfare Assistants are supervised by a Health Inspector (HI) and a Family Planning Inspector (FPI) respectively, posted at the union level.

[1] Source: Bangladesh MDG Progress Report 2009
[2] ibid

The UHC is staffed by qualified allopathic practitioners and supporting staff, while the Union Health and Family Welfare Centres (UHFWCs) are staffed by professionals such as a Medical Assistant (MA/SACMO) and mid-wife (Family Welfare Visitor), both trained in formal institutions.

The Ministry of Health and Family Welfare (MOHFW) provides the preventive health services in the rural areas (approximately 73% of the total population), while the Ministry of Local Government Rural Development and Cooperatives (MOLGRD&C) - through the City Corporations & Municipalities - is responsible for the urban areas. However the MOHFW has responsibility for overall health policy guidelines and logistics for providing primary health care services.

C. Immunization and health sector policy implementation

Within the broader context of Bangladesh National Strategy for Economic Growth, Poverty Reduction and Social Development (Bangladesh PRSD), the Government's vision for the health is articulated in the strategic goal of the Ministry of Health and Family Welfare (MOHFW) which seeks to "create conditions whereby the people will have the opportunity to reach and maintain the highest level of health. It is a mission that recognizes health as a fundamental human right". As a vehicle to deliver the essential development goal, the Government of Bangladesh (GoB) established a Health, Nutrition and Population Sector Program (HNPSP) to increase the availability of and utilization of user-centred effective and efficient equitable, affordable and accessible quality services for a defined Essential Services Delivery (ESD) which includes immunization.

The first HNPSP was a 5-year program (1998-2003) that incorporated a sector-wide approach to health services, emphasizing integration of Health & Family Planning wings and decentralization of management and financial responsibilities. As follow-on to the first HNPSP, a Strategic Investment Plan (SIP) for 2006 – 2011 is currently being implemented (and is expected to be further extended).

Under the HNPSP, EPI is one of several programs of the "Essential Services Delivery" (ESD) that is administered by the Director, Primary Health Care (PHC) and Line Director, ESD. Under him, the Program Manager (PM), Child Health & Limited Curative Care, Deputy Program Managers EPI, ARI, CDD and School Health assists the PM in managing EPI activities and other child health activities. However, cold chain, logistics, training, surveillance, and communication, under the HNPSP are the responsibilities of the various Line Directors responsible for each of the respective sector areas (e.g., Logistics, Training, Unified Management Information System, and Behavioural Change & Communication). This therefore indicates an increased need for effective coordination and collaboration with other Line Directors in order to assure effective immunization program.

The HNPSP is funded by both the GoB and pooled funding from Development Partners (DPs). DPs' contribution for HNPSP (2003-2010) has been estimated amounting to US$ 1,799 million.

Figure 2: Priority objectives and indicators with benchmarks and targets for 6th 5-year Plan 2011-2015

6th 5-year Plan 2011-2015	Unit of Measurement	Benchmark (with Reference Period and Source)	Projected	
			Baseline Mid-2010	Target Mid-2016
Reducing Maternal Mortality	Proportion of births attended by skilled health personnel	18% (BDHS 2007)	43%	50%
	Maternal deaths per 1,00000 live births	320 (BMMS, 2001)	275	143
Reducing the Total Fertility Rate	Total fertility rate (TFR)	2.7 (BDHS 2007)	-	2

6th 5-year Plan	Unit of Measurement	Benchmark (with	Projected	
Reducing Malnutrition	% of underweight children age 6 to 59 months	41% (BDHS 2007)	34%	33%
	% of stunting children age 6 to 59 months	43% (BDHS 2007)	-	25%
Reducing Infant and Under-five Mortality	Infant deaths per 1,000 live births	52 (BDHS, 2007)	37	32
	Deaths in children under 5 per 1,000 live births	65 (BDHS, 2007)	52	49
Reducing the Burden of HIV/AIDS, TB, malaria and other diseases	Case detection: Proportion of estimated new smear positive TB cases detected in a given year	73% (NTP, 2008)	80%	75%
	Cure rate: Proportion of registered smear positive TB cases successfully treated under DOTS in a given year	92% (NTP, 2008)	88%	95%
	HIV prevalence	< 1%	%	<1%
Prevention and Control of major Non-communicable diseases	Prevalence of Smokeless Tobacco use in adults	27.2 % (GATS Bangladesh 2009)	20	12%
	Prevalence of Smoking in adults	23% (GATS Bangladesh 2009)	20	10%
	Increase screening for Early Detection of Cancer (Cervix, Breast & Oral Cancer) through Self Examination		30% of the eligible Women	40%
	Detection of Hypertension with awareness raising		20%	40%

D. Immunization programme

D.1 Historical perspective of EPI programme

EPI in Bangladesh was launched on April 7, 1979 (World Health Day). As vaccination centres were few and were located mainly in health care facilities in urban areas, the EPI coverage remained less than 2% by 1984. In 1985, the Government of the People's Republic of Bangladesh committed to the Global Universal Child Immunization Initiative (UCI), and began a phase-wise process of EPI intensification from 1985-1990. During this time period, EPI was intensified throughout 476 Upazila, 92 major Municipalities and 6 City Corporations. EPI was made available to all target groups (infants and pregnant mothers) by 1990.

EPI intensification consisted of establishing the cold chain system from EPI HQ to District and Upazila level and capacity to maintain cold chain down to the vaccination points in rural and urban areas, procuring and managing logistics needs for about 134,000 EPI outreach sites, and providing basic EPI training for thousands of mid-level managers, supervisors and field workers in the public and private sectors.

In the year 1993 GoB endorsed TT5 dose schedule for women of child bearing age initially from 15 to 45 years age and later extend o 15 to 49 years age.

Polio eradication and Maternal & Neonatal tetanus elimination activities initiated in 1995. As a part of this AFP Measles and Neonatal tetanus surveillance initiated in 1997.

During the last few years, based on the data on disease burden, new vaccines for selected emerging diseases such as Hepatitis- B (2003) and Hib Disease (2009) have been introduced into the EPI schedule. Hepatitis B vaccine was incorporated into the programme with GAVI phase 1 support bundle with injection safety supply later followed by the introduction of Hib antigen (as combined

Pentavalent vaccine with GAVI support). Vit A supplementation was added to the programme in 1990. In view of enhancing the injection safety AD syringes were introduced in to the programme from 2004.

Since 1995 to 2010, 18 National immunization days were conducted with very high (around 90%) coverage in Bangladesh in view of eradicating Polio. Measles catch up programme was conducted in 2005.

D.2 National Immunization schedule – Bangladesh

According to the current Immunization Schedule for Bangladesh, all the children during their first year of life should be immunize with BCG, OPV, Pentavalent and Measles before reaching the age of one year (see Figure 3 below).

Figure 3: Vaccination schedule for under 1 year children

Name of the disease	Name of the vaccine	Amount of dose	No of dose	Interval between doses	Starting time for vaccination
Tuberculosis	BCG	0.05 ml	1	-	After Birth
Diphtheria Pertussis Tetanus Hepatitis-B Hib Disease	Pentavalent DTP-HepB-Hib Vaccine	0.5 ml	3	4 Weeks	1st Dose -6 weeks 2nd Dose-10 weeks 3rd Dose -14 weeks
Poliomyelitis	OPV	2 Drops	4	4 Weeks*	1st Dose -6 weeks 2nd Dose-10 weeks 3rd Dose -14 weeks 4th Dose-38 weeks
Measles	Measles Vaccine	0.5 ml	1	-	After completion of 9 Months
Night Blindness	Vitamin-A	1 (Blue)	1	-	With Measles

Other than that all the females of child bearing age (15 -49 Years) should receive five doses of TT as shown in Figure 4 below:

Figure 4: Vaccination schedule for 15-49 years women

Dose number	Interval between doses	Amount of dose
TT-1	Just after 15 years of age	0.5 ml
TT-2	28 days after TT-1	0.5 ml
TT-3	6 months after TT-2	0.5 ml
TT-4	1 year after TT-3	0.5 ml
TT-5	1 year after TT-4	0.5 ml

D.3 Immunization service delivery

The Bangladesh Immunization program with the support of development partners has taken a number of measures since EPI intensification during late 1980s to improve utilization of EPI services and injection safety. The key interventions and achievements include:

- Providing training for supervisors and field workers; at all levels in the country;
- Mid-level managers' training - conducted to improve quality service;
- Monthly EPI Review sessions – conducted by Upazila, City Corporation, Municipality and District managers to identify problems and solutions at the local level;

- Periodic NT campaigns - conducting in high risk areas;
- Measles catch-up campaign
- NIDs/SNIDs for polio
- Annual CES evaluations - to monitor Division/ District/ City Corporation specific coverage, dropout rates and other performance issues

GAVI funds have been supportive of the Immunization program. The major activities funded using GAVI ISS funding are recruitment of District Immunization Medical Officers, different training, procurement of logistics, and extension of cold and dry store space at different level, communication activities, and additional support for hard-to-reach and high risk areas

D.3.1 EPI services in rural areas

The service delivery mechanism for providing EPI services in rural areas relies on a system of 64 Districts, 482 Upazilas, 4,498 Unions, 13,494 Wards, and 108,000 sub-blocks within the wards. Each sub-block has an EPI outreach site where routine EPI services are provided monthly for catchments of approximately 1,000 populations.

The composition of the system is shown on Figure 6 below (for illustrative purposes). It assumes that Upazila consists of one Health Complex (in the centre of hexagram) and 6 Unions (green triangles labelled from U1 to U6). Each Union consists of three wards (labelled as w1, w2 and w3). Ward's composition is shown separately as a circle - each Ward consists of 8 vaccinations sites (correspondingly numbered segments in the circle). Each weak vaccination services are provided in 2 vaccinations sites.

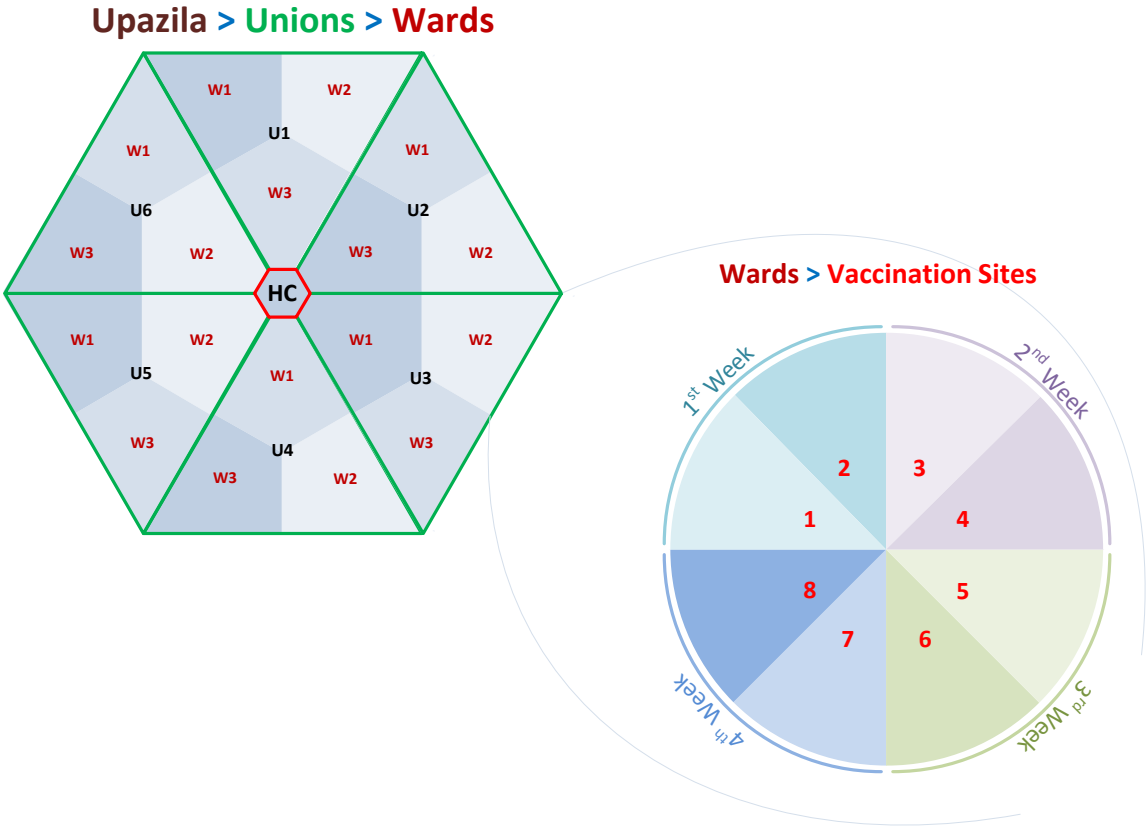
Vaccination at rural wards is provided primarily by the Health Assistant (HA), an employee of the health wing of MOHFW and is usually assisted by Family Welfare Assistant (FWA), an employee of family planning wing of MOHFW. In some instances wherever the post of HA is vacant, the primary responsibility of vaccination is carried out by FWA. Inadequate number of Health Assistants who are trained to carry out vaccination at EPI outreach sites may have a negative impact on reaching expected immunization coverage and quality targets.

Porters deliver vaccines from the Upazila Health Complex to the vaccination site/distribution points where the field workers collect and deliver the vaccines to vaccination sites.

Almost all EPI outreach sites are within 15-20 minutes walking distance, and field workers are instructed to conduct home visits to register new-borns (in the EPI Registration Book) and invite parents to bring their target children to come to vaccination sessions prior to the day of session thus performing an important social mobilization role.

Currently there are about 6,000 to 7,000 vacant Health assistant (vaccinator) posts prevail in all 64 districts (that accounts for 10 to 12 % of the total posts). **This may be one of the main obstacles to reach and sustain expected coverage targets at district level**.

Figure 5: Immunization service delivery system components in rural areas



Important challenges of this mechanism include the inconsistency of home visits (either for registration or for invitation for services) by the health workers, which may contribute to immunization drop-out rates.

Lack of supervision on the EPI activities at grassroots' level by union level supervisory officers (sometimes due to vacant posts) also contribute to the poor performance in some districts.

D.3.2 EPI Services in the urban areas

The large and increasing population in urban areas has led to increased attention to urban health, and this is a critical issue, to sustain the high levels of immunization coverage. Historically, development of urban healthcare facilities was focused more on developing secondary and tertiary (specialized) care with relative neglect of primary care sector. As a result, there is an acute lack of primary health care infrastructure. In distinction from rural areas, there are no dedicated primary health care providers to serve the urban population (except few specialized outpatient clinics/dispensaries) and hence health care providers are not recruited on the basis of population or number of wards of the urban Municipalities / City Corporations. The urban municipalities and city corporations have limited number of infrastructure and health care providers and with these limited resources immunization, family planning services and other health care services are being providing to the large population. Local Government is intending to develop its own health infrastructure.

Large number of slum areas and rapid population migration aggravate the situation. The responsibility for providing urban primary and preventive health care services rests with the City Corporations and Municipalities. Accordingly, the City Corporations and Municipalities have established Immunization sites, based mainly on the population size of the wards.

The urban EPI services, especially in the City Corporations are heavily supported by NGOs associated with two major projects, the Smiling Sun Franchise *Program (SSFP),* which is funded by USAID, and the *Urban Primary Health Care Project (UPHCP),* which is funded by a consortium led by the Asian Development Bank (ADB) that includes also DFID, SIDA and UNFPI. Both SSFP and UPHCP subscribe to the concept of *one-stop services* and discourage the use of outreach and doorstep service delivery.

Funding for the 5-year UPHCP project ($60 million) is provided primarily by the ADB-led consortium ($40 million), United Nations Population Fund (UNPFA) ($5 million), and the Nordic Development Fund ($3.5 million), in addition to the government contributions (~$11.5 million). The UPHCP is developing primary care infrastructure that may later on be taken over by the city governments (corporations) so as primary care is institutionalized within the system of government-provided health services. The government sets the standards, manages a competitive bidding process, contracts with NGOs and the private sector, and supervises the contract to ensure that contracted services are delivered. If levels of health or specific targets are met or surpassed cash bonuses are awarded. **This performance-based reward system is intended to boost high immunization coverage**. Currently operating UPHCP and SSFP project will end in 2011. Sustaining the funding for the services after the UPHCP and SSFP come to an end remains a challenge.

Majority of the vaccinators who are attached to the urban vaccination clinics are contract workers funded by NGOs. Recruitment of NGO staff is done against explicit professional standards. Their quantity is enough for routine immunization but severely insufficient for campaigns. Also of a problem is high turnover among contracted workers – they tend to switch to better positions as soon as there is a chance. Institutionalization of services (that could counteract this tendency) is expected to be reflected in the sectoral policy/strategies.

D.4 Immunization coverage performance

The programme has prevented an estimated 2 million deaths from 1987-2000, and continues to prevent approximately 200,000 deaths each year. The trend of immunization coverage – a key measure of immunization system performance, shows that the Immunization program has strong capacity to reach children with BCG (94%), DPT-3 (96%), Polio-3 (96%) and Measles (98%). However, only 75% of children one year of age are fully immunized with all doses of vaccines which they are supposed to receive during the first year of life. At the same time, significant disparity can be observed regarding the immunization coverage among districts as 13 out of 64 (20%) districts are having DPT-3 coverage less than 80%, and 11 out of 64 (17%) districts are having Measles coverage less than 80%.

These are the key areas that EPI programme need to address in the future in view of achieving and sustaining the vaccine preventable disease control. It is noteworthy that in the past five years, the percentage of fully immunized children has shown a substantial increase (from 64% in 2005 to 75% in 2009).

TT coverage among pregnant women shows that 93% of children were protected at birth from NNT. The TT coverage among 15-49 years women is 97% for TT-1, 95% for TT-2, 86% for TT-3, 70% for TT-4 and 52% for TT-5 (complete protection). Fifty-five out of 64 districts (86%) have TT-2+ coverage (received more than 2 doses of TT at the time of pregnancy) less than 50%. There is therefore a need to ensure that the performance is improved especially for TT vaccination for 15-49 years women and to focus on strengthening the weak districts in view of maintaining the NNT elimination status.

The CES 2010 revealed that Fully Vaccinated Coverage (FVC) rate increased by 4 per cent in CES 2010 (from 75 per cent in 2009). Across the country, 79 per cent of the surveyed children aged between 12-23 months were found to be fully vaccinated before observing their first birthday along with the highest coverage for BCG at 99 per cent, DPT3 89 per cent, and measles 85 per cent. Compared to BCG, a marked declination (14 per cent lower) in measles coverage was observed in CES 2010. Over the period between 2005 and 2010, DPT3 coverage increased by 12 per cent while the measles coverage increased by 14 per cent.

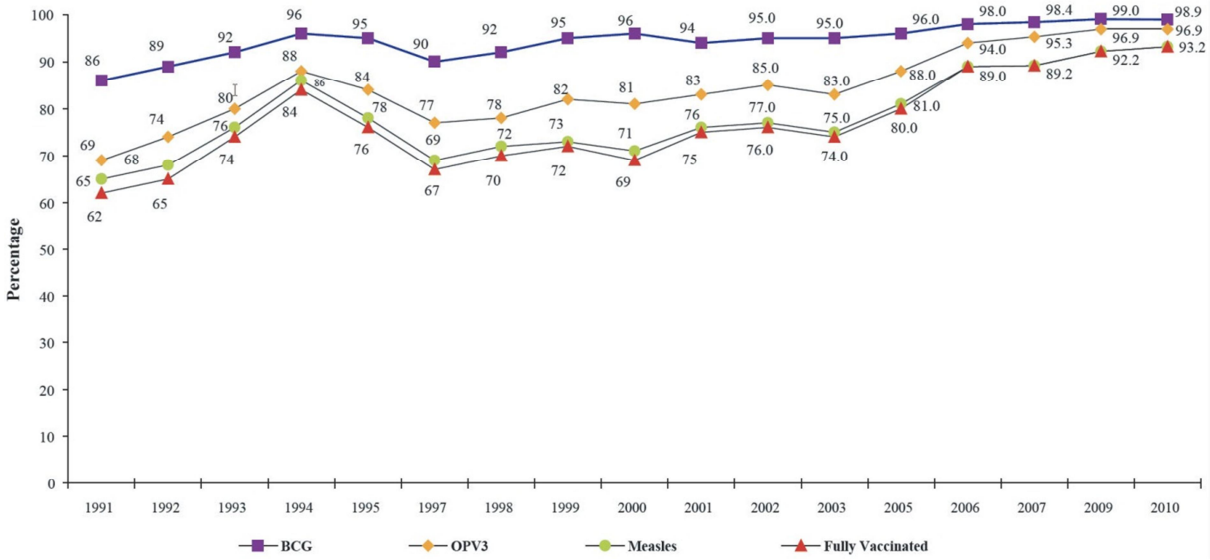
Figure 6: Valid Vaccination Coverage[3] by Age 12 Months by Card and History (CES 2010)

Sources	BCG	OPV1	DPT1	HB1	OPV2	DPT2	HB2	OPV3	DPT3	HB3	MCV	FVC
Card	70.5	70.3	70.3	70.3	69.1	69.0	69.0	65.9	62.4	62.4	56.3	52.7
History	28.5	28.1	28.1	28.1	28.0	28.0	28.0	27.7	26.2	26.2	28.5	26.7
Both (C+H)	98.6	98.4	98.4	98.4	97.1	97.0	97.0	93.6	88.7	88.7	84.8	79.4

It is noteworthy that the survey showed no difference in valid vaccination coverage between the children residing in rural and urban areas. However significant difference was found by the level of education of mothers: "Valid coverage of the children whose mothers attained 10 years of education (82 percent) was found to be 8 percent higher than that of the children whose mothers had no education (74 percent)."

Figure 7 below shows positive trends in national crude vaccination coverage rates for major vaccines.

Figure 7: Annual Trend in National Crude Vaccination Coverage by Age 23 Months among 12-23 Months Old Children from 1991 to 2010 (Card + History)



As to 15 low performing districts the survey confirmed a steady growth in the full vaccination coverage rates since 2006 as shown in Figure below:

Figure 8: Per cent Distribution of Children who received all the Vaccine by the Age of 12 Months by 15 Low Performing Districts (CES 2010)

Districts	2006	2007	2009	2010
Lalmonirhat	56.3	74.4	75.2	82.6
Gaibandha	59.7	67.4	74.7	78.1
Sirajganj	70.4	73.6	79.6	83.5

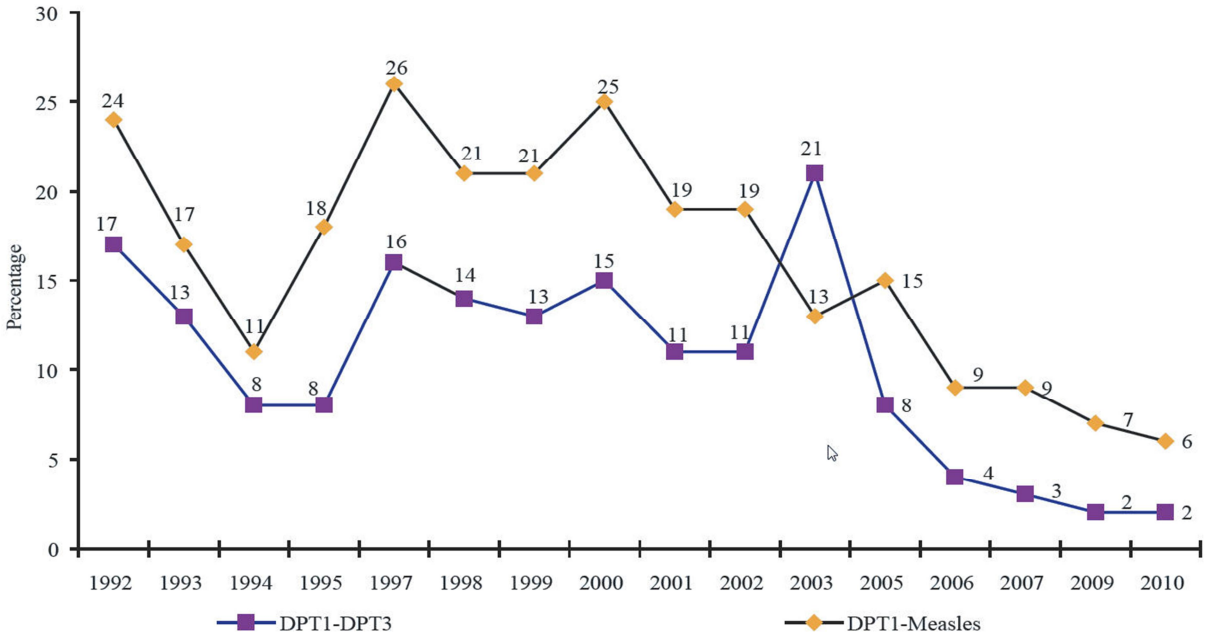
[3] The valid coverage was assessed in terms of valid doses(s) of any antigen administered to a child by one year. A valid dose is a recommended dose of an antigen administered at the recommended age and during the appropriate interval

Districts	2006	2007	2009	2010
Mymensingh	74.2	71.5	80.6	79.3
Jamalpur	68.3	69.2	71.8	77.2
Netrokona	60.6	62.0	66	76.2
Sherpur	67.1	78.6	79.1	85.6
Bandarban	60.3	48.3	74.6	65.3
B. Baria	48.5	69.7	67.0	84.7
Coxsbazar	60.6	72.4	65.7	72.6
Khagrachai	64.5	73.6	77.6	73.2
Noakhali	48.3	76	75.2	63.9
Rangamati	60.5	69	76.2	74.6
Moulvibazar	57.1	66.2	66.8	73.7
Sunamganj	44.6	64.4	79.9	73.6
Total	60.0	69.0	74.0	76.4

According to the CES 2001, dropout rate was found to be 2 per cent for DPT1-DPT3 and 6 per cent for DPT1-measles (see Figure C11). The urban-rural variation was absent for DPT1- DPT3. In rural areas, DPT1-DPT3 dropout rate was found to be 2 per cent. However, DPT1-measles dropout rate was 6 per cent in both in rural and urban areas.

