Government of People's Republic of Bangladesh

Comprehensive Multi-Year Plan 2018-2022

for National Immunization Program of Bangladesh

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List of abbreviations

ADP	Annual Development Program
AH	Adolescent health
AEFI	Adverse Events Following Immunization
AFP	Acute Flaccid Paralysis
AHUB	Ayurvedic, Homeopathy and Unani Boar
HSMQI	Hospital Service Management and Quality Improvement
PFPS	Population and Family Planning Services
AMC	Alternative Medical Care
AMS	Asset management system
ANC	Antenatal care
APIR	Annual Programme Implementation Report
BCG	Bacillus Calmette-Guérin
BGT	Bangladesh Taka
BDHS	Bangladesh demographic and health survey
BHB	Bangladesh Homeopathic Board
BHFS	Bangladesh Health Facility Survey
BMDC	Bangladesh Medical and Dental Council
BMMS	Bangladesh Maternal Mortality and Healthcare Survey
BMRC	Budget Monitoring and Resource Committee
BNC	Bangladesh Nursing Council
BPC	Bangladesh Pharmacy Council
CCs	Community Clinics
CD	Communicable Diseases
CEmONC	Comprehensive Emergency Obstetrical and Neonatal Care
CEmOC	Comprehensive Emergency Obstetrical Care
CES	Coverage evaluation survey
CH&I	Child Health and Immunization
CIPRB	Center for Injury Prevention, Health Development and Research, Bangladesh
CMSD	Central Medical Stores Depot
cMYP	Comprehensive Multi-Year Plan
CY	Calendar year
DGDA	Directorate General of Drug Administration
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DGNM	Directorate General of Nursing and Midwifery
DHS	Demographic and Health Survey
DHs	District hospitals
DLL	Disbursement linked indicator
DLR	Disbursement linked result
DP	Development Partner
DPA	Direct project aid
DQS	Data Quality Self-Assessment
DTP	Diphtheria, Tetanus and Pertussis (whooping cough) [vaccine]
DTP3	Third dose of Diphtheria, Tetanus and Pertussis (whooping cough) [vaccine]
EPI	Expanded Programme on Immunization
FAPAD	Foreign Aide Project Audit Directorate
FMAU	Financial Management and Audit Unit
FP	Family planning
FY	Fiscal year
FYP	Five-year plan

Gavi	Global Alliance for Vaccines and Immunization
GDP	Gross domestic product
GHED	WHO Global Health Expenditure Database
GIVS	Global Immunization Vision and Strategy
GNI	Gross national income
GoB	Government of the People's Republic of Bangladesh
GRS	Grievance Redress System
GTBR	Global Tuberculosis Report
GVAP	Global vaccine action plan
HBB	Helping Babies Breathe
HDI	Human Development Index
HepB	Hepatitis B Vaccine
HFs	Health Facilities
Hib	Haemophilus Influenza type b vaccine
HSDP	Health Sector Development Program
HWs	Health Workers
iBAS	Integrated budget and accounting system
ICC	Interagency Coordination Committee
IDA	International Development Agency (the World Bank)
IEDCR	Institute of Epidemiology, Disease Control and Research
IEDCR	Institute of Epidemiology, Disease Control and Research
IMCI	Integrated management of childhood illnesses
IMF	International Monetary Fund
IMR	Infant Mortality Rate
IPF	Investment Project Financing
IPH	Institute of Public Health
IPHN	Institute of Public Health and Nutrition
IR	Intermediate result (indicator)
IUFRs	Interim Unaudited Financial Reports
JDTAF	Joint Donor Technical Assistance Fund
KPI	Key performance indicators
M&E	Monitoring and Evaluation
LD	Line Director
MBF	Ministry Budget Framework
MDGs	Millennium Development Goals
MLGRDC	Ministry of Local Government, Rural Development and Cooperatives
MNCAHC	Maternal, Neonatal, Child and Adolescent Health Care
MNC	Maternal and Newborn Care
MMEIG	Maternal Mortality Estimation Inter-Agency Group
MMR	Maternal Mortality Ratio
MNTE	Maternal and Neonatal Tetanus Elimination
MOF	Ministry of Finance
MoHFW	Ministry of Health and Family Welfare
MOPA	Ministry of Public Administration
MPDR	Maternal Perinatal Death Review
MPIR	Mid-term Program Implementation Report
MTBF	Medium Term Budget Framework
NCT	National competitive tender
NEMEMW&TC	National Electro-Medical Equipment Maintenance Workshop & Training Centre
NHA	National Health Accounts
NHP	Health, nutrition and population

NGF	Nutrition and Food Safety
NIPSOM	National Institute of Preventive and Social Medicine
NMR	Neonatal mortality rate
NNT	Neonatal Tetanus
NPORT	National Institute of Population, Research and Training
NPML	National Polio and Measles Campaign
OPs	Operational Plans
OPV	Oral Polio Vaccine
PDO	Project development objective
PHC	Primary Health Care
PIP	Program Implementation Plan
RFW	Results framework
RI	Routine Immunization
PforR	Program for results
PPFP	Post-partum family planning
SCMP	Supply chain management portal
SDG	Sustainable Development Goals
SIA	Supplemental Immunization Activity
SIP	Strategic Investment Plan
SMF	State Medical Faculty
SIMO	Surveillance and Immunization Medical officer
SmPR	Six-monthly Progress Report
TBA	Traditional birth attendants
Td	Tetanus-diphtheria [vaccine]
TEMO	Transportation and Equipment Maintenance Organization
TFR	Total fertility rate
TT	Tetanus Toxoid
TTBA	Trained traditional birth attendants
U5MR	Under Five Mortality Rate
UH&FWC	Union Health and Family Welfare Centers
HTRA&VP	Services for Hard-to-Reach Areas and Vulnerable Population
UrbHS	Urban Health Services
TrHS	Tribial Health Services
UHC	Upazila Health Complex or Universal Health Coverage
UNICEF	United Nations Children's Fund
VAR	Vaccine Arrival Reporting
VDPV	Vaccine Derived Polio Virus
VPD	Vaccine Preventable Diseases
VVM	Vaccine Vial Monitor
WB	World Bank
WHA	World Health Assembly
WHO	World Health Organization
WICR	Walk in Cold Room
WPV	Wild Polio Virus

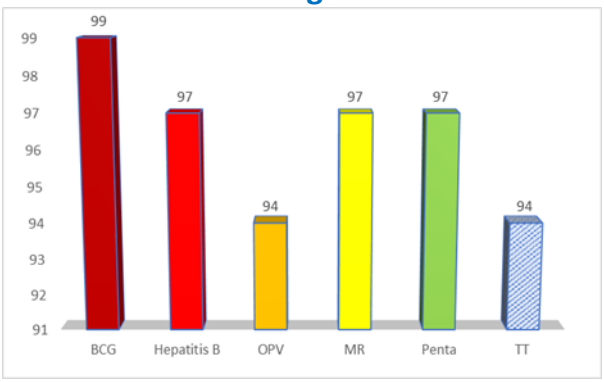
Executive Summary (Dashboard)

Immunization Situation Analysis Summary: 2012-2016

Immunization Achievements

- Sustainable Maintenance of Polio Free Status
- Maintenance of MNT Elimination Status
- New vaccine introduction - IPV and PCV Vaccine
- Government commitment to finance national EPI
- Well defined policies, health systems and EPI development agenda
- Strong and experienced nationwide surveillance system
- Integration of EPI into the national DMIS2 platform
- Effective procurement mechanisms and uninterrupted vaccine supply

Immunization coverage



Immunization System gaps

- Inadequate coordination between National and sub-national (City corporation and municipalities)
- Insufficient number and inadequate distribution of service providers across the country
- Lack of sufficient qualification of the front-line service providers in urban areas
- Ageing cold-chain equipment
- Complicated financial transactions (fund release, procurement and etc.)

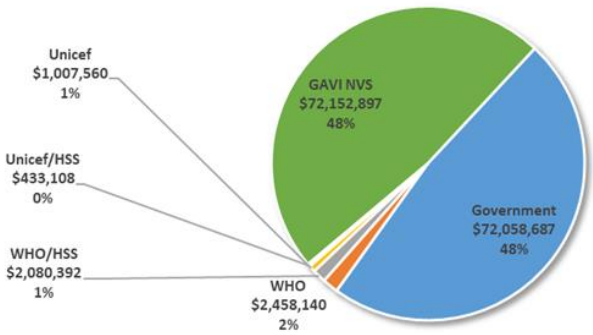
Health System Constraints

- Low access and utilization of HPN services, including immunization
- Inadequate service delivery
- Absence of facilities in certain areas and insufficient number and qualification of the staff
- Inability of existing facilities to function properly due to inadequate staff and funding of operations (operational and recurrent costs)
- Low demand for maternal, neonatal, children and adolescent and immunization services
- High dependence on external funding

Baseline expenditure profile

Total Immunization Specific Expenditures	**$150,190,784**
Supplemental immunization activities	$0
Routine immunization only	$150,190,784
Per capita	$1.00
Per DTP3 immunized child	$52.68
% Vaccines and Supplies	62.5%
% Government Funding	44.5%
% Of Total Health Expenditures (THE)	1.1%
% Government Health Expenditures	4.1%
% GDP	0.1%
Total shared costs	**$93,095,290**
% Shared Health Systems Cost	38.3%
Total Immunization Expenditures	**$243,286,075**

Baseline financing profile



cMYP 2018-2022 summary

National immunization objectives

- Improved full immunization coverage among children under one and childbearing age women
- Maintenance of Polio Free and MNT elimination status
- Eliminate measles, rubella and CRS by 2020
- Enhance prevention of diseases protected by new and underused vaccines
- Sustain operation of critical immunization system components while transitioning from external to domestic financing

Immunization program strategies

- Improve service delivery through implementation of REC Strategy to reach every community, district, municipality and city corporation
- Improve service delivery and coverage in hard-to-reach areas
- Improve service delivery to and increase coverage of high-risk population groups
- Maintenance high-standards of data management, monitoring and VPC surveillance
- Ensure adequate HR capacity at all levels of EPI
- Achieve and maintain 95% coverage with 2 doses of MR vaccine in every community
- Introduce Rotavirus vaccine and roll-out HPV vaccine at the national level
- Ensure sustainability of critical immunization components and smooth transition and integration into the broader health care system

Immunization performance targets

Indicator	2016	2022
BCG	81%	95%
Hepatitis B	87%	95%
OPV	53%	95%
MR	87.5%	95%
Penta	90.1%	95%
TT	50%	95%
PCV	n/a	95%
HPV	n/a	95%
IPV	n/a	95%
Fully immunized children	82.3%	95%

Major risks and challenges

- Shortage of human resources for health with 20% of vacant posts in the health system
- Inadequate skills of the front-line service providers and mid-level-managers
- Training programs heavily dependent upon donor's funding
- Workforce composing surveillance network fully depends on external funding
- Shortage of supply chain management staff at district and Upazila levels
- Heavy dependence on DP funding threatening financial sustainability
- Existence of the hard-to-reach areas

Resource requirement and financing projections

	2018	2019	2020	2021	2022	Total
Total Resources Required (US$ millions)	317.4	308.4	300.4	299.2	326.7	1,552.2
Cost per capita	1.78	1.85	1.77	1.74	1.72	1.77
Total Secure Financing (US$ millions)	311.1	293.9	292.3	291.7	293	1,482.1
Funding Gap (with secure) (US$ millions)	6.3	14.5	8.2	7.5	33.7	70.1
Total Secured and probable financing (US million)	317.4	308.4	300.4	299.2	326.7	1,552
Gap (with secure + probable) (US$ millions)	0	0	0	0	0	0
% of total needs	0%	0%	0%	0%	0%	0%

1 Situation analysis

1.1 Country context

1.1.1 Landscape and road infrastructure

People's Republic of Bangladesh is a sovereign state located in South Asia within geographic coordinates 24 00 N, 90 00 E. The country is bordered by India on all sides except for a small border with Myanmar to the far southeast and by the Bay of Bengal to the south.

Bangladesh is in the low-lying Ganges-Brahmaputra River Delta (or Ganges Delta) and is the subject to annual flooding that often hampers access to affected communities (and impedes vaccination of children for routine immunization, as described in detail in section 1.1.3 below). The delta is formed by the confluence of the Ganges, Brahmaputra and Meghna rivers and their respective tributaries. The Ganges unites with the Jamuna (main channel of Brahmaputra) and later joint the Meghna to eventually empty into the Bay of Bengal. The alluvial soil deposited by these rivers has created some of the most fertile plains in the world.

Most part of Bangladesh are less than 12 m above the sea level, and it is believed that about 10% of the land would be flooded if the sea level were to rise by 1 meter.

The country is served by a network of 21,269 kilometers of primary and secondary roads, but only around 10% of them (or 2,021 km) are paved. The eastern and western parts of Bangladesh are connected by Jamuna Multipurpose Bridge, that significantly improved transportation between different parts of the country. Bangladesh has a railway system of about 2,460 kilometers, of which only 659 km is a broad gauge (1.676-meter gauge) and the remaining 1,801 kilometers is narrow (1 meter) gauge. Major links run from the largest Bangladeshi port, Chittagong to Dhaka and further to the north of the country. Other links connect such centers as Khulna and Rajshahi. Presumably, unpaved roads hamper distribution of vaccines in rainy seasons in certain areas.

1.1.2 Administrative and political structure

Before 2016 Bangladesh was divided into seven administrative divisions, each named after their respective divisional headquarters: Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Sylhet and Rangpur. In 2016 the Government created new administrative division – Mymensingh – through splitting former Dhaka vision by two parts and forming two – Dhaka and Mymensingh divisions.

The divisions in Bangladesh are subdivided into districts *(zila)*. In total there are 64 districts, each further subdivided into 488 *Upazilas* (sub-districts). The area within each police station, except for those in metropolitan areas, is divided into several *unions* (from 5 to 27 unions: average 10), with

each union consisting of multiple villages. In contrast with the rural areas, in the metropolitan areas, police stations are divided into wards, which are further divided into *mahallas*. The urban areas are administered by the 11 city corporations and major municipalities (7 city corporations and 4 municipalities).

Bangladesh is a unitary state and parliamentary democracy. The latest Constitution of the country was enacted in November 4. Direct elections in which all citizens, aged 18 or over, can vote are held every five years for the unicameral parliament known as *Jatiiya Sangsad*.

There are no elected officials at the divisional, district or Upazila levels, and the administration is composed only of government officials. Direct elections are held for each union (or ward), electing a chairperson and a number of members.

The president of the country is indirectly elected by the National Parliament for a 5-years term and is eligible for second term. The president appoints as Prime Minister party leader in the National Parliament. The Prime Minister, as the head of government, forms the cabinet and runs the day-to-day affairs of state.

1.1.3 Climate and Natural hazards

Bangladesh climate is tropical with a mild winter from October to March, a hot, humid summer from March to June. A warm and humid monsoon season lasts from June to October and supplies most of the country's rainfall. Natural calamities, such as floods, tropical cyclones, tornadoes and tidal bores occur almost every year, combined with the effects of deforestation, soil degradation and erosion. The cyclones of 1970 and 1991 were particularly devastating. A cyclone that struck Bangladesh in 1991 killed some 140,000 people. In September 1998, Bangladesh saw the most severe flooding in modern world history. As the Brahmaputra, the Ganges and Meghna split over and swallowed 300,000 houses, 9,700 km or road and 2,700 km of embankment 1,000 people were killed and 30 million more were made homeless with 135,000 cattle killed, 50 km of land destroyed and 11,000 km or roads damaged or destroyed. Two-thirds of the country was underwater. There were several reasons for the severity of the flooding. Firstly, there were unusually high monsoon rains. Secondly, the Himalayas shed off an equally unusually high amount of melt water that year. Thirdly, trees that usually would have intercepted rain water had been cut down for firewood or to make space for animals.

Bangladesh is now widely recognized to be one of the most vulnerable countries to climate change. Natural hazards that come from increased rainfall, rising sea levels, and tropical cyclones are expected to increase as climate changes, each seriously affecting agriculture, water and food security, human health and shelter. It is believed that in the coming decades the rising sea level alone will create more than 20 million climate refugees. Bangladesh is among the countries most prone to natural

floods, tornados and cyclones. Also, there is evidence that earthquake pose a threat to inducing Bangladesh disasters through movement of rivers, shifting the course of rivers rapidly and dramatically. It has been shown that rainy-season flooding in Bangladesh, on the world's largest river delta, can push the underlying crust down by as much as 6 centimeters and possibly perturb faults.

Natural hazards will remain an important issue in coming years and will impact performance of overall health sector, including immunization.

1.1.4 Demography

(1) Population estimates

According to the National Census 2011 data (conducted by the Bangladesh Bureau of Statistics), the population of the country was 149.77 million people, showing 3% increase from the total population in 2006 (145.37 million).

Bangladesh shows one of the most rapid demographic transitions in the world. According to the UN estimates, population of Bangladesh will peak at 203.7 million in 2059. Data from the latest BDHS[1] shows that the total fertility rate (TFR) for the period from 2012 to 2014 stands at 2.3 births per woman. TFR in rural areas higher than in urban areas (2.4 and 2.0 respectively).

Women of child bearing age account for 53.4% of the total population. Over the last decade sex ratio has decreased from 106.26 in 2001 to 99.68 in 2011. The average household (HH) size has also decreased from 4.87 in 2001 to 4.35 in 2011

Figure 1: Demographic profile of Bangladesh (2011)

Demographic Profile	Urban	Rural	Total
Population	28,762,602 (19.2%)	121,009,062 (80.8%)	149,772,364 (100%)
Women of Child Bearing Age	10,324,416	33,986,381	44,310,797

Source: EPI, Bangladesh National Census 2011

In the baseline year (2016) the birth cohort was estimated at 3,279,741 million children and the annual population growth rate - at 1.37.

(2) Population distribution and ethnical composition

About 80.8% of the population lives in the rural areas while urban areas account for only 19.2% of the total population of the country. Out of the 8 divisions, Dhaka division alone contains almost 32.1% of the country's total population, reporting a total population count of 49,321,688 individuals.[2] Chittagong, Rajshahi and Khulna are the other three most populated divisions with housing more than 65 million people (see details in Figure 83 on page 112 in Annexes).