Over the time, national dropout rates declined substantially, particularly since 2003. The dropout rate for DPT1-DPT3 declined from 21 per cent in 2003 to 2 per cent in 2010 and for DPT1-measles from 13 per cent in 2003 to 6 per cent in 2010.

Figure 9: Annual Trend in National Vaccination Dropout Rates for DPT1-DPT3 and DPT1-Measles among 12-23 Months Old Children from 1992 to 2010 (CES 2010)



D.5 Vaccine wastage

For the year 2009 Bangladesh EPI programme has reported exceptionally high vaccine wastage for all the vaccines. Reported vaccine wastage for each individual vaccine is as follow, BCG -85%, DPT-43%, Hepatitis B – 43%, Oral polio – 33%, Measles – 71% and TT – 30%. Those reported vaccine wastage figures were more or less similar to that of the previous year (2008).

EPI provides immunization services through 120,000 fixed and outreach sites in both rural and urban areas. Out of these about 1,190 are fixed sites in both rural and urban areas where open vials policies are followed. In other words, about 99% EPI sites are held at outreach sites where open vial policies are not adopted and 85% of the total population is covered. Hence in outreach sites the open vials/partially used vials are discarded at the end of session and the wastage is high. BCG ampoules contain 20 doses but at each outreach session usual average target for BCG are 3 children. Eventually the wastage rate for BCG is 85%. Similarly 3 children are vaccinated at a post for measles per day and wastage rate is 70% and 30% for TT. But after introduction of Hib Pentavalent vaccine as a single dose vial, wastage rate dramatically reduced from 43% for DPT/HepB to 0.45% for Pentavalent.

D.6 EPI Logistics

Effective logistics management is essential for Immunization program performance. However, an added challenge and opportunity is the need to strengthen the coordination between ESD directorate and the Centre for Medical Store Depot (CMSD) to ensure that routine EPI logistics, including AD syringes, safety boxes and accessories for maintaining vaccination, injection safety, record keeping and reporting forms are made available in adequate quantities at all levels.

An Assessment of existing cold chain storage capacity in the Bangladesh in light of new vaccines introduction was conducted in October-November 2010 (with UNICEF support). The assessment pursued to objectives:

- To strengthen cold chain system in Bangladesh with particular attention on availability of adequate chain storage space at national, district and Upazila level to introduce new vaccine (e.g. Pneumococcal vaccine in 2011 and Rotavirus vaccine in 2012/2013) in routine immunization program in future
- To explore the readiness of possible Effective Vaccine Management (EVM) assessment in Bangladesh in early 2011

An EVM Assessment was conducted in April 2011 with the assistance of an external consultant provided by WHO. Some findings are highlighted in sections below; cold chain storage capacity upgrade requirements in light of new vaccines introduction are discussed in a separate sub-section (see “D.6.5 Cold chain upgrade requirements” on page 13).

An Improvement Plan was developed based on the EVM Assessment and endorsed by EPI HQ. A detailed implementation plan will be designed to address major issues highlighted in the EVS Assessment report and meet milestones of the Improvement Plan (see details in Annex 4 “Vaccine Management Improvement Plan” on page 73).

D.6.1 Vaccine procurement

All the EPI vaccines used in the EPI programme are procured through UNICEF. The quality of vaccine is assured by obtaining vaccines from suppliers’ recommended by the WHO for bulk purchase for UN agencies and by looking into the criteria of’ good manufacturing practices” as laid down by the WHO. Prevailing complex vaccine procurement procedures cause delays in vaccine procurement. Still Bangladesh EPI programme managed to provide adequate amount of vaccines to all districts without any interruption during the last few years. Usually, six months stocks (three months operational + three months reserve stocks) of EPI vaccines are stored at the EPI HQ stores.

D.6.2 Vaccine and other EPI logistic distribution

Distribution of vaccines and other logistics to each district is currently done on a monthly basis, based on request on requirement of each item from each district. All the districts have their own cold chain storage facility to store vaccines and other immunization logistics. The responsibility of transportation of vaccines and other logistics to the districts rests with the yearly basis hired contractor's vehicles. These hired vehicles carry vaccines and logistics under the direct control and supervision of EPI HQ. EPI HQ monitors the process and provides cold boxes. This mechanism of distribution of vaccines and other logistics from the EPI HQ store to districts store is well elaborated and functioning during last few years.

However, the contractor's vehicles are not specialized and vaccines have to be transported in cold boxes (that increases cargo load and would do it more after the introduction of new vaccines). A rough cost-effectiveness analysis revealed that 2/3 of the operational costs (transportation contract annual face value) can be saved if own specialized tracks (with refrigerators) are used (that is approximately 200,000 US$ per year, equivalent of the price of 4 brand new specialized track). From a managerial point of you, operating own specialized tracks produces two more benefits: decrease in the cargo volume (and saving costs for cold boxes) and optimization of the transportation routes. Therefore, EPI HQ is inclined to gradually replace (fully or partially) hired vehicles with own specialized tracks introducing necessary managerial/technical arrangements. Implementation of this plan in constrained by a) lengthy and complicated public procurement procedures (in case of funds are coming from the state budget) and b) availability of funds. EPI HQ requested donors/partners to secure fund for procuring vehicles for well operation considering the introduction of new vaccines and overcoming the huge loads.

From district stores vaccines and other logistics are distributed monthly to Upazila level stores located within Upazila Health Complexes. Upazila level stores have enough cold chain capacity to store 15 days buffer stock of vaccines. Every day porters deliver vaccines from the Upazila Health Complex to the vaccine distribution points at Union level where the field workers collect and deliver the vaccines to vaccination sites. To transport vaccines from Upazila level into field, they use vaccine carriers. Every evening, remaining unused vaccines are returned to the Upazila level store using similar transport mechanism.

D.6.3 Central level stores

Bangladesh has well equipped central level vaccine store with a computerized logistics management system at EPI headquarters. Central cold room complex is equipped with computerized temperature monitoring system and backup generators. During last few years the delay in receiving request from Districts has improved, so there is no undue delays in distribution of logistics from the central stores to the districts. The following constrains were identified during latest (2009) cold chain inventory review following:

- Current central level vaccine storage capacity is just adequate for storing six months buffer stock of EPI vaccines. Current central level total vaccine storing capacity is nearly 623 cubic meters. Out of this total volume, 100 cubic meters belongs to old cold room complex and rest (523 cubic meters) belongs to new cold room complex. Old cold room complex is more than 24 years old; it needs proper repair or replacement soon.

- In the event of introduction of new vaccines to the EPI in future, it is essential to expand central cold room capacity accordingly (see details in section "D.6.5 Cold chain upgrade requirements" below).
- Due to inadequate space other vaccine logistic (AD syringes, diluents) are not properly stored in the EPI HQ store.
- Time consuming procedures to receive logistics delivered by Central Medical Supplies Division (CMSD).This led to Stock out of some logistics other than vaccines at the central stores store.
- Inadequate number of cold chain technicians, store-keepers and minor employees.
- Lack of training opportunities for all categories of workers regarding new advancements of the cold chain technology.

In addition, proper training is essential in order to improve the quality of the vaccination program by the implementers, including district EPI Supervisors, Medical Technologists (EPI technicians), EPI Store-keepers and Field Workers. Periodical revision of record keeping and reporting forms will also be done based on the program need.

D.6.4 District level stores

All districts have their own vaccine storage facilities. These consist of number of separate refrigerator units (some districts comprise up to 30-40 refrigerator units). Cold chain technician is responsible for maintaining the cold chain at district stores. All districts have adequate number of cold boxes and vaccine carriers for transporting vaccines from the National level and down to Upazila level.

At the district level, the following issues were identified in certain areas that need improvement for quality service delivery:

- Inadequate storage capacity to store three months buffer stock of vaccines. So central store has to send vaccines to the districts monthly after introduction of Hib vaccine (as a component of Pentavalent vaccine);
- In the event of introduction of new vaccines to the EPI in future, it is essential to expand district cold room capacity accordingly;
- Frequent power failures experience in some districts;
- Non availability of backup power supply;
- Non availability of proper replacement plan for cold chain equipment;
- Lack of staff resulting in inadequate supervision on management of store at district and Upazila level;
- Lack of refreshers orientation for store-keepers and cold chain technicians;
- Lack of periodic monitoring and review on inventory and stock position;

D.6.5 Cold chain upgrade requirements

Cold chain upgrade requirements by each level of the NIP logistical system are summarized in Figure 10 below. The calculations are based on the following assumptions:

- Size of the target population (and number of vaccine doses needed) by years of introduction (linked to cMYP excel tool projections)
- Country's preferences of a) vaccine formulations and b) sequence of introduction:
  - Measles conjugated vaccine (MCV) requiring 2.5 cm^3 per dose
  - PCV10 2-dose presentation was selected requiring only 4.8 cm^3 storage space per dose
  - Rotarix single dose liquid presentation was selected requiring 85.3 cm^3 storage space per dose (hoping that volume requirements might fall in the foreseeable future)
  - The 2nd dose of measles is the considered as a top priority followed by PCV and then Rota
- Number of shipments and size of reserve (buffer) stock for each level:
  - National level: frequency of shipments - 4 per year, buffer stock – 3 months
  - District level: frequency of shipments – 4 per year, buffer stock – 1 month
  - Upazila level: frequency of shipments – 12 per year, buffer stock – 0.5 month
- Space requirement (column C) is calculated using the formula: Column A (stock volume per year) divided by Number of Shipments plus Column B (reserve stock volume)
- Td will substitute TT in 2016 and there is no additional space requirements considering the similar packed volume for both (3 cm^3 per dose); therefore, it is not reflected in upgrade estimations

Figure 10: Summary of cold chain storage capacity in light of new vaccines introduction by Administrative/functional levels of the immunization system

Vaccines	Year of introduction	Stock volume per year (m^3) A	Reserve stock volume (m^3) B	**Space Requirement** C	Space Requirement (Cumulative) D	Existing Space (m^3) E	**Space Excess / Gap (m^3)** E-D
National Level							
Current Vaccines		274	68	**137**	137	110	-27
MCV2	2012	26	6	**13**	150	110	-40
PCV 10 (2 dose)	2013	56	14	**28**	178	110	-68
Rota (1 dose liquid)	2014	672	168	**336**	514	110	-404
HepB Birth dose (1 dose)	2014	70.9	18	**35**	550	110	-440
District Level							
Current Vaccines		274	23	**91**	91	118	27
MCV2	2012	26	2	**9**	100	118	18
PCV 10 (2 dose)	2013	56	5	**19**	119	118	-1
Rota (1 dose liquid)	2014	672	56	**224**	343	118	-225
HepB Birth dose (1 dose)	2014	71	6	**24**	366	118	-248
Upazila Level							
Current Vaccines		274	11	**34**	**34**	**177**	**142**
MCV2	2012	26	1	**3**	**37**	**177**	**139**
PCV 10 (2 dose)	2013	56	2	**7**	**44**	**177**	**132**
Rota (1 dose liquid)	2014	672	28	**84**	**129**	**177**	**48**
HepB Birth dose (1 dose)	2014	71	3	**9**	**137**	**177**	**39**

Calculations show that even without introduction of new vaccines there is an urgent need to add at least 30 m^3 net volume positive cold chain just only at the national level. There is enough space at the subnational levels.

Introduction of MCV2 adds 9 m^3 positive space requirements at the national level, 6 m3 at the district level and 2 m at the Upazila level. This extra load will be easily accommodated at the district and Upazila levels (excess of the positive cold chain storage capacity) but will require adding at least 40 m^3 positive cold chain storage at the national level.

If PCV introduction is considered together with MCV2, it can be still accommodated at the Upazila level (excess capacity up to 132 m^3), but it exhausts cold chain storage capacity at the district level (gap 1 m^3). The cold chain storage capacity gap increases up to 70 m^3 at the national level.

Introduction of only Rota vaccine (liquid 1 dose formulation) requires 84 m^3 positive cold chain storage at the Upazila level; that would be less than available 132 m^3 storage capacity (remaining after the introduction of MCV2 and PCV vaccines). Rota vaccine introduction requires major upgrades at district level (at least 225 m^3) and national level (at least additional 340 m^3).

Taking into account the existing gap and needs in additional positive cold chain storage space for all three vaccines plus HepB Birth dose (1 dose vial formulations), total positive cold chain upgrade requirements amount to 440 m^3 at the national and 250 m^3 at the district levels (or 690 m^3 net volume cold chain (positive) equipment should be added in total). There is no need to upgrade positive cold chain storage capacity at the Upazila level in 2011-2016.

D.7 Injection safety

In Bangladesh introduction of AD syringes into the EPI programme with GAVI support was done in 2004 in order to ensure immunization safety and to improve the quality. For the last few years Bangladesh EPI programme exclusively use AD syringes for all EPI vaccinations. Since 2007, government is procuring AD syringes from the local manufacturer using its own funds.

Under HPSP and later HNPSP, government of Bangladesh included medical waste management as a priority sector as an activity under improved hospital services component. But Upazila and below level health centres were not considered in that initiative as they fall under the jurisdiction of primary health care.

At the immunization sites medical wastes are collected into the safety boxes. All filled safety boxes are transported to the corresponding Upazila and temporarily stored. Periodically those collected medical wastes are disposed off by burning. Out of 474 Upazila only few (about 50) have incinerators that also most of the places currently not in an operational state. Majority of the Upazila use pit burning method to dispose medical wastes.

D.8 AEFI Surveillance

The country has a well-established system of AEFI surveillance.

As vaccine coverage increases over the time reports on adverse events following immunization (AEFI) also increases which may have a negative impact on the EPI programme. Availability of efficient AEFI surveillance system may be a key to increase immunization acceptance and improve the quality of services. For the year 2008, AEFI surveillance system had reported 2322 adverse cases out of that 8

were categorized as "serious". When we consider the number of antigens administered in 2008, this figure seems to be far less than the expected

D.9 VPD surveillance

EPI programme is assigned for management of AFP and VPDs surveillance system in Bangladesh. The diseases under surveillance are Polio (any age), AFP (< 15 years) Neonatal tetanus (< 28 days), Tetanus (any age after neonatal period), Measles (any age), Diphtheria (any age), Pertussis (any age) and Tuberculosis (< 5 years).

AFP and VPDs are reported from static health facilities on weekly basis using "AFP and EPI Diseases Weekly Line Listing Form for Hospitals and Upazila Health complexes". Designated health facilities send weekly passive reports to civil Surgeons/Chief Health Officers. Civil Surgeons and Chief Health officers of all districts and city co operations send the compilation of the passive reports to the EPI HQ. Currently 753 health facilities are under passive surveillance.

In addition to passive reporting, weekly active surveillance is conducted for AFP, NNT and Measles in major hospitals. Currently 137 major hospitals are under active surveillance.

In year 2009, all the stake holders involve in VPD surveillance at National, district and Upazila level were given a training opportunity regarding VPD surveillance. Same time clear written guidelines are available in this regard.

Currently this system is operating smoothly. Through this system for year 2009, Bangladesh has reported 23 Diphtheria cases, 718 Measles cases, 121 NNT cases and 16 Pertussis cases.

D.10 New vaccine introduction

With the GAVI co- financing support EPI programme in Bangladesh successfully introduced the Hib + Hep b vaccine in to the EPI schedule in the form of Pentavalent vaccine in 2009.

In 2009 a National committee on Immunization practice (NICP) was established with the Chairmanship of secretary to the Ministry of Health and Family Welfare to consider and assess feasibility of introduction of new and underused vaccines (such as Pneumococcal vaccine, Rota vaccine, Birth dose of hepatitis B vaccine, second dose of measles vaccine and Td vaccine) in to the national EPI programme in coming years. They have appointed Scientific and technical subcommittee. Those committees produced recommendations based on the analysis of global, regional practices and the country needs.

Pneumococcal vaccine

Diseases caused by Streptococcus pneumoniae (S. pneumoniae or pneumococcus) are a major public health problem worldwide. Serious diseases that are often caused by pneumococci include pneumonia, meningitis and febrile bacteraemia; otitis media, sinusitis and bronchitis are more common but less serious manifestations of infection. In 2005, WHO estimated that 1.6 million people die of pneumococcal disease every year; this estimate includes the deaths of 0.7–1 million children3 aged <5 years, most of whom live in developing countries.

In Bangladesh the study was conducted and uncovered the substantial diseases burden affecting children living in impoverish communities. Pneumococcus was found consistently a leading cause of severe pneumonia, invasive disease and death among hospitalized children. In Bangladesh the authors estimated the PCV could prevent an incredible one million episodes of pneumonia each year.

The results of active multicentre surveillance network in Bangladesh also showed invasive pneumococcal disease to be the most prevailing in early life, with 48% of patient aged less than 6 months, and 72 % aged less than 12 months.

In 2009 meeting of National Committee on Immunization and practices considered PCV vaccine as one of the priority to be introduce in Bangladesh to reduce child mortality. During this meeting the NCIP discussed the recommendations on PCV introduction as per WHO position paper and also considered the national data from the studies and active surveillance activities conducted in Bangladesh. **NCIP recommended PCV to be introduced in National EPI in Bangladesh**.

Rota vaccine

According to the hospital based surveillance study carried out in 2000 to 2006 in Bangladesh revealed 33% of all diarrhoea admissions among children less than 5 years were due to Rotavirus. 56% of the reported rotavirus positive cases were less than 1 year. Based on that they have estimated that population based incident rates of rotavirus ranged from 10.8 to 19.6/1000 children less than 5 years of age. **This study finding indicates that rotavirus is an important cause of childhood diarrhoea in rural Bangladesh and this burden may be reduced with a rotavirus vaccination programme.**

Second dose of measles vaccine

In accordance with Global and Regional strategy to reduce measles mortality down to 2000 estimates, National EPI prepared A National Plan for reduction of measles mortality in Bangladesh during 2004-2010. In accordance with this plan the measles second dose was provided as measles catch up campaign in 2005-2006 to vaccinate more than 35 million children aged from 9 month to 10 years. Measles follow up campaign was conducted in 2010 to immunize children aged 9 month to 5 years. The achievements are dramatic: more than 80% of deaths related to measles are averted.

In Bangladesh the CES 2010 showed that the mean coverage of measles was 80-85%. With 85% vaccine effectiveness actual protection was given to only 72% of annual birth cohorts (85% x 85% = 72%). In other words, at least 28% remained susceptible to measles.

It was decide in the national measles control plan 2004-2005 that measles second dose will be introduce into routine EPI after the follow up campaign to sustain the achievement of measles mortality reduction.

In addition Bangladesh National EPI supported the recommendation of SEARO to eliminate measles till 2015. National Committee on Immunization and practices during its meeting in 2009 supported the National EPI proposal to eliminate measles in Bangladesh till 2015 and recommended to introduce MCV21 into routine EPI in Bangladesh.

Birth dose of Hepatitis B vaccine

Bangladesh is grouped as intermediate endemic country for Hep B. It was estimated that nearly eight per cent of Bangladesh's total population are infected with the hepatitis B virus. According to the Liver Foundation of Bangladesh (LFB) nearly **3.5 per cent of the pregnant mothers are affected by hepatitis B virus**.

The main objective of hepatitis B immunization strategies is to prevent chronic hepatitis B virus (HBV) infection and its serious consequences, including liver cirrhosis and hepatocellular cancer (HCC). High coverage with the primary vaccine series among infants has the greatest overall impact on the prevalence of chronic HBV infection in children and should be the highest HBV-related priority.

A variety of schedules may be used for hepatitis B immunization in national programmes, depending on the local epidemiological situation and programmatic considerations. In countries

where a high proportion of HBV infections are acquired perinatally, WHO recommend to give the first dose of hepatitis B vaccine as soon as possible (<24 hours) after birth.

Above epidemiological evidence justify the introduction of birth dose of Hep B into the EPI schedule.

Low-dose diphtheria & tetanus toxoid (Td) vaccine

In view of further strengthening of MNT control measures, it is planned that from the year 2011 Government of Bangladesh will introduce low-dose diphtheria and tetanus toxoid vaccine (Td) to the national EPI schedule. WHO position paper on Tetanus vaccination also advocates to introduce vaccine combinations containing diphtheria toxoid (D or d) and tetanus toxoid, rather than tetanus toxoid alone, when immunization against tetanus is indicated.

According to new strategy and considering the three doses of DTP as two doses of TT the third dose of Td will be given at the age of school entry (class-I or 6 Years), the fourth and fifth dose of Td will be given at class-II (at the age of 7 years) and class-III (at the age of 8 years). Children who could not be enrolled in the school (estimated at the level of 8%) will be followed up at community level and will be vaccinated accordingly.

The existing TT schedule for child bearing age women will also be continued till the new schedule fully operationalized.

Rubella vaccine

In 2006, the surveillance system has reported 83 outbreaks of fever and rash. It confirmed by serology that, 34 of them were measles outbreaks and 26 were rubella outbreaks. In contrast 2007 has reported 102 rubella outbreaks but no measles outbreaks. These data indicate that rubella cases need attention for assessing rubella and CRS burden in Bangladesh. For year 2009 surveillance system has reported 1206 rubella cases.

The abovementioned epidemiological evidence warrants the introduction of Rubella vaccine in to the national EPI schedule in future.

D.11 Immunization program advocacy, social mobilization and IEC

Since the second half of the 1990s, the Bangladesh immunization program communication activities have been on an ad-hoc basis, such as during NIDs, Measles NT, and Hib introduction Campaigns. Other than regular TV & Radio advertisements and few fixed advertisement boards, there has not been an effective, sustainable, coordinated (institutionalized) communication strategy implemented to support the behaviours of clients in favour of routine EPI. This may be essential to overcome the future challenges associated new vaccine introduction.