The population of Bangladesh is unevenly distributed across the country. The density of population varies from 97 individuals per Sq. Km. in the lowest populated areas to 9,178 people per Sq. Km. in the highest populated areas (see details in Figure 83 on page 112 in Annexes).

The overwhelming majority of Bangladeshis are ethnic Bengali, comprising nearly 98% of the population. The remainder are of the population are indigenous tribal groups. There is also a small but growing population of Rohingya migrants. The indigenous tribal peoples are concentrated in the Chittagong Hills Tracts in the southeast. There are 13 tribal groups located in this region the largest

[1] BDHS 2014
[2] Target Population Projection for National EPI Program in Bangladesh, 2014-2021

being the Chakma. Outside the Hill Tracts, the largest tribal groups are the Santhals and Garos (Achiks), while smaller groups include the Kaibartta, Meitel, mundas, Oraons, and Zomi.

Nearly all Bangladeshis speak Bangla as their mother tongue and the official language in the country. It is an Indo-Aryan language of Sanskrit origin with its own script. English is used as a second language and also widely used in higher education and the legal system.

1.1.5 Social and economic context

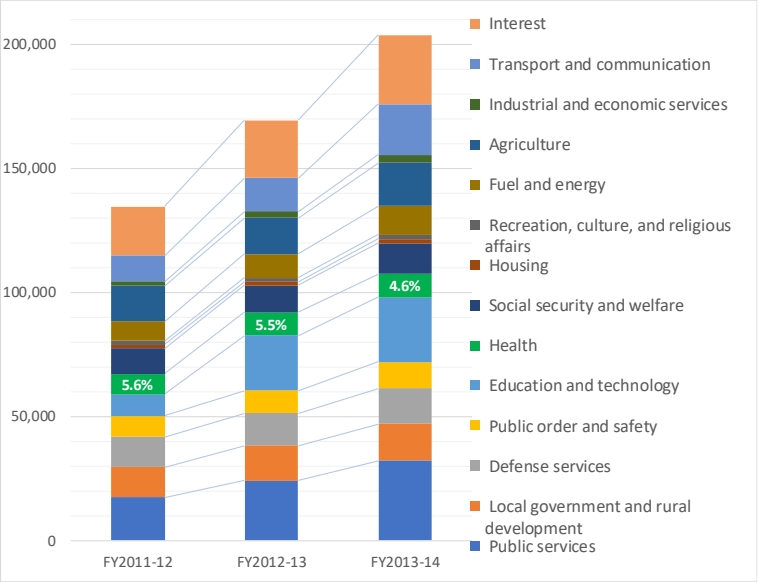
The overall economy of Bangladesh is growing at around 6% per year despite slow implementation of economic reforms, and the global financial crisis and recession. With the overall Gross Domestic Product (GDP) growth, health financing is also increasing in absolute terms. However, the percentage contribution of GDP to health is still very low (as illustrated in Figure 87 on page 113 and discussed in detail in section 1.2.5 “Healthcare financing” on page 32).

Bangladesh has among the lowest revenue as a share of GDP in the world. A surge in revenue growth raised revenue from 9.1 percent of GDP in FY09 to 10.8 percent in FY12. It since declined somewhat, leaving Bangladesh with among the lowest revenue to GDP ratio in the world.[3]

The main sources of government revenue in Bangladesh are the value-added-tax (VAT) and the personal income tax. There have been recent efforts to boost tax revenue collections. The National Board of Revenue developed a Tax Modernization Plan now under implementation. The IMF forecasts an increase of 1.5% in the tax-to-GDP ratio during the period 2015-2019, mainly due to VAT, while the government’s Five-Year Plan aims at an increase of 6 or 7%. In brief, while economic growth tends to boost tax collection, Bangladesh has found it challenging to fulfill this potential. As a result, tax revenues remain well below of what is expected for Bangladesh’s level of development.

With low revenues, the low fiscal deficits reflect low public expenditures. Bangladesh had the world’s lowest public expenditures at around 14 percent of GDP in FY14.[3] An inability to absorb resources by some ministries, in both recurrent and development budgets, contribute to the low expenditure. Around 60 percent of the budget goes to recurrent expenditure, but there has been a shift toward investment or development over the last five years.

Figure 2: Budget allocation by government fnctions



[3] GoB, Public Financial Management Performance Report (PFM-PR), 2016

Source:

Bangladesh has a good record of low fiscal deficits and sustainable public debt. Over the past decade, Bangladesh achieved an average fiscal deficit of 3.1 percent of GDP and, at 3.5 percent in FY14, the deficit was well below the South Asia average of 3.7 percent. Deficits also varied within a fairly narrow band in recent years, ranging from 3.2 to 3.9 percent of GDP. According to the recent review conducted jointly by the BoG and the WB, public debt is low and declining as a share of GDP steadily from 42 percent of GDP in FY06 to 34 percent of GDP at the end of FY14, among the lowest in South Asia "due to contained deficits and strong economic growth".

According to Medium Term Macroeconomic Policy Statement, "public spending is targeted to be elevated to around 19.1 percent of GDP over the medium tern. Actual budget deficit stood at 3.8 percent of GDP in FY16. On the whole, deficit is expected to remain within the range of 5 percent of GDP over the medium term".

The macro-fiscal environment offers strong potential for greater fiscal space due to robust growth, but this is hindered by very low levels of revenue resulting in low elasticity of public health expenditures to GDP. The fiscal space of the country is restricted given the lowest tax-to-GDP ratios in the world that limits the government's capacity to translate this growth into public revenues. A reprioritization towards the health sector needs strong evidence-based advocacy and negotiation with the Ministry of Finance (MOF**).** the macro-fiscal environment offers strong potential for greater fiscal space due to robust growth, but this is hindered by very low levels of revenue resulting in low elasticity of public health expenditures to GDP.

According to the Medium Term Macroeconomic Policy Statement (MTMPS) for 2017-18 and 2018-20), investment is rapidly growing both in public and private sector; in FY17, both public and private sector inveshnents are estimated to grow more than 18 percent, compared to the actual investment in FY16. The government has been scaling up investment in both physical and social infrastructure, including roads, power and energy and capacity enhancing human capital development projects which will encourage private investment by raising its productivity and in turn, creating crowding-in effect. The amount of total investment is estimated to reach about 30.27 percent of GDP at the end of 2016-17 fiscal year

Figure 3: Investments as % of GDP

Indicators	2016-16 (actual)	2016-17 (estimate)	2017-18 (budget)	2018-19 (projection)	2019-2020 (projection
Total Investment	**29.65**	**30.27**	**31.88**	**32.78**	**34.49**
Private	22.99	23.0	23.20	23.90	25.40
Public	6.66	7.3	8.70	8.90	9.00
GDP Growth	7.10	7.24	7.40	7.60	8.00

Source: Financial Division, MTMPS 2017-18 and 2019-20

Selected social and economic indicators for 2000-2016 are presented in Figure 109 (on page 131).

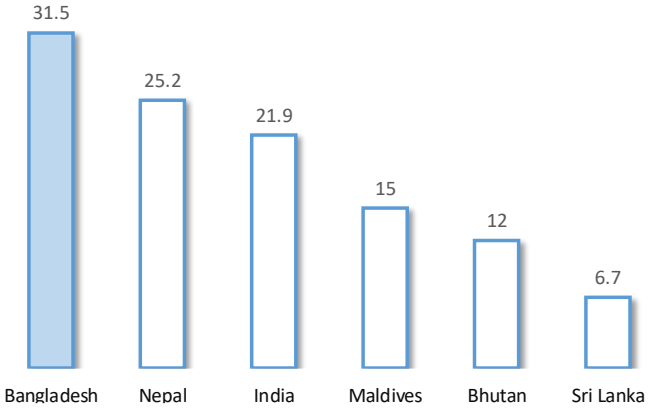
(1) Poverty and development strategies

According to the World Human Development Report 2016, with a Human Development Index (HDI) of 0.579, Bangladesh is ranked 139 among 188 countries of the world with a GDP per capita of 1,212 US$[4] US$ and GNI per capita 1,330 US$.

[4] WB, 2015

It is estimated that 31.5% of the population lives below the national poverty line (down from 49% in 2000 and 40% in 2005) and Bangladesh is one of the poorest countries in South Asia (as shown in Figure 4 below). Income inequality has not changed significantly remaining at the level of 32-33 in the same period. The proportion of employed population below 1.9 US$ purchasing power parity a day is 73.5%[5].

Figure 4: Share of Population Below the National Poverty Lines in selected countries (in %, 2015)



Source: Asian Development Bank, 2015

According to the World Bank estimates (World Development Indicators), almost three quarter of population is at risk of catastrophic expenditures[6] when surgical care is required. The extremely high level of vulnerability of the people in Bangladesh to health-related financial burden shows that even a minor health problem has the potential to drive majority of Bangladesh's population into poverty, which makes the population of the country more dependent upon state provided HNP services.

The present Government's Vision 2021 and associated Perspective Plan 2010-2021 aim to place Bangladesh in the first stages of a middle-income economy and to reduce the incidence of poverty from 40 percent in 2005 to 15 percent by 2021.

The government is now working with the 'Vision 2041' to continue the flow of progress achieved under the 'Vision 2021'. A 2nd Perspective Plan will be prepared to attain Vision 2041, the core philosophy behind this document will be to establish a developed Bangladesh by 2041, a peaceful and prosperous country free from hunger and poverty.

(2) Literacy

Literacy rate in Bangladesh is 56.19% (7 years and above). Among the young population (below 30 years old), males are slightly more likely to be literate than females 67.7% vs. 63.8%.

In general, 33.3% of population, older than 15 years have primary education and 31% - secondary or higher secondary education[7].

The lack of important personal asset – the ability to read and write reduces an individual's opportunities in life and increases chances to fall into poverty. The low level of literacy, especially among young women makes it more challenging to communicate important public health messages, including immunization related ones, and to mobilize community support for reaching marginalized households with essential health services..

[5] Asian Development Bank, 2015
[6] Catastrophic expenditure is defined as direct out of pocket payments for surgical care exceeding 10% of total income.
[7] Census, 2011

1.1.6 Public Financial Management

The management of public finances in Bangladesh is concentrated in two central agencies, the Ministry of Finance and the Planning Commission:

- The Ministry of Finance (MOF) is responsible for the recurrent budget and
- The Planning Commission prepares the Five-Year Plans (like the current 7th five-year plan for FY16-20) and Annual Development Plans (ADP), and has the lead responsibility for the national development strategy and for ensuring that a robust set of cross-sectoral and sector strategies are in place.

Five-Year Plans are indicative in nature as ADP allocations are done annually to ensure consistency with available resources, effectiveness of implementation, and evolving global environment.

The GoB defined Public Financial Management (PFM) reform goals and objectives in 2016-2021 strategies based on a thorough analysis of the achievements of the reforms in the past and lesson, learned as well as international experiences:

- Goal 1: Maintain aggregate fiscal discipline compatible with macro-economic stability and pro-poor growth
- Goal 2: Allocate resources consistent with Government priorities as reflected in National Plan
- Goal 3: Promote the efficient use of public resources and delivery of services through better budget execution
- Goal 4: Promote accountability through external scrutiny and transparency of the budget
- Goal 5: Enhance the enabling environment for improved PFM outcomes

1.2 Health system context

1.2.1 Population health

(1) Overview

Life expectancy at birth reached 72 years in 2015 (70 for males and 73 for females), up from 65.3 in 2000 (65 for males and 65.7 for females) (as shown in Figure 109 on page 131).

The length of healthy life increased by 6.1 years from 56.3 in 2000 to 62.4 in 2015, higher compared to 5.1-year average increase in the South-East Asia region, or to 4.5 year increase in healthy life expectancy globally (see details in Figure 85 on page 113).

Figure 5: Healthy life expectancy at birth (in years), comparison with regional and global dynamics

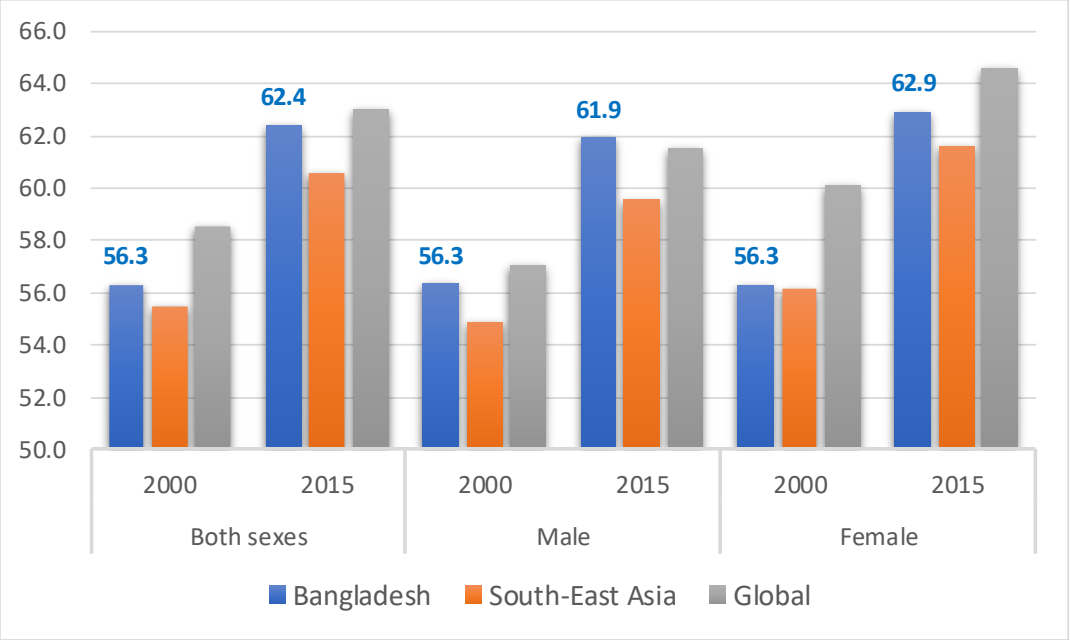


Figure 85 below illustrates that in 2000 healthy life expectancy was the same for male and female in Bangladesh, and for females in Bangladesh and South-East Asia region. Healthy life expectancy improved more for females than for males in Bangladesh; however, compared to global averages, healthy life expectancy is higher among males in Bangladesh (61.9 vs. 61.6 globally), but falls short for females (62.9 vs. 64.6 globally).

Death rate was estimated at 5.39 per 1,000 population (all causes). According to the World Health Organization estimates, disease burden amounted to 30,209 Disability Adjusted Life Years (DALY) per 100,000 population in 2015 (all causes).

Non-communicable diseases and injuries accounted for 75% of deaths in 2015, and 68% of disease burden (expressed in DALY) as shown in Figure 6 below, while infection and parasitic diseases for 13.6 of deaths and 32% of disease burden.

Figure 6: Mortality by selected causes and burden of selected group of diseases (2015)

	As % of total deaths	Disease burden as % of total DALYs
Communicable, maternal, perinatal and nutritional conditions	**25.25%**	**31.98%**
A. Infectious and parasitic diseases	13.60%	12.14%
4. Diarrhoeal diseases	2.30%	2.30%
5. Childhood-cluster diseases	0.16%	0.22%
a. Whooping cough	0.06%	0.10%
b. Diphtheria	0.00%	0.00%
c. Measles	0.00%	0.00%
d. Tetanus	0.10%	0.11%
6. Meningitis	0.21%	0.41%
7. Encephalitis	0.21%	0.24%
b. Acute hepatitis B	0.22%	0.13%
B. Respiratory Infectious	3.51%	4.42%
C. Maternal conditions	0.52%	0.63%
D. Neonatal conditions	6.89%	11.86%
E. Nutritional deficiencies	0.73%	2.93%
Noncommunicable diseases	**66.91%**	**59.11%**
Injuries	**7.84%**	**8.81%**

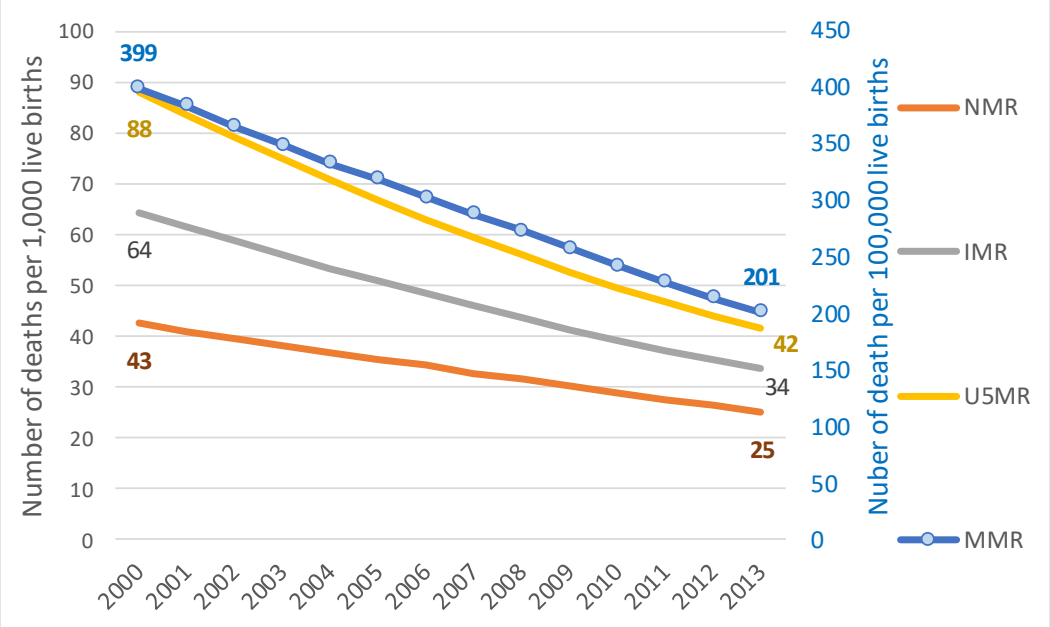
Source: World Health Organization Global Burden of Diseases dataset

(2) Maternal and Child health status

During the last two decades Bangladesh has made a commendable progress in reducing child and maternal mortality:

- Maternal mortality reduced 319 in 2005 to 176 in 2015 per 100,000 live births
- Under 5 child mortality reduced from 66.8 to 37.6 (per 1,000 live births) for the same period

Figure 7: Maternal mortality (MMR, Neonatal Mortality (MR), Infant Mortality (IMR) and Under 5 Mortality rates (U5MR) by years



Source: World Bank< World Development Indicators

Maternal services have improved steadily through increased ANC uptake (ANC4: 25% 2011 to 31% in 2014), the share of deliveries attended by qualified health staff from 32% in 2011 to 42% in 2014 and facility delivery from 29% in 2011 to 37% in 2014.[8] Maternal Mortality Ratio (MMR) declined from 322 per 100,000 live births in 2000 to 176 in 2015.[9]

"As for under-five deaths, pneumonia, neonatal causes and drowning are major causes. Diarrheal deaths among under-five has decreased substantially over the last few years (2 percent), however pneumonia remains the single most important cause (21 percent) of under-five mortality followed by neonatal causes".