CES 2010 revealed that poor quality of knowledge of mothers/caregivers on vaccination leads most often to misconceptions and/or inability to find vaccination sites and, ultimately, to incomplete vaccination (as discussed later in Section “F. Analysis of barriers to immunization services” on page 21 and illustrated in Figure 12 on page 22). Coupled with a relatively low literacy rates it poses serious challenges for the effectiveness and efficiency of future IEC interventions and calls for more needs tailored, targeted and creative solutions.

E. Accelerated disease control initiatives

Polio eradication, neonatal tetanus elimination and accelerated measles control are the major vaccine-preventable disease control initiatives in Bangladesh.

E.1 Polio eradication

Strengthening Acute Flaccid Paralysis (AFP) Surveillance, conducting supplementary OPV vaccination (NIDs/SNIDSs), mop-up OPV campaigns, and maintaining high routine OPV coverage are the key strategies for polio eradication in Bangladesh.

AFP Surveillance was strengthened with introduction of Surveillance Medical Officers (SMO) network in 1999. The AFP Rate was below 1 until year 2000 and the percentage stool adequacy was less than 80% until 2001. However, since active surveillance in 2002, AFP surveillance quality has improved significantly. The non-polio AFP rate increased from 0.1/100,000 children under 15 years in 1997 to 3.1 in 2007.

Confirmed polio cases peaked in 1999 with 29 confirmed cases. The last indigenous case was reported in 2000 and the country remained free from confirmed poliovirus till early 2006 for more than 5 years – in spite of the on-going polio outbreaks in neighbouring India. In 2006 polio importation occurred in Bangladesh from neighbouring Uttar Pradesh of India. A total of 18 polio cases in 12 districts were identified after importation in 2006.Timly response with very high coverage all rounds of NIDs, strong routine EPI programme and special effort to ensure "reaching the unreached" were the interventions for that Bangladesh was able to stop the virus circulation again. Bangladesh remains free from confirmed wild polio virus again since 2007.

Supplementary OPV Campaigns

Bangladesh has conducted 18 OPV National Immunization Days (NIDs) and many SNIDs to administer OPV to children under 5 years. The campaigns conducted between 1999 and 2010 were combined with NT campaigns *(target group – CBAW)*. Since 18th NID carried out in 2010, the coverage has been more than 98 %.

E.2 Neonatal tetanus elimination

The World Health Assembly in 1998 set the goal of elimination of NT. In December 1999 UNICEF, WHO and UNFPA agreed to set the year 2005 as the target date for global elimination of neonatal tetanus. Toward achieving the global goal to reduce NT cases to less than 1 case per 1000 live births in every district of every country, UNFPA/UNICEF/WHO recommend the following three strategies for achieving MNT elimination:

- Provision of at least two doses of tetanus toxoid (TT) to all pregnant women, and, in high-risk areas, three TT doses to all childbearing aged women;
- Promotion of clean delivery services to all pregnant women;
- Effective surveillance for MNT.

Neonatal Tetanus was a major public health problem in Bangladesh. In 1985, death due to neo-natal tetanus was 41/1000 live births causing more than 100,000 neonatal deaths in a year. In Bangladesh, due to cultural reason most of the deliveries take place at home and are attended by traditional birth attendants.

With the expansion of EPI programme in Bangladesh, the number of deaths due to neonatal tetanus has decreased gradually over the last 15 years. There is relatively high TT2 + coverage among pregnant

women now. Disease incidence surveys show that number of neonatal tetanus death has decreased from 6/1000 live births in 1994 to 2.3/1000 live birth in 2000.

In Bangladesh an integrated surveillance was developed in 1997, later on the guidelines have been revised. Emphasis has been given on weekly reporting of EPI diseases through both active and passive surveillance system.

Bangladesh conducted MNT campaigns in high-risk districts in consecutive three years (1995, 2000 and 2001) and NT campaigns in 2005 and 2006. The first phase conducted in 1995 targeting approximately 3 million women of child bearing age. Second phase of NT campaigns was held through 1999 to 2001 targeting 2.6 million women of childbearing age which is around 15% of total population. The third phase was held in 2006 targeting around 3.5 million women of child bearing age. Bangladesh recently conducted a nation-wide coverage evaluation survey. The survey result revealed that national TT2+ is 94% among pregnant women and 93% of children is protected at birth (PAB) against neonatal tetanus.

In the beginning of immunization program vaccination only to pregnant women with TT has been in the EPI policy. Later on in 1993 national EPI has endorsed and promoted the TT five dose schedules to all child bearing aged (CBA) women of 15-49 years.

With the reduction of reported NT cases a comprehensive review of district level indicators for the risk of NT was conducted in 2008. Overall, the data supported the claim of elimination but it was decided that a survey should be done for confirmation. In 2008, the Ministry of Health and Family Welfare carried out an evaluation using standard WHO protocol to determine whether neonatal tetanus had been eliminated in Bangladesh. Two community based surveys were performed in the 2 districts where children were considered to be at the highest risk from neonatal tetanus. According to the survey results Bangladesh has achieved MNT elimination.

The elimination of MNT in Bangladesh is a major public health success, but significant challenge remains. Maintaining the elimination status would require a continuous strengthening of routine TT immunization services. In addition, as a priority, a far greater percentage of women should be giving birth with trained attendants or in a health facility.

E.3 Accelerated measles control

Bangladesh endorsed the measles mortality reduction goal set at the UN special session on Children in May 2002 and World Health Assembly in 2003. Bangladesh also reaffirmed its commitment through endorsing the recommendations of WHO/SEARO regional Technical Consultative Group meeting in June 2003 and Cape Town declaration on measles in October 2003. In accordance with joint WHO-UNICEF measles mortality reduction strategic plan, Bangladesh adopted National Measles Control Plan of Action 2004-2010.

The overall goal of the Measles Control Plan of Action 2004 – 2010 was to reduce the number of measles deaths by half by 2006 relative to 1999 estimates. The specific objectives are:

1 To achieve at least 90% measles containing vaccine (MCV1) coverage nationally and 80% MCV1 coverage in all districts by 2010

2 To achieve 90% completeness and 80% timeliness weekly reporting of measles cases and deaths, together with AFP, NT and other priority VPDs, from facilities including “0” reporting by 2010

3 To conduct case-based measles surveillance within an integrated VPDs surveillance

4 To investigate while ensuring adequate clinical case management of all measles outbreaks by 2009

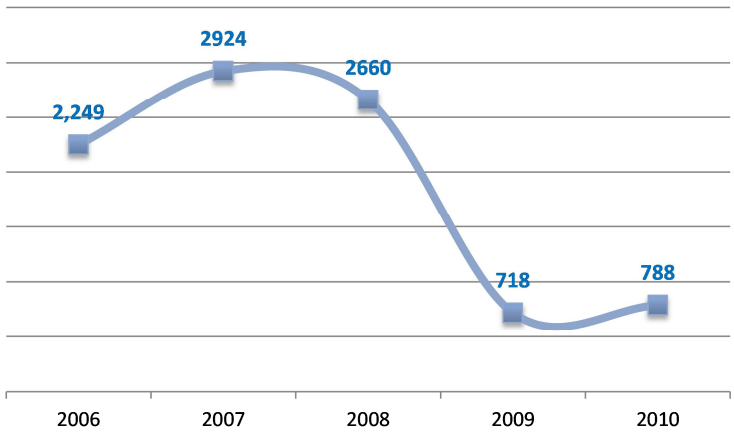
5 To provide a second opportunity for measles vaccination for eligible children while ensuring more than 90% coverage nationally by 2010

In Bangladesh, baseline (pre immunization) measles data from 1984 WHO EPI study indicated that nearly 2.6 million cases of measles used to occur annually among children 0-4 years of age, with a case fatality rate 1.74%. Thus, there was an estimated 45,240 measles deaths among children of under 5 years in 1984.

In 2009, EPI programme has managed to reach national level measles-1 coverage among infants over 90%; still 11 out of 64 (17%) districts reported measles coverage less than 80%. To achieve the National goal, Measles vaccination through the routine immunization program needs to be strengthened further with special emphasis to the poor coverage districts in the future.

Measles catch up campaign was successfully conducted targeting 35 million children from 9 months to 10 years in 2005-06. No measles outbreaks were confirmed in 2007 by laboratory testing, indicating that measles virus circulation has been reduced after catch-up campaign.

Figure 11: Reported measles cases



There has been a drop in the number of measles cases reported from outbreaks in the country since 2006. There were 2,095 measles cases reported from 34 laboratory confirmed measles outbreaks in 2006 and no measles outbreaks were reported in 2007. After supplementary immunization activities, number of reported measles cases has dropped to 2,249 in 2006 to 2,097 in 2007, 2,660 in 2008, 718 – in 2009 and 788 in 2010. Since these cases were not laboratory confirmed, diagnosis was limited to clinical suspicion. To overcome this Bangladesh EPI programme has introduced measles case based surveillance in all health facilities in 2008.

Government of Bangladesh has successfully conducted a measles follow-up campaign in year 2010 targeting all children aged from nine months to sixty months. It was also planned that a second dose of Measles vaccine will be introduced in the routine immunization program from 2011.

F. Analysis of barriers to immunization services

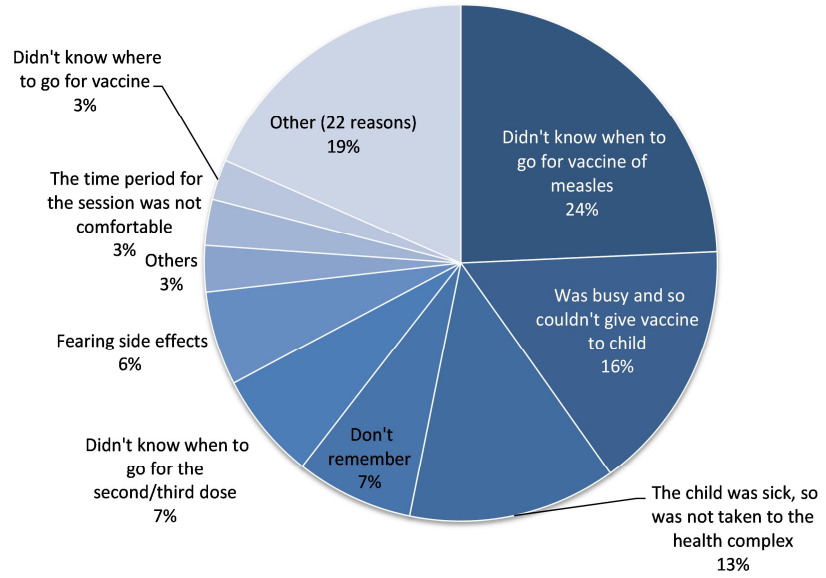
Barriers that affect achievement and sustenance of desired levels of vaccination covers can be grouped into 2 categories (for the purpose of an analysis):

- Supply side barriers (availability of service delivery sites, access to immunization services – geographical and/or financial)

- Demand side barriers (knowledge and understanding of the importance, misconceptions, other social and cultural determinants)

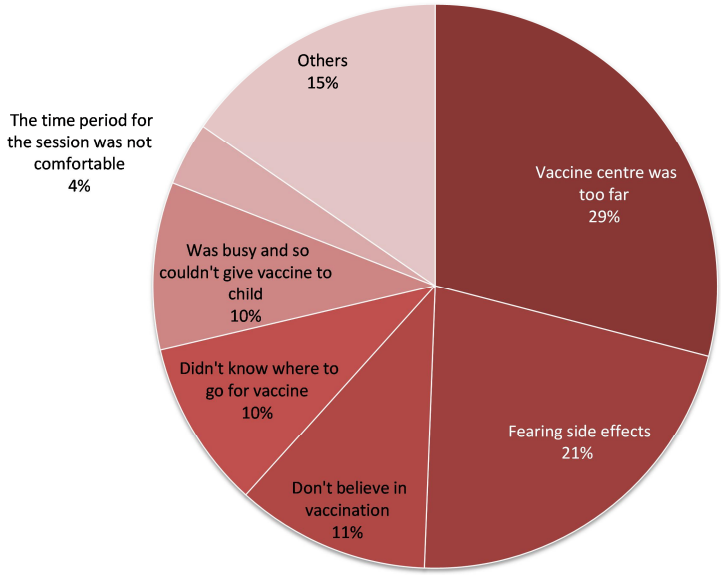
The analysis of reasons for partial vaccination revealed poor information on the location of vaccination site was the most frequent reason (34%=24%+7%+3%) mothers/caregivers failed to fully child. Another 16% reported to be busy and not able to take child to a vaccination site as shown in Figure 12 below:

Figure 12: Reasons for Partial Vaccination among 12-23 Months Old Children by National Data in 2010 (CES 2010) (n=834)



In total 164 respondents mentioned one major reason of failing to get any kind of vaccination: 29 of them (that is 17.7%) indicated that "Didn't know that my child should be given vaccine". In the rest 135 cases (when mother/caregiver was aware of vaccination) two reasons accounted for the half of situation when child had not received vaccination at all (as shown in Figure 13 below): "Vaccine Centre was too far" – 29% and "Fearing side effects" – 21%.

Figure 13: Reasons for complete lack of Vaccination among 12-23 Months Old Children by National Data in 2010 (CES 2010) (n=135)



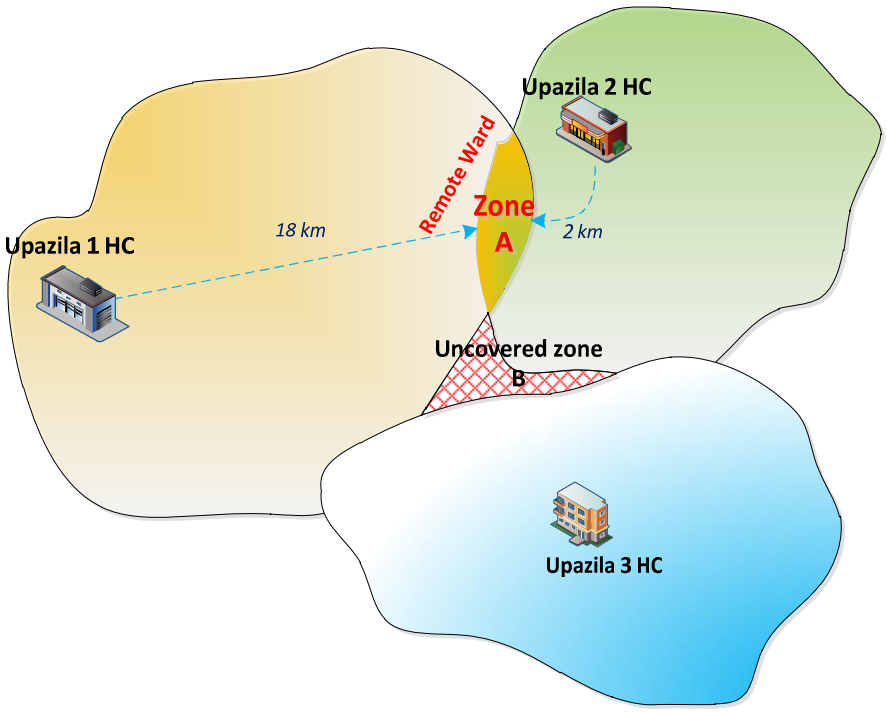
It could be concluded that major reasons of partial or completely no vaccination rest on the demand side: mothers were either not aware where to get vaccination (assuming that they were willing to do so) or they refrained because of misconceptions (did not believe in vaccination or were afraid of side effects). However, geographical access problem ("vaccination site is too far") was mentioned by 29% of respondents whose child missed all antigens. Other supply side problems (such as inability of vaccinators to administer) were really negligible (<2%).

It should be stressed that due to the CES 2010 methodology these findings should be interpreted carefully: mothers were asked to point to one, the most important reason. There could be other reasons of almost equal importance. Therefore, addressing just one reason may not produce expected result: for instance, let us concentrate on 34% of respondents who were not aware where to get vaccination services; if the mothers/caregivers become much better informed about the location of the vaccination site they may still not apply for vaccination because of other reasons (misconceptions or being busy) not captured by the survey.

Another set of problems on the supply side arises due to administrative division specificities as shown in Figure 14 below:

- Upazila Health Complex (HC) can occur quite far from a union/ward bordering with another Upazila with HC much closer to this ward (see Remote area A in the scheme). It makes difficult and less efficient to supply vaccines from Upazila 1 HC to area A than from HC from neighbouring Upazila 2. The issue is sometimes addressed through managerial intervention to change traditional flow of vaccines and injection supplies (Union/ward gets vaccines from Upazila 2 HC instead of Upazila 1 HC).
- Although not very common still uncovered zones (area B on the scheme) can be found between 2 or more bordering Upazilas: it is not clear which entity is responsible to provide immunization services in such pockets of ZERO coverage.

Figure 14: Common situation with the administrative borders and geographical characteristics of Upazila



G. Summary of situational analysis

Issues discussed in the different sections of the situational analysis are summarized in Figure 15 below:

Figure 15: Situation Analyses Matrix & Summary Table

	Key Barriers	Key Enablers
Immunization program –Specific Issues	**Access to immunization and other health services**	
	• Sustaining outreach supervisory visits due to inadequate staff, logistics and funds • Vacant posts, especially at lower levels • Unavailability of proper primary health care delivery system (infrastructure) at city corporation level. • Pockets not covered by Upazila Health Complexes or remote wards within administrative borders of Upazila with inefficient logistical support	• Availability of wide network of Community Clinics and Outreach Sites to support immunization services in rural areas • Strong linkage with communities • Motivated and committed staff at service delivery level • Availability of review meetings at all levels • Availability of regular supportive supervision mechanism from higher levels • Availability of trained manpower, many of whom have had MLM training • GAVI ISS funds for staff recruitment at lower levels
	Immunization Coverage and Performance	
	• Complete immunization coverage among under one year, at national level is 75% • Low TT5 coverage (53%)among child bearing age women • 163/64(20%) districts having less than 80% coverage for DPT3 and 11/64 (17%)for Measles • High staff turnover in some districts • Non availability or underutilization of the following vaccines in the National EPI schedule which are	• Implementation of TT-5 dose schedule • 39/64 districts high-performing districts • Consistent national BCG coverage more than 95% • Improving OPV3 coverage (96% in 2009) • Possibility to finance introduction of new antigens via GAVI and commitment of the GoB to co-finance new vaccines

Key Barriers	Key Enablers
proven to be capable to reduce the current childhood morbidity and mortality in Bangladesh: Pneumococcal, Rotavirus, Rubella, Measles-2, dT, Hepatitis-B birth dose.	
EPI Logistics • Lack of training for technical EPI staff at all levels. • Inadequate cold chain storage capacity for new vaccines at all the levels	• Availability of computerized logistics management system • Trained logistics staff in most districts • Logistics reporting, requisition, and distribution mechanism in place
Injection Safety • Non availability of safe and environmental friendly waste disposal system for disposal of EPI waste	• Use of AD syringes for all vaccination • Local production of AD syringes • AEFI surveillance system in place
Accelerated Disease Control • Possibility of Polio importation from neighbouring countries • Need to put extra effort to maintain MNT elimination status due to high percentage of home deliveries (80%) • Still Significant measles morbidity and mortality prevailing in the county	• High quality and high coverage SIAs • Good routine coverage • Strong active EPI surveillance system with high consistently quality indicators
Financing • Funding gap likely, with the end of GAVI Phase II support • Resource requirements especially for new vaccines introduction	• GoB support for immunization through the HNPSP • Opportunities for EPI funding through GAVI Phase II and HSS facilities as well

	Key Barriers	Key Enablers
		as other donor facilities
Sectoral / Other External Issues	• Lack of focal person from Government side for active VPD disease surveillance at District, Upazila and City Corporation levels • Relatively high vaccine wastage • Poor coverage of AEFI surveillance	• Strong government commitment to immunization and child health • Availability of Global and national goals and initiatives that relate to immunization • Improving communication networks and internet facilities that may facilitate better information transmission and communication between all levels • Increasing macro-economic status of Bangladesh

The major barriers in achieving and sustaining high immunization coverage are as follows:

- On the supply side:
  - 10-12% of the critical workforce at the front line of immunization service delivery
  - Lack of primary health care infrastructure/service in urban areas and heavy reliance on NGO sector and external donor support
- On the demand side: low level of information on the necessity, availability and safety of vaccination among certain groups of population

The major problem causing the medical staff deficit is out of the scope of EPI: though funds are available to finance health assistants and family welfare assistants and human resources supply on the labour market is sufficient, it takes 2-3 years to recruit new personnel on existing positions due to existing procedures and practices in the public domain (creating similar bottlenecks in other areas/programs of health care). The risk of reduction of coverage rates even if the immunization system demonstrates 100% performance is very high considering that the temporary solution (using GAVI ISS funds hire volunteers and fill in existing vacancies thus bypassing public bureaucratic procedures) exhausts soon (Bangladesh does not expect to receive ISS rewards in the foreseeable future).

If enough resources to finance NGO service (until public primary health care infrastructure capacity meets the country needs in urban areas) are not mobilized the EPI may face serious problems in the provision of access to approximately one fourth of population living in urban areas.

The main obstacle to the introduction of new vaccines is related to the cold chain constraints. If the storage capacity is not upgraded timely (in accordance with the Improvement Plan based on the recent EVM assessment) introduction of new vaccines will be postponed.

Additional but not least important challenge the NIP faces is related to the high reliance on outreach services (accounting for 98% of the services delivered) – a core stone of the country success in

achieving high coverage of routine immunization. It makes almost impossible to enforce the open-vial policy (that is limited to fixed sites only – that is Upazila Health Complexes and specialized and/or district hospitals) and the NIP opted for single dose presentations to minimize wastage rates. Having obvious benefits on the programmatic side it poses serious problems to financial sustainability of the NIP in long run and has already increased burden on the storage and logistics capacity (ultimately calling for larger financial investments in cold chain in short run).