The increase in facility delivery is mostly attributed to the private sector. 23% of all deliveries are conducted through caesarean section. About 80% of the deliveries in the private sector are by caesarean section, which is unaffordable for the poorest. Quality of care in the private sector facilities is yet to be defined and monitored.

Despite the tremendous effort in reduction of maternal deaths nationwide, the country still loses 14 mothers a day to complication of pregnancy delivery and post-partum period and largely due to delivery by unskilled birth attendants at home and lack of appropriate care for obstetric complication from a skilled provider at facilities. Lessons show that there is high utilization of services if women friendly services can be made available nearer to the communities.

[8] BDHS 2014
[9] Strategic Investment Plan of 4th HPNSP

There are inequities documented across geographical regions and between different wealth quintiles. Maternal Mortality Ratio is the highest in Sylhet division (425 per 100,000 live births) and the lowest in Khulna division (64% per 100,000 live births).[10]

(3) Burden of vaccine preventable diseases

According to the global disease burden estimates of World Health Organization, four vaccine preventable diseases (VPD) caused 16 out of 10,000 deaths in 2015, accounting for 0.22% of the total disease burden (see Figure 6 on page 8). If hepatitis B is accounted, then the VPD caused 38 out of 10,000 deaths in 2015, and contributed to 0.35% of the disease burden (or 107 DALYs per 100,000 population).

The number of reported cases of selected vaccine preventable diseases in Bangladesh (together with the total number of cases in South-East Asia region) are presented in Figure 110 on page 134 in Annexes).

1.2.2 Governance

(1) Policy framework

The following policy documents compose a conceptual and legislative platform for health system organization, guiding interaction between actors in public and private domains and different levels of public administration, and determining health care development agenda and responsibilities and functions of key actors:

- Government Vision 2021;
- Government Perspective Plan 2010-2021 including 6th and 7ht Five Year Plans for the periods 2011-2015 and 2016-2020 respectively;
- National Health Policy 2011;
- National Population Policy 2012; and
- National Nutrition Policy 2015

Government Vision 2021 defines several economic and social outcomes for Bangladesh to achieve by 2021. *"Perspective Plan 2010-2021",* converts "Government Vision 21" into the long-term development targets and these targets are further realized through implementation of the *"6th Five Year Plan (2011-2015)"* and the *"7th Five Year Plan (2016-2020)" (FYP).* Through implementation of the *6th FYP* Bangladesh has made solid progress in reducing poverty. *The 7th FYP* outlines new strategies, institutions and policies to complete the remaining agenda and achieve the social and economic outcomes of the Vision 2021.

The National Health Policy 2011 acknowledges "health" as a right of the citizens and aims at: i) to strengthening primary health and emergency care for all; ii) expanding availability of client-centred, equity-focused and high-quality health care services; and iii) motivating people to seek care based on their rights (right to health). The policy advocates for equitable access to health care by gender, disability and poverty to achieve better health for all. In addition, there are two core guiding documents, the *National Population Policy 2012* and *National Nutrition Policy 2015*, which have been taken into consideration while formulating health care sector development strategy and strategy implementation instrument – *The Health, Nutrition and Population Sector Program 2017-2022*.

[10] BMMS, 2010

Finally, the Government of Bangladesh recognizes that in a market economy like Bangladesh, where the bulk of the economy is privately owned and managed, the role of planning is essentially indicative and strategic in its nature.

(2) Health policy implementation instruments

As a vehicle to deliver the essential development goal, the government established a *Health, Nutrition and Population Sector Program (HNPSP)* funded by the GoB and Development Partners (DPs) to increase the availability of and utilization of user-oriented effective and efficient equitable, affordable and accessible quality services.

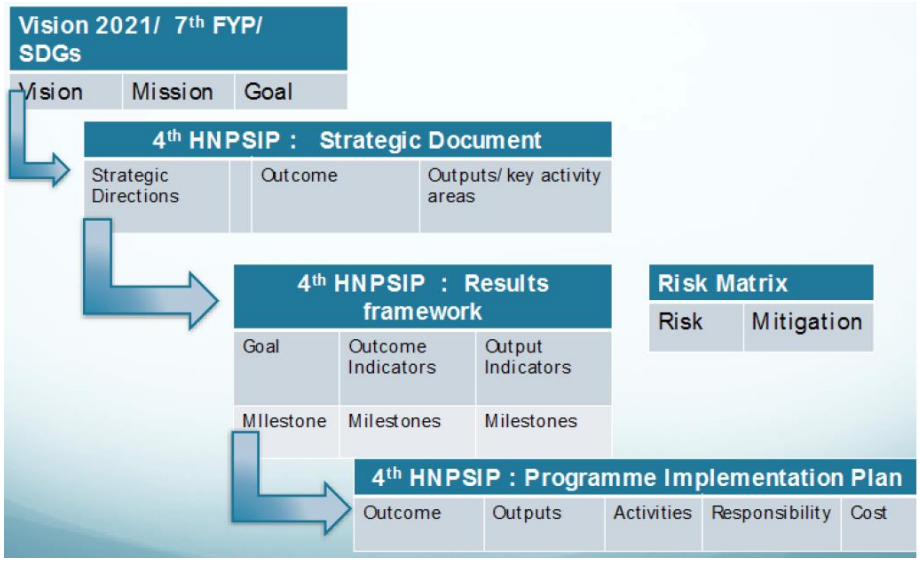
The HNPSP results framework, and strategies are descripted in a *Strategic Investment Plan (SIP)*, which was developed on the basis of wide and intensive consultations of stakeholders.[11]

The Strategic Investment Plan is operationalized through the implementation of the Health, Nutrition and Population Sector Programme. The instrument of Sector Programme Implementation is the Program Implementation Plan (PIP) and its Operational Plans (Ops) covering all key components of the Sector Program.

In 2017, GoB approved the *Fourth National Health, Nutrition and Population Sector Program (4th HNPSP)*, which builds on a successful history and foundation created within the frameworks of the three previous sector programs, well-established planning and consultation processes and monitoring and coordination mechanisms. The programme encompasses the whole health sector and is relevant to all stakeholders working in health, nutrition and population. At the same time, the 4th HPNSP is the first and the foundation stone of the three successive Sector Programs for realizing the SDG health targets by 2030.

The main goal of the 4th Health, Population and Nutrition (HPN) Strategic Investment Plan (SIP) is to ensure equity and effectiveness in delivery of HPN services to all. The SIP identifies the key investment areas required for acceleration of the pace of development in the health, nutrition and population sector for achieving the targets of the strategies of Government's 7th Five Year Plan (2016-20). In the long run, the SIP aims to move towards achieving universal health coverage (UHC) as targeted in SDGs.

Figure 8: 4th HPN SIP Framework & program documentatoin



[11] Current Strategic Investment Plan for 4th HPNSP was approved in 2016

Source: 4th HPN Strategic Investment Plan 2016-2021, (page 47)

The Government prepared the PIP of the 4th NHP Sector Programme – the plan document to reflect the NHP sector development activities of MOHFW under the SWAp. The main purpose of the PIP is to describe broadly aspirations of the GoB and targets set for the HPN sector in the Government's 7th Five Year Plan and to detail out *what* needs to be done and *how it will be achieved* through implementation of the 4th NHPSP.

The PIP also demonstrates allocation of resources to specific programmes and activities. The 4th HPNSP and the PIP incorporate appropriate strategies and activities for ensuring improvements in financial protection, access, equity and quality of health care in order to meaningfully realize objectives of universal health coverage by 2030.

The 4th HPNSP is characterized by restructured Operational Plans (OPs). The 32 Operational Plans of the previous Sector Program - 2011-2016 (32) had been reviewed, optimized and renamed for implementation during the 4th HPNSP.

There are now 29 OPs for the PIP of 4th HPNSP distributed across Directorate General of Health Services (DGHS - 14 OPs), Directorate General of Family Planning (DGFP – 7 OPs), Ministry of Health and Family Welfare (MOHFW – 5 OPs) and other agencies (Directorate General of Drug Administration (DGDA – 1 OP), Directorate General of Nursing and Midwifery (DGNM – 1 OP) and National Institute of Population, Research and Training (NIPORT – 1 OP)) and reflecting priority areas of the 4th HPNSP (detail list of Operational Plans of the 4th HPNSP are presented in the Annex (Figure 90 on page 116).

(3) Health care system development agenda

The 4th NHPSP covers the period five and half years from January 2017 to June 2022.

The Government of the People's Republic of Bangladesh defined vision, mission and goal in health, nutrition and population sector as follows:

- **Vision**: "to see the people healthier, happier and economically productive to make Bangladesh a middle income country by 2021 (Vision 2021);
- **Mission:** "To create conditions whereby the people of Bangladesh have the opportunity to reach and maintain the highest attainable level of health"
- **Goal**: "To ensure that all citizens of Bangladesh enjoy health and well-being by expanding access to quality and equitable health care in a healthy environment".

The Government proposed in the Results Framework (RWF) of the 4th HPNSP eight indicators to measure the attainment of the goal as shown below:

Figure 9: Goal level indicators with baseline and target values set in the RWF

Indicator	Baseline		Target June 2022
	Value	Data sources	
1. Under 5 Mortality Rate (U5MR)	46	BDHS, 2014	34
2. Neonatal Mortality Rate (NNMR)	28	BDHS, 2014	18
3. Maternal Mortality Ratio (MMR)	176	WHO, 2015	121
4. Total Fertility Rate (TFR)	2.3	BDHS, 2014	2
5. Prevalence of stunting among under 5 children	36.1%	BDHS, 2014	25%
6. Prevalence of hypertension among adult population	Female 32% Male 19%	BDHS, 2011	F 32% M 19%

Indicator	Baseline		Target June 2022
	Value	Data sources	
7. % of public facilities with key service readiness as per approved ESP	FP: 38.2% ANC 7.8% CH 6.7%	BHFS, 2014	FP: 70% ANC:50% CH:50%
8. % of total health expenditure (THE) financed from public sector	23.1%	BNHA, 2012	26.2%

In order to achieve the Goal, the Government set eight Strategic Objectives grouped under 3 components ("priority program areas") of the 4th HPNSP:

Component 1: Governance and Stewardship

Strategic objective 1: To strengthen governance and stewardship of the public and private health sectors

Strategic objective 2: To undertake institutional development for improved performance at all levels of the system

Strategic objective 3: To provide sustainable financing for equitable access to health care for the population and accelerated progress towards universal health coverage

Component 2: Stronger Health systems

Strategic objective 3: To provide sustainable financing for equitable access to health care for the population and accelerated progress towards universal health coverage

Strategic objective 5: To establish a high quality health workforce available to all through public and private health service providers

Strategic objective 6: To improve health measurement and accountability mechanisms and build a robust evidence-base for decision making.

Component 3: Provision of quality health services

Strategic objective 7: To improve equitable access to and utilization of quality health, nutrition and family planning services

Strategic objective 8: To promote healthy lifestyle choices and a healthy environment

Each strategic objective is further broken down into a set of outputs and related activities (as shown in Figure 114 (on page 136) .

The implementation of Strategic Objective 7 envisaged several priority programs:

1 Reproductive, Maternal, New-born, Child, and Adolescent Health (RMNCAH)

1.1 Maternal Health and New-born Health

1.2 Child Health

1.3 Adolescent Health

2 Nutrition and Food Safety (NFS)

3 Population and Family Planning Services (PFPS)

4 Non-Communicable Disease control (NCDC)

5 Communicable Disease Control (CDC)

6 Hospital Service Management and Quality Improvement (HSMQI)

7 Alternative Medical Care (AMC)

8 Revitalizing Community Based Primary Health Care towards UHC in Bangladesh (PHC-UHC)

9 Urban Health Services (UrbHS)

10 Tribal Health Services (TrHS)

11 Services for Hard-to-Reach Areas and Vulnerable Population (HtRA&VP)

Child health component of the RMNCAH defined 4 "prioritized child health interventions" ("with special attention to addressing regional disparities"):

1 Develop a comprehensive costed Child Health Strategy

2 Strengthen /MCI both at community and facility levels

3 Financial sustainability of EPI Program

4 Improve quality of child health care

Under the priority program 8 "Revitalizing Community Based Primary Health Care towards UHC in Bangladesh" the Government introduced Essential Package of Services (ESP) – "a limited list of public health and clinical services that will be provided at primary and/or secondary care level" and will be funded through SWAp. Extended Program of Immunization is one core services of the ESP (under component of Child Health and Immunization) – see Figure 88 for details (on page 114).

Sector Program Context

Three interconnected plans together with the Results Framework constitute a policy implementation framework of the 4th NHP Sector Program (covering period from January 2017 to June 2022):

1: NHP Sector Investment Plan (SIP)

- NPH Sector Investment Plan (SIP) defines 7 strategic objectives (SO) for achieving the NPNSP goal: "To ensure that all citizens of Bangladesh enjoy health and well-being by expanding access to quality and equitable health care in a healthy environment".
- Strategic objective 7 "To improve equitable access to and utilization of quality health, nutrition and family planning services" implies addressing health system bottleneck to immunization for under-served population and in hard-to-rich areas that determines equity in immunization coverage between urban and rural population, across administrative divisions (with focus in poor performing areas such as Chittagong and Sylhet)
    - Two Outputs/Intermediate under SO 7, namely "7.2 Achieve effective and equitable coverage of evidence based high impact maternal, neonatal, child and adolescent health (MNC&AH) care interventions" and "7.6 To reduce mortality and morbidity due to Communicable Diseases in Bangladesh through strengthening of measures for control of risk factors, and health service delivery options for early detection and management" are specifically connected with immunization:

- if the first output is achieved, it implies that health system barriers for effective and equitable coverage of immunization are addressed successfully
- Successful implementation of the national immunization program, and scaling up surveillance and early response mechanisms, contributes to the achievement of the second (#7.6) output
- The achievement of Output "7.1 Establish service level integration across tiers of the system including role out of (new) ESP and establishment of effective referral systems" implies enhancement of service delivery capacity at PHC level that is essential for addressing immunization coverage inequalities due to supply side issues

- Finally, intermediate result "4.1 To ensure availability and quality of medical products including life-saving drugs, vaccines, contraceptives and necessary equipment through an effective, efficient and transparent procurement and supply chain management process" of SO 4 "To strengthen the capacity of the MOHFW's core health systems (Financial Management, Procurement, Infrastructure development)" envisages addressing system bottlenecks to uninterrupted supply of vaccines along with other commodities.
- SIP defines indicators and end targets for 8 indicators at the goal level, that includes Under 5 Mortality Rate.

2: HPN Sector Program Implementation Plan (PIP)

- In overall, the PIP details out what needs to be done and how it will be achieved through implementation of the 4th NHPSP.
- The PIP Defines programs that are required to implement each strategic objective. It sets 11 priority programs for the implementation of SO 7 (of the 4th NPN SIP).
- Child health is covered under Reproductive, Maternal, New-born, Child, and Adolescent Health (RMNCAH) program (#1), and includes "Financial Sustainability of EPI Program" as on out of 4 priority interventions
- The PIP defines the content of Essential Package of Services under #8 "Revitalizing Community Based Primary Health Care towards UHC in Bangladesh (PHC-UHC)" that includes Extended Program of Immunization (EPI))(under sub-category of Child Health and Immunization services, category "Maternal, Neonatal, Child and Adolescent Health Care").
- The PIP reflects the NHP sector development activities of MOHFW under the SWAp, and defines resource requirements and allocation of funds by sources
- The PIP maps Operational Plans (29 in total after optimization from 32 OPs for the previous sector program) with the HNPSIP Strategic components and underlying programs, and assigns key responsible/implementing actors; Immunization falls under 16. Maternal, Neonatal, Child & Adolescent Health (MNC&AH) Operational Plan
- SWAp Management and Monitoring (SWPMM) Operational Plan is defined for the implementation of Component 1 "Strengthening governance and stewardship".