Section II. Immunization program objectives and strategies

A. National priorities, NIP objectives and milestones

The GoB defined priority order of the main problems and challenges and set corresponding NIP objectives with milestones ass shown in Figure 16 below:

Figure 16: National level priorities, NIP objectives and milestones

Discretion of problem	NIP Objectives	NIP milestones	Order of priority
1 Completed immunization coverage among under one year, at national level is 75%. 2 Only 53% of the child bearing age women had fully TT protection (TT -5) 3 Significant disparity can be observed regarding the immunization coverage among districts 4 Prevailing of vacant posts, especially at lower levels in the EPI service delivery system.	1. Improve immunization coverage among children under one and child bearing age women, namely 1)At least 90% fully immunization coverage among under one at national level and 85% full immunization coverage at each district level. 2) TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.	• 2011- > 78% FIC in every district • 2012 - > 80% FIC in every district • 2013 - > 83% FIC in every district • 2014 - > 85% FIC in every district • 2015 - > 88% FIC in every district • 2016 - > 90% FIC in every district	1
5 Non availability of proper primary health care delivery system at city cooperate level. 6 Lack of training opportunities for technical EPI staff at all levels.	2. TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.	• 2011- > 55% with TT5 protection • 2012- > 60% with TT5 protection • 2013- > 65% with TT5 protection • 2014- > 70% with TT5 protection • 2015- > 75% with TT5 protection • 2016- > 80% with TT5 protection	1
7 Need to put extra effort to maintain the polio free status in the country due to presence of polio outbreaks in neighbouring India.	3.Maintain polio free status	Maintain polio free status	2
8 Need to put extra effort to maintain MNT elimination status in the country due to: 9 Only 53% of child bearing age women are fully protected with TT. 10 Nearly 80% of the deliveries are home deliveries. 11 Significant disparity can be observed regarding the immunization coverage for TT among districts	4.Maintain maternal and neonatal tetanus elimination status	2011 onwards: Maintain NT rate < 1 per 1000 live births in all districts	2

Discretion of problem	NIP Objectives	NIP milestones	Order of priority
12 Need to put extra effort to maintain the current measles control status and reached measles elimination status in 2016	5. Achieve national level 95% measles coverage and reaching measles elimination status by 2016	2011onwards, reduction of reported number of measles cases each year by 10%- 15% of previous years reported cases.	3
13 Non availability or underutilization of the following vaccines in the National EPI schedule which are proven to be cable to reduce the current childhood morbidity and mortality in Bangladesh. 14 Inadequate cold chain storage capacity for new vaccines at all the levels	6. Prevention of diseases protected by new and underused vaccines	Successful introduction of following new and underused vaccines in all districts: • Pneumococcal vaccine by the end of 2013 • Rota vaccine by the end of 2014 • Rubella vaccine by the end of 2012 • Hepatitis B birth dose by the end of 2014 • Td vaccine by the end of 2016 • Measles 2nd dose at second year of life by the end of 2012	4
15 Non availability of safe and environmental friendly waste disposal system for disposal of EPI waste.	7.Ensure safe injection practices and waste disposal	Availability of safe operational EPI waste disposal system in : • 2012 – 10% of Upazilas • 2013 – 20% of Upazilas • 2014 – 30% of Upazilas • 2015 – 40% of Upazilas • 2016 – 50% of Upazilas	5

The following strategies and key activities grouped by major immunization system components have been defined to achieve the aforementioned NIP objectives:

Figure 17: Objectives, Strategies and key activities of cMYP

Objective	Strategy	Key activities
1. Improve immunization coverage among children under one and child bearing age women, namely 1)At least 90% fully immunization coverage among under one at national level and 85% full immunization coverage at each district level. 2) TT5 coverage among	**Service delivery**	
	1. RED strategy implemented in every district	1 Prepare Districts/Upazila level annual district/Upazila RED micro-plan to reach every children and child bearing age women
		2 Identify low performing districts/Upazila
		3 Regular supportive supervisory visit to each Upazila at least once per month by a supervisor
		4 Established proper primary healthcare delivery system to city cooperates
		5 Review district/Upazila and city cooperate coverage performance and vaccine wastage quarterly

women of childbearing age reached at least 80% at national level and 75% at each district level.		6	Prepare Districts/Upazila level annual district/Upazila micro-plan with especial emphasis to reduce the vaccine wastage
	Advocacy and Communication		
	2. Strengthen coordination with development partners, local NGOs and GoB	1	Conduct regular ICC meetings
		2	Broaden agenda and participation of ICC
		3	Better involvement of NGOs
		4	Involving community leaders linking community with immunization planning and implementation
		5	Develop district level community strategy and implement Social mobilization using community health workers/volunteers
	Surveillance		
	3. Strengthening of immunization coverage and VPD surveillance system in all districts	1	Review and analyze coverage and VPD surveillance data at all level and disseminate feedback to stakeholders
		2	Availability and timely distribution of disease surveillance & coverage format
		3	Introduction of case based laboratory surveillance for all VPD diseases
		4	Training on VPD surveillance
	Vaccine supply Quality and logistics		
	4.Ensure sufficient , timely and potent vaccines and quality injection devices available at all level with no stock out	1	Made timely and accurate vaccine forecast and procurement at national level
		2	Made timely and accurate vaccine forecast at district/Upazila level
		3	Effective cold chain management at all level
		4	Cold chain rehabilitation and expansion plan at each level developed and followed
		5	Vaccine stock management assessment conducted periodically (EVM)
		6	Timely vaccine distribution to each level
		7	Maintain adequate buffered stocks at all levels
		8	Periodical training of staff on vaccine and cold chain management
		9	Proper monitoring and supervision of vaccine distribution and storage
		10	Proper stock management in every district
		11	Regularly monitor district level stock in national database.
		12	Appropriate storage of other vaccine logistics at all level
	Programme Management		

	5. Periodical review of the National EPI program performance at each level and take timely and appropriate measures accordingly.	1	EPI review is conducted quarterly at district and Upazila level and biannually at national level
		2	Immunization sessions are monitored and supervised
		3	Monthly reporting of routine immunization coverage data to central level in timely manner
		4	Periodically VPD data are reviewed (both district & National level) and take appropriate action
		5	Conduct immunization coverage surveys periodically
	6. Develop staff recruitment plan with budget.	1	Conduct audit to identify vacant post related to EPI service delivery at central, district and Upazila level
		2	Vacant staff positions are filled with qualified trained persons, priority goes to poor performing districts
		3	Establish human resource development plan for EPI programme
		4	Refresher training of staff (Immunization in Practice, Mid-Level Management, surveillance, vaccine management, cold chain)
2.Maintain polio free status	**Service delivery**		
	1. Conduct Periodic polio SIAs 2. Maintain high coverage with quality OPV routine immunization	1	Conduct annual NIDs till polio is free in the region targeting under 5 children
		2	Vitamin A, de-worming tablets and other health interventions are provided during NIDs
		3	Special emphasis shall be focused on low performing districts
	Advocacy and communication		
	3. Strengthen polio eradication measures coordination with development partners, local NGOs and GoB	1	Conduct regular polio ICC meetings
		2	Broaden agenda and participation of ICC meetings
		3	Better involvement of NGOs
		4	Regular communication with curative sector
		5	Involving community leaders linking community with immunization planning and implementation
		6	Sharing of surveillance data with stakeholders
		7	Conduct advocacy meeting with different stake holders
	Surveillance		
	4. Strengthened AFP surveillance system	1	Ensure active AFP surveillance in all district
		2	Improve timeliness and completeness of weekly and monthly reporting of AFP and other VPD data

		3 Ensure quality of surveillance data
		4 Improve timeliness and completeness of collection of stool samples and reporting
	Vaccine supply, quality and logistics	
	5. Make available all the logistics for Effective implementation of Polio eradication activities	1 Timely availability of adequate supplies for SIAs at all level
		2 Timely availability of all logistics for AFP surveillance (stool containers, forms, guidelines, IEC materials, transport)
	Programme management	
	6. Effective implementation of polio eradication activities	1 Training of staff on AFP surveillance activities
		2 Review and analyze coverage and surveillance data at all level periodically and disseminate to stakeholders
		3 Regular review of polio status in neighboring countries
3. Maintain maternal and neonatal tetanus elimination status	**Service Delivery**	
	1 Maintain high coverage of TT5 among childbearing age women and high PAB	1 Continue to follow TT5 schedule in routine immunization program among childbearing age women
		2 Special emphasis shall be focused on low TT coverage districts
		3 Practice clean delivery at community
		4 Improve institutional delivery by incentive scheme
	Advocacy and communication	
	2 Strengthen coordination with development partners, local NGOs and GoB	1 Conduct regular ICC meetings
		2 Broaden agenda and participation of ICC meetings
		3 Better involvement of NGOs
		4 Involving community leaders linking community with immunization planning and implementation
		5 Conduct advocacy meeting with different stake holders
		6 Regular communication with curative sector
		7 Sharing of MNT surveillance data with stakeholders
	Surveillance	
	3 Intensify MNT surveillance	1 Improve timeliness and completeness of weekly and monthly reporting of MNT and other VPD data
		2 Review and analyze coverage and surveillance data at all level and disseminate to stakeholders periodically
		3 Ensure quality of surveillance data

	Vaccine supply, quality and logistics		
	4	Make available all the logistics for Effective implementation of MNT elimination activities	1 Timely availability of all logistics for surveillance (forms, guidelines, IEC materials, transport)
			2 Ensure availability of TT vaccines and related logistics
			3 Ensure availability of dT vaccines and related logistics available
	Programme management		
	5	Effective implementation of MNT elimination activities	1 Review and analyze coverage and surveillance data at all level periodically and disseminate feedback to stakeholders
			2 Training of staff on MNT surveillance activities
			3 Introduce dT among school age children
4. Achieve national level 95% measles coverage and reaching measles elimination status by 2016	**Service Delivery**		
	1. Maintain high MCV1coverage		1 Special emphasis shall be focused on low MCV 1 coverage districts
			2 Include routine MCV1 immunization for infants into district micro plans
	Advocacy and communication		
	2. Strengthen coordination with development partners, local NGOs and GoB		1 Conduct regular ICC meetings
			2 Broaden agenda and participation of ICC meetings
			3 Better involvement of NGOs
			4 Involving community leaders linking community with immunization planning and implementation
			5 Conduct advocacy meeting with different stake holders
			6 Regular communication with curative sector
			7 Review and analyze coverage and surveillance data at all level and disseminate to stakeholders
	Surveillance		
	3. Intensity measles surveillance		1 Improve timeliness and completeness of weekly and monthly reporting of Measles and other VPD data
			2 Improve timeliness and completeness of collection of samples and reporting
			3 Continue case base measles surveillance and laboratory investigation
			4 Ensure quality of surveillance data
	Vaccine supply, quality and logistics		
	4.Make available all the logistics for Effective		1 Update and provide all logistics for surveillance (forms, guidelines, IEC materials, transport)

	implementation of measles control activities	2	Measles vaccines and related logistics available
		3	Measles vaccines and related logistics available for the 2nd dose of measles
	5.Effective implementation of measles control measures	1	Data review and periodically give feedback to relevant stakeholders
		2	Ensure availability of logistics for the measles control activities
		3	Training of staff on VPD surveillance activities
		4	Introduction of Measles 2nd dose to the EPI schedule
	6.Provide second opportunity of measles	1	Upgrade cold chain capacity to accommodate MCV vaccines for the 2nd
		2	Apply to GAVI and other partners to support 2nd dose measles in vaccination calendar
	Program management		
	7. Strengthen managerial capacity at all levels for the implementation of 2nd of Measles introduction	1	Revise practice guidelines and forms
		2	Conduct training of health and managerial staff and advocacy at all levels
		3	Carry out monitoring and supervision of the introduction of the 2nd dose of measles
5. Prevention of diseases protected by new and underused vaccines	**Service Delivery**		
	1 Introduce pneumococcal vaccine	1	Revise practice guidelines and forms
		2	Train health care personnel in the administration of PCV vaccines
		3	Include new vaccine introduction into district micro plans
	2 Introduce Rota vaccine	1	Revise practice guidelines and forms
		2	Train health care personnel in the administration of PCV vaccines
		3	Include new vaccine introduction into district micro plans
	3 Introduce Rubella antigen	1	Revise practice guidelines and forms
		2	Train health care personnel in the administration of PCV vaccines
		3	Include new vaccine introduction into district micro plans
	4 Introduce Hepatitis B vaccine birth dose	1	Revise practice guidelines and forms
		2	Train health care personnel in the administration of PCV vaccines
		3	Include new vaccine introduction into district micro plans
	5 Introduce dT vaccine	1	Revise practice guidelines and forms
		2	Train health care personnel in the administration of PCV vaccines
		3	Include new vaccine introduction into district micro plans
	Advocacy and communication		

	6. Strengthen coordination with development partners, local NGOs and GoB	1 Conduct regular ICC meetings
		2 Broaden agenda and participation of ICC meetings
		3 Better involvement of NGOs
		4 Involving community leaders linking community with immunization planning and implementation
		5 Ensure financial sustainability of new vaccines
		6 Develop targeted communication strategies and approach to reach mothers about new vaccines
		7 Train interpersonal communication skills of all health staff
	Surveillance	
	7. Establishment of surveillance system for diseases covered by new antigens.	1 Establish disease burden surveillance for targeted diseases
		2 Incorporate new diseases into the existing VPD surveillance system
		3 Introduce new surveillance formats
		4 Close collaboration with academic institutions
	Vaccine supply, quality and logistics	
	8. Effective in-cooperation of new vaccine into national EPI program	1 Vaccines and other logistics available for new vaccines introduction
		2 Upgrade Cold chain storage space all level for new vaccines
		3 Availability of storage capacity for other logistics
		4 Effective cold chain maintenance operate at all level
		5 Availability of VVM in all individual vaccine vials
	Programme management	
	8. Introduction of new vaccines according to the planned timeline	1 Ensuring financial sustainability of newly introduced vaccines
		2 Seek concurrence from ICC and NCIP for introduction of new vaccines and other under-used vaccines
		3 Train managerial staff on new vaccines
		4 Train Staff on the management of AEFI
6.Ensure safe injection practices and waste disposal	**Service delivery**	
	1 AEFI surveillance system strengthened	1 Improve the timeliness and completeness of AEFI reporting
		2 Training on AEFI Management for MLMs
		3 Regular review of AEFI data with relevant stakeholders and provide feedback

	2. Implementation on national plan on sharp and waste management for EPI waste	1	Improve the timeliness and completeness of AEFI reporting
		2	Pilot other safe waste disposal methods
		3	Sustain use of AD syringes/safety boxes
		4	Practice relatively safe disposal methods till establishment of proper waste disposal system
		5	Piloting of environmental friendly incinerators and expansion to the Upazila level
	Advocacy and communication		
	3. Increase effectiveness of the implementation of safe injection practices considering the country specifics	1	Develop communication strategy for AEFI
		2	Develop communication strategy for waste disposal.
		3	Orientation meeting with media on AEFI
		4	Regular review of AEFI situation with relevant stakeholders and provide feed back
		5	Better involvement of NGOs
	Surveillance		
	4. Strengthen AEFI surveillance system and ensure injection safety	1	Support all health centers to report AFEI as part of surveillance system
		2	Improve timeliness and completeness of AEFI reporting
	Vaccine supply, quality and logistic		
	6.Make available all the logistics for implementation of safe injection practices	1	Availability of AD syringes and safety boxes at all levels
		2	Proper maintenance of existing incinerators
	Programme management		
	6.Effective implementation of safe injection practices	1	Training of staff on safe injection practices
		2	Identify and recommend suitable places for install incinerators
		3	Provision of incinerators
		4	Assign tasks to appropriate staff for maintenance of incinerators
		5	Train staff on AEFI management

B. Strategies and key activities

Objective 1. Improve immunization coverage among children under one and child bearing age women, namely

1) At least 90% fully immunization coverage among under one children at national level and 85% full immunization coverage at district level.

2) TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.

In view of reaching this objective (with 2 sub-objectives), further improvement and expansion of the EPI during the coming years is mandatory. This may include setting new feasible targets, researching new techniques and exploring the means to be more effective, equitable and efficient service delivery at all levels.

Failure to reach expected immunization coverage targets in Bangladesh EPI are related to a number of programmatic factors, such as often limited capacity of the especially vaccinators at the rural settings, non-availability of proper primary health care delivery system (infrastructure) at urban settings, lack of social mobilization, lack of supportive supervision, lack of mechanism to address immunization needs of slum areas (where rapid population migration regularly taking place) & difficult to reach areas in the in rural settings .

To address the above mention programmatic factors, following broad Strategies are incorporated into the cMYP

- Implement RED strategy in every district, giving special emphasis to the low coverage areas
- Establishment of proper primary health care delivery system at city cooperation level
- Incorporate regular supportive supervision at each level
- Strengthen coordination with development partners and local NGOs/CBOs
- Strengthening of coverage and VPD surveillance system in all districts
- Ensure sufficient, timely and potent vaccines and quality injection devices available at all level with no stock out
- Periodical review of the National EPI program performance at each level and take timely and appropriate measures accordingly.
- Develop & implement staff recruitment plan with budget.

Objective 2. Maintain polio free status

By effectively implementing Acute Flaccid Paralysis (AFP) Surveillance, conducting supplementary OPV vaccination (NIDs/SNIDSs), mop-up OPV campaigns, and maintaining high routine OPV coverage Bangladesh managed to maintain the polio free status since 2006. In the presence of on-going polio outbreaks in neighbouring India and presence of few districts with relatively low OPV coverage, Bangladesh need to put extra effort to intensify the above strategies in coming years to maintain the polio free status in the country.

Objective 3. Maintain maternal and neonatal tetanus elimination status

Achieved elimination status of MNT in Bangladesh (2008) is a major public health success, but significant challenge remains to maintain this status especially due to the fact that 80% of deliveries still taking place outside the institutions. Other than that TT complete coverage (TT5) among child bearing age females remain around 53%. In view of maintaining this MNNT elimination status, following broad Strategies are incorporated into the cMYP

- Maintain high coverage of TT5 among childbearing age women
- Maintain high TT protection at birth
- Intensify current NT surveillance
- Introduce Td among school age children

Objective 4. Achieve national level 95% measles coverage and reaching measles elimination status by 2016

In 2009, EPI programme has managed to reach national level measles-1 coverage among infants over 90%, still 11 out of 64 (17%) districts reported measles coverage less than 80%.

Over the last few years Bangladesh EPI programme managed to control the morbidity and mortality associated with measles up to a significant level by maintaining high coverage of measles-1 among infants, immunizing 35 million children from age 9 months to 10 years during the measles catch up programme in 2006 and immunizing all children aged nine months to sixty months during measles follow-up campaign in year 2010. To achieve the measles elimination status by 2016, Bangladesh EPI programme need to intensify the measles control activities in coming years. For that, following broad Strategies are incorporated into the cMYP

- Maintain high MCV1 coverage among infants with special emphasis to the low coverage districts
- Intensity measles surveillance
- Introduction of Measles 2nd dose to the EPI schedule

Objective 5. Prevention of diseases protected by new and underused vaccines

Bangladesh Government and EPI programme is planning to introduce Pneumococcal vaccine, Rota vaccine, Birth dose of hepatitis B vaccine, second dose of measles vaccine and Td vaccine in to the national EPI programme in coming years with GAVI support. To achieve this objective following broad Strategies are incorporated into the cMYP

- Strengthen coordination with development partners, local NGOs/CBOs, institutions
- Establishment of surveillance system for diseases covered by new antigens.
- Introduction of new vaccines according to the planned timeline
- Ensure the future financial sustainability

Objective 6. Ensure safe injection practices and waste disposal

For the last few years Bangladesh EPI programme exclusively use AD syringes for all EPI vaccinations. When we consider the number of antigens administered, reported number of AEFI seems to be far less than the expected. Though under HPSP and later HNPSP, government of Bangladesh identified medical waste management as a priority area, still there is no proper EPI waste management mechanism in place. Majority of the Upazila use pit burning method to dispose medical wastes. To address this important area in future, following broad Strategies are incorporated into the cMYP.

- AEFI surveillance system strengthened
- Implementation on national plan on sharp and waste management for EPI waste
- Strengthen AEFI surveillance system
- Ensure injection safety

C. Timeline for the key activities

Sequence of key activities (grouped under corresponding Objectives and strategies) bound to timelines are presented below. Specific activities and timelines required for the introduction of new vaccines are discussed in detail in next sub-section (see "C.2 Action plan for the introduction of new vaccines" on page 48).