3: Maternal, Neonatal, Child & Adolescent Health (MNC&AH) Operational Pan

- Director of PHC, DGHS is designated as a lead[12] and coordinates implementation with Director General of Family Planning (DGFP), Director General of Health Services (DGHS), and Director General of Nursing and Midwifery (DGNM)
- OP was approved in May 2017 by the Hon'ble Minister of MOHFW upon recommendation by the HNP Steering Committee chaired by the Secretary, HSD and includes a detailed list of strategies for 7 EPI objectives:
  - 1: At least 95% fully vaccination coverage among under one-year children at national level and 90% folly vaccination coverage at each district level
  - 2: TTS coverage among women of childbearing age reached at least 80% at national level and 75 % at each district level
  - 3: Maintain polio free status
  - 4: Achieve national level 95% measles and rubella coverage and reaching measles and rubella elimination status and control of CRS by 2018
  - 5: Prevention of diseases protected by new and underused vaccines
  - 6: Maintain maternal and neonatal tetanus elimination validation status
  - 7: Ensure safe injection practices and waste disposal

4: 4th HPNSP M&E Framework

- The framework consists of a set of indicators spread across three documents:
  - Goal level indicators (8) defined in the 4th HNPSIP
  - 25 indicators to measure results at outcome, output and process levels for all three priority program areas (components) in addition to the abovementioned 8 indicators:
    - 4 indicators were set for Component 1 Governance and Stewardship,
    - 6 indicators for – Component 2 Stronger Health Systems, and
    - 15 indicators for Component 3: Provision of quality health services the 4th HPNSP
  - The Log frame of the Operational Plan of Maternal Neonatal Child and Adolescent Health (MNC&AH) 2017-22 defines 6 immunization related indicators under objective "increase coverage and utilization of quality MNCAH service" (4 indicators) and under objective "Improve awareness, knowledge and practice about essential MNCAH"
- "measles-rubella coverage among children under 12 months (indicator 3.2.9)" is one of 9 indicators for "result 3.2 "Equitable coverage of ESP ensured" (under component 3 "Quality basic services reach the disadvantaged population to progress towards UHC")" with baseline of 86.6% in 2014 and end target of 90% in 2022.

EPI position within the health policy framework and implementation instruments is illustrated in Figure 117 (on page 139).

[12] That is important to avoid confusions with similar OP 17 "Maternal, Child, Reproductive and Adolescent Health (MCRAH)" implemented by Director (MCH), DGFP

(4) Leadership and management

The Ministry of Health and Family Welfare (MOHFW) of Bangladesh takes the lead in implementation of the 4th Health, Nutrition and Population Sector Program (HPNSP). The MOHFW is responsible for implementation, management, coordination and regulation of national health, family planning and nutrition related policies, programs and activities.

The MOHFW organizational structure comprises 2 main groupings: (i) Division of Health Services responsible for management of nine functional wings/units and seven Directorates/Units/Institutes and (ii) Medical Education and Family Welfare Division responsible for management of NIPORT, Medical Education and Family Planning Directorate. Through these functional wings/units and executing agencies the MoHFW implements its policies all over the country. Both groups are supervised by the State Minister, who works as the Chief Executive. The Minister, assisted by the State Minister heads the Ministry.

MOHFW, (Directorates General of Health Services (DGHS) and Family Planning (DGFP)), manages a dual system of general health and family planning service delivery through District Hospitals (DHs), Upazila Health Complexes (UHC) at sub-district level, Union Health and Family Welfare Centres (UH&FWC) at union level, and Community Clinics (CCs) at ward level.

The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) manages primary health care and family planning service delivery in the urban areas of the country through outsourced NGOs.

The Ministry of Health and Family Welfare implements its programs through different executing and regulatory authorities. The executing authorities include five Directorates of the Ministry and some other organizations: Directorate General of Health Services (DGHS); Directorate General of Family Planning (DGFP); Directorate General of Drug Administration (DGDA); Directorate for Nursing and Midwifery (DGNM); Health Economics Unit (HEU) and the Health Engineering Department (HED)[13]. The DNMS and the DGDA are attached to the Health Services Division of the Ministry of Health and Family Welfare. The DNSM is responsible for nursing/midwifery education and services, while the DGDA implements drug regulations. Other executive organizations implementing other important activities of the Ministry include technical and implementing agencies and Specialized Entities of MOHFW responsible for maintenance of medical equipment and transport. The technical and implementing agencies are: National Institute of Population, Research and Training (NIPORT) and Medical Education managing work of Institute of Public Health (IPH), Institute of Public Health and Nutrition (IPHN), Institute of Epidemiology and Disease Control and Research (IEDCR). And finally, the specialized entities of MOHFW include: Transportation and Equipment Maintenance Organization (TEMO) and National Electro-Medical Equipment Maintenance Workshop & Training Centre (NEMEMW&TC) (see Figure 10 below).

Figure 10: MOHFW Technical Directorates, Implementing Agencies and Specialized Entities

Technical Directorates/Units and Wings of MOHFW	
PW	Planning Wing
DW	Development Wing
AW	Administration Wing
FMAW	Financial Management and Audit Wing
NMW	Nursing and Midwifery Wing
HEU	Health Economics Unit

[13] formerly known as the Construction Management and Maintenance Unit)

PHWH	Public Health and World Health Unit
HRU	HR Management Unit
DGHS	Directorate General for Health Services
DGFP	Directorate General for Family Planning
DGDA	Directorate General for Drug Administration
DGNM	Directorate General for Nursing and Midwifery
HED	Health Engineering Department
Technical and implementing agencies of MOHFW	
NIPORT	Institute of Population, Research and Training
NIPSOM	National Institute of Preventive and Social Medicine
IPH	Institute of Public Health
IPHN	Institute of Public Health and Nutrition
IEDCR	Institute of Epidemiology, Disease Control and Research
Specialized Entities of MOHFW responsible for maintenance of Medical Equipment and Transport	
TEMO	Transportation and Equipment Maintenance Organization
NEMEMW & TC	National Electro-Medical Equipment Maintenance Workshop & Training Centre

The regulatory bodies of the health sector are the Bangladesh Medical and Dental Council (BMDC), Bangladesh Nursing Council (BNC), State Medical Faculty (SMF), the Ayurvedic, Homeopathy and Unani Board (AHUB), and the Bangladesh Pharmacy Council (BPC).

The Directorate General of Health Services (DGHS), Family Planning (DGFP) and Drug Administration (DGDA) have a separate presence at the divisional level, providing administrative and regulatory oversight. Technical agencies provide specialized services, including capacity development, disease surveillance and research and autonomous bodies are responsible for fulfilling specified governance and stewardship functions for different professional groups in the Health, Nutrition and Population Sector within the MOHFW structure, as envisaged by the existing legislation.

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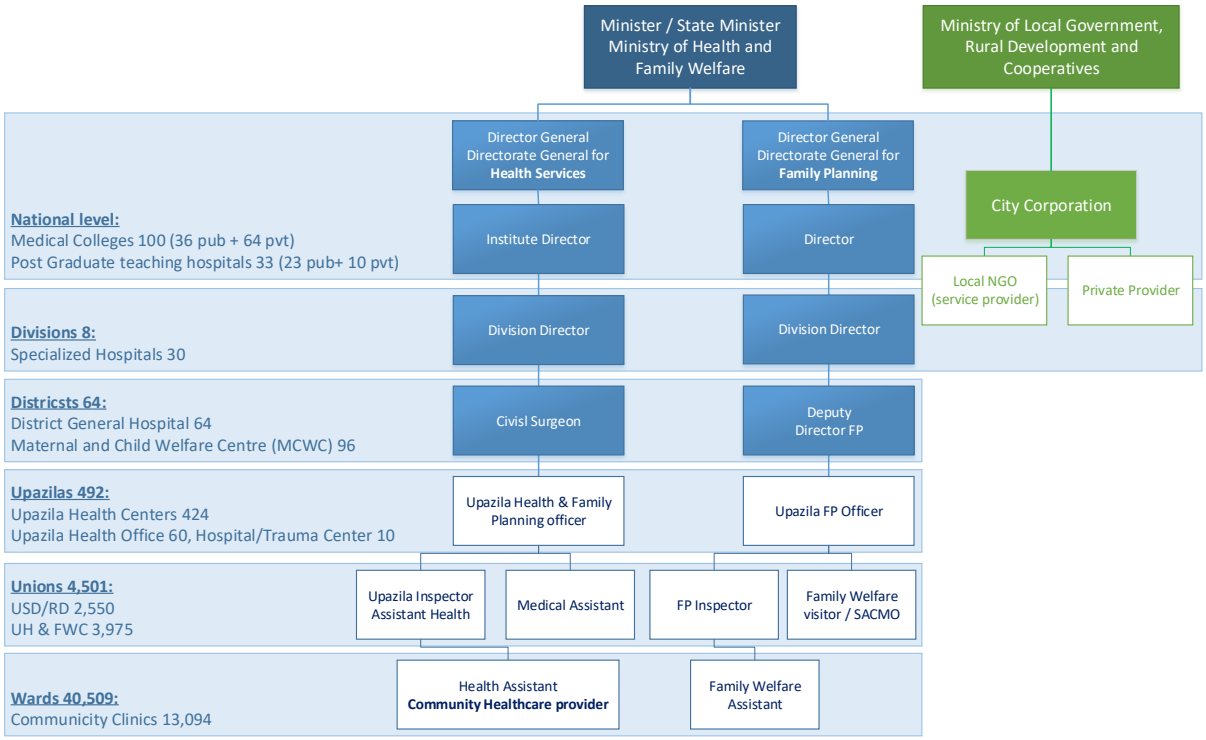
Figure 11: Health service delivery facilities and administrative arrangements



A variety of mechanisms were identified and practiced in HPNSDP (2011-2016) on sector-side programme management, collaboration and coordination. Conscious efforts were made to improve both inter and intra OP coordination and also to strengthen inter-ministerial coordination (see Figure 90 for details on page 116). Therefore, for further improvement of the coordination and overall management of the Sector Program the 4th HPNSP is focused on strengthening coordination with Development Partners through establishment of *HPN sector Coordination Forum* chaired by Honourable Minister of MOHFW and participation of the existing Task Groups against the backdrop of emergence of issues like NCD, governance and stewardship, institutionalization of MOHFW new units (such as Programme Management and Monitoring Unit (PMMU) the Planning Wing and etc.).

The Expanded Program of Immunization (EPI), as the part of Maternal and Neonatal health is implemented within the framework of Operational Plan of Maternal Neonatal Child and Adolescent Health services.

Responsibility for implementation of EPI at the national and sub-national levels is assigned to the Directorate General of Health Services. The overall management of EPI is provided by the Line Director of the MNC&AH OP, who is also responsible for overseeing implementation of other major components of the operational plan such as: Maternal health, National Newborn Health Program (NNHP), Integrated Management of Childhood Illness (IMCI), Adolescent Health and School Health. Responsibility for routine (day-to-day) management of EPI at the national and sub-national levels is assigned to the EPI Program Manager and four Deputy Program Managers (DPM-EPI): DPM- EPI and Surveillance, DPM- procurement and supplies, DPM- Field Services and DPM-IEC and SBC.[14].

(5) Monitoring and evaluation of the 4th HPNSP implementation

A monitoring and evaluation framework for the measurement of 4th HPNSP implementation progress is based on a Results Framework (RFW): results are defined at different levels (goal,

[14] Social and Behavioral Change

objectives, outputs, inputs) connected logically and having own sets of indicators. The top level 8 indicators that measure the attainment of the 4th HPNSP goal were described in Figure 9 (on page 12).

The 4th HPNSP M&E framework includes 25 indicators to measure results at outcome, output and process levels for all three priority program areas (components) in addition to the abovementioned 8 indicators: 4 indicators were set for Component 1 Governance and Stewardship, 6 indicators for – Component 2 Stronger Health Systems and 15 indicators for Component 3: Provision of quality health services (see details in Figure 89 on page 115).

One of the 9 indicators for result 3.2 "Equitable coverage of ESP ensured" (under component 3 "Quality basic services reach the disadvantaged population to progress towards UHC") is measles-rubella coverage among children under 12 months (indicator 3.2.9): the target for 2022 is set at 90% (up from 86.6% in 2014 according to CES).

The Log frame of the Operational Plan of Maternal Neonatal Child and Adolescent Health (MNC&AH) 2017-22 further specifies indicators to measure immunization related results:

- under objective "Increase coverage and utilization of quality MNCAH services":
  - % of children fully immunized by 12 months
  - % of <1 year children vaccinated against measles
  - Maintaining Polio free status
  - Maintaining MNT Elimination Status
- Under objective: Improve awareness, knowledge, and practice about essential MNCAH"
  - Proportion of women age 15-49 yrs received TT-5 doses of TT vaccine ~
  - Proportion of all under 1 children received all antigen at right time at right interval

1.2.3 Service delivery

(1) Service delivery organization and capacity

The Ministry of Health and Family Welfare (MOHFW) and the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) manage health service delivery in rural and urban areas of the country.

Under the MOHFW:

- Directorate General for Family Planning is primarily responsible for managing and ensuring Family Planning service delivery in collaboration with other directorates and departments, particularly Directorate General for Health Services.
- Directorate General for Health Services is responsible for delivery of health care services in close collaboration with all directorates and departments of the MOHFW, particularly Directorate General for Family Planning.
- Provision of HPN services in the urban areas is a prerogative of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC), while the MOHFW provides the technical oversight and logistics.

Details of health service delivery organization in Bangladesh are presented in Figure 11 (on page 19).

Management responsibility for public sector hospitals and rural health facilities within provinces is divided between MOHFW and local governments of City Corporations. The National Department of Health manages the provincial hospitals, while provincial and local governments are responsible for management of all other public health service provision (health centers and sub-centers, rural hospitals and aid posts), known collectively as 'rural health services').

Figure 12: Public health facilities by levels and types of services

Facility	Location, Level	Number	Type of Services	ESP
Post-graduate Teaching Hospitals[15]	City Corporation/Municipalities	33	Tertiary HC	
Medical Colleges[16]	City Corporation/Municipalities	100	Tertiary HC	
Specialized Hospitals[17]	Division	30	Tertiary HC	
Maternal and Child Wellness Centre	District	96	PHC/FP	
District General Hospital	District	64	PHC & Secondary HC	
Hospital/Trauma Centre	Upazila	10	PHC & Secondary HC	
Upazila Health Office[18]	Upazila	60	PHC/FP	
Upazila Health Complex	Upazila	424	PHC/FP	
Union Health & Family Welfare Centers	Union	3,975	PHC/FP	
Satellite Centers	Union	2,550	PHC/FP	
Community clinics	Ward	13,094	PHC/FP	

The field level HPN service delivery has multiple layers of service provision entities corresponding to different administrative tiers. The grass-root level service point of MOHFW is the Community Clinic at ward level, serving approximately 6,000 people. At union level, there are Union Health & Family Wellness Centres, Union Sub-Centres/RD with an average coverage of 30,000 people. Union Health Centres are located at the Upazila headquarters. These three layers provide Primary Health Care and Maternal, Neonatal, Child and Adolescent Services.

The secondary layer of service provision is delivered from the District Hospitals. These health care institutions also provide primary care and work as a referral site for the Union Health Centres. On top of these health care facilities, there are specialized hospitals and medical college hospitals, mostly located at divisional headquarters and in major cities and providing tertiary care services. Figure 12 above shows structure of health care provider facilities of the MOHFW.

Details of the types of HPN services provided at each tier of the health care system are presented in the Figure 13 below:

Figure 13: Provision of Essential Services in Bangladesh

HEALTH CARE SYSTEM TIER	SERVICE PROVIDER
TIER 1: COMMUNITY LEVEL	Domiciliary services Satellite clinics Outreach services; Community Clinics
TIIER 2: UNION LEVEL	Health and Family Welfare Centres (HFWC) Sub-centres; Maternal and Child Welfare Centres M&CWC
TIER 3: UPAZILA LEVEL	Upazila health complexes (UHC)

[15] 23 public, 10 private
[16] 36 public, 64 private
[17] In eight divisions
[18] Situated at "Sadar Upazila" which do not have indoor facility and managed by the headquarters from co-located district town

HEALTH CARE SYSTEM TIER	SERVICE PROVIDER
	Maternal and Child Welfare Centres (M&CWC)
TIER 4: DISTRICT LEVEL	District hospitals (DH)
	Maternal and Child Welfare Centres (MCWC)

Family Planning services at the domiciliary level are provided by the Family Welfare Assistants (FWAs) through the household visits and include registration of eligible couples, providing counselling and distribution of contraceptives. Maternal and child services at the community level are also provided through the approximately 30,000 Satellite Clinics (SC), which are organized every month to cover rural population with the MCH services.

Community Level Facilities

At the community level domiciliary visits are provided through the Satellite clinics and outreach. The field staff both from DGHS and GHFP conduct house-to-house visits in the community for providing services to the patients in their respective geographic area. Satellite clinics (8 in each union per month) and EPI outreach services (24 per months in each union) are providing designated services through health and family planning field workers. Community Clinics cover 6,000 people to provide health care services to the door step of the community. Each Community Clinic is served by Community Health Care Provider (CHCP0, a Health Assistant (HA) and a Family Welfare Assistants (FWAs).

Union Level Facilities

Union level services are provided through the Union Health and Welfare Centres and Maternal and Child Welfare Centres These facilities are located at the union level and are staffed with a Doctor, a Family Welfare Visitor (FWV); a Sub-Assistant Community Medical Officer (SACMO) and a Pharmacist. There is provision of residential accommodation for SACMO and FWVs and office space for the Family Planning Inspector (FPI) in the upgraded UHFWCs.

Upazila Leve Facilities

The HPN services at the Upazila level are provided through the Upazila Health Complexes (UHC) and Maternal and Child Wellness Centres (M&CWCs). The UHC is the first level referral center established at Upazila and providing both in- and out-patient services to the population. UHC have been upgraded to 50 bedded facilities and are staffed with: Upazila Health and Family Planning Officers (UHFPO), Resident Medical Officers (RMO), Medical Officers (MOs), Medical Officer-MCHFP, Upazila Family Planning Officers (UFPO), Specialist Doctors (consultants), Staff Nurses, Lab. Technicians and a cadre of field staff. The Upazila Health Complexes have both in- and out-patient facilities.

District Level Facilities

Out of 64 districts 59 have District Hospitals and these are in the process of being upgraded from 100 to 200-250 bed hospitals in phases, with provision of trained manpower and necessary equipment. District hospitals are specialized health care facilities with consultants from relevant disciplines to provide services. The district hospitals will serve as the secondary referral centre. Maternal and Child Welfare Centres (MCWCs) in the districts are providing maternal, neonatal, child and family planning services. These facilities are staffed with trained Medical Officers and Family Welfare Visitors (FWVs).

(2) Private Sector

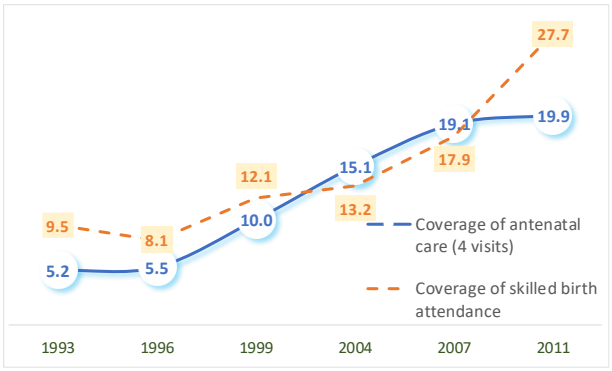
Health service delivery of the country is significantly contributed by the private, NGO, associations and other non-government organizations. About 3,487 private hospitals and clinics and about 6,422 diagnostic centers are registered with DGHS up to December 2013. However, daily newspapers clips indicate that the number would be much more than this. Due to lack of capacity for proper monitoring and supervisory mechanisms, their services are remaining fully or partially un-regulated. A serious concern has been emerged that dishonest and fake doctors are involved with illegal medical businesses, as a consequence, issues related to irrational use of drug, over prescription, unnecessary and wrong medical diagnostics are frequently reported as cases in the mass media which directly contribute to high out of pocket expenditures, and finally causes threat to lives due poor healthcare services.

About 75% of rural and 84% in urban population depend on private, small, informal health-care service providers who are mostly semi-skilled with no professional training[19]. In Bangladesh, 13% of treatment-seekers use government services, 27% use private/ NGO services, and 60% use unqualified services.[20] T

(3) Service delivery coverage and equity (MCH)

Utilization of antenatal care has almost quadrupled for last two decades: percentage of pregnant women who visited healthcare provider for antenatal care at least 4 times during pregnancy increased from 5.2% in 1993 up to 19.9% in 2011 as shown in Figure 14.

Figure 14: Trends in antenatal care (4 visits at least) and skilled birth atandance coverage by years



Source: DHS/ WHO GHO

The share of delivered attended by qualified healthcare personnel increased threefold during the same period from 9.5% in 1993 to 27.7% in 2011. It was far below the regional average for South Asia - 72%[21]. According to the World Bank estimates[22], half of deliveries of pregnant women in the wealthiest income quintile were attended by skilled health staff, while only 1 out every 20 pregnant women in the poorest income quintile were assisted by qualified medical personnel during delivery in 2007.

Utilization of antenatal care services differed across regions as shown in Figure 15 below:

- When at least 1 antenatal care visit was counted, the utilization was the lowest interchangeably in Barisal and Sylhet division (40% and 52% respectively in 2012, colored in red in the table), and had been highest always in Khulna since 1999 (growing from 46% in 1999 to 75% in 2012, colord in green)

[19] WHO, 2015
[20] Cockcroft, Milne et al., 2004
[21] World Bank World Development Indicators
[22] World Bank. Health Equity and Financial Protection Datasheet. 2012

- If at least 4 antenatal care visits are counted, the utilization was highest in Khulna, Dhaka and Rangpur (27% and 26% in 2012, and 38% in 2011 respectively); it had been lowest in Sylhet division till 2012 when Barisal reported the lowest coverage – 14% (compared to 16% in Sylhet).

Figure 15: Trends in quity in antenatal care coverage across divisions (geographic) by number of visits

Antenatal care coverage - at least one visit (in the two or three years preceding the survey) (%)

	1993	1996	1999	2004	2006	2007	2011	2012
Barisal	25.7	27.7	37.0	**39.8**	**41.8**	**45.2**	50.8	**40.3**
Chittagong	24.5	**34.8**	29.9	47.8	49.4	53.3	55.1	58.1
Dhaka	**33.1**	29.2	35.1	51.1	48.7	50.6	54.5	61.9
Khulna	26.3	31.8	**45.8**	**58.3**	**52.5**	**67.8**	**65.4**	**74.6**
Rajshahi	**19.6**	26.9	35.3	**53.6**	45.8	55.0	56.1	63.6
Sylhet		**19.0**	**27.3**	44.0	43.3	49.5	**46.7**	52.1
Rangpur							49.6	46.6

Antenatal care coverage - at least four visits (in the two or three years preceding the survey) (%)

	1993	1996	1999	2004	2006	2007	2011	2012
Barisal	4.2	5.5	10.4	11.6		17.4	27.0	**14.0**
Chittagong	4.1	7.0	7.2	14.8		20.3	20.3	21.7
Dhaka	**9.4**	**8.4**	12.2	**19.2**		21.4	26.6	26.3
Khulna	3.8	6.3	**16.8**	19.1		**27.9**	33.3	**27.1**
Rajshahi	**3.7**	5.7	10.9	**17.4**		26.7	21.4	25.6
Sylhet	0.0	**4.5**	**5.9**	**10.2**		**13.4**	**15.9**	16.0
Rangpur							**38.4**	

Source: DHS / WHO GHO

Utilization of antenatal coverage varied by economic status being the highest among the richest pregnant women and the lowest among the poorest as shown in Figure 16 below:

- The probability of making at least one antenatal care visit is still almost three times higher among the pregnant women in 5th (richest) income quintile compared to the 1st quintile in 2012. Despite the 2.5 times increase of the share of pregnant women with at least 1 antenatal care among the poorest (reaching 34% in 2012), the gap between the richest and poorest quintiles remains 55 percentage points, higher than it was in 1993-1999

Figure 16: Trends in equity in antenatal care coverage across income groups (quintiles)

Antenatal care coverage - at least one visit (in the two or three years preceding the survey) (%)

	1993	1996	1999	2004	2006	2007	2011	2012
Q1 (Poorest)	**13.0**	**15.4**	**21.1**	**26.6**	**27.1**	**31.7**	**30.4**	**34.4**
Q2	17.2	16.5	23.2	39.6	35.1	38.9	39.6	43.1
Q3	22.5	24.9	29.3	50.5	44.9	49.1	54.2	59.4
Q4	29.4	36.4	43.2	64.7	60.8	66.6	68.1	71.9
Q5 (Richest)	**59.3**	**65.5**	**70.7**	**83.7**	**82.1**	**85.3**	**87.4**	**90.0**

Antenatal care coverage - at least four visits (in the two or three years preceding the survey) (%)

	1993	1996	1999	2004	2006	2007	2011	2012
Q1 (Poorest)	**0.4**	1.6	**2.2**	**4.2**		**9.4**	**10.6**	**12.8**
Q2	0.7	**1.5**	3.9	7.0		11.3	14.9	13.9
Q3	2.2	2.4	5.7	13.0		15.7	21.0	18.4
Q4	3.9	6.9	10.5	19.4		27.8	32.7	25.3
Q5 (Richest)	**25.5**	**26.8**	**40.4**	**48.0**		**49.2**	**53.2**	**55.2**

Source: DHS / WHO GHO

- The probability of making 4 antenatal visits was 4 times higher among the richest pregnant women compared to the poorest ones (55% vs 13% respectively) despite a dramatic increase (30 times!)

of the utilization of antenatal care (4 visits) from 0.4% in 1993 to 12.8% in 2012 among the latter group.

According to the World Health Statistics (2014), only 27 of children beneficiated from postnatal care visit within two days of childbirth in 2006-2012. *In 2014 36% of mothers and children received check-ups from a skilled health care service provider within 2 days of delivery*. *Importantly 34% of women and 31% of children receiving this within 2 days of delivery*[15]. According to WHO GHO, coverage with postpartum care was 27.2% in 2011, up to 40.4% in 2013 down to 33.9% in 2014.

Figure 17: Trends in equity in utilization of children healthcare services across divisions (geographic)

Children aged < 5 years with diarrhoea receiving oral rehydration therapy and continued feeding

	1999	2004	2006	2007	2011	2012
Barisal	**42.0**	**51.0**	**57.6**	**75.7**	70.1	**59.5**
Chittagong	34.0	56.7	48.1	61.3	70.5	**68.7**
Dhaka	33.5	53.3	52.6	71.8	**88.2**	64.2
Khulna	40.1	**51.1**	48.1	**69.7**	67.0	**65.1**
Rajshahi	38.3	**51.4**	**42.7**	72.8	**61.8**	65.2
Sylhet	**25.5**	**43.7**	47.8	**57.0**	79.0	**51.6**
Rangpur					**78.8**	**67.6**

Children aged < 5 years with pneumonia symptoms taken to a health facility (%)

	1999	2004	2006	2007	2011	2012
Barisal			**24.6**	57.6	40.1	**26.1**
Chittagong			32.1	56.7	**26.3**	30.0
Dhaka			32.0	**53.4**	36.5	37.8
Khulna			**34.9**		**45.4**	**46.2**
Rajshahi			**24.7**	**59.2**	31.1	35.0
Sylhet			29.8	**56.4**	43.2	39.2
Rangpur					**46.6**	37.7

Geographic inequity of the utilization of healthcare services for children under the age of five was not as prominent as for antenatal care as shown in Figure 17 above:

- In case of receiving oral rehydration therapy, Barisal division outperformed others till 2007, but the highest utilization was found in Dhaka (88% in 2011) and Chittagong (68% in 2012).
- The utilization rate had been the lowest in Sylhet and Rajshahi divisions; overall utilization declined In 2012 compared to the previous years (2011 and 2007).

It is noteworthy that the proportion of children with pneumonia symptoms visiting a health facility had reduced since 2007: Barisal had the lowest utilization rate in 2012 - only 26% of children were taken to health facility, while the highest utilization was detected Khulna – 46% (that was below the lowest utilization rate in 2007 – 53% in Dhaka).

Figure 18: Trends in equity of utilization of children healthcare services across income groups (quintiles)

Children aged < 5 years with diarrhoea receiving oral rehydration therapy and continued feeding (%)

	1999	2004	2006	2007	2011	2012
Q1 (Poorest)	**23.3**	**40.6**	**44.5**	**57.0**	**77.4**	**63.1**
Q2	33.3	50.1	47.0	**72.8**	76.6	**56.1**
Q3	40.3	52.4	49.4	69.6	**71.8**	61.9
Q4	33.4	57.3	**54.6**	**73.0**	72.7	**74.6**
Q5 (Richest)	**52.9**	**76.1**	**55.1**	69.8	**79.3**	68.5

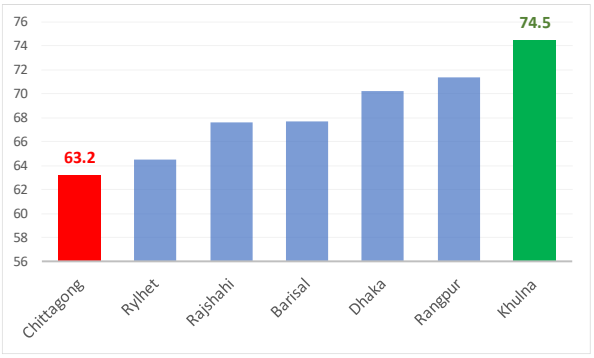
Children aged < 5 years with pneumonia symptoms taken to a health facility (%)

	1999	2004	2006	2007	2011	2012
Q1 (Poorest)			**16.0**	**45.2**	**24.7**	**32.3**
Q2			25.5	56.3	30.3	34.0
Q3			26.9	**72.7**	29.1	37.3
Q4			41.2	55.8	46.2	37.9
Q5 (Richest)			**55.6**	**73.3**	**58.7**	**43.6**

Utilization of oral rehydration therapy with feeding was the highest in 4th income quintile in 2012 (75%) and the lowest – in the 2nd income quintile (56%) as shown Figure 18 above. The gap between the richest and poorest had been reduced from 13 percentage points in 2007 to 6 percentage points in 2012.

As to the probability of visiting a health facility in case of pneumonia symptoms, it had been always the highest in 5th income quintile (44% in 2012) and the lowest among the poorest (32% in 2012). The gap between the richest and poorest families had been reduced from 40 percentage points in 2006 to 12 points in 2012 (albeit at the cost of a decline of the utilization in the 5th quantile from 56% in 2006 to 44% in 2012).

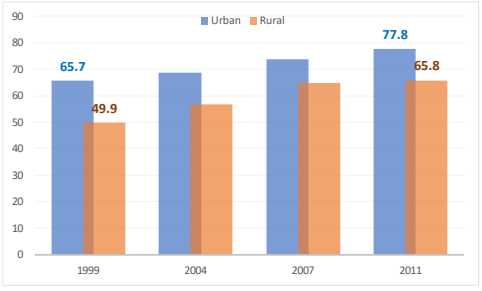
Figure 19: A composite coverage index by divisions (in %), 2011



Source: DHS 2011 / WHO GHO

A Composite Coverage Index calculated based on the coverage of 9 the most important MCH interventions was highest in Khulna division (75%) compared to the lowest 63% in Chittagong (see Figure 19).

Figure 20: A composie coverage index by residence and years

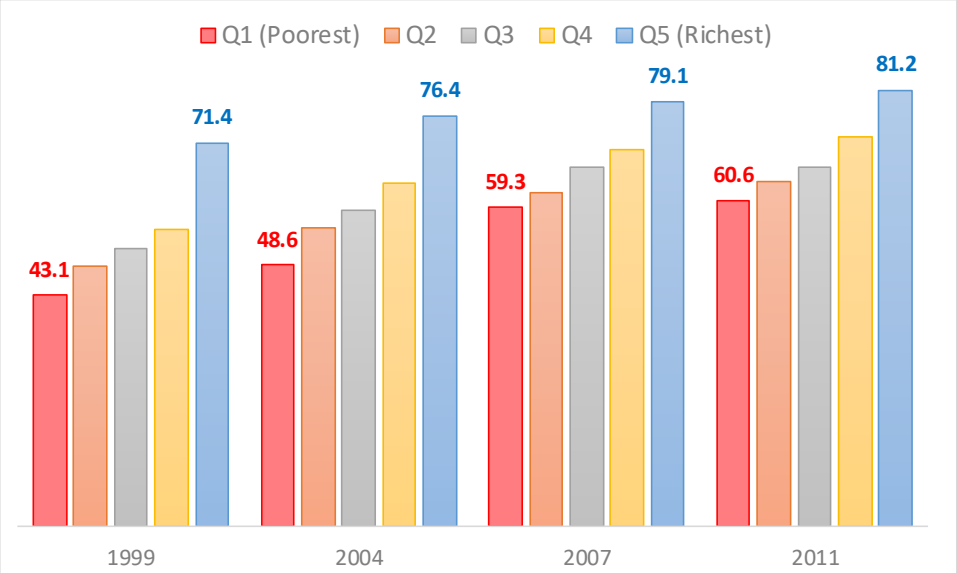


Source: DHS / WHO GHO

The coverage with MCH interventions had been improving but urban-rural differences remained despite the reduction of the gap from 16 percentage points in 1999 to 12 points in 2011.

The coverage with important MCH interventions had improved among the poorest from 43% in 1999 to 61% in 2011 as shown in Figure 21 below. The gap between the richest and poorest had reduced from 28 percentage points to 21 points for the same period.

Figure 21: A Composite Coverage Index by income groups an and yeards



Source: DHS / WHO GHO

1.2.4 Health workforce

(1) Overview

In 2015 the Government of Bangladesh elaborated "Bangladesh Health Workforce Strategy" to support the health sector in achievement its vision, mission, goals and objectives, as well as support the strategic plans that contribute to the pathways towards achieving Universal Health Coverage of the country's population.

Administration Wing of the MOHFW Secretariat is primarily responsible for most of the personnel management functions such as post creation, recruitment, selection, deployment (e.g. transfer, posting, and deputation), leave and promotions. *Human Resource Management Unit* is a project based set up of the Ministry and exists as an operational plan attached with the Administration Wing. The Unit provides health workforce policy, plan and strategy formulation support to the Ministry including HW data and information generation. Many of the HR functions are carried out by the other Wings of the Ministry though they should be coordinated by and fallen under the purview of HRM Unit. But the Unit is running under staff.

Healthcare services in Bangladesh are provided by different categories of workforce who can be divided under different sectors such as public, private (both profit and non-profit), NGOs, associations and informal sectors (e.g. 'kobiraj', 'village doctor', 'drug-sellers', herbalists, 'totka', faith healer' and others who do not have any formal education). Major formally trained health workforce can be denoted as physicians, dentists, nurses, midwives, medical assistants, health technologists, trained domiciliary workforce, alternative medical care professionals and other allied health professionals attached with management, finance, and administration functions.[23]

(2) Health workforce supply and distribution

A rapid growth of the private sector in terms of the health workforce production is observed during the last decade. The number of MBBS[24] seats has been increased by 148% in the private sector

[23] BNG Health Workforce Strategy, 2015
[24] Bachelor of Medicine and Bachelor of Surgery

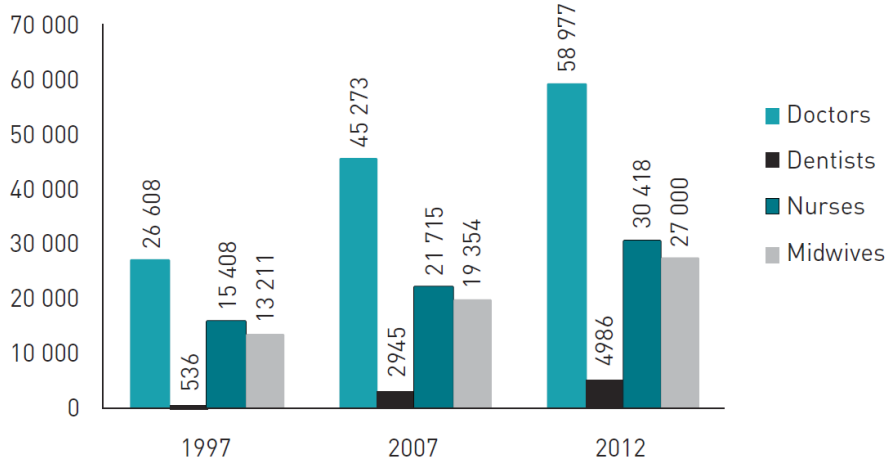
and 24% in the public sector from 2008 to 2014.[25] For Diploma Nurses the increase was 408% in the private sector and 128% in the public sector.[26]

By 2015, the total health workforce[27] in the formal sub-sector approached 350,000, which is about 185% increase from the 2003 estimate (120,000 health workers). Over the same period, Bangladesh's population increased by 15% and reached approximately 160 million individuals.