C.1 Key activities by Objectives and Strategies

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
Objective 1: Improve immunization coverage among children under one and child bearing age women, namely: 1) At least 90% fully immunization coverage among under one at national level and 85% full immunization coverage at each district level 2) TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.												
Strategy 1.1: RED strategy implemented in every district												
1.1.1: Prepare Districts/Upazila level annual district/Upazila RED micro-plan to reach every children and child bearing age women		X		X		X		X		X		X
1.1.2: Identify low performing districts/Upazila	X		X		X		X		X		X	
1.1.3: Regular supportive supervisory visit to each Upazila at least once per month by a supervisor	X		X		X		X		X		X	
1.1.4: Established proper primary healthcare delivery system to city cooperates	X		X		X		X		X		X	
1.1.5: Review district/Upazila and city cooperate coverage performance and vaccine wastage quarterly	X	X	X	X	X	X	X	X	X	X	X	X
1.1.6: Prepare Districts/Upazila level annual district/Upazila micro-plan with especial emphasis to reduce the vaccine wastage		X		X		X		X		X		X
Strategy 1.2: Strengthen coordination with development partners, local NGOs and GoB												
1.2.1: Conduct regular ICC meetings	X	X	X	X	X	X	X	X	X	X	X	X
1.2.2: Broaden agenda and participation of ICC		X										
1.2.3: Better involvement of NGOs			X		X		X					
1.2.4: Involving community leaders linking community with immunization planning and implementation		X		X		X		X		X		X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
1.2.5: Develop district level community strategy and implement Social mobilization using community health workers/volunteers		X		X		X		X		X		X
Strategy 1.3: Strengthening of immunization coverage and VPD surveillance system in all districts												
1.3.1: Review and analyse coverage and VPD surveillance data at all level and disseminate feedback to stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
1.3.2: Availability and timely distribution of disease surveillance & coverage format		X	X									
1.3.3: Introduction of case based laboratory surveillance for all VPD diseases				X	X		X		X		X	
1.3.4: Training on VPD surveillance			X	X					X	X		
Strategy 1.4: Ensure sufficient , timely and potent vaccines and quality injection devices available at all level with no stock out												
1.4.1: Made timely and accurate vaccine forecast and procurement at national level	X	X	X	X	X	X	X	X	X	X	X	X
1.4.2: Made timely and accurate vaccine forecast at district/Upazila level	X	X	X	X	X	X	X	X	X	X	X	X
1.4.3: Effective cold chain management at all level	X	X	X	X	X	X	X	X	X	X	X	X
1.4.4: Cold chain rehabilitation and expansion plan at each level developed and followed			X	X	X	X						
1.4.5: Vaccine stock management assessment conducted periodically (EVM)					X	X						
1.4.6: Timely vaccine distribution to each level	X	X	X	X	X	X	X	X	X	X	X	X
1.4.7: Maintain adequate buffered stocks at all levels	X	X	X	X	X	X	X	X	X	X	X	X
1.4.8: Periodical training of staff on vaccine and cold chain management			X			X			X		X	
1.4.9: Proper monitoring and supervision of vaccine distribution and storage	X	X	X	X	X	X	X	X	X	X	X	X
1.4.10: Proper stock management in every district	X	X	X	X	X	X	X	X	X	X	X	X
1.4.11: Regularly monitor district level stock in national database	X	X	X	X	X	X	X	X	X	X	X	X
1.4.12: Appropriate storage of other vaccine logistics at all level	X		X		X		X		X		X	
Strategy 1.5: Periodical review of the National EPI program performance at each level and take timely and appropriate measures accordingly.												
1.5.1: EPI review is conducted quarterly at district and Upazila level and biannually at national level	X	X	X	X	X	X	X	X	X	X	X	X
1.5.2: Immunization sessions are monitored and supervised	X	X	X	X	X	X	X	X	X	X	X	X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
1.5.3: Monthly reporting of routine immunization coverage data to central level in timely manner	X	X	X	X	X	X	X	X	X	X	X	X
1.5.4: Periodically VPD data are reviewed (both district & National level) and take appropriate action	X	X	X	X	X	X	X	X	X	X	X	X
1.5.5: Conduct immunization coverage surveys periodically	X		X		X		X		X		X	
Strategy 1.6: Develop staff recruitment plan with budget.												
1.6.1: Conduct audit to identify vacant post related to EPI service delivery at central, district and Upazila level	X		X		X		X		X		X	
1.6.2: Vacant staff positions are filled with qualified trained persons, priority goes to poor performing districts			X	X		X		X		X		X
1.6.3: Establish human resource development plan for EPI programme			X	X	X							
1.6.4: Refresher training of staff (Immunization in Practice, Mid-Level Management, surveillance, vaccine management, cold chain)			X	X	X				X			
Objective 2: Maintain polio free status												
Strategy 2.1: Combine periodic polio SIAs with a high coverage quality OPV routine immunization												
2.1.1: Conduct annual NIDs till polio is free in the region targeting under 5 children	X		X		X		X		X		X	
2.1.2: Vitamin A, de-worming tablets and other health interventions are provided during NIDs	X	X	X	X	X	X	X	X	X	X	X	X
2.1.3: Special emphasis shall be focused on low performing districts			X		X		X		X		X	
Strategy 2.2: Strengthen polio eradication measures coordination with development												
2.2.1: Conduct regular polio ICC meetings	X	X	X	X	X	X	X	X	X	X	X	X
2.2.2: Broaden agenda and participation of ICC meetings		X										
2.2.3: Better involvement of NGOs			X		X		X		X		X	
2.2.4: Regular communication with curative sector			X		X		X		X		X	
2.2.5: Involving community leaders linking community with immunization planning and implementation		X		X		X		X		X		X
2.2.6: Sharing of surveillance data with stakeholders		X		X		X		X		X		X
2.2.7: Conduct advocacy meeting with different stake holders		X		X		X		X		X		X
Strategy 2.3: Strengthened AFP surveillance system												
2.3.1: Ensure active AFP surveillance in all district	X	X	X	X	X	X	X	X	X	X	X	X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
2.3.2: Improve timeliness and completeness of weekly and monthly reporting of AFP and other VPD data	X		X		X		X		X		X	
2.3.3: Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
2.3.4: Improve timeliness and completeness of collection of stool samples and reporting	X	X	X	X	X	X	X	X	X	X	X	X
Strategy 2.4: Make available all the logistics for Effective implementation of Polio eradication activities												
2.4.1: Timely availability of adequate supplies for SIAs at all level	X		X		X		X		X		X	
2.4.2: Timely availability of all logistics for AFP surveillance (stool containers, forms, guidelines, IEC materials, transport)	X		X		X		X		X		X	
Strategy 2.5: Effective implementation of polio eradication activities												
2.5.1: Training of staff on AFP surveillance activities			X		X							
2.5.2: Review and analyse coverage and surveillance data at all level periodically and disseminate to stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
2.5.3: Regular review of polio status in neighbouring countries		X	X	X	X	X	X	X	X	X	X	X
Objective 3: Maintain maternal and neonatal tetanus elimination status												
Strategy 3.1: Maintain high coverage of TT5 among childbearing age women and PAB												
3.1.1: Continue to follow TT5 schedule in routine immunization program among childbearing age women	X	X	X	X	X	X	X	X	X	X	X	X
3.1.2: Special emphasis shall be focused on low TT coverage districts	X		X		X		X		X		X	
3.1.3: Practice clean delivery at community	X	X	X	X	X	X	X	X	X	X	X	X
3.1.4: Improve institutional delivery by incentive scheme	X	X	X	X	X	X	X	X	X	X	X	X
Strategy 3.2: Strengthen coordination with development partners, local NGOs and GoB												
3.2.1: Conduct regular ICC meetings	X	X	X	X	X	X	X	X	X	X	X	X
3.2.2: Broaden agenda and participation of ICC meetings		X										
3.2.3: Better involvement of NGOs			X		X		X		X		X	
3.2.4: Involving community leaders linking community with immunization planning and implementation	X		X		X		X		X		X	
3.2.5: Conduct advocacy meeting with different stake holders		X		X		X		X		X		X
3.2.6: Regular communication with curative sector	X		X		X		X		X		X	
3.2.7: Sharing of MNT surveillance data with stakeholders		X		X		X		X		X		X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
Strategy 3.3: Intensify MNT surveillance												
3.3.1: Improve timeliness and completeness of weekly and monthly reporting of MNT and other VPD data	X	X	X	X	X	X	X	X	X	X	X	X
3.3.2: Review and analyse coverage and surveillance data at all level and disseminate to stakeholders periodically		X		X		X		X		X		X
3.3.3: Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
Strategy 3.4: Make available all the logistics for Effective implementation of MNT elimination activities												
3.4.1: Timely availability of all logistics for surveillance (forms, guidelines, IEC materials, transport)			X		X		X					
3.4.2: Ensure availability of TT vaccines and related logistics			X		X		X		X		X	
3.4.3: Ensure availability of dT vaccines and related logistics available												
Strategy 3.5: Effective implementation of MNT elimination activities												
3.5.1: Review and analyse coverage and surveillance data at all level periodically and disseminate feedback to stakeholders	X		X		X		X		X		X	
3.5.2: Training of staff on MNT surveillance activities			X		X							
3.5.3: Introduce dT among school age children			X									
Objective 4: Achieve national level 95% measles coverage and reaching measles elimination status by 2016												
Strategy 4.1: Maintain high MCV1coverage												
4.1.1: Special emphasis shall be focused on low MCV 1 coverage districts		X	X	X								
4.1.2: Include routine MCV1 immunization for infants into district micro plans	X		X		X		X		X		X	
Strategy 4.2: Strengthen coordination with development partners, local NGOs and GoB												
4.2.1: Conduct regular ICC meetings	X	X	X	X	X	X	X	X	X	X	X	X
4.2.2: Broaden agenda and participation of ICC meetings		X										
4.2.3: Better involvement of NGOs			X		X		X		X		X	
4.2.4: Involving community leaders linking community with immunization planning and implementation	X		X		X		X		X		X	
4.2.5: Conduct advocacy meeting with different stake holders		X		X		X		X		X		X
4.2.6: Regular communication with curative sector	X		X		X		X		X		X	
4.2.7: Review and analyse coverage and surveillance data at all level and disseminate to stakeholders		X		X		X		X		X		X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
Strategy 4.3: Intensify measles surveillance												
4.3.1: Improve timeliness and completeness of weekly and monthly reporting of Measles and other VPD data	X	X	X	X	X	X	X	X	X	X	X	X
4.3.2: Improve timeliness and completeness of collection of samples and reporting		X		X		X		X		X		X
4.3.3: Continue case base measles surveillance and laboratory investigation	X	X	X	X	X	X	X	X	X	X	X	X
4.3.4: Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
Strategy 4.4: Make available all the logistics for Effective implementation of measles control activities												
4.4.1: Timely availability of all logistics for surveillance (forms, guidelines, IEC materials, transport)		X	X	X	X							
4.4.2: Measles vaccines and related logistics available	X	X	X	X	X	X	X	X	X	X	X	X
4.4.3: Measles vaccines and related logistics available for the 2nd dose of measles	X											
Strategy 4.5: Effective implementation of measles control measures				X	X	X	X	X	X	X	X	X
4.5.1: Data review and periodically give feedback to relevant stakeholders		X	X									
4.5.2: Ensure availability of logistics for the measles control activities			X	X	X							
4.5.3: Training of staff on VPD surveillance activities			X	X								
4.5.4: Introduction of Measles 2nd dose to the EPI schedule			X	X								
Strategy 4.6: Provide second opportunity of measles												
4.6.1: Upgrade cold chain capacity to accommodate MCV2 vaccines		X										
4.6.2: Apply to GAVI and other partners to support 2nd dose measles in vaccination calendar	X											
Strategy 4.7: Strengthen Managerial capacity at all levels for the implementation of 2nd of Measles introduction												
4.7.1: Revise practice guidelines and forms			X									
4.7.2: Conduct training of health and managerial staff and advocacy at all levels			X									
4.7.3: Carry out monitoring and supervision of the introduction of the 2nd dose of measles			X	X								

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
Objective 5: Prevention of diseases protected by new and underused vaccines												
Strategy 5.1: Introduce pneumococcal vaccine by the end of 2013												
5.1.1: Revise practice guidelines and forms			X									
5.1.2: Train health care personnel in the administration of PCV vaccines			X	X								
5.1.3: Include new vaccine introduction into district micro plans			X									
Strategy 5.2: Introduce rota vaccine by the end of 2014												
5.2.1: Revise practice guidelines and forms							X					
5.2.2: Train health care personnel in the administration of PCV vaccines							X	X				
5.2.3: Include new vaccine introduction into district micro plans							X					
Strategy 5.3: Rubella antigen is introduced by the end of 2012												
5.3.1: Revise practice guidelines and forms	X											
5.3.2: Train health care personnel in the administration of PCV vaccines	X	X										
5.3.3: Include new vaccine introduction into district micro plans	X											
Strategy 5.4: Introduce Hep B vaccine birth dose by the end of 2014												
5.4.1: Revise practice guidelines and forms					X							
5.4.2: Train health care personnel in the administration of PCV vaccines					X	X						
5.4.3: Include new vaccine introduction into district micro plans					X							
Strategy 5.5: Introduction of Td vaccine by the end of 2016											X	
5.5.1: Revise practice guidelines and forms											X	X
5.5.2: Train health care personnel in the administration of PCV vaccines											X	
5.5.3: Include new vaccine introduction into district micro plans												
Strategy 5.6: Strengthen coordination with development partners, local NGOs and GoB												
5.6.1: Conduct regular ICC meetings	X	X	X	X	X	X	X	X	X	X	X	X
5.6.2: Broaden agenda and participation of ICC meetings		X				X						
5.6.3: Better involvement of NGOs			X		X		X		X		X	
5.6.4: Involving community leaders linking community with immunization planning and implementation	X		X		X		X		X		X	
5.6.5: Ensure financial sustainability of new vaccines						X		X		X		X

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
5.6.6: Develop targeted communication strategies and approach to reach mothers about new vaccines	X		X		X		X		X		X	
5.6.7: Train interpersonal communication skills of all health staff		X		X		X		X		X		X
Strategy 5.7: Establishment of surveillance system for diseases covered by new antigens.												
5.7.1: Establish disease burden surveillance for targeted diseases					X	X						
5.7.2: Incorporate new diseases into the existing VPD surveillance system					X	X						
5.7.3: Introduce new surveillance formats					X	X						
5.7.4: Close collaboration with academic institutions					X	X						
Strategy 5.8: Effective in-cooperation of new vaccine into national EPI program												
5.8.1: Vaccines and other logistics available for new vaccines introduction			X	X								
5.8.2: Upgrade Cold chain storage space all level for new vaccines		X	X	X	X	X	X					
5.8.3: Availability of storage capacity for other logistics				X	X	X						
5.8.4: Effective cold chain maintenance operate at all level			X	X	X	X						
5.8.5: Availability of VVM in all individual vaccine vials												
Strategy 5.9: Introduction of new vaccines according to the planned timeline												
5.9.1: Ensuring financial sustainability of newly introduced vaccines			X	X	X	X						
5.9.2: Seek concurrence from ICC and NCIP for introduction of new vaccines and other under-used vaccines		X	X	X	X	X						
5.9.3: Train managerial staff on new vaccines	X		X		X		X				X	
5.9.4: Train Staff on the management of AEFI			X		X							
Objective 6: Ensure safe injection practices and waste disposal												
Strategy 6.1: AEFI surveillance system strengthened												
6.1.1: Improve the timeliness and completeness of AEFI reporting			X	X								
6.1.2: Training on AEFI Management for MLMs			X	X			X					
6.1.3: Regular review of AEFI data with relevant stakeholders and provide feedback			X		X		X		X		X	
Strategy 6.2: Implementation on national plan on sharp and waste management for EPI waste												
6.2.1: Pilot other safe waste disposal methods					X	X						

Key activities	2011		2012		2013		2014		2015		2016	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H	1H	2H
6.2.2: Sustain use of AD syringes/safety boxes	X	X	X	X	X	X	X	X	X	X	X	X
6.2.3: Practice relatively safe disposal methods till establishment of proper waste disposal system	X	X	X	X	X	X	X	X	X	X	X	X
6.2.4: Piloting of environmental friendly incinerators and expansion to the Upazila level			X	X	X	X						
Strategy 6.3: Increase effectiveness of the implementation of safe injection practices considering the country specifics												
6.3.1: Develop communication strategy for AEFI			X	X								
6.3.2: Develop communication strategy for waste disposal.			X	X								
6.3.3: Orientation meeting with media on AEFI			X	X								
6.3.4: Regular review of AEFI situation with relevant stakeholders and provide feed back	X	X	X	X	X	X	X	X	X	X	X	X
6.3.5: Better involvement of NGOs			X	X								
Strategy 6.4: Strengthen AEFI surveillance system and ensure injection safety												
6.4.1: Support all health centres to report AFEI as part of surveillance system	X		X		X							
6.4.2: Improve timeliness and completeness of AEFI reporting	X		X		X							
Strategy 6.5: Make available all the logistics for implementation of safe injection practices												
6.5.1: Availability of AD syringes and safety boxes at all levels			X		X		X		X		X	
6.5.2: Proper maintenance of existing incinerators	X		X		X		X		X		X	
Strategy 6.6: Effective implementation of safe injection practices												
6.6.1: Training of staff on safe injection practices			X		X							
6.6.2: Identify and recommend suitable places for install incinerators			X	X								
6.6.3: Provision of incinerators		X	X	X								
6.6.4: Assign tasks to appropriate staff for maintenance of incinerators			X	X								
6.6.5: Train staff on AEFI management			X	X								

C.2 Action plan for the introduction of new vaccines

Considering the NIP objectives set above the vaccination calendar in 2016 with all new antigens and vaccines is presented in Annex 2 (on page 72).

According to the abovementioned strategy and key activities introduction of the following antigens and vaccines is planned:

Figure 18: Description of new vaccines to be introduced by presentation/formulation and years of introduction

Antigen	Vaccine	Presentation/ Formulation	Year of Introduction	Packed volume
Measles (2nd dose)	MCV	10 dose lyophilized	2012	3.0
Rubella	MR	10 dose lyophilized	2012	2.5
Pneumococci	PCV10	2 dose liquid	2013	4.8
Rota virus	Rotarix	1 dose liquid	2014	85.3
Hepatitis B birth dose	HepB	1 dose liquid	2014	18.0
Diphtheria and tetanus	Td	10 dose liquid	2016	3.0

The introduction of vaccines (consequently the timeline of activities) is primarily conditional upon:

1 Availability of adequate positive cold chain storage space

2 Availability of financial support from GAVI

Therefore, activities listed below show not only time line but also dependence on these two factors. Thus, if any out of these 2 conditions is met with delay, dependant activities will be postponed correspondingly.

New vaccine introduction specific activities	2011				2012				2013			
	QI	QII	QIII	QIV	QI	QII	QIII	QIV	QI	QII	QIII	QIV
1 Mobilization of financial support from GAVI												
1.1 Conduct ESM assessment	X											
1.2 Revise cMYP	X	X										
1.3 Prepare and endorse NVS application to GAVI		X										
1.4 Application is submitted in time (by 15.05.2011)		X										
1.5 GAVI decision letter received				X								
1.6 Introduction Grant funds are received					**X**							

New vaccine introduction specific activities	2011				2012				2013			
	QI	QII	QIII	QIV	QI	QII	QIII	QIV	QI	QII	QIII	QIV
2 Upgrade of the cold chain storage capacity												
2.1 Conduct EVM assessment	X											
2.2 Endorse **Improvement Plan** based on EVM assessment report		X										
2.3 Mobilize funds from partners for the procurement of 4 cold rooms (40 m3 net space)			X									
2.4 Procure and install 4 cold rooms at the central level			X	X								
2.5 Cold chain is ready to meet MCV2 introduction requirements (by Dec 2011)				**X**								
2.6 Design detailed work plan and budget for the implementation of Improvement Plan			X	X								
2.7 Cold chain storage capacity upgrade work plan and budget is approved				X								
2.8 Upgrade Cold chain storage capacity to meet new vaccines requirements:												
2.8.1 Install additional 30 m³ cold chain equipment at the national level for PCV						X	X					
2.8.2 Install additional 5-10 m³ cold chain equipment at the district level for PCV							X	X				
2.8.3 Cold chain meets PCV introduction requirements (by Dec 2012)								**X**				
2.8.4 Install additional 1,100 m³ cold chain equipment at all levels for Rota									X	X	X	X
2.9 Implement all other activities in accordance with the **Improvement Plan**					X	X	X	X	X	X	X	X
3 Introduce MCV 2nd dose into EPI												
3.1 Revise the EPI training Guideline /training materials, record keeping and recording forms					X							
3.2 Conduct National level ToT (for MLMs)					X							
3.3 Conduct orientation trainings at district level and sub-district levels					X	X						
3.4 Carry out advocacy meetings with multi-sectoral actors and community representatives at national, divisional, district and sub-district levels					X	X						
3.5 Produce communication materials (posters, leaflets, etc.)					X							
3.6 Receive and accommodate first shipment of vaccines					X	X						
3.7 Start distribution and administration of MCV2						X	X	X				
3.8 Carry out monitoring and supervision of MCV2 introduction					X	X	X	X				
4 Introduce PCV into EPI												
4.1 Revise the EPI training Guideline /training materials, record keeping and recording forms									X			
4.2 Conduct National level ToT (for MLMs)									X			
4.3 Conduct orientation trainings at district level and sub-district levels									X	X		
4.4 Carry out advocacy meetings with multi-sectoral actors and community representatives at national, divisional, district and sub-district levels									X	X		
4.5 Produce communication materials (posters, leaflets, etc.)									X			

New vaccine introduction specific activities	2011				2012				2013			
	QI	QII	QIII	QIV	QI	QII	QIII	QIV	QI	QII	QIII	QIV
4.6 Procure Specialized Trucks to improve transportation of vaccines to district level									X			
4.7 Receive and accommodate first shipment of vaccines									X	X		
4.8 Start distribution and administration of PCV										X	X	X
4.9 Carry out monitoring and supervision of PCV introduction									X	X	X	X
5 Prepare for the introduction of other new vaccines												
5.1 Prepare action plan for the introduction of new vaccines (Rota, Hep B birth dose)									X			
5.2 Revise cMYP and financial projections correspondingly									X	X		
5.3 Prepare NVS Application and submit to GAVI (for Rota)										X		

Three critical conditions (milestones) are marked in red: activity 1.6 “Introduction Grant funds are received” in the 1st quarter of 2012, activity 2.5 “Cold chain is ready to meet MCV2 introduction requirements” by January 2012 and Activity 2.8.3 “Cold chain is read to meet PCV introduction requirements” by December 2013.

Financial resources to install 40m3 net volume positive cold chain in 2011 and another 30m3 in 2012 has been secured from EPI partners (UNICEF). Therefore, the country would be ready from a logistics standpoint to introduce MCV2 in 2012 and PCV10 in 2013 if GAVI Board approves funding support.

According to the action plan, EPI program together with partners intends to design (in 2011) a detailed work plan for the implementation of the Improvement Plan based on the findings and recommendations of the EVM assessment. This plan will allow mobilizing additional financial resources for further upgrade of cold chain storage capacity (necessary for the introduction of Rota and Hep B in 2014) as well as for addressing other issues highlighted in the Improvement Plan. Actual implementation is expected to start in 2012 to meet milestones outlined in the Improvement Plan of EVM Assessment.

Section III. Financial sustainability of the cMYP

A. Costs and financing of the Bangladesh National cMYP

A.1 Health Sector Analysis

The Government of Bangladesh is committed to providing appropriate vaccines of high quality in a quality manner for all children in each annual cohort. It is also committed to assuring that all pregnant women are adequately protected by TT vaccine prior to giving birth. Immunization is being provided as part of the Essential Services Delivery (ESD) package and is made available to target groups through the network of rural and urban health facilities – either public or nongovernmental. Sustaining immunization coverage for stated constituencies and developing it through introducing into the immunisation schedule new antigens will require increased financial resources.

A.2 Data entry tables – key assumptions

A.2.1 Demographic projections

Calculation of total Population size, size of birth cohort and other target groups are based on 2001 Census data using flat population growth rate at 1.5% and birth rate at 2.6%. Progress in mother and child health care services may require revision of the infant mortality rate (52 per 1,000 live births used at the present) – the size of surviving infants would increase (hence, the need in number of vaccine doses to be procured). Childbearing age women (CBA) have been estimated as 24.7% of total population.

A.2.2 Vaccine and injection supply costs

Historical costs were used for vaccines in current vaccination calendar. The estimated freight cost is 8% for all routine antigen and 2% for GAVI supported vaccine (Pentavalent).

Figure 19: Unit costs – vaccines (comparison with UNICEF/cMYP recommended prices)

Vaccine	Presentation	Formulation	UNICEF /cMYP	Actual Price per dose	Difference from UNICEF
BCG	Lyophilized	20	$0.105	**$0.106**	0.001
DTP	Liquid	10	$0.178		-0.178
Measles	Lyophilized	10	$0.237	**$0.237**	0
Measles 2nd Dose	Lyophilized	10	$0.237	**$0.237**	0
OPV	Liquid	10	$0.173	**$0.178**	0.0046
TT - CBA Women	Liquid	10	$0.077	**$0.080**	0.003
DTP-HepB-Hib	Liquid	1	$3.050	**$3.200**	0.15
HepB (at birth)	Liquid	1	$0.400	**$0.400**	0
PCV10	Liquid	2	$3.500	**$3.570**	0.07
Rotavirus	Liquid	1	$7.500	**$7.650**	0.15
MR	Lyophilized	10	$0.534	**$0.534**	0
Td	Liquid	10	$0.096	**$0.096**	0

Country purchases injection supplies directly on the local market (at a slightly higher cost than available via UNICEF procurement mechanism).

Figure 20: Unit costs – Injection supplies (comparison with UNICEF recommended prices)

Injection Supplies	UNICEF prices	Actual prices	Difference
AD syringe 0.5 ml	**$0.069**	**$0.090**	$0.02
AD syringe for BCG 0.05 ml	**$0.086**	**$0.100**	$0.01
Reconstitution syringe (BCG/Hib) 2 ml	**$0.035**	**$0.090**	$0.06
Reconstitution syringe (Measles/Yellow Fever) 5 ml	**$0.040**	**$0.100**	$0.06
Reconstitution syringe (Meningitis/Yellow Fever) 10 ml	**$0.069**	**$0.069**	($0.00)

A.2.3 Wastage Rates

Proposed wastage rates for single and 2 dose formulation vials are in line WHO/UNICEF recommendations.

However wastage rates for vaccines with 10 or 20 doses per vial are much higher than maximum recommended level of 50%: thus, wastage rates for BCG (20 dose vial) are estimates as high as 85% and for Measles 2nd dose (10 dose vial) – 75%. These projections are based on the fact that 98% of immunization services are (and will be) delivered via outreach sites. It means that in average 3 children will be vaccinated per vaccination site per day, so when a vial with 20 does is open, 17 doses are lost (or 7 doses in case of 10 dose vial).

The only exception from this practice is MR vaccine – instead of 70% only 50% of wastage rate is projected. The reason of lower wastage rate projection for 10 doses per vial formulation is that the vaccine will be administered to two target groups: surviving infants and women at the age of 15 years. Therefore, it is expected to vaccinate 3 children and 2 women at a vaccination site per day achieving fewer losses of vaccine after opening 10 doses vial. Other way around, if only surviving infants were targeted the wastage rate would have been again 70%. By increasing target group with another cohort (of women aged 15 years).

If other formulation of MCV (<10) become available it will decrease wastage rates significantly (as it happened after switching 1 dose formulations of Pentavalent).

A.2.4 Cold chain equipment

Cold chain will require substantial upgrade during the projected period. Otherwise, it will become the major bottleneck in implementing proposed NIP expansion as most of the vaccines proposed for introduction in 2011-2015 are single-dose ones and will require considerable storage capacity.

Needs for investment in cold chain capacity by years and levels are described in Figure 21 below. It shows that 440 m^3 net volume cold chain equipment, approximately 44 units of WIC should be installed over the period 2011-2013 to cover the current deficit and meet future needs at the National Level. Additional 250 m^3 net space volume cold chain equipment will be needed in 2013 to meet positive cold chain space needs for Rota and HepB at the district level.

Cost of Walk in Cold Room (WICR) with 40 m^3 gross and 10 m^3 net space was estimated at 250,000 US$ per unit.

Total investment at the national level (only equipment) was estimated as 11 million US$. Cost of construction of additional buildings to accommodate new WIC will be defined later and reflected in updated cMYP in 2013.

Figure 21: Projection of investments in positive cold chain storage capacity

Vaccines	Central	District	Upazila	Total
Annual Space requirements (in m^3)				
Current Vaccines	137	91	34	**262**
MCV2	13	9	3	**25**
PCV 10 (2 dose Synflorix)	28	19	7	**54**
Rota (1 dose Rotarix)	336	224	84	**644**
HepB Birth dose (1 dose vials)	35	24	9	**68**
Total	**550**	**366**	**137**	**1,053**
Space available (in m^3)	**110**	**118**	**177**	**404**

Deficit / Surplus (in m^3)				**Total Deficit**
Current Vaccines	-27	27	142	-27
+ MCV2	-40	18	139	-40
+ PCV 10 (2 dose Synflorix)	-68	-1	132	-69
+ Rota (1 dose liquid Rotarix)	-404	-225	48	-629
+ HepB Birth dose (1 dose vials)	-440	-248	39	-688

Investment Projections (in m^3)			**Year**
Current vaccines	27		2011
MCV2	13		2011
PCV 10 (2 dose Synflorix)	28	1	2012
Rota (1 dose Rotarix)	336	224	2013
HepB Birth dose (1 dose vials)	35	25	2013
Total investment	**440**	**250**	

More accurate financial projection of cold chain equipment as well as other inputs to improve logistical infrastructure will be carried out this year during the design and budgeting of the implementation plan of EVM Assessment Improvement Plan. Corresponding changes will be amended to the cMYP.