From the organizing body of the 'village physician', the front-line informal providers across 87,000 villages, has 1.4 million members.[28] At least 155,000 (45%) occupy posts in the public sub-sector within the two major Directorates-General of the MOHFW[29]. A further 35,000 (10%) are practitioners of Alternate Medical Care (AMC) who, with some exceptions, work for-profit[30]. About 160,000 (45%) dominate health provision in the urban areas and provide services for-profit.[31]

The number of doctors registered with Bangladesh Medical and Dental Council (BMDC) increased by 13.5 thousand in 5 years as shown in Figure 22 below. The number of registered doctors and nurses doubled compared to 1997 (59 vs. 26.6 thousand doctors and 30.4 vs 15.4 thousand nurses respectively).

Figure 22: Bangladesh Medical and Dental Council (BMDC) registered health workforce in 1997, 2007 and 2012



Source: Asia Pacific Observatory on Health Systems and Policies. Bangladesh Health Systems Review. 2015

Physicians had outnumbered nurses and midwifery personnel since 2005 as shown in Figure 23 (on page 29). Only community and traditional health workers, and pharmaceutical personnel exceeded doctors (0.48 and 0.42 per 1,000 population respectively) in 2012, which was far below the threshold of 4.45 skilled health professionals per 1,000 defined by WHO. According to the World Health Statistics, density of skilled health professionals per 10,000 population (3.a SDG indicator) was 5.7 during 2005-2013, which was also far below regional and global averages: 12.5 for SEARO and 25 globally per 10,000 population.

[25] DGHS, 2014
[26] HRH Data Sheet, 2014
[27] Total health workforce includes the health workforce registered with BMDC, BNC, PCB, SMFB, BHB, UABB and domiciliary and support workforce working with MOHFW (HRH Country Profile, Bangladesh)
[28] General Secretary of the PolliChikishshokSomiti, the Village Physician Committee, Jan 2015
[29] DG-HS Health Bulletin 2014 and DG-FP interview
[30] HRH Country Profile 2013
[31] Derived from registration figures with professional bodies

According to WHO ratios for health workforce, 91,000 physicians and 273,000 nurses were needed in 2012 (compared to existing/registered 59,000 and 30,000 respectively).

Density of the qualified allopathic providers (i.e. physician, nurse and dentist) in the formal side is more prominent in the urban areas than those in the rural. The number of unqualified allopathic providers, traditional birth attendants and healers is more prominent in the rural than urban areas. In terms of gender distribution, inequality in the number exists; the males are dominant in all categories except nursing.[32]

Figure 23: Health workforce density (per 1,000 population) by types of workforce and years

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Physicians	0.243		0.264	0.273	0.300	0.308	0.320	0.333	0.345	0.354	0.374	**0.389**
Nursing and midwifery personnel			0.268		0.276	0.276	0.158	0.164	0.173	0.186	0.198	**0.213**
Community and traditional health workers				0.328	0.147						0.393	**0.476**
Pharmaceutical personnel		0.056						0.317	0.377	0.385	0.402	0.417
Dentistry personnel		0.014		0.018	0.016		0.022	0.033	0.037	0.041	0.046	0.045
Laboratory health workers							0.028	0.031	0.035	0.041	0.048	0.054
Other health workers		0.004		0.042	0.046		0.049	0.050	0.053	0.055	0.062	0.065
Environmental and public health workers		0.008		0.041	0.043		0.005	0.006	0.006	0.007	0.008	0.009
Health management & support workers											0.317	**0.324**

Source: WHO GHO

In the public sector, there are several institutional actors providing health and family welfare services. Out of them MOHFW bears the major responsibilities of formulating policy, planning and strategic development, as well as implementing, monitoring and evaluating implementation of programs and evaluation of service delivery. About 35% (i.e. 25,207) of the total graduate medical doctors[33] works under the MOHFW and about 3% (i.e. 1,858) of them works under other Ministries such as Social Welfare, Home, Local Government and Cooperatives, Railway, Women and Children Affairs, Defense and others.[47]

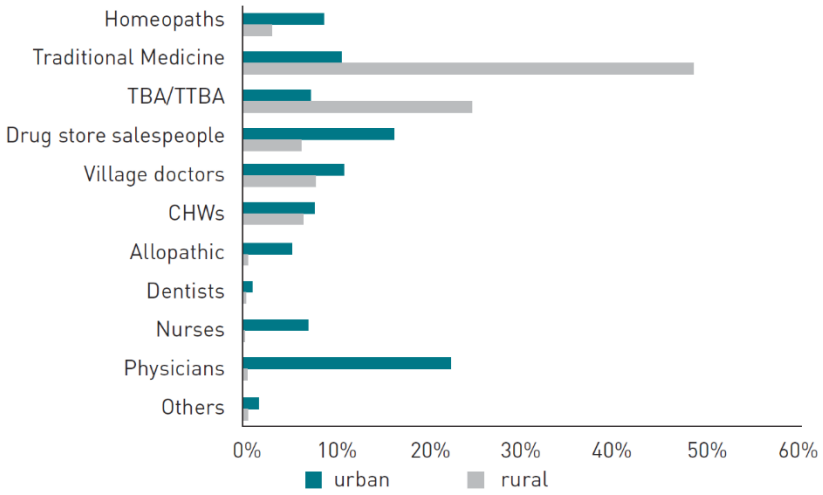
MOHFW provides formal training to produce and develop the human resources for health but there are other ministries which also produce and develop the health personnel. Bangladesh Technical Education Board (BTEB) under the Ministry of Education is developing health personnel through the various training courses such as Diploma in Nursing Technology (4 years), Health Technology, and other short-term training courses (e.g. 6 months to 1 year). Academic health institutes under the Ministry of Défense also produce health professionals such as medical doctors, nurses, medical assistants and technologists. In general, health workforce supply in the public sector suffers due to the lack of coordination and collaboration among all ministries and institutions involved in the health education processes.

Distribution of human resources for health was substantially skewed toward urban area even for such professionals as “village doctors” or community health workers (CHW) as shown in Figure 24 on page 30. In result, the majority of service providers in the rural areas are practitioners of traditional medicine and traditional birth attendants.

[32] Bangladesh Health Watch Report- 2007

[33] According to the HRH Data Sheet, 2014, 75,514 graduate medical doctors are registered with BMDC however, how many of them are dead and out of the country are not counted.

Figure 24: Rural-urban distribution of health-care providers by type (per 10 000 populations)



Source: Asia Pacific Observatory on Health Systems and Policies. Bangladesh Health Systems Review. 2015

The major portion (approximately 56%) of the total health workforce is employed by the Department General for Health Services (DGHS) of MOHFW and approximately 29% - by Department General for Family Planning (DGFP). 13 per cent of the total health workforce is employed by the DGNM and rest 2 percent - by other implementing agencies. MOHFW has one of the largest public health service networks covering all levels from door-step domiciliary services in the field to the health facilities at the Division and Capital City level. Despite such robust and extended infrastructure, the full potential of this network is not realized, which remains one of the most burning challenge for the MOHFW.[34]

The health workforce in Bangladesh is predominantly linguistically and culturally homogenous and transferable across the country although individual circumstances affect deployment in practice.

(3) Staffing practices

Proper utilization of health workforce mainly depends on how best it is planned and managed. The workforce planning function in Bangladesh has not been given much importance to determine the need and demand of the categories of workforce as per requirement of the population's health needs and international standards. Creation of posts, recruitment and selection are performed routinely, through traditional practices and have little or no strategic impact, as they're rarely supported by scientific researches and or evidences. These decisions are primarily made based on "rule of thumb". Traditional personnel management practices are still in place within the Ministry instead of modern HRM concepts and techniques to put into action. In many cases, health facilities are constructed and established without paying much attention to manpower recruitment, which leads to the underutilization of the newly established facilities. Performance audit of the functioning institutions/departments are rarely conducted to ensure proper utilization of resources. Financial audits, however, are annually conducted but reports are rarely disclosed.

Recruitment, selection and deployment of HR are among the most serious challenges in Bangladesh. Responsible agency for formulation, review, update and approval of all sorts of laws, rules and regulations related to the public sector employees is the Ministry of Public Administration (MOPA) according to the current regulations.[35]

[34] Health related background paper for the 7th Five year Plan, Planning Commission, Ministry of Planning, GOB, 2014.
[35] Rules of Business, 1996 of the Government

Technically the ministries can propose to MOPA all necessary changes to any of the rules and regulations upon ensuring compliance, however consideration of these proposals may take several years. For instance, DGHS and DGFP of MOHFW have formulated and submitted proposals to change many recruitment rules and promotion policies in 1980s and 1990s, but MOPA has not taken any significant action for addressing these proposals. Since 1977 DGNM of MOHFW has been trying to revise its recruitment rules, but similarly to DGHS and DGFP, these efforts were unsuccessful and led to the situation when recruitment and/or promotion of experienced and qualified nurses have been impossible during the decades due to absence of an appropriate recruitment rule. According to the commitment of honorable Prime Minister, about 2,996 midwife posts were going to be created during the period 2015-2020, MOHFW was able to create only 600 posts at Upazila and Union Sub-center level to date.

There are many positions in the DGNM, NIPORT and DGFP which have not been filled in since their creation, including a good number of Director level positions. In the DGNM almost all permanent positions are temporarily filled by "current charge or in-charge" mechanisms. Regularization of the individual employee into the post has not yet been taken place.

One of the main priority concern of policy makers is skill-mix balance. The National Health Policy (2011) sets the skill mix composition, which includes 1 physician, 3 nurses and 5 allied professionals according to the international standards. The current scenario of workforce pattern, however, is reverse, i.e. the total number of registered medical doctors (MBBS – 75,514) is nearly two times more than that of nurses (diploma – 38,452) and the number of medical technologists (diploma – 16,545) is less than the half of the total number of nurses,[36] which leads skill mix composition 1.00 (physician): 0.5 (Nurse): 0.2 (medical technologist).

Unfilled of sanctioned positions are common phenomenon at the public health facilities accounting for approximately 20% of the total sanctioned posts, which significantly limits ability of these facilities to provide high quality and required volume of health services. Absenteeism and timely attendance of the health workers at the workplaces particularly situated in rural, remote and hard to reach areas are frequently reported in the mass media and thus cause rural retention of the workforce as a challenge for the Ministry.

Deputation and deployment practices in the public health system frequently attract attention. Studies show that the density of physicians and nurses are significantly skewed in the urban areas (mostly in the capital city) compared to the rural. Sometimes health workforces (especially physicians) take advantage of the deputation policy for studying postgraduate courses, which leads to the increase of absenteeism. Absenteeism in turn makes impossible to achieve improvement of health care system performance and meet needs of the care seekers. Unauthorized absence is regarded as a misconduct as per service regulation[37], but due to the weak monitoring and supervision mechanisms response of the system is insufficient.

(4) NGOs and private sector

"According to an estimate of 2003, around 50% of the doctors, 42% of the nurses and 65% of the paramedics work in the private sector exclusively, besides those public-sector employees who also practice privately after office hours. The involvement of the health workforce in the private sector is

[36] HRH Data Sheet, 2014
[37] The Government Servants (Discipline & Appeal) Rule, 1985

increasing, as revealed by an estimated 62% of the medical doctors working in the private sector in 2013"[38]

In the non-government sector of Bangladesh, BRAC is the largest health workforce employer employing about 90,000 medical doctors, nurses, technologists and community health workers across the country. Other prominent NGOs are Gonosasthoy Kendro, Grameen Shasthoy, Shajeda Foundation, ASA, TMSS, RDRS, FIVDP, CWCH and others.

Along with the national NGOs, there are a number of international NGOs and Development partners directly or indirectly involved in health care service delivery across the country such as United Nations agencies - WHO, UNFPA, UNICEF, UNAIDS and other international agencies: icddrb, USAID, DFATD Canada, DFID UK, European Union, JICA, SIDA (Swedish), GIZ, AUSaid, UKaid, CARE International, Good Neighbors, Oxfam and others.

Private sector institutions, NGOs, associations and other informal sector organizations are collectively the largest employers of the health workforce in the country as well as they are significant contributors in improvement of health sector performance.

However, it is still unclear how much these institutions contribute in equity and quality of the currently provided services. Up to this date the MOHFW has not been able to develop a comprehensive database of the non-state actors working in the health care field as well as collect information on types, qualification and specialties of health workers employed in non-government sector, which leads to the difficulties in formulation of national HWF plan and projections of required human resources.

Professional associations play a critical role in terms of formulation of HWF related policy-making process. Bangladesh Medical Association (BMA) has a long history for the growth and development of the medical profession in the country, closely working with the Government for rendering health services. Similarly, Bangladesh Nurses Association, Bangladesh Midwifery Association, Bangladesh Physiotherapy Association and others play an important role in decision making process related to the national level decisions on the HWF development.

Figure 91 (on page 119) presents a list of all sanctioned posts and the estimated adjusted sanctioned posts for 2015 if the relevant GoB target has been fully applied for that specific HWF category, taking into account respective population growth.

1.2.5 Healthcare financing

(1) Overview

There has been long-standing support provided by various donor organizations to the health sector in Bangladesh. Currently about one quarter of the public health budget is provided through the official external development assistance. Since 1998 the greater part of the donor support has been provided through the government's health care Sector-Wide Approach program (SWAp). Since its initiation the donor support for the SWAp has increased in absolute terms, however, as proportion of the MOHFW budget it has not changed much, as it is shown on the Figure 25 below.

[38] Asia Pacific Observatory on Health Systems and Policies. Bangladesh Health Systems Review. Health Systems in Transition Vol. 5 No 3. 2015

Figure 25: Donor Contributions in the Sector Wide Approach (SWAp) for Health: Actual Expenditures of 1999-2016 (in current US$)

	Donors (current US$ billion)		Average Annual Donor contribution (current US$ billion)	As Percentage of Annual MOFHW Budget
	Pooled	Non-pooled		
FY 1999-2003	0.47	n/a	0.09	23%
FY 2004-2010	0.69	0.51	0.17	24%
FY 2011-2016	1.11	0.27	0.23	23%

Source: Fiscal Space in Bangladesh, 2016

Official development assistance has provided fiscal space to the health sector for many years. This substantial donor support remains very important for the country, however it is expected that it will be gradually decreasing over the future years. These expectations are based on a) the dynamics of activities of some major donor agencies such as EU, AusAID, KfW and the Netherlands, and b) economic growth of Bangladesh. The country is growing richer and it will be difficult for donor organizations to keep pace with government sources in relative terms.

There are new emerging initiatives in the country such as the Global Financing Facility supporting women and children, and recently offered bilateral assistance for health from India. Overall, the role of the development assistance is likely to become more focused on leveraging the larger share of government health spending, through targeting specific financial gaps. A declining share of external aid in total health spending is a natural part of health financing transition.[39]

Currently the health sector in Bangladesh is funded through the Sector Wide Approach mechanism through funding the 4th NHPSP. Total estimated cost of the Sector Program is US$12.3 billion, which covers the entire government health, nutrition and population budget over the 5.5 year period (or about US$ 2.5 billion per year). The budget for the program comes through two channels (i) the revenue (non-development) institutions; and (ii) the development budget which largely covers capital costs, but also some recurrent costs allocated to different Operational Plans, each implemented by a line directorate in the Ministry of Health and Family Welfare. Similar to the previous sector programs, it is expected that, under the SWAp, a significant proportion of development partner support will be channeled through on-budget financing, including through co-financing of this proposed operation.

Figure 26: Cost of the 4th Health, Nutrition and Population Sector Programme 2017-2021

Financing Pattern	Total USD in Crore (million USD)	% of Grand total	Source
1 GoB -Non development (Revenue)	9,172	62.3%	Credits from IDA & JICA, Grants from DPs (DFID, GAC, USAID, SIDA, EKN, WHO, UNICEF, GFATM, Gavi-HSS, WB (GFF), UNFPA
2 GoB Development	3,139	21.3%	
Sub-total of GOB (1+2)	12,311	83.7%	
3 RPA	1,487	10.1%	
4 DPA	914	6.2%	
Sub-total of PA (3+4)	2,401	16.3%	
Sub-total of Development (2+3+4)	5,540	37.7%	
Grant Total	**14,712**		

Source: PIP of 4th HPNSP. Planning Wing of the MOHFW Bangladesh, 2017

The government has consistently shown commitment in ensuring sustainable financing for health care in Bangladesh. A Health Care Financing Strategy[40] has been approved which proposes to

[39] Source
[40] HCFS, 2012

cover the entire formal and non-forma sectors and those below the poverty line under a common scheme. The HCFS (2012) has recently been embedded in the approved National Social Security Strategy (NSSS) 2015. The NSSS focuses on strengthening financial risk protection and extending health services and population coverage especially to the poor and vulnerable segments of the population to achieve universal health coverage.

Figure 27: Sources of PA and Type of Support – Bangladesh 4th HPNSP 2017-2021

Source	Amount in million US$	Amount in Lac BDT	RPA (in LAC BDT)	Other than PRA (DPA) in LAC BDT
1 IDA Credit	500.00	392,500.00	392,500.00	
2 World Bank GFF	15.00	11,775.00		11,775.00
3 GAC (TBD)				
4 JICA Credit	51.71	40,592.35	37,232.55	3,359.80
5 SIDA (200 mln croner)	21.70	17,034.50	17,034.50	
6 DFID - TBD				
7 USAID	40.00	31,400.00	31,400.00	
8 UNICEF	15.00	11,775.00		11,775.00
9 WHO	30.00	23,550.00		23,550.00
10 EKN (7.7 mln EURO)	8.13	6,382.05	6,382.05	
11 Gavi - HSS	84.00	65,940.00		65,940.00
12 Gavi - ISS+MR	500.00	392,500.00		392,500.00
13 GFATM	146.00	114,610.00		114,610.00
14 UNFPA	11.00	8,635.00		8,635.00
Grant Total	**1,422.54**	**1,116,694**	**484,549**	**632,144.80**

Source: PIP of 4th HPNSP. Planning Wing of the MOHFW Bangladesh, 2017

Government has piloted a health protection scheme for the poor (Shasthyo Shuroskha Karmasuchi – SSK) and garment workers (the Ready-Made Garment Workers' Scheme). A social health protection scheme for the formal sector is being designed, the required law has been drafted and a communication strategy has been approved. A resource allocation formula has been developed by MOHFW.

A considerable resource has been invested in the health sector during the 3rd SWAp. Total revised estimated cost for the 3rd SWAp41 was US$ 6.5 billion. Out of this, it was estimated that BDT 39,748 Crore (78%) will be contributed by Government of Bangladesh and 22% to be financed by Development Partners (17% pool fund/RPA, 5% DPA).42

The absorptive capacity of the MOHFW has improved in recent years. During the first four years of 3rd SWAp implementation (2011, 2012-2014, 2015), utilization of annual development programme budget was 87% in 2011/12, which increased to 91% in 2012/13, 89% in 2012/14 and 83% in 2014/2015. Utilization of the revenue budget was more than 95% during the first four years of the 3rd SWAp.

Despite the initiatives, in Bangladesh, households constitute a major financing source of the Total Health Expenditures at 63.3%, which is unacceptably high, followed by Government contribution at 23%, Development partners at 8.4%, while voluntary health insurance payment was 5.25% of THE

41 HPNSDP – 2011-2016
42 PIP of 3rd SWAp.

in 2012.43 Every year, 14.2% of the households face catastrophic health spending while 3.5% of the population falls into poverty due to health expenditures.[44] Inadequate pre-payment mechanisms to protect the population from catastrophic spending, very little revenue raised through pre-payment of insurance contributions (0.2% of total health expenditures), slower than expected progress in SSK implementation, and little progress made in other pilot initiatives are major challenges. The experience of Demand Side Financing is also not very satisfactory.

Figure 28: Health Expenditure Pattern in Bangladesh

	2009	2010	2011	2012	2013	2014
Total Health expenditure (THE) per capita in current US$	20	23	25	26	28	31
Total Health Expenditure (THE) as per cent of Gross Domestic Product (GDP)	2.9	3.1	3.2	3.1	2.9	2.8
General Government Expenditure on Health (GGHE) per capita in current US$	6.8	7.9	8.4	8.2	7.9	8.6
General Government Health Expenditure (GGHE) as % of THE	34	34	33	32	28	28
GGHE as % of General government expenditure (GG)	7.8	8.3	7.5	6.9	5.5	5.7

Source: WHO GHED (NHA)

The budget of MOHDW as a percentage of national budget is on a continuous decline, it decreased from6.1% in 2010/11 to 4.1% in 2015/2016. It thus remained below of the 3rd Sector Programme target (10% and the Sixth Five Year Plan Target (12%).

The government allocation to health (both development and non-development expenditures) as a share of the total allocation reduced from 5.6% in FY2011-12 to 4.6% despite the growth in absolute terms from 81.5 billion Taka to 94.70 billion as shown in Figure 2 (on page 4). According to the Medium Term Macroeconomic Policy Statement, "Total spending for the sector is projected to grow on average by 18.86 percent annually to Taka 249 billion in FY20."

Public health care facilities experience funding shortages as illustrated below Figure 29 below: ambulances were unfunctional in up to 40% of MCWC and 17% of UHCs (Presumably due to the lack of funding for capital repair/spare parts), and the majority of functional vehicles cannot operate due to "lack of funding" (to cover operational costs). Although emergency care is more competitive for public funding than public health and preventive interventions in most resource-constrained environments, its performance was still affected by healthcare financing problems. It indicated indirectly to the constraints insufficient public funding puts on the delivery of primary healthcare services (including vaccination).

Figure 29: Availability and functional status of ambulance

	DHs	UHCs	MCWC
Has ambulance	100%	93.6%	70.7%
Ambulance functional	97.5%	83.5%	61.7%
Lack of funding restricts the use of ambulance	47.5%	41.0%	24.1%

Source: BHFS 2011

The government budget provided to public hospitals is allocated on the basis of number of beds and staff employed. The allocation is not linked to performance or results achieved. Proportion of allocation for repair and maintenance in revenue budget declined over time. Health spending disparities across wealth quintiles and geographic regions persists. Weak capacity in budget planning

[43] BNHA, 2015
[44] Household Income and Expenditure Survey, 2010

as well as poor procurement planning results in under spending of resources. In general, delay in disbursement of fund the complex procurement process and delay in settlement of claims (bills), in the CAO (Health) office and at District and Upazila account offices result in low utilization or resources.

(2) SWAp Financing and Management

Experience gained through the implementation of the last three SWAps, significantly improved the capacity GoB in public expenditures management including budgeting procedures, resource allocation, resource tracking, financial monitoring and reporting. Within the framework of the 3rd Sector Program the MOHFW has engaged qualified Financial Management Consultants to support Financial Management and Audit Unit (FMAU) and Line Directors as a temporary measure, finalized FMAU restructuring proposal and submitted it to the Ministry of Public Administration (MOPA) for final approval, drafted an audit and financial management strategy; trained financial management officials and established connectivity between integrated Budget and Accounting System (iBAS) and FMAU; strengthened the management of revenue budget and audit functions by putting them under the FMAU and strengthened capacity for timely development of Interim Unaudited Financial Reports (IUFRs) and outsourced internal audit to private audit firms.

Despite of this progress, Financial Management and Audit Unit still lacks appropriate organizational structure and human resources result in inability of many Operational Plans of the 3rd Sector Plan to reach target of 90% for execution of available budgets, significant delays in settlement of audit observations, as well as delayed responses from Foreign Aide Project Audit Directorate (FAPAD). There were also issues with the audit system for which the audit observations were not met timely or satisfactory.

In 2015 the World Bank conduced an Integrated Fiduciary Assessment (IFA) of the sector program in close coordination with the other development partners contributing to the pooled funds. The result was an agreed Action Plan to strengthen fiduciary oversight and systems, with steps through the end of 2017. The IFA Action Plan implementation was supported by additional financing to HSDP which linked disbursement to achievement of the agreed actions.

Within the framework of the 4th Sector Program MOHFW focuses on overcoming existing challenges and making the financial management and accounting more transparent while reducing the financial and fiduciary risks in the next sector programme.

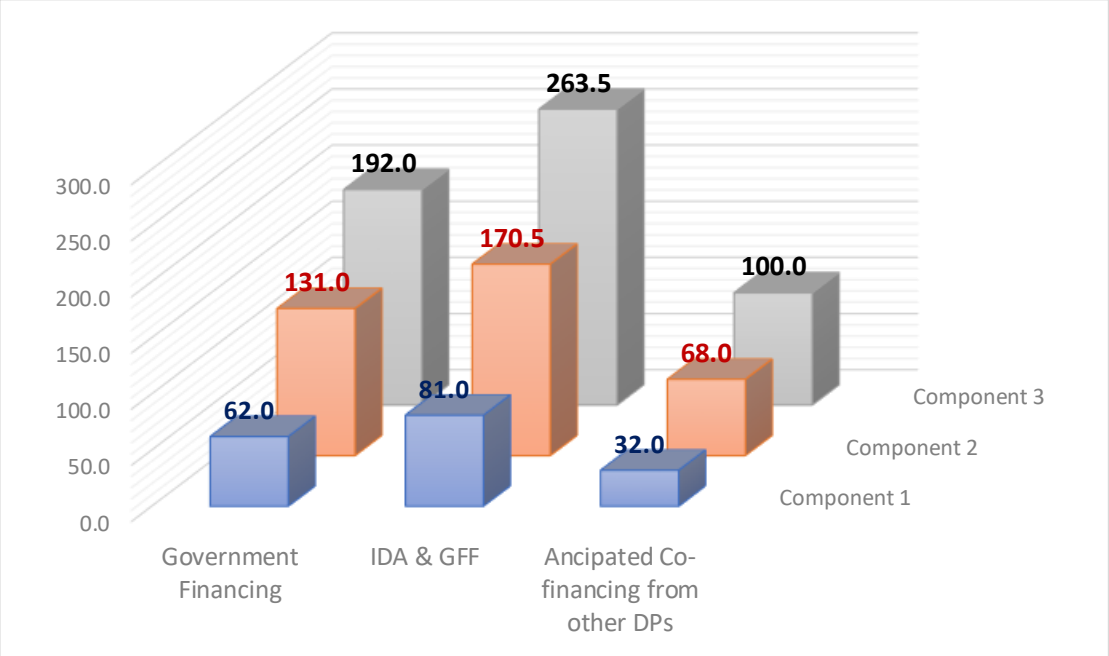
In addition, the MOHFW will undertake efforts to improve the three core systems of the financial management: capacity building in terms of systems and skills, strengthening internal supervision and strengthening control systems to ensure efficiency in implementation of the programme.

The World Bank Board of Directors approved a new project (“Health Sector Support Project”) with total financing of 900 million US$ to support 4th HPNSP implementation via SWAp arrangements. 50 million US$ allocation to SWAp is conditional upon the delivery of immunization coverage and equity intermediate result measured by DLI 12 (measles-rubella vaccination coverage in Chittagong and Sylhet divisions).

Financing from IDA and Global Financial Facility (GFF) is conditional upon meeting of the targets of so called 16 Disbursement Linked Indicators as it is shown (see Figure 115 on page 137 below).

It is expected that development partners will contribute additional 200 million US$ that will increase HPNSP implementation budget to 1.1 billion US$ till the end of 2022.

Figure 30: 4th NHPSP financing via SWAp by sources and components



Source: The WB PAD2355, 2017

The Project aims to strengthen the health nutrition and population (HPN) sector's core management systems and delivery of essential HPN services with a focus on selected geographical areas (Chittagong and Sylhet). The project development objective (PDO) consists of two elements with corresponding Disbursement Linked Indicators (DLI) as shown Figure 31 below:

Figure 31: The WB supported "Health Sector Development Project" (2017-2022) objectives and indicators

Strengthening of the HPN sector's core management systems	1 Increase in the number of Community Clinics providing complete essential data on service delivery, including gender-disaggregated (DLI 8) 2 Increase in the number of *Upazila* Health Complexes with at least 2 accredited diploma midwives (DLI 7)
Strengthening of delivery of essential HPN services, with a focus on selected geographical areas	3 Increase in the number of normal deliveries in public health facilities in Sylhet and Chittagong divisions (DLI 10) 4 Increase in the number of District Hospitals with improved capacity to provide comprehensive emergency obstetric and neonatal care (CEmONC) services in Sylhet and Chittagong divisions (DLI 11) 5 Increase in the percentage of registered children aged under 2 years receiving specified nutrition services in Sylhet and Chittagong divisions (DLI 14)

The list of DLIs for measuring implementation progress are presented in Figure 115 (on page 137) and in Figure 116 (on page 138). 50 million US$ allocation to SWAp is conditional upon the delivery of immunization coverage and equity intermediate result measured by DLI 12 (measles-rubella vaccination coverage in Chittagong and Sylhet divisions).

1.2.6 Summary of health system enablers and bottlenecks to immunization performance

A bottleneck analysis of Maternal, Neonatal and Child Health (MNCH) interventions conducted in 2014 revealed that each of nine critical MNCH interventions had at least four major

health system bottlenecks and that of seven health system building blocks, at least five were significant or major. The table below summarizes the key HS building blocks that need to be given more attention such as health workforce (7 interventions), leadership and governance (6 interventions) and community ownership and partnership (5 interventions) as shown Figure 32 below:

Figure 32: Findings of the analysis of heath system bottlenecks to MNCH interventions (2014)

	Health System Building Blocks						
Interventions to Scale-up Newborn Care	**Leadership and Governance**	Health Financing	**Health Workforce**	Essential Medical Products and Technologies	Health Service Delivery	Health MIS	**Community Ownership and Partnership**
Management of Preterm Birth							
Skilled Care at Birth							
Basic Emergency Obstetric Care							
Comprehensive Emergency Obstetric Care							
Basic Newborn Care							
Neonatal Resuscitation							
Kangaroo Mother Care							
Treatment of Severe Infections							
Inpatient Care for Sick and Small/LBW Babies							

Not a bottleneck | **Minor Bottleneck** | **Significant Bottleneck** | **Major bottleneck**

In 2014 the country also analyzed health system bottlenecks to immunization program performance specifically using the same methodology. Findings of the analysis presented below demonstrates the following health system building blocks that need to be given more attention: health workforce (4 interventions), health service delivery (4 interventions) and health management information systems (4 interventions) and essential medical products and technologies (3 interventions).

Figure 33: Findings of the analysis of health system bottlenecks to immunizaiton (2014)

	Health System Building Blocks						
Interventions for Health System Strengthening through the Gavi Alliance	Leadership and Governance	Health Financing	Health Workforce	Essential Medical Products and Technologies	Health Service Delivery	Health MIS	Community Ownership and Partnership
Vaccine Introduction			*	*	*	*	*
Vaccine Security							
Service Delivery							
Surveillance							
Cold Chain and Effective Vaccine Management							
Data improvement							

*Depicted as significant because the group listed these as Major/Significant/Mild

Not a bottleneck | **Mild Bottleneck** | **Significant Bottleneck** | **Major bottleneck**

Gavi HSS2 project focuses on health care system bottlenecks in two areas of the immunization system: VPD surveillance and EVM/Immunization Supply Chain and Logistics (ISCL).

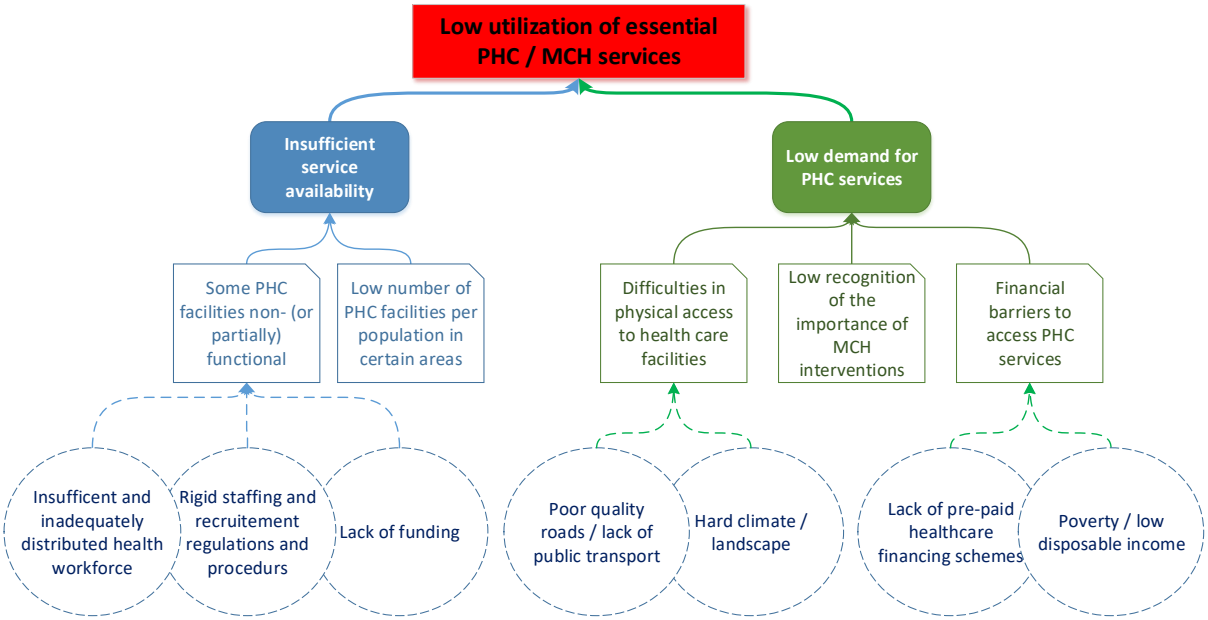
Low access to and utilization of PHC services is the major bottleneck of the health system to immunization performance. It can be explained by a set of factors both on supply (service supply) and demand sides as shown in Figure 34 (on page 39):

- On the supply side insufficient service availability limits the ability of population to avail themselves of MCH services despite high demand. Although there is no direct evidence to quantify MCH service availability, especially by divisions and districts, the case with emergency care / ambulance illustrates that such problem exists (confirmed by the bottleneck analysis in 2014). Insufficient service availability can be caused by two factors:

- Absence of PHC facilities in certain areas, or insufficient number of PHC per population; and
- Inability of PHC facilities to function properly even if they exist due to the following possible reasons:
  - Staffing problems either due to the insufficient supply of professionals to labor market and/or rigid staffing/recruitment policies and practices
  - Lack of funding (for capital investment or recovering operational/recurrent costs)

- The low demand for PHC/MCH services can explain low utilization rates for specific risk-group populations even in the case availability of quality MCH services. It can be caused by:
  - Low recognition of the importance (benefits) of MCH interventions either due to misconceptions or lack of information (that is linked to the level of education of mothers)
  - Geographical access barriers due to natural hazards and climate specifics, or lack of paved roads and transportation that impedes demand generation even if mother/parents are willing to use MCH services
  - Financial barriers similar to Geographic ones affect demand when a family is reluctant to visit health facility (for preventive services in particular) because of inability to cover the service related costs (including transportation costs). Unaffordability can be further explained by:
    - Insufficient disposable income due to economic hardship
    - Absence of pre-paid or other financial protection mechanisms

Figure 34: Root cause analysis of low utilization of essential MCH services



A limited fiscal space for health in general, and public health/prevention program in particular, including immunization, together with high dependence on financing from external sources is another health system bottleneck that threatens sustainability of the national immunization program and puts some system components such as supply chain and logistics, and data management and surveillance under the risk of full or partial failure. Factors that contribute to the risks associated with financial sustainability of the immunization program are further discussed in section 1.4 “Summary of situational Analysis” below.