A.2.5 Other costs and inputs

Cost of a brand new vehicle with refrigerator (to distribute vaccines to districts) on the local market was estimated at 50,000 US$ per unit.

Unit costs of all other items in sections “3. -Vehicles and Transport Costs”, “4. - Cold Chain Equipment, Maintenance & Overheads”, “2. - Personnel Costs” and “6. - Program Activities, Other Recurrent Costs and Surveillance” are based on historical costs of corresponding items or inputs.

It has to be stressed that section “6. - Program Activities, Other Recurrent Costs and Surveillance” considers inputs related to the introduction of MCV2 and PCV in 2012 and 2013 respectively funded from GAVI introduction grant as well as from other sources.

A.3 Baseline Programme Cost and Financing

The year 2009 was chosen as the baseline for cost and financing projections because that is the most recent year for which full costing and financing information is available. EPI data for the estimations and projections were supplied by the EPI Central Store, WHO and UNICEF Country Offices, UPHCP-II Project. Economic data were obtained from the WHO NHA database and World Bank publications.

A.3.1 NIP Cost structure

Baseline Program indicators of the NIP of Bangladesh are presented in Figure 22 below.

Figure 22: Baseline Program Indicators – 2009

Baseline Indicators	With shared costs	Without shared costs
Total Immunization-specific Expenditures	$100,194,164	$100,194,164
Campaigns	$21,433,856	$21,433,856
Routine Immunization only	$78,760,309	$78,760,309
per capita	$0.5	$0.5
per DTP3 child	$22.9	$22.9
% Vaccines and supplies	64.2%	64.2%
% National funding	55.0%	55.0%
% Total health expenditures	3.1%	3.1%
% Gov. health expenditures	12.4%	12.4%
% GDP	0.10%	0.10%
Total Shared Costs		
% Shared health systems cost	32%	
TOTAL	$146,287,281	$100,194,164

In 2009, estimated total cost of the Bangladesh NIP was $146.2 million, including shared cost (though shared costs did not include costs of buildings). Of the total Programme cost, $78.8 million (or 53.9%) were spent for routine immunization, estimated $21.4 million (14.7%) – for supplemental immunisation activities, whereas $46.1 million (32%) constituted Programme's shared cost, mainly through shared healthcare service delivery staff and transportation cost[4]. Minor routine capital costs accounted for just 0.4%.

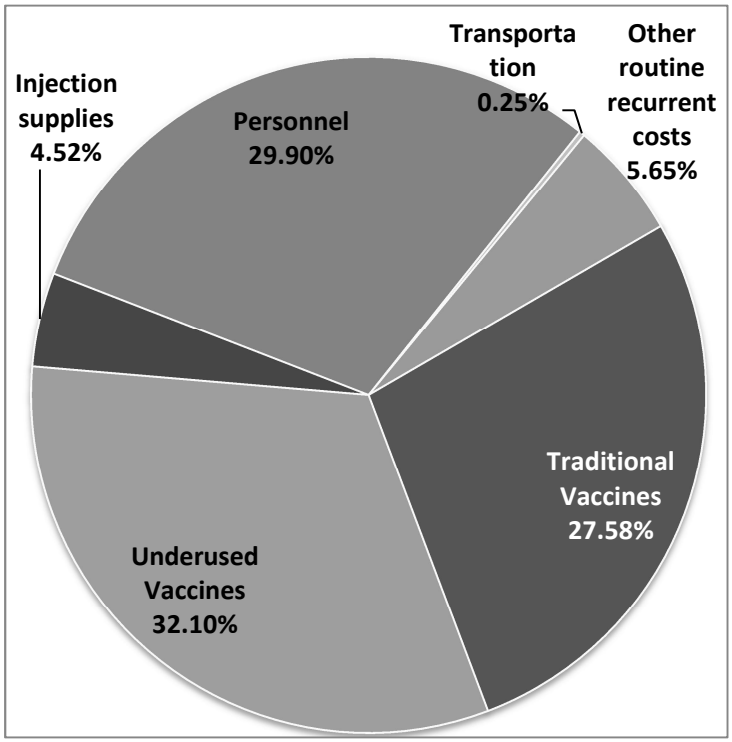
It is noteworthy that cost per DTP3 fully immunized child was as low as 22.9 US$.

Thus, immunization specific costs - $100.7 million - accounted for 68.6% of the total Programme cost. Figure 23 below presents the baseline cost structure for 2009 without shared health system costs.

Personnel cost – at $23.6 million for immunisation specific staff and $45.6 million for shared staff – turned out to be the largest expenditure category of the NIP in 2009 if shared health system costs are considered, accounting for roughly 48.3% of total outlays. It is worthwhile to note that the share of personnel cost has increased substantially since the last cMYP (prepared in 2004) as the average rate of salary rise in the health sector was much higher than that for other NIP inputs.

[4] Although building maintenance cost is also in fact shared one, for the purpose of this projection that aspect was ignored as it is not a straightforward task to separate shared and specific building maintenance cost within the cMYP tool.

Figure 23: Baseline NIP Cost Structure – 2009 (without shared health system costs)



Procuring vaccines for routine immunisation accounted for $47.0M (32.8%) of the total 2009 NIP expenditures with shared health system costs and almost 60% of the NIP budget without shared health systems costs. Out of the total $47.0M roughly half - $21.7M (27.6% of the budget) being allocated to traditional vaccines and $25.3M (32.1%) – to underused vaccines: 2009 was the introductory year for the new Pentavalent DPT-HepB-Hib vaccine that not only replaced in the immunisation schedule DPT and Hepatitis-B vaccines but also added a new antigen to the EPI list – that of *Haemophilus influenzae* type b (*Hib*). As the vaccine started to be introduced mid-year, its cost impact on the total NIP outlays was not as dramatic as for the subsequent years, yet still significant. In the future, however, introduction of additional new and under-utilized vaccines into the national immunization schedule will be single most important factor impacting the Programme costs.

The next highest cost category in 2009 – $21.6M or 15.1% of total resources – were expenditures for supplemental immunisation activities, which included, apart from vaccine cost, injection supply for SIAs and campaign-related operational costs. Two campaigns were held in that particular year: a nation-wide measles campaign and OPV NID both targeting a group of around 20 million children less than 5 years old.

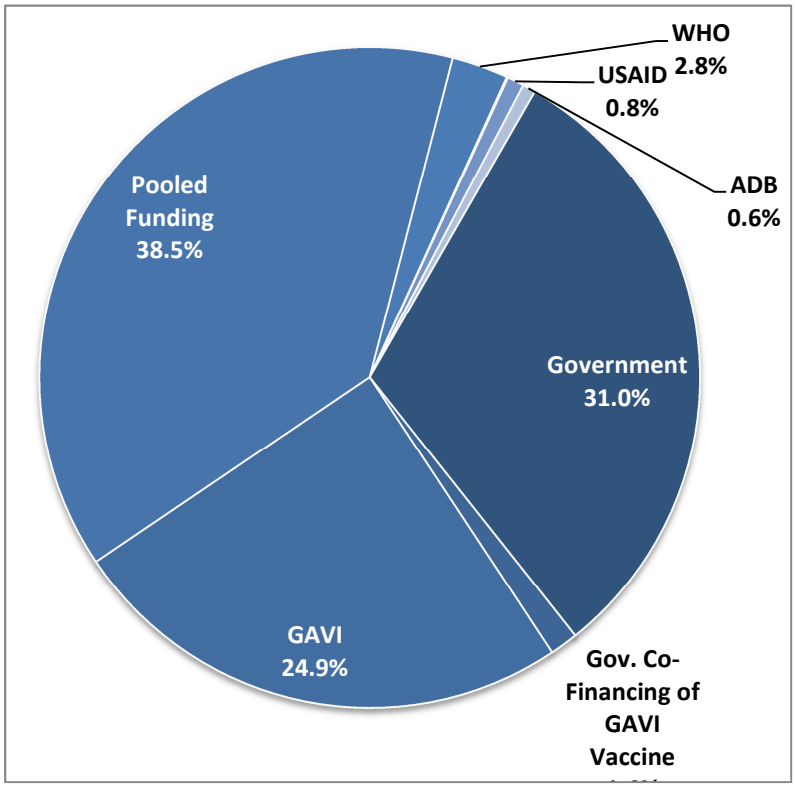
At the same time, any introduction of additional new or under-utilized vaccines should be contingent on the country's ability to support recurrent costs of such vaccines in the future as well as any necessary expansion of vaccine storage capacity.

The remainder of 2009 NIP expenditures were distributed between injection supplies for routine immunisation ($3.6M or 2.5%), the cost of cold chain equipment and its maintenance - 0.9% ($1.3M) and transportation cost ($0.7M or 0.5%). Detailed description of all the cost categories above mentioned is provided in Annex 3 " Multi-Year Plan Costing for Bangladesh- Summary Table (in US$)" (on page 73).

A.3.2 NIP financing in baseline year

Programme financing in the baseline year is represented on Figure 24 below that demonstrates contribution by financing parties to Programme-specific cost (that is, financing of shared costs is not included).

Figure 24: NIP (routine only) Baseline financing – 2009 (without shared costs)



Together with co-financing GAVI-supported vaccines, Government directly contributed around 31% of the Total Programme financing. If, however, one takes into account 70% of Government's share in the Pooled Fund, the overall Government financing responsibility will rise to almost 62%.

GAVI provided 24.9% of total Programme-specific financing, being the second largest contributor to the program in 2009. Participants of Pooled Fund excluding GoB, were responsible for 14.5% of total financing (while the Pooled Fund as a whole provided 38.5% of funds).

WHO was directly responsible for 2.8% of Programme financing, while other bilateral partners combined accounted for 1.4%.

It is noteworthy that Government's co-financing of the Pentavalent in 2009 constituted 1.4% of the total financing of routine immunization specific budget.

B. Future Resource requirements

B.1 Structure and major trends of resource requirements

Figure 25 below presents the summary of total resource requirements by Programme components while Figure 26 below graphically presents projected Programme cost dynamics throughout 2011-2015.

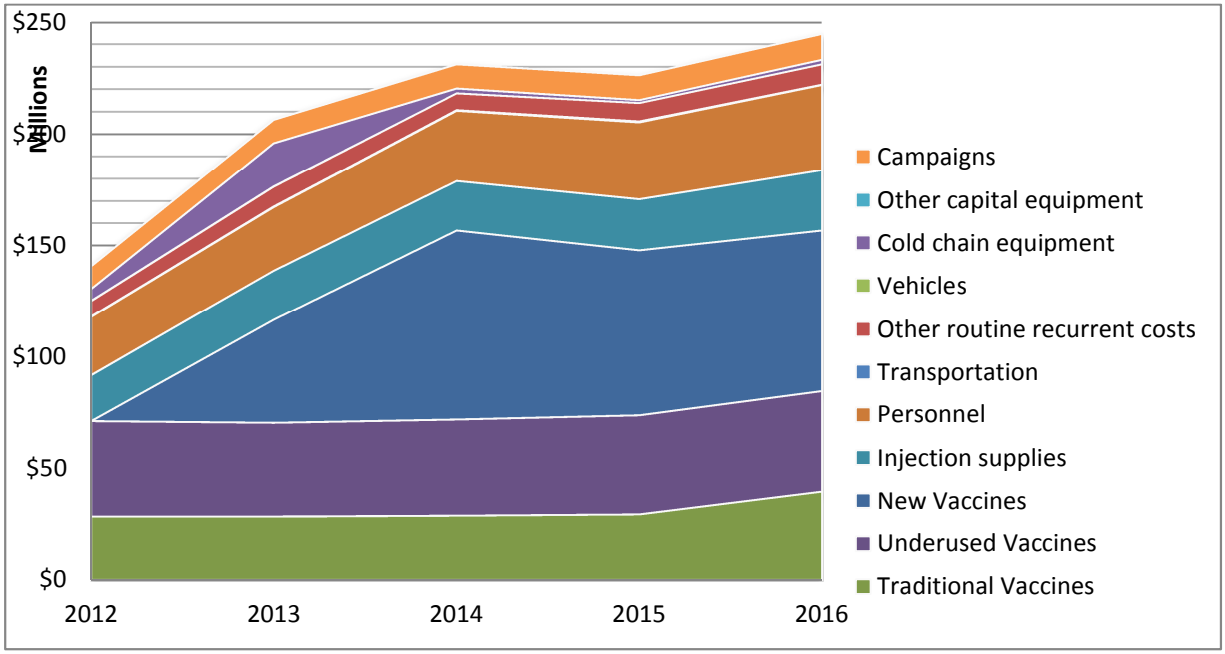
Figure 25: Resource Requirements (in Thousands US$) by Program Components by Years

	2012	2013	2014	2015	2016	Total
Vaccine Supply and Logistics	98,933	161,440	183,908	175,103	189,204	808,587
Service Delivery	26,149	28,853	31,729	34,893	38,218	159,841
Advocacy and Communication	1,466	1,414	100	105	110	3,195
Monitoring and Disease Surveillance	2,165	2,448	2,769	3,133	3,548	14,062
Programme Management	1,723	1,790	1,868	1,960	2,074	9,416
Supplemental Immunization Activities	10,246	10,523	10,812	11,114	11,430	54,124
Shared Health Systems Costs	50,679	55,728	61,275	67,375	74,083	309,139
Total	**191,360**	**262,195**	**292,459**	**293,683**	**318,666**	**1,358,363**

Estimated total resource requirement for the Programme during 2012-2016 is $1,358 million. On average, total Programme cost is expected to rise annually by 20% during 2011-2016.

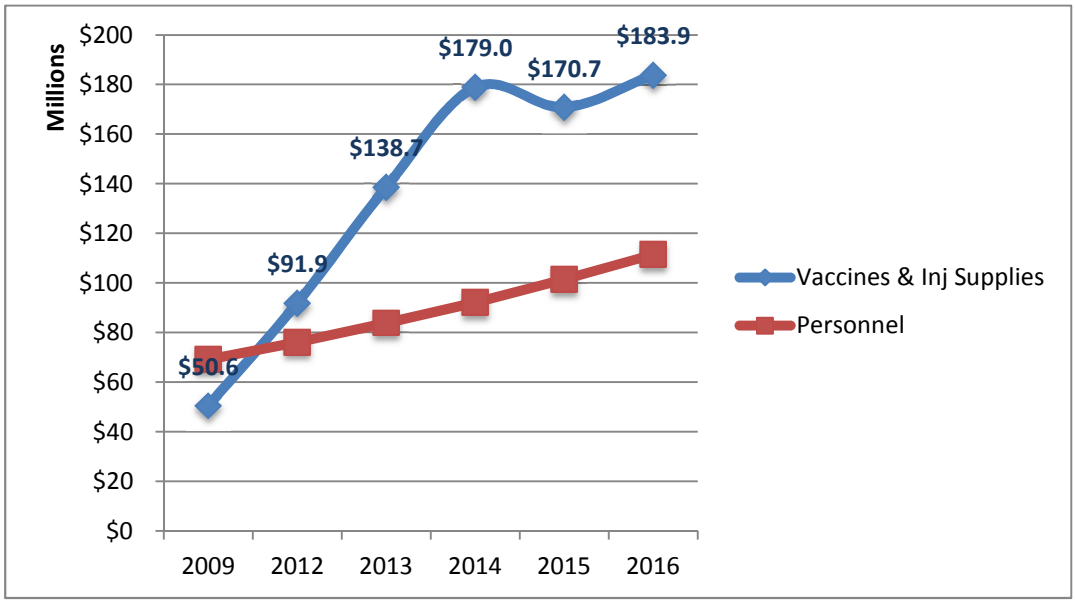
As may be seen from Figure 26 below, the lion's share in rise of total resource requirement is attributed to vaccines. Other cost categories' experience more moderate growth over years.

Figure 26: Projection of Future Resource Requirements – 2011-2016 (Shared costs excluded)**



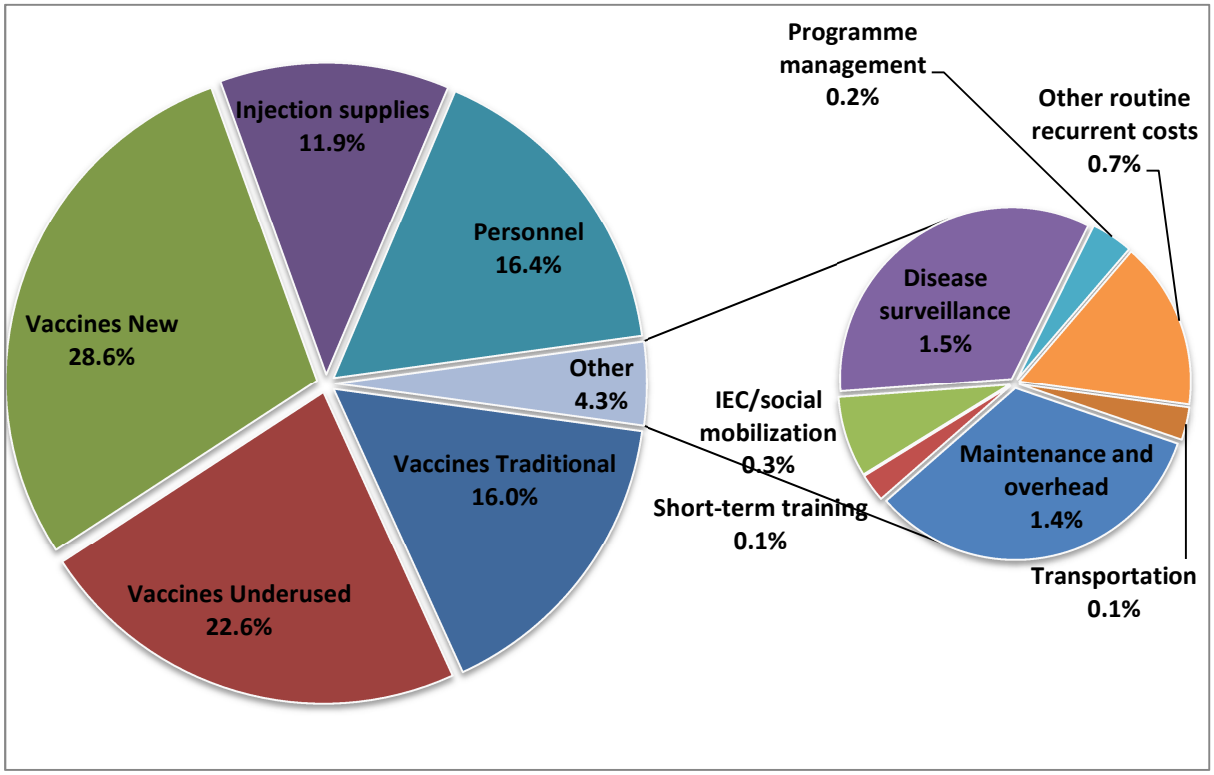
A simple comparison of dynamics of two cost categories: Vaccines and Injection Supplies vs. Total personnel costs (immunization specific plus shared personnel costs) shows that the latter growth staidly primarily due to inflation. At the same time, resource requirements for vaccines and injection supplies almost triples in 2013 compared to the baseline and reaches a pick in 2014 ($179M) as shown in Figure 27 below.

Figure 27: Relative costs categories dynamics 2009 - 2016



The structure of all resource requirements (for routine immunization excluding shared health care system costs) is shown in Figure 28 below.

Figure 28: NIP Resource requirement (2012-2016) structure (routine recurrent)



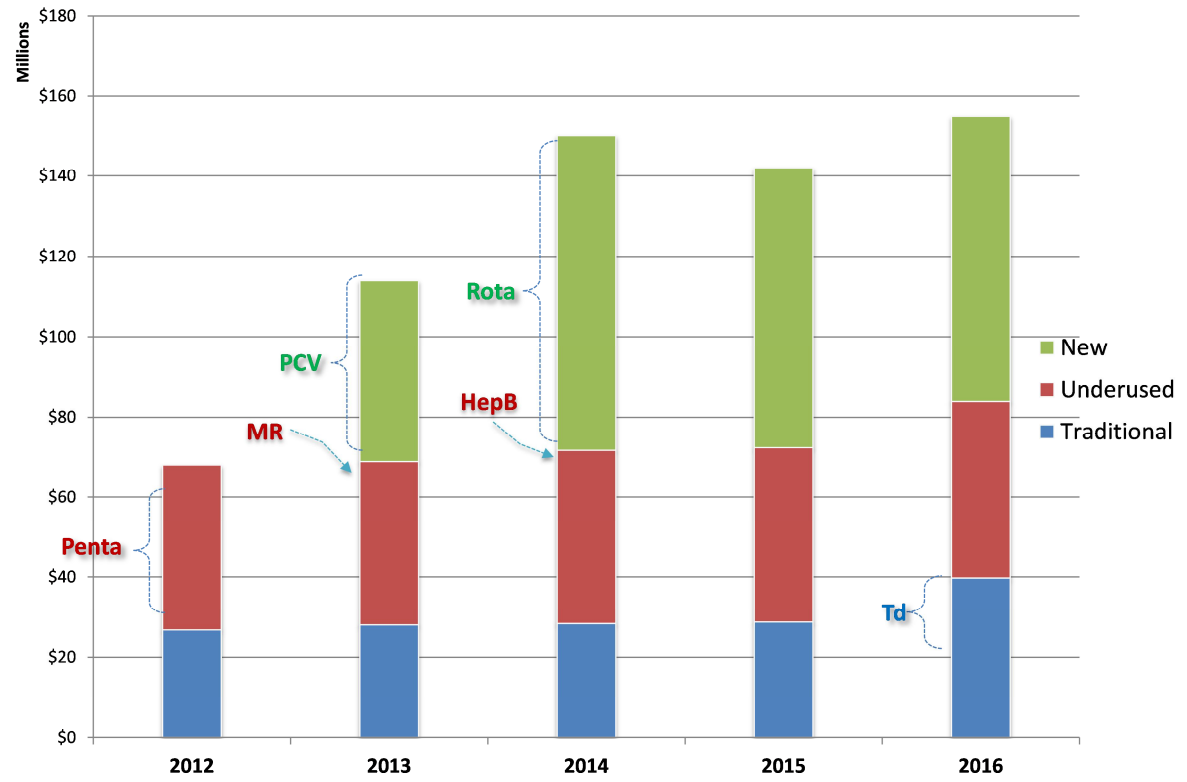
Personnel (immunization specific) resource requirements constitute 16.4% while almost 80% of total resource requirements are attributed to vaccines and injection supplies. The remaining small share of 4.3% is associated with other cost categories (as shown on the right small pie chart).

B.2 Recurrent costs – Structure and analysis

B.2.1 Vaccines and injection supplies

With the introduction of the new and underused vaccines mentioned above, the EPI cost structure is expected to undergo substantial changes (as shown in Figure 29 below).

Figure 29: Structure of resource requirements - Vaccines



On the one hand, the share of traditional vaccines in the total Programme cost will decrease in 2014 to the lowest 26% against 51.2% in 2011 even in spite of substantial absolute increase in procurement cost for traditional vaccines – from $46.6M in 2011 to $62.7M in 2016. The latter is mainly explained by expected increase in coverage of child-bearing age women (CBAW) by TT5 vaccination up to 80% and switching from TT to Td vaccine in 2016.

On the other hand, expanding Pentavalent vaccine coverage up to 95% and contemplated addition of Pneumococcal and Rotavirus vaccines will increase resource requirements of new and underused vaccines in 2.7 times up in 2016 to nearly 67% (or $122.1M) of the total vaccine resource requirements in 2016.

Figure 30: Resource requirement by vaccines (routine immunization) in US$

	2012	2013	2014	2015	2016
BCG	2,768,902	2,809,054	2,849,785	2,891,107	2,933,028
Measles 2nd Dose	3,170,171	2,771,289	2,773,635	3,008,564	3,013,246
OPV	3,863,425	3,919,448	3,976,280	4,033,936	4,092,428
DTP-HepB-Hib	36,387,020	36,914,665	37,449,928	37,992,952	38,543,850
HepB (at birth)	-	-	539,522	658,378	735,193
PCV	-	45,895,854	40,121,076	42,933,668	43,000,483
Rotavirus	-	-	44,344,137	31,011,681	29,037,471
MR	6,575,437	5,355,693	5,433,351	5,893,559	5,902,730

	2012	2013	2014	2015	2016
TT – CBA Women	18,627,732	18,897,852	19,171,870	19,449,863	-
Td	-	-	-	-	29,492,446
Total	**25,203,169**	**24,253,545**	**156,661,598**	**147,875,723**	**29,492,446**

During the same period injection supplies will account for 9% of total resource requirements of routine immunization.

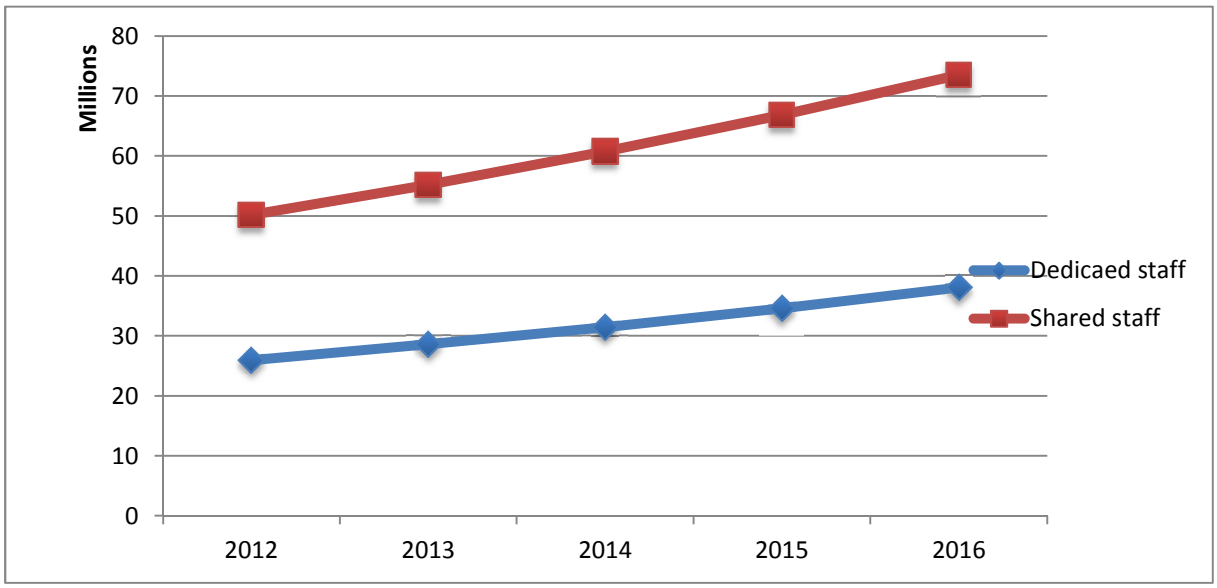
The share of vaccines procured for any campaigns conducted during the discussed cMYP period 2011-2016 will be considered an additional expense.

The OPV vaccine alone for the SIA rounds to be held annually during 2012-2016 will cost approximately $ $39,8M. Overall, campaign-related activities are expected to claim from 3.6% to 5.4% of NIP resource requirements.

B.2.2 Personnel costs

As can be seen from charts above, the proportion of total NIP costs represented by program personnel will drop substantially from 2011 (42%) to 2014 (32.7) being 'ousted' by the new vaccine cost, after which it will resume gradual increase from 32.7% in 2014 to 36.3% in 2016, even though the absolute labour cost will go on rising significantly throughout the projected period as shown in Figure 31 below.

Figure 31: NIP Staff costs dynamic in 2012-2016



B.2.3 Vehicles and transport costs

Vehicle cost will remain a minor cost category throughout projected period, reflecting existing successful practice of contracting out vaccine transportation services on the National and District level as well as the fact that most of the vehicles being used by the NIP are shared with other healthcare programs. So far EPI intends to purchase 2 specialized trucks (with refrigerator) in 2012 and 2013 that will allow gradual reduction of resource requirements for contracting our transportation services.

B.2.4 Training, Programme Management, Disease Surveillance, and IEC & Social Mobilization

Training activities are expected to consume around 0.1% of the total Programme cost, IEC & Social mobilization – around 0.06%, Programme Management – around 0.11% and Disease surveillance – around 0.95% of the estimated Programme cost.

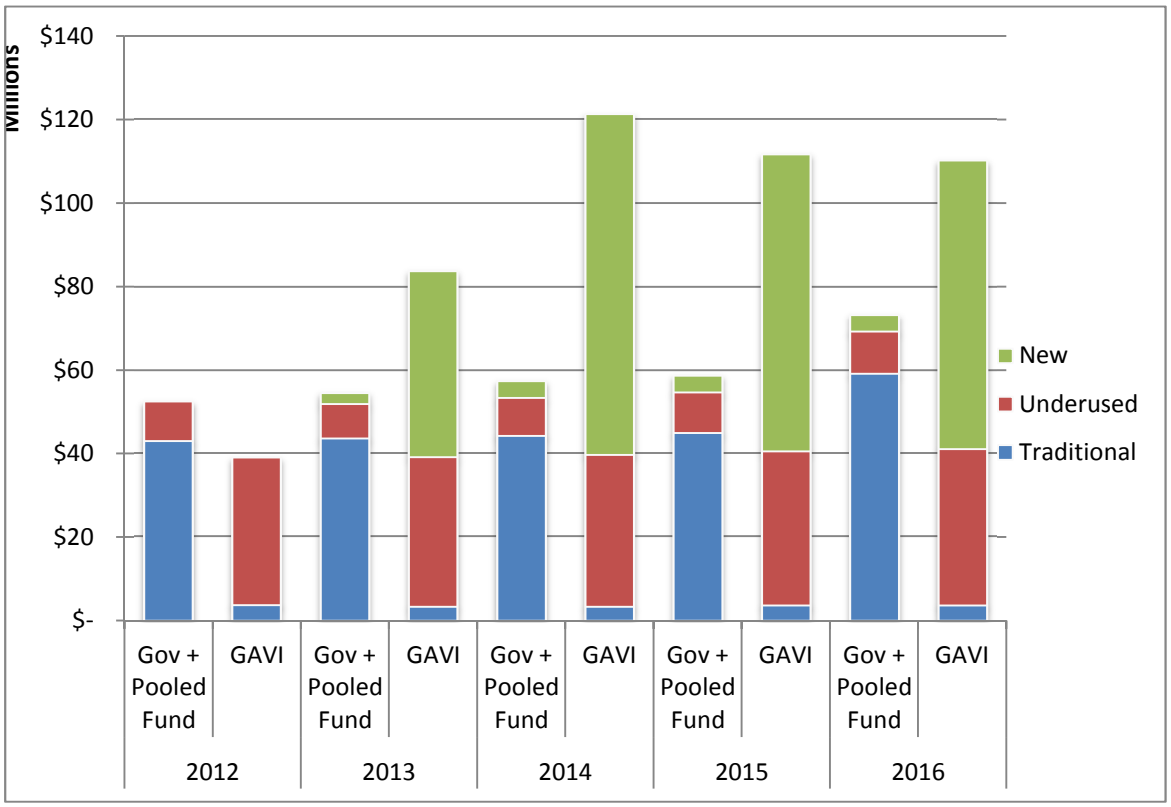
B.2.5 Other Capital Costs

Other projected capital costs have to do mainly with providing office equipment and software update for the National cold chain facilities and are expected to consume negligible share of the total Programme cost (.003%), although, once again, being quite important in terms of assuring efficient functioning of the cold chain.

C. Future Financing and funding gap analysis

The requirements for vaccines and injection supplies are expected to be financed from two sources: GAVI and the Government of Bangladesh (through Pooled Funds).

Figure 32: Financing of vaccines and Injection Supplies by sources, types of vaccines and years



GAVI is supposed to finance $465.5M in 2012-2016 provided that NVS for Measles 2nd dose, PCV and Rota are approved. The Government of Bangladesh intends to allocate $298,7M during the same period including co-financing obligations. Contribution of GAVI to traditional vaccines is associated with the possible support of the Measles 2nd dose vaccine. The rest of the costs of traditional vaccines will be covered by the Governments as well as cost of OPV for polio campaigns.

Total funding gap (with secure and probable funds) is estimated as low as 4% for the entire period of 2012-2016 as shown in Figure 33 below.

Government contribution to secure funds is approximately 31% and together with Pooled Funding accounts for two third of total secured financing.

The most of GAVI financing is treated as possible (conditional upon approval of NVS support by the GAVI Board), and that explains GAVI's 93% in probable financing.

Figure 33: Financing by sources and type of financing and estimated funding gaps

	2012	2013	2014	2015	2016	2012 - 2016	
Total Resource Requirements	**140,681**	**206,467**	**231,185**	**226,308**	**244,583**	**1,049,224**	
Total Secured Financing	**131,681**	**133,908**	**136,808**	**142,228**	**161,250**	**705,875**	
Government	36,744	41,302	43,853	47,477	51,380	220,757	31.3%
Gov. Co-Financing	2,274	4,878	6,327	6,300	6,445	26,225	3.7%
GAVI	38,985	37,601	35,109	35,618	36,135	183,449	26.0%
Pooled Funding	50,666	50,126	51,518	52,833	67,290	272,433	38.6%
WHO	757	-	-	-	-	757	0.1%
UNICEF	2,255	-	-	-	-	2,255	0.3%
Funding Gap (with secured funds only)	**9,000**	**72,559**	**94,377**	**84,080**	**83,333**	**343,349**	
	6%	35%	41%	37%	34%	33%	
Total Probable Financing	**3,341**	**51,081**	**90,277**	**80,652**	**79,175**	**304,526**	
Government	836	919	1,011	1,112	1,224	5,102	1.7%
GAVI	1,145	47,259	86,077	75,994	74,003	284,477	93.4%
WHO	1,360	2,366	2,616	2,936	3,299	12,577	4.1%
UNICEF	-	538	573	610	650	2,370	0.8%
Funding Gap (with secured & probable funds)	**5,659**	**21,477**	**4,100**	**3,428**	**4,157**	**38,822**	
	4%	**10%**	**2%**	**2%**	**2%**	**4%**	

Overall, Government of Bangladesh is expected to provide around 27% of the total resource requirements for the NIP during 2011-2015, GAVI funds are expected to account for approximately 48% of the total needs, whereas Pooled funding may account for 13% and WHO for around 1% of total financing.

Projected funding gap for the Bangladesh NIP will constitute around 10% of the total resource requirements in 2013 and will decrease to around 2% in 2015-2016, provided probable financing is taken into account. At the same time, the lion's share of probable financing is attributed to the expected GAVI financing of newly introduced vaccines. Should the GAVI support forthcoming country application for introducing these vaccines, the discussed funds will be secured. On the other hand, should the application not proceed as planned, the size of financing gap will be much smaller, taking into account currently available prices for these vaccines.

Remaining funding gap is mostly formed by the programme components with funding sources not agreed with certainty as yet: purchase of vehicles, cold chain and other equipment, campaigns (vaccines and logistics) as well as activities and other recurrent costs.

Government is planning to address remaining gap by extending cooperation proposals to development partners once currently valid cooperation agreements run to an end.

D. Future Financial Sustainability

Resource requirements for vaccines and injection supplies and financing with secure and probable funds are fully balanced and there is no funding gap.

The Bangladesh NIP financial sustainability outlook is presented in Annex 6 (on page 80). NIP cost per DTP3 child increases from $36.3 in 2009 to $82.6 in 2016. At the same time, resource requirements for routine immunization as percentage of Total Health Expenditures decrease from 4.9% in 2009 to 2.8% in 2016. It does not exceed 12% of the Government's total health expenditures and constituted less than 0.3% of GDP for the projected period.

The NIP long-term financial sustainability will depend on a range of factors, the most important of which are:

- success of forthcoming country application to GAVI for assistance in introducing Measles 2nd dose, Pneumococcal and Rotavirus vaccines
- addressing existing bottlenecks with mobilising GAVI HSS funds already earmarked for NIP
- Government success in taking over routine vaccine procurement currently performed from the Pooled fund
- Ability of the EPI itself to efficiently use available resources

The GoB is continuously monitoring financial situation with financing NIP to develop, in collaboration with DPs, the most effective scenarios for its development.

Section IV. Stakeholder comments

Section V. Annual plan

The present updated version of cMYP defines annual plan for 2012. New vaccine introduction specific activities in 2012 are outlined in Section II.C.2 "Action plan for the introduction of new vaccines" (on page 48).

Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	**Improve immunization coverage among children under one and child bearing age women, namely: 1) At least 90% fully immunization coverage among under one at national level and 85% full immunization coverage at each district level 2) TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level.**												
1.1	**RED strategy implemented in every district**												
1.1.1	Prepare Districts/Upazila level annual district/Upazila RED micro-plan to reach every children and child bearing age women	X	X										
1.1.2	Identify low performing districts/Upazila	X	X										
1.1.3	Regular supportive supervisory visit to each Upazila at least once per month by a supervisor		X	X	X	X	X	X	X	X	X	X	X
1.1.4	Strengthen immunization service delivery system of city cooperates			X	X	X	X	X	X	X	X	X	X
1.1.5	Quarterly review district/Upazila and city cooperate coverage performance and vaccine wastage			X			X			X			X
1.1.6	Develop & implement Upazila/CC level annual PoA based on micro-plan with special emphasis to hard to reach area and reduce the vaccine wastage			X	X	X	X	X	X	X	X	X	X
1.2	**Strengthen coordination with development partners, local NGOs and GoB**												
1.2.1	Conduct regular ICC meetings			X			X			X			X
1.2.2	Better involvement of NGOs			X									
1.2.3	Involving community leaders linking community with immunization planning and implementation			X			X			X			X
1.2.4	Develop district level community strategy and implement Social mobilization using community health workers/volunteers			X	X	X	X	X	X	X	X	X	X
1.3	**Strengthening of immunization coverage and VPD surveillance system in all districts**												
1.3.1	Review and analyse coverage and VPD surveillance data at all level and disseminate feedback to stakeholders			X			X			X			X
1.3.2	Availability and timely distribution of disease surveillance & coverage format			X			X			X			X
1.3.3	Introduction of case based laboratory surveillance for all VPD diseases						X						
1.3.4	Training on VPD surveillance				X	X							

Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.4	**Ensure sufficient , timely and potent vaccines and quality injection devices available at all level with no stock out**												
1.4.1	Made timely and accurate vaccine forecast and procurement at national level	X											
1.4.2	Made timely and accurate vaccine forecast at district/Upazila level	X											
1.4.3	Effective cold chain management at all level	X	X	X	X	X	X	X	X	X	X	X	X
1.4.4	Cold chain rehabilitation and expansion plan at each level developed and followed			X			X			X			X
1.4.5	Vaccine stock management assessment conducted periodically (EVM)												
1.4.6	Timely vaccine distribution to each level	X			X			X			X		
1.4.7	Maintain adequate buffered stocks at all levels	X			X			X			X		
1.4.8	Periodical training of staff on vaccine and cold chain management			X			X			X			X
1.4.9	Proper monitoring and supervision of vaccine distribution and storage	X	X	X	X	X	X	X	X	X	X	X	X
1.4.10	Proper stock management in every district	X			X			X			X		
1.4.11	Regularly monitor district level stock in national database	X	X	X	X	X	X	X	X	X	X	X	X
1.5	**Periodical review of the National EPI program performance at each level and take timely and appropriate measures accordingly.**												
1.5.1	EPI review is conducted quarterly at district and Upazila level and biannually at national level			X			X			X			X
1.5.2	Regular Immunization sessions are monitored and supervised	X	X	X	X	X	X	X	X	X	X	X	X
1.5.3	Monthly reporting of routine immunization coverage data to central level in timely manner	X	X	X	X	X	X	X	X	X	X	X	X
1.5.4	Periodically VPD data are reviewed (both district & National level) and take appropriate action			X			X			X			X
1.5.5	Conduct immunization coverage surveys periodically			X									
1.6	**Develop staff recruitment plan with budget.**												
1.6.1	Conduct audit to identify vacant post related to EPI service delivery at central, district and Upazila level			X									
1.6.2	Vacant staff positions are filled with qualified trained persons, priority goes to poor performing districts			X	X								
1.6.3	Establish human resource development plan for EPI programme			X	X								
1.6.4	Refresher training of staff (Immunization in Practice, Mid-Level Management, surveillance, vaccine management, cold chain)							X	X				
2	**Maintain polio free status**												
2.1	**Combine periodic polio SIAs with a high coverage quality OPV routine immunization**												
2.1.1	Conduct annual NIDs till polio is free in the region targeting under 5 children	X	X										

Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.1.2	Vitamin A, de-worming tablets and other health interventions are provided during NIDs	X	X										
2.1.3	Special emphasis shall be focused on low performing districts and hard to reach areas	X	X										
2.2	**Strengthened AFP surveillance system**												
2.2.1	Ensure active AFP surveillance in all district	X	X	X	X	X	X	X	X	X	X	X	X
2.2.2	Improve timeliness and completeness of weekly and monthly reporting of AFP and other VPD data	X	X	X	X	X	X	X	X	X	X	X	X
2.2.3	Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
2.2.4	Improve timeliness and completeness of collection of stool samples and reporting	X	X	X	X	X	X	X	X	X	X	X	X
2.3	**Effective implementation of polio eradication activities**												
2.3.1	Training of staff on AFP surveillance activities			X	X	X							
2.3.2	Review and analyse coverage and surveillance data at all level periodically and disseminate to stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
2.3.3	Regular review of polio status in neighbouring countries	X	X	X	X	X	X	X	X	X	X	X	X
3	**Maintain maternal and neonatal tetanus elimination status**												
3.1	**Maintain high coverage of TT5 among childbearing age women and PAB**												
3.1.1	Continue to follow TT5 schedule in routine immunization program among childbearing age women	X	X	X	X	X	X	X	X	X	X	X	X
3.1.2	Special emphasis shall be focused on low TT coverage districts	X	X	X	X	X	X	X	X	X	X	X	X
3.2	**Strengthen coordination with development partners, local NGOs and GoB**												
3.2.1	Involving community leaders linking community with immunization planning and implementation	X	X	X	X	X	X	X	X	X	X	X	X
3.2.2	Conduct advocacy meeting with different stake holders	X	X	X	X	X	X	X	X	X	X	X	X
3.2.3	Regular communication with curative sector			X			X			X			X
3.2.4	Sharing of MNT surveillance data with stakeholders			X			X			X			X
3.3	**Intensify MNT surveillance**												
3.3.1	Improve timeliness and completeness of weekly and monthly reporting of MNT and other VPD data	X	X	X	X	X	X	X	X	X	X	X	X
3.3.2	Review and analyse coverage and surveillance data at all level and disseminate to stakeholders periodically			X			X			X			X
3.3.3	Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
3.4	**Effective implementation of MNT elimination activities**												
3.4.1	Review and analyse coverage and surveillance data at all level periodically and disseminate feedback to stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
3.4.2	Training of staff on MNT surveillance activities			X	X	X							

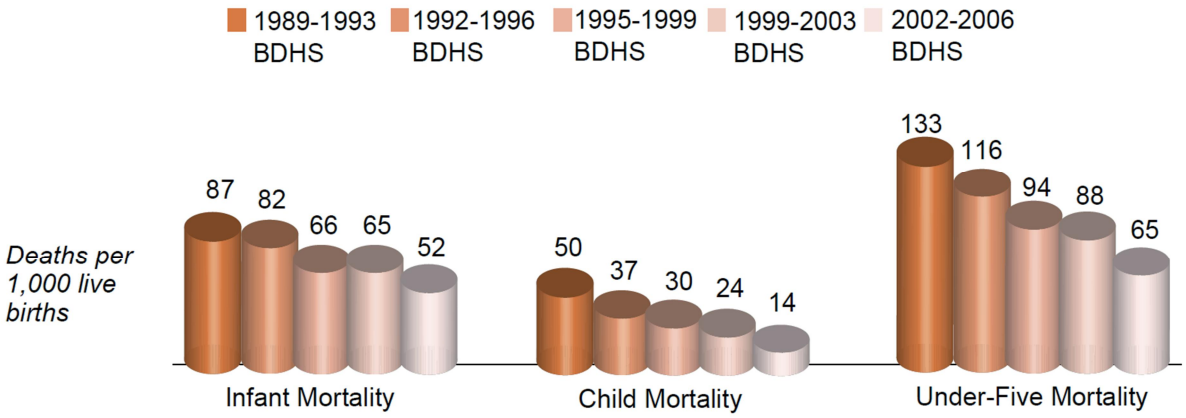
Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	**Achieve national level 95% measles coverage and reaching measles elimination status by 2016**												
4.1	**Maintain high MCV1coverage**												
4.1.1	Special emphasis shall be focused on low MCV 1 coverage districts	X	X	X	X	X	X	X	X	X	X	X	X
4.1.2	Include routine MCV1 immunization for infants into district micro plans	X	X	X	X	X	X	X	X	X	X	X	X
4.2	**Strengthen coordination with development partners, local NGOs and GoB**												
4.2.1	Involving community leaders linking community with immunization planning and implementation			X			X			X			X
4.2.2	Conduct advocacy meeting with different stake holders				X			X			X		
4.2.3	Regular communication with curative sector			X									
4.2.4	Review and analyse coverage and surveillance data at all level and disseminate to stakeholders	X	X	X	X	X	X	X	X	X	X	X	X
4.3	**Intensify measles surveillance**	X	X	X	X	X	X	X	X	X	X	X	X
4.3.1	Improve timeliness and completeness of weekly and monthly reporting of Measles and other VPD data	X	X	X	X	X	X	X	X	X	X	X	X
4.3.2	Improve timeliness and completeness of collection of samples and reporting	X	X	X	X	X	X	X	X	X	X	X	X
4.3.3	Continue case base measles surveillance and laboratory investigation	X	X	X	X	X	X	X	X	X	X	X	X
4.3.4	Ensure quality of surveillance data	X	X	X	X	X	X	X	X	X	X	X	X
4.4	**Effective implementation of measles control measures**				X								
4.4.1	Data review and periodically give feedback to relevant stakeholders			X									
4.4.2	Ensure availability of logistics for the measles control activities			X	X								
4.4.3	Training of staff on VPD surveillance activities			X	X								
4.4.4	Introduction of Measles 2nd dose to the EPI schedule			X	X								
4.5	**Provide second opportunity of measles**												
4.5.1	Upgrade cold chain capacity to accommodate MCV2 vaccines	X	X										
4.5.2	Apply to GAVI and other partners to support 2nd dose measles in vaccination calendar	X	X										
4.6	**Strengthen Managerial capacity at all levels for the implementation of 2nd of Measles introduction**												
4.6.1	Revise practice guidelines and forms	X	X										
4.6.2	Conduct training of health and managerial staff and advocacy at all levels	X	X										
4.6.3	Carry out monitoring and supervision of the introduction of the 2nd dose of measles	X	X	X	X	X	X	X	X	X	X	X	X
4.7	**Rubella antigen is introduced by the end of 2012**	X	X										
4.7.1	Revise practice guidelines and forms	X	X										
4.7.2	Train health care personnel in the administration of PCV vaccines	X	X	X	X	X	X	X	X	X	X	X	X

Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.7.3	Include new vaccine introduction into district micro plans												
4.8	**Strengthen coordination with development partners, local NGOs and GoB**												
4.8.1	Involving community leaders linking community with immunization planning and implementation	X	X	X	X	X	X	X	X	X	X	X	X
4.8.2	Develop targeted communication strategies and approach to reach mothers about new vaccines	X	X	X									
4.9	**Establishment of surveillance system for diseases covered by new antigens.**												
4.9.1	Establish disease burden surveillance for targeted diseases												
4.9.2	Incorporate new diseases into the existing VPD surveillance system	X	X										
4.9.3	Introduce new surveillance formats	X	X										
4.9.4	Close collaboration with academic institutions			X			X			X			X
4.10	**Effective in-cooperation of new vaccine into national EPI program**												
4.10.1	Vaccines and other logistics available for new vaccines introduction	X	X	X	X	X	X	X	X	X	X	X	X
4.10.2	Upgrade Cold chain storage space all level for new vaccines	X	X	X	X								
4.10.3	Availability of storage capacity for other logistics	X	X	X	X	X	X	X	X	X	X	X	X
4.10.4	Effective cold chain maintenance operate at all level	X	X	X	X	X	X	X	X	X	X	X	X
4.11	**Introduction of new vaccines according to the planned timeline**	X	X										
4.11.1	Ensuring financial sustainability of newly introduced vaccines	X	X										
4.11.2	Seek concurrence from ICC and NCIP for introduction of new vaccines and other under-used vaccines	X	X										
4.11.3	Train managerial staff on new vaccines	X	X										
4.11.4	Train Staff on the management of AEFI	X	X										
5	**Ensure safe injection practices and waste disposal**												
5.1	**AEFI surveillance system strengthened**												
5.1.1	Improve the timeliness and completeness of AEFI reporting	X	X	X	X	X	X	X	X	X	X	X	X
5.1.2	Training on AEFI Management for MLMs			X	X								
5.1.3	Regular review of AEFI data with relevant stakeholders and provide feedback	X	X	X	X	X	X	X	X	X	X	X	X
5.2	**Implementation on national plan on sharp and waste management for EPI waste**												
5.2.1	Pilot other safe waste disposal methods							X	X				
5.2.2	Sustain use of AD syringes/safety boxes			X	X								
5.2.3	Practice relatively safe disposal methods till establishment of proper waste disposal system			X	X								

Key activities		2012											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.3	**Increase effectiveness of the implementation of safe injection practices considering the country specifics**												
5.3.1	Develop communication strategy for AEFI			X	X								
5.3.2	Develop communication strategy for waste disposal.			X	X								
5.3.3	Orientation meeting with media on AEFI			X	X								
5.3.4	Regular review of AEFI situation with relevant stakeholders and provide feed back			X			X			X			X
5.3.5	Better involvement of NGOs	X	X	X	X	X	X	X	X	X	X	X	X
5.4	**Strengthen AEFI surveillance system and ensure injection safety**												
5.4.1	Support all health centres to report AFEI as part of surveillance system	X	X	X	X	X	X	X	X	X	X	X	X
5.4.2	Improve timeliness and completeness of AEFI reporting	X	X	X	X	X	X	X	X	X	X	X	X
5.5	**Make available all the logistics for implementation of safe injection practices**												
5.5.1	Availability of AD syringes and safety boxes at all levels	X	X	X	X	X	X	X	X	X	X	X	X
5.5.2	Proper maintenance of existing incinerators	X	X	X	X	X	X	X	X	X	X	X	X
5.6	**Effective implementation of safe injection practices**												
5.6.1	Training of staff on safe injection practices			X									
5.6.2	Identify and recommend suitable places for install incinerators			X	X								
5.6.3	Train staff on AEFI management			X	X								

Section VI. Annexes

Annex 1: Trends in Childhood Mortality (MDG Bangladesh Progress Report 2009)



Annex 2: Vaccination Calendar - 2016

Vaccine		Dates										
Name	Doses	Birth	6th week	10th week	14th week	38th week	15-18 months	15 year	After 28 days	After 6 months	After 1 year	After 1 year
BGG	1	X										
Pentavalent	3		X	X	X							
OPV	4		X	X	X							
MCV2	1						X					
MR (Surviving Infants)	1					X						
MR (15 Years old women)	1							X				
PCV	3		X	X	X							
Rota	2		X	X								
HepB	1	X										
Td	5							X	X	X	X	X

Annex 3: Multi-Year Plan Costing for Bangladesh- Summary Table (in US$)

	Expenditures	Future Resource Requirements					
	2009	2012	2013	2014	2015	2016	Total 2012 - 2016
Vaccines (routine vaccines only)	47,002,312	71,392,686	116,563,855	156,659,585	147,873,707	156,750,875	649,240,708
Traditional	21,718,961	28,430,230	28,397,642	28,771,571	29,383,469	39,531,148	154,514,060
Underused	25,283,351	42,962,457	42,270,359	43,422,801	44,544,889	45,181,774	218,382,278
New	0	0	45,895,854	84,465,213	73,945,349	72,037,953	276,344,370
Injection supplies	3,558,042	20,482,503	22,088,241	22,372,041	22,871,468	27,121,574	114,935,828
Personnel	23,552,092	25,907,302	28,579,808	31,437,789	34,581,568	38,039,724	158,546,190
Salaries of full-time NIP health workers	23,182,157	25,500,373	28,130,478	30,943,526	34,037,878	37,441,666	156,053,921
Per-diems for outreach vaccinators/mobile teams	0	0	0	0	0	0	0
Per-diems for supervision and monitoring	369,935	406,929	449,330	494,263	543,689	598,058	2,492,269
Transportation	200,738	241,505	272,802	291,268	311,140	178,150	1,294,865
Fix site strategy (incl. vaccine distribution)	111,521	134,169	151,556	161,816	172,856	98,972	719,369
Outreach strategy	66,913	80,502	90,934	97,089	103,713	59,383	431,622
Mobile strategy	22,304	26,834	30,311	32,363	34,571	19,794	143,874
Maintenance and overhead	866,506	1,611,069	3,270,678	2,743,918	2,995,254	3,357,371	13,978,289
Cold chain maintenance and overheads	866,506	1,604,235	3,262,355	2,734,049	2,983,780	3,342,079	13,926,498
Maintenance of other capital equipment	0	6,834	8,323	9,869	11,474	15,292	51,792
Building overheads (electricity, water…)	0	0	0	0	0	0	0
Short-term training	210,000	230,000	215,000	215,000	215,000	230,000	1,105,000
IEC/social mobilization	50,000	1,466,000	1,414,000	100,000	105,000	110,000	3,195,000
Disease surveillance	1,915,300	2,164,610	2,447,519	2,768,685	3,133,430	3,547,832	14,062,076
Programme management	258,189	288,598	310,778	324,892	351,119	379,657	1,655,045
Other routine recurrent costs	1,147,129	1,204,485	1,264,710	1,327,945	1,394,342	1,464,060	6,655,542
Subtotal	**78,760,309**	**124,988,758**	**176,427,391**	**218,241,123**	**213,832,029**	**231,179,243**	**964,668,544**
							0
Vehicles	0	122,400	52,020	0	0	0	174,420
Cold chain equipment	0	5,285,167	19,462,763	2,129,844	1,360,617	1,968,235	30,206,627
Other capital equipment	0	38,760	2,081	2,122	2,165	5,520	50,648
Subtotal	**0**	**5,446,327**	**19,516,864**	**2,131,967**	**1,362,782**	**1,973,755**	**30,431,695**
							0
Polio	12,407,027	10,246,198	10,522,759	10,811,679	11,113,681	11,429,534	54,123,852
Vaccines and Injection Supplies	9,955,398	7,722,957	7,834,940	7,948,547	8,063,800	8,180,725	39,750,969
Operational costs	2,451,629	2,523,241	2,687,820	2,863,133	3,049,881	3,248,809	14,372,883

	Expenditures	Future Resource Requirements					
	2009	2012	2013	2014	2015	2016	Total 2012 - 2016
Measles	9,026,829	0	0	0	0	0	0
Vaccines and Injection Supplies	6,575,200	0	0	0	0	0	0
Operational costs	2,451,629	0	0	0	0	0	0
Subtotal	**21,433,856**	**10,246,198**	**10,522,759**	**10,811,679**	**11,113,681**	**11,429,534**	**54,123,852**
							0
Shared personnel costs	45,619,347	50,181,282	55,205,594	60,726,153	66,798,769	73,478,646	306,390,443
Shared transportation costs	473,770	497,459	522,331	548,448	575,870	604,664	2,748,772
Construction of new buildings	0	0	0	0	0	0	0
Subtotal	**46,093,117**	**50,678,740**	**55,727,925**	**61,274,601**	**67,374,639**	**74,083,309**	**309,139,216**
	146,287,281	**191,360,024**	**262,194,940**	**292,459,370**	**293,683,131**	**318,665,842**	**1,358,363,307**
Routine Immunization	**124,853,426**	**181,113,825**	**251,672,180**	**281,647,691**	**282,569,450**	**307,236,308**	**1,304,239,455**
Supplemental Immunization Activities	**21,433,856**	**10,246,198**	**10,522,759**	**10,811,679**	**11,113,681**	**11,429,534**	**54,123,852**

Annex 4: Vaccine Management Improvement Plan (April 2011)

Item no.	EVM code	Task description	Priority	Responsibility	Budget	Target start	Target completion	Completion indicator
1	E1	Include a contingency plan and training module for customs officials in the contract with the central medical stores depot	Low	DPM, EPI	$1000	Sep-2011	Dec-2011	Revised Contract
2	E2	Calibrate all temperature monitoring sensors and thermometers at the central EPI store	High	Sr. Cold Chain Engineer, EPI	$3000	Jul-2011	Dec-2011	Calibration report
3	E2	Change/Replace Multilog software temperature graphs to include temperature range indicator lines, i.e. range 1: +2°C to +8°C and range 2: -15°C to -25°C	High	Sr. Cold Chain Engineer, EPI	$10000 (change) $ 30000 (replace)	Jul-2011	Jun-2012	Software change
4	E3	Increase central EPI store cold room capacity by another 113 m³ (gross) for current requirements	High	LD- MNCH and PM EPI	$750,000	May-2011	Jun-2014	New storage space
5	E3	Increase central EPI store cold room capacity by another 1593 m³ (gross) for new vaccines requirements (MCV2,Pneumo and Rota)	High	LD- MNCH and PM EPI	$10,000,000	May-2011	Jun-2014	New storage space
6	E3	Increase central EPI store dry store capacity by another 837 m³ for current requirements	High	LD- MNCH and PM EPI	GoB yet to decide	May-2011	Jun-2013	New storage space
7	E3	Increase central EPI store dry store capacity by another 887 m³ for new vaccines requirements	High	LD- MNCH and PM EPI	GoB yet to decide	May-2011	Jun-2013	New storage space
8	E3	Ensure that all stores have adequate vaccine cold boxes and vaccine carriers for the distribution of required vaccines	Medium	Store Manager, EPI	Nil	Jul-2011	Dec-2011	Passive containers adequate
9	E4	Provide storage space for diluents in the central vaccine store	High	Store Manager and Logistic Office, EPI	Nil	Jul-2011	Sep-2011	New storage space
10	E4	Provide fire extinguishers for all stores	Medium	Store Manager and AO, EPI	$10000	Jan-2012	Dec-2012	Fire extinguishers in place
11	E4	Ensure adequate, clean dry storage areas at District Stores	Low	DPM and Store Manager, EPI	Nil	Jul-2011	Dec-2011	Stores clean
12	E5	Implement system for the routine maintenance of temperature monitoring sensors at the central EPI store	Medium	Sr. Cold Chain Engineer, EPI	Nil	Jul-2011	Dec-2011	Maintenance records

Item no.	EVM code	Task description	Priority	Responsibility	Budget	Target start	Target completion	Completion indicator
13	E6	Introduce inventory lists on all cold chain WIC, WIF, Refrigerators and Freezers of contents (not necessary at Upazila level)	Medium	DPM and LO, EPI	Nil	Jul-2011	Dec-2011	List on all equipment
14	E6	Verify knowledge, attitude and practices of the Standard Operating Procedures at all levels and provide training to all in: SOP 10 and the contingency plans for transport of vaccines SOP 6 & 7 Use of maximum - and safety stock and the recording of required information Reporting of waste in unopened vials Calculation of vaccine needs based on target population, coverage and wastage rates All updated SOPs All other SOPs to strengthen understanding and knowledge	High	PM- EPI	$100000	Jul-2011	Dec-2012	Training course
15	E6	Install extra shelves in the middle of all cold rooms and freezer rooms to maximize packing space in the central EPI store	High	PM & Sr. Cold Chain Engineer, EPI	$30000	Jun-2012	Dec-2013	Shelves installed
16	E6	Obtain and implement new WHO software for managing vaccine stocks at the central EPI store	High	PM-EPI	Nil	Jan-2012	Dec-2012	Software operational
17	E6	Increase number of physical stock counts in the central EPI store to at least four per annum	High	Logistic Officer, EPI	Nil	Jan-2013	Dec-2014	Physical counts
18	E8	Do a temperature monitoring study for Bangladesh including a fair sample of routes and all levels of distribution to the lowest level of consumption.	High	PM & Sr. Cold Chain Engineer, EPI	$50000	Jun-2012	Dec-2013	Study report
19	E9	Introduce uniform formula for the forecasting of vaccine needs at all levels which includes the target population, coverage and wastage rates (opened and unopened vials)	High	PM-EPI	Nil	Jan-2012	Dec-2012	Uniform forecasting forms

Item no.	EVM code	Task description	Priority	Responsibility	Budget	Target start	Target completion	Completion indicator
20	E9	Introduce new batch cards and registers to reflect updates to SOP 6 & 7 and also: Update SOP 6 to include coverage in formulas Update SOP 6 to include location in store Update SOP 7 to include VVM status Update SOP 7 to include location in store Update SOP 8 to include physical verification every 3 months at Central EPI Store Update SOP 12 to include monthly review of results and actions Update SOP 13 to include monthly review of results and actions Update SOP 16 to include monthly review of results and actions Update SOP 17 to include monthly review of results and actions Write new SOP for a monthly review system by supervisors of the temperature monitoring records and providing a monthly report - All levels Write new SOP for waste disposal Write new SOP for calculation and monitoring of wastage in opened and unopened vials	High	LD- MNCH and PM EPI	$100000	Jul-2011	Jun-2013	New SOP manual and batch cards and registers and monthly reports of temperature monitoring records Waste disposal records

Annex 5: Resource requirements and financing by sources (Government vs. GAVI) of vaccines and injection supplies for routine immunization by years (in thousands US$)

	FINANCING												Total Resource Requirements					
	Government (+Pooled Fund)						GAVI											
Vaccines																		
	2012	2013	2014	2015	2016	Total	2012	2013	2014	2015	2016	Total	2012	2013	2014	2015	2016	Total
BCG	2,769	2,809	2,850	2,891	2,933	**14,252**	-	-	-	-	-	**-**	2,769	2,809	2,850	2,891	2,933	**14,252**
Measles	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
Measles 2nd Dose	-	-	-	-	-	**-**	3,170	2,771	2,774	3,009	3,013	**14,737**	3,170	2,771	2,774	3,009	3,013	**14,737**
OPV	3,863	3,919	3,976	4,034	4,092	**19,886**	-	-	-	-	-	**-**	3,863	3,919	3,976	4,034	4,092	**19,886**
TT - CBA Women	18,628	18,898	19,172	19,450	-	**76,147**	-	-	-	-	-	**-**	18,628	18,898	19,172	19,450	-	**76,147**
DTP-HepB-Hib	2,274	2,307	2,341	2,375	2,409	**11,706**	34,113	34,607	35,109	35,618	36,135	**175,583**	36,387	36,915	37,450	37,993	38,544	**187,288**
HepB (at birth)	-	-	540	658	735	**1,933**	-	-	-	-	-	**-**	-	-	540	658	735	**1,933**
Pneumococcal	-	2,571	2,248	2,405	2,409	**9,633**	-	43,325	37,873	40,528	40,591	**162,318**	-	45,896	40,121	42,934	43,000	**171,951**
Rotavirus	-	-	1,739	1,520	1,627	**4,886**	-	-	42,605	29,492	27,411	**99,507**	-	-	44,344	31,012	29,037	**104,393**
MR	6,575	5,356	5,433	5,894	5,903	**29,161**	-	-	-	-	-	**-**	6,575	5,356	5,433	5,894	5,903	**29,161**
Td	-	-	-	-	29,492	**29,492**	-	-	-	-	-	**-**	-	-	-	-	29,492	**29,492**
Total Vaccines	**34,110**	**35,860**	**38,298**	**39,227**	**49,601**	**197,096**	**37,283**	**80,703**	**118,361**	**108,647**	**107,150**	**452,145**	**71,393**	**116,564**	**156,660**	**147,874**	**156,751**	**649,241**
Injection Supplies																		
	2012	2013	2014	2015	2016	Total	2012	2013	2014	2015	2016	Total	2012	2013	2014	2015	2016	Total
BCG	616	625	634	643	652	**3,169**	-	-	-	-	-	**-**	616	625	634	643	652	**3,169**
Measles	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
Measles 2nd Dose	-	-	-	-	-	**-**	515	523	524	568	570	**2,700**	515	523	524	568	570	**2,700**
OPV	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
TT - CBA Women	16,997	17,243	17,493	17,747	-	**69,480**	-	-	-	-	-	**-**	16,997	17,243	17,493	17,747	-	**69,480**
DTP-HepB-Hib	76	77	78	79	80	**390**	1,137	1,154	1,171	1,187	1,205	**5,854**	1,213	1,231	1,249	1,267	1,285	**6,244**
Hep B (at birth)	-	-	141	174	195	**511**	-	-	-	-	-	**-**	-	-	141	174	195	**511**
Pneumococal	-	75	67	72	72	**286**	-	1,267	1,130	1,209	1,213	**4,819**	-	1,342	1,197	1,281	1,285	**5,105**
Rotavirus	-	-	-	-	-	**-**	-	-	-	-	-	**-**	-	-	-	-	-	**-**
MR	692	675	684	741	743	**3,536**	-	-	-	-	-	**-**	692	675	684	741	743	**3,536**
Td	-	-	-	-	21,941	**21,941**	-	-	-	-	-	**-**	-	-	-	-	21,941	**21,941**
Other	450	450	450	450	450	**2,250**	-	-	-	-	-	**-**	450	450	450	450	450	**2,250**
Total Injection Supplies	**18,830**	**19,144**	**19,547**	**19,906**	**24,134**	**101,562**	**1,652**	**2,944**	**2,825**	**2,965**	**2,987**	**13,374**	**20,483**	**22,088**	**22,372**	**22,871**	**27,122**	**114,936**

	FINANCING												Total Resource Requirements					
	Government (+Pooled Fund)						GAVI											
Vaccines																		
	2012	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Traditional	25,260	25,626	25,998	26,375	36,518	**139,777**	3,170	2,771	2,774	3,009	3,013	**14,737**	28,430	28,398	28,772	29,383	39,531	**154,514**
Underused	8,850	7,663	8,313	8,926	9,047	**42,799**	34,113	34,607	35,109	35,618	36,135	**175,583**	42,962	42,270	43,423	44,545	45,182	**218,382**
New	-	2,571	3,987	3,925	4,036	**14,519**	-	43,325	80,479	70,020	68,002	**261,825**	-	45,896	84,465	73,945	72,038	**276,344**
Total Vaccines	**34,110**	**35,860**	**38,298**	**39,227**	**49,601**	**197,096**	**37,283**	**80,703**	**118,361**	**108,647**	**107,150**	**452,145**	**71,393**	**116,564**	**156,660**	**147,874**	**156,751**	**649,241**
Injection Supplies																		
	2012	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Traditional	17,612	17,868	18,127	18,390	22,593	**94,589**	515	523	524	568	570	**2,700**	18,127	18,391	18,651	18,958	23,163	**97,290**
Underused	768	752	903	995	1,019	**4,437**	1,137	1,154	1,171	1,187	1,205	**5,854**	1,905	1,905	2,074	2,182	2,224	**10,290**
New	-	75	67	72	72	**286**	-	1,267	1,130	1,209	1,213	**4,819**	-	1,342	1,197	1,281	1,285	**5,105**
Other	450	450	450	450	450	**2,250**	-	-	-	-	-	**-**	450	450	450	450	450	**2,250**
Total Injection Supplies	**18,830**	**19,144**	**19,547**	**19,906**	**24,134**	**101,562**	**1,652**	**2,944**	**2,825**	**2,965**	**2,987**	**13,374**	**20,483**	**22,088**	**22,372**	**22,871**	**27,122**	**114,936**
ALL																		
	2012	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Traditional	42,872	43,494	44,125	44,765	59,111	**234,367**	3,685	3,295	3,298	3,577	3,583	**17,437**	46,558	46,789	47,423	48,341	62,694	**251,804**
Underused	9,617	8,414	9,217	9,921	10,066	**47,236**	35,250	35,761	36,280	36,806	37,340	**181,437**	44,867	44,176	45,497	46,727	47,406	**228,673**
New	-	2,646	4,054	3,997	4,108	**14,805**	-	44,591	81,609	71,229	69,215	**266,645**	-	47,238	85,662	75,227	73,323	**281,450**
Grand Total	**52,940**	**55,005**	**57,845**	**59,133**	**73,735**	**298,658**	**38,935**	**83,647**	**121,186**	**111,612**	**110,138**	**465,519**	**91,875**	**138,652**	**179,032**	**170,745**	**183,872**	**764,177**

Annex 6: Bangladesh NIP financial sustainability outlook

Macroeconomic and Sustainability Indicators	2009	2012	2013	2014	2015	2016
Reference						
Per capita GDP ($)	$520	$562	$588	$614	$642	$671
Total health expenditures per capita (THE per capita $)	$17.4	$55.0	$58.3	$61.6	$64.9	$68.1
Population	146,191,325	152,643,304	154,856,632	157,102,053	159,380,033	161,691,043
GDP ($)	$76,019,489,238	$85,826,419,202	$90,995,881,819	$96,495,832,294	$102,347,932,772	$108,575,294,989
Total Health Expenditures (THE $)	$2,543,729,063	$8,399,738,939	$9,028,872,480	$9,674,484,850	$10,336,921,657	$11,016,535,072
Government Health Expenditures (GHE $)	$635,932,266	$2,099,934,735	$2,257,218,120	$2,418,621,212	$2,584,230,414	$2,754,133,768
Resource Requirements for Immunization						
Routine and Campaigns ($)	$146,287,281	$191,360,024	$262,194,940	$292,459,370	$293,683,131	$318,665,842
Routine Only ($)	$124,853,426	$181,113,825	$251,672,180	$281,647,691	$282,569,450	$307,236,308
per DTP3 child ($)	$36.3	$51.6	$70.6	$77.9	$77.0	$82.6
% Total Health Expenditures						
Resource Requirements for Immunization						
Routine and Campaigns	5.8%	2.3%	2.9%	3.0%	2.8%	2.9%
Routine Only	4.9%	2.2%	2.8%	2.9%	2.7%	2.8%
Funding Gap						
With Secure Funds Only		0.7%	0.8%	1.0%	0.8%	0.8%
With Secure and Probable Funds		0.7%	0.2%	0.0%	0.0%	0.0%
% Government Health Expenditures						
Resource Requirements for Immunization						
Routine and Campaigns	23.0%	9.1%	11.6%	12.1%	11.4%	11.6%
Routine Only	19.6%	8.6%	11.1%	11.6%	10.9%	11.2%
Funding Gap						
With Secure Funds Only		2.8%	3.2%	3.9%	3.3%	3.0%
With Secure and Probable Funds		2.7%	1.0%	0.2%	0.1%	0.2%
% GDP						
Resource Requirements for Immunization						
Routine and Campaigns	0.19%	0.22%	0.29%	0.30%	0.29%	0.29%
Routine Only	0.16%	0.21%	0.28%	0.29%	0.28%	0.28%
Per Capita						
Resource Requirements for Immunization						
Routine and Campaigns	$1.00	$1.25	$1.69	$1.86	$1.84	$1.97
Routine Only	$0.85	$1.19	$1.63	$1.79	$1.77	$1.90