1.3 Immunization system

1.3.1 Background of the national immunization program

National immunization program entitled as "Expanded Program of Immunization" (EPI) is an integral part of the national health policy framework, and serves as an instrument for the implementation of health policy under 4th Health, Nutrition and Population Sector Program Component 3 "Quality Health Services", Strategic Objective 7 "To improve equitable access to and utilization of quality health, nutrition and family planning services" (as described in details in section 1.2.2 Governance above). EPI services are explicitly defined in the Essential Service Package, and its objectives and strategies are reflected in the Operational Plan on Maternal, Neonatal Child and Adolescent Health 2017-2022.

EPI aims at realizing commitment of the GoB to the Global Universal Child Immunization Initiative. The government of Bangladesh regularly develops a comprehensive Multi-Year Plans for Immunization (cMYP) for national immunization program of the country. The plan provides a framework for implementation of activities to achieve important objectives of the Expanded Program on Immunization, as contained in the national health policy. This plan sets out the medium-term (five year) strategic goals of the immunization program, the related objectives, indicators, milestones, key activities and the associated costing and financing plan.

Since its establishment, the EPI has been a priority and one of the most successful public health program. The Government showed strong commitment to reach every child and mother with quality immunization services to reduce maternal and child mortality and morbidity arising from vaccine preventable diseases. The 4th HPNSP, elaborated by the Government of Bangladesh identified improvement of child survival through vaccination of children and women as one of its key priority areas for achieving targets of national health strategy.

EPI has been aiming at achievement of the 6 strategic objectives as defined in the cMYP 2014-2018 that contributes to the achievement of respective targets of the 3rd HPNSP results framework:

- Objective 1: Improve immunization coverage among children under one and child bearing age women (CBAW)
- Objective 2: Maintain polio free status
- Objective 3: Maintain maternal and neonatal tetanus elimination status
- Objective 4: measles elimination and rubella control
- Objective 5: Prevention of diseases protected by new and underused vaccines
- Objective 6: Strengthen the Immunization Health System

1.3.2 Immunization system outcomes

(1) Immunization coverage trends

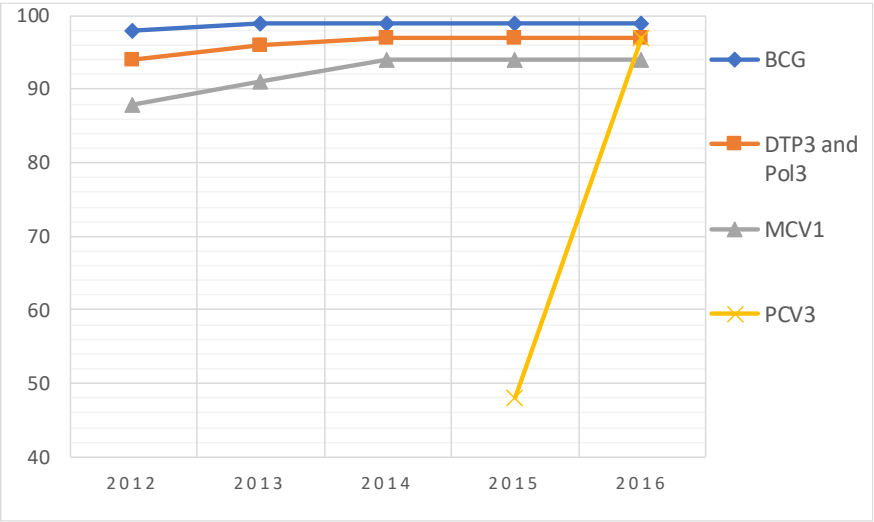
Bangladesh has a high performing immunization program, with the established capacity to set and achieve targets and deliver immunization services through well-structured network of service providers, monitor programme implementation and create evidence basis for design and implementation of corrective measures through the well-established surveillance system.

The immunization programme in Bangladesh under the strong government ownership has made tremendous progress in recent years through maintenance of high national coverage levels and reduced drop-out rates. Reported immunization coverage rates and WHO&UNICEF coverage estimates have remained over 90% for more than ten years and more than 80% of children under 12 months of age are fully immunized.

- According the CES 2016 national coverage estimate for Penta3 was estimated is 93.6%. MR/MCV1 coverage was estimated at 84.5%, and fully vaccinated child (BCG, TT, DTP3, OPV, MCV) - at 82.3%.
- According to CES 2016 preliminary findings, more than 80 percent of children under 12 months of age were fully immunized

According to the national Coverage Evaluation Survey 2016 national coverage for Penta3 was estimated at 93.6%; MR/MCV1 - at 84.5%, and fully vaccinated child (BCG, TT, DTP3, OPV, MCV) - at 82.3% as shown Figure 35 below.

Figure 35: National Immunization Coverage for selected antigens in last 5 years



Source: WUENIC, 2017

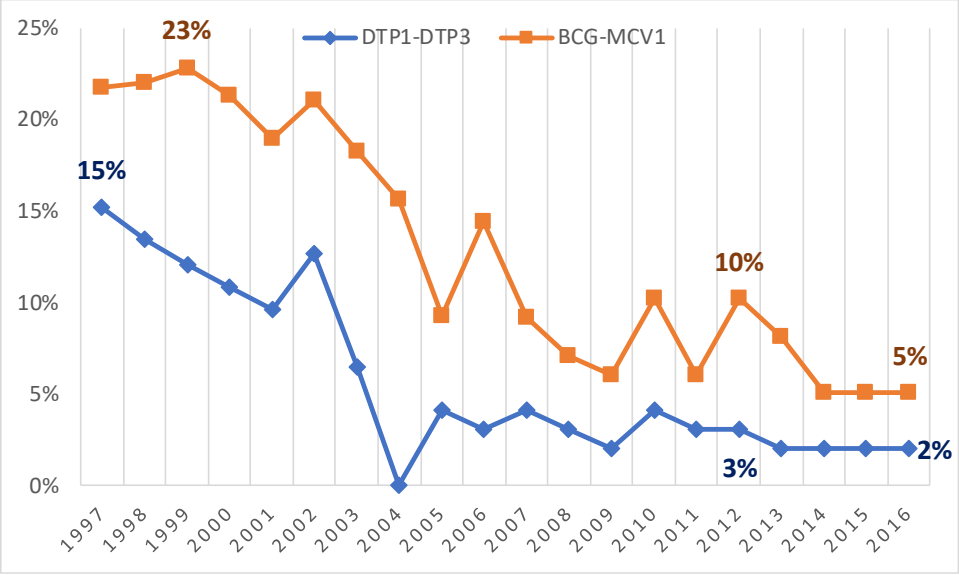
WHO/UNICEF estimates of national immunization coverage (WUENIC) for DTP3 was 97%, while DTP3 coverage based on administrative data reports was 118% in 2016; Official estimates of MCV1 and MCV2) coverage were 94% and 80.5% respectively, while administratively reported data showed 118%.

Immunization coverage trends by antigens and sources of data are presented in (see details in Figure 111, Figure 112, and Figure 113 on page 135).

(2) Immunization coverage equity

Drop-out rates have been substantially reduced during the recent years. Drop-out from BCG to MCV1 declined from 10% in 2012 to 5% in 2016, as shown in Figure 36 below:

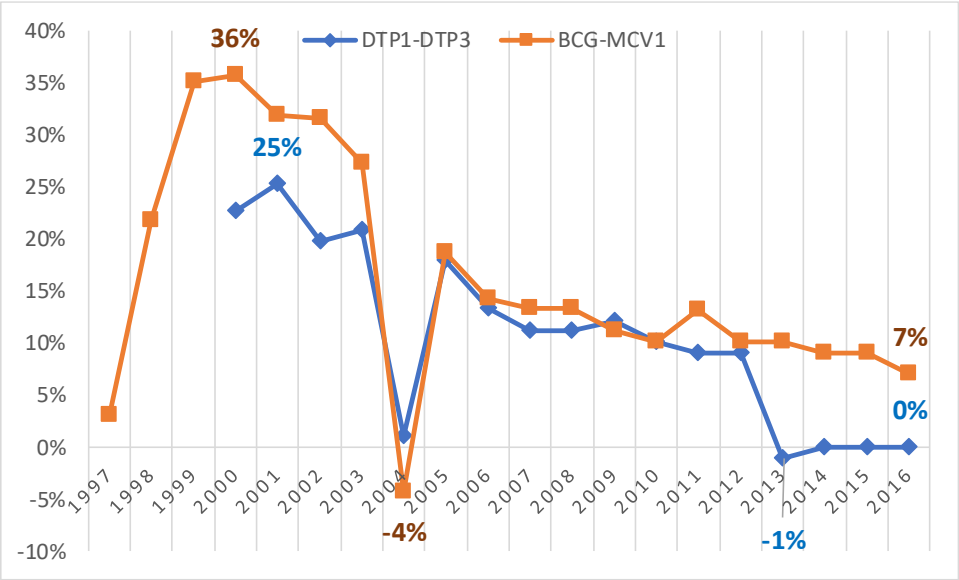
Figure 36: Trends in drop-out rates between DTP1 -DTP3 and between BCG and MCV1



Source: WUENIC 2017

If official immunization coverage estimates are considered (see Figure 37 on page 42), drop-out rate improvement was more impressive, although it shows that despite two episodes when more measles vaccine was administered than BCG (in 2004), or more DTP3 than DTP1 (in 2013).

Figure 37: Drop-out rates for DTP1-DTP3 and BCG-MCV1, Bangladesh, 1997-2016



Source: EPI Bangladesh 2017

Despite strong programme performance, progress is in some cases uneven and it remains a challenge for the programme to reach all children across different socioeconomic groups and geographical locations.

The national Coverage Evaluation Survey 2016 reports coverage of the third dose of pentavalent vaccine at 90.1%; the first dose of measles-rubella vaccine at 87.5%, and fully vaccinated children at 82.3%.

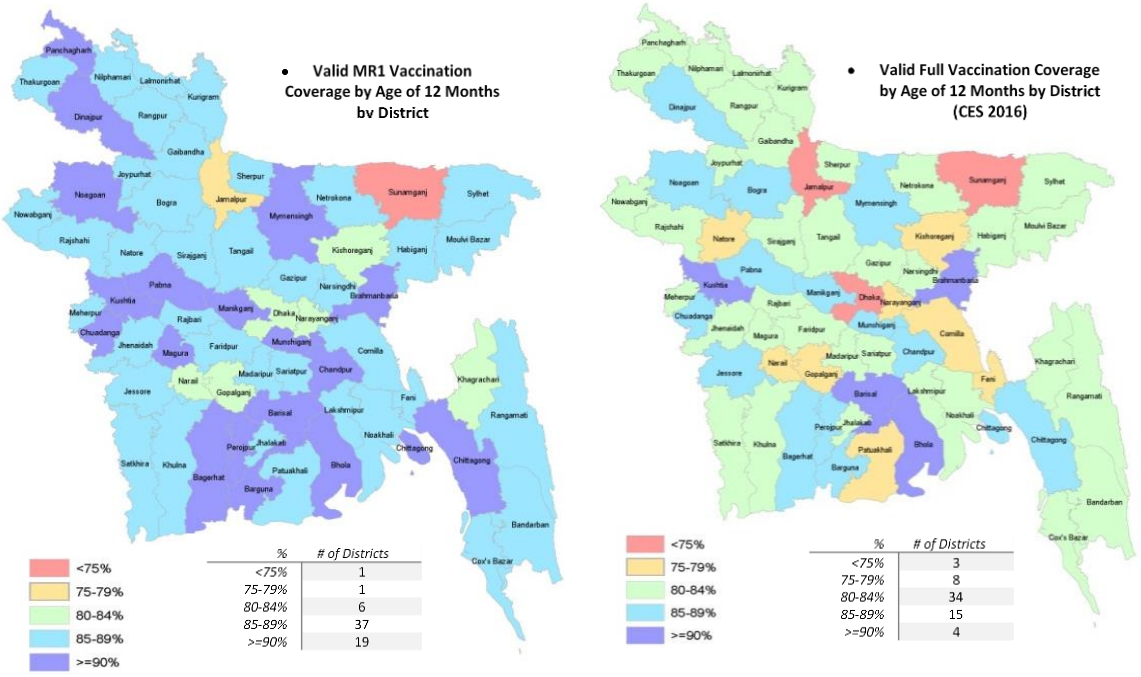
In 2015 a little variation was observed in crude[45] full vaccination[46] coverage between rural and urban areas (94.8% vs. 91.7% respectively).[47]

Geographical inequities

According to the Coverage Evaluation Surveys (CES) of 2016[48] the EPI performance has been variable across the districts and city corporations. Overall, the equity of immunization services improved from 2014 to 2016: the number of districts achieving higher than 90% coverage for the fully immunized child increased from 1 to 4 and 52 out of 64 districts achieved above 80% fully immunized children coverage. In 2016, 27 districts (or 42.2% of all districts) achieved equal or more than 90% DPT3 coverage.

Differences in coverage between the districts are quite significant. According to the CES 2016, the gap in coverage of the first dose of the measles-rubella vaccine (MR1) between the district with the highest coverage (96.5%) and the district with the lowest coverage (74.7%) was 21.8 percent. In terms of fully vaccinated children (FVC), the gap between the highest performing district (92.6%) and the lowest performing district (68.4%) was more than 24 percent. Only 19 out of 64 districts achieved higher than 90% coverage for MR1, and just in four districts more than 90% of children were fully vaccinated. There was only one district achieving less than 75% MR1 coverage and there were three districts with less than 75% fully vaccinated children.

Figure 38: Map of Valid MR1 and Full Vaccination Coverage by Age of 12 Months by District (CES 2016)



[45] According to CES (20;15), ***crude vaccination coverage*** was defined as the vaccine given to the children where the exact age for starting vaccinations and/or interval between did not meet the EPI recommended schedule

[46] According to CES (2015), a child is considered as ***fully vaccinated*** if the child has received one dose of BCG, 3 doses of Pentavalent (diphtheria, pertussis, tetanus, Hep-B and Hib), 3 doses of polio and one dose of MR (Measles and Rubella) vaccines

[47] CES 2015

[48] CES 2016 is unpublished

Rural / urban inequalities

Contrary to some other countries, in Bangladesh the full vaccination of children in urban areas (77.1%) is lagging behind rural coverage (83.5%). Seven out of 11 City Corporations of the country achieved FVC coverage less than 80 percent.

In the city corporations (CC) only 1 out of 11 CCs achieved higher than 90% valid coverage of the fully immunized child and 4 out of 11 – achieved above 80% valid coverage of fully immunized child. Two CCs achieved equal or more 90% DPT3 coverage and 7 CCs could not reach 80% DPT3 valid coverage, as it is shown in the Figure 39 on below (see also Figure 92 on page 120):

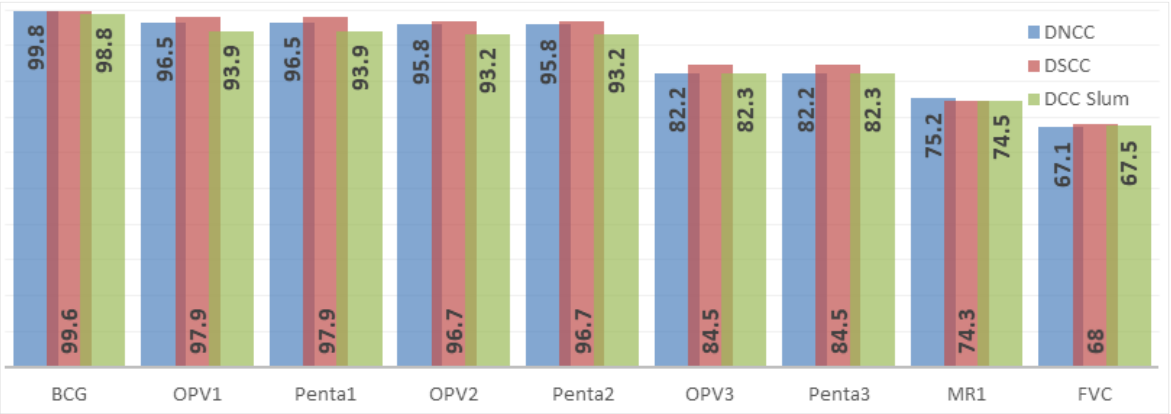
Figure 39: Penta3 valid coverage and Full Vaccinated Children Coverage by 12 months

#	District/City Corporation	Penta3 Valid Coverage by 12 months	FVC Coverage by 12 months
1	Dhaka North City Corporation	82.2	67.1
2	Dhaka South City Corporation	84.5	68.0
3	Narayanganj City Corporation	85.9	69.6
4	Sylhet City Corporation	77.8	70.0
5	Khulna City Corporation	85.4	72.5
6	Gazipur City Corporation	85.9	73.2
7	Rangpur City Corporation	87.9	76.6
8	Comilla City Corporation	87.5	80.2
9	Chittagong City Corporation	88.0	81.1
10	Barisal City Corporation	90.9	82.3
11	Rajshahi City Corporation	97.1	93.0

Source: CES 2016

The urban areas of Dhaka City Cooperation (CC) North and Dhaka CC South are the lowest performing areas in the country, with FVC coverage of around 67-68 percent, therefore improvement of coverage in urban areas is one of the factors to ensure the equity in service delivery. It is estimated that a quarter of population in Dhaka, or about 14 million individuals, lives in slum areas.[49] According to the results of CES in 2016 there is no significant difference in vaccination coverage in slum and non-slum areas (see Figure 40 below), indicating the need for more in-depth analysis and defining the real causes for low immunization coverage in urban settings.

Figure 40: Valid coverage by 12 months by DCC and DCC slum, CES 2016



[49] Urban Health Survey 2013

One of the main challenges of the EPI Bangladesh are remaining pockets of unvaccinated and unprotected children and CBAW living in urban slums and hard-to-reach areas. Therefore, one of the key priority actions for EPI Bangladesh is identification and reaching out these vulnerable groups for significantly improving overall performance of immunization system, protecting underserved groups of population against VPD and preventing potential outbreaks.

CES 2016 revealed some indications that one of the reasons for low coverage in urban areas is low knowledge of target communities about the benefits of immunization leading to the low or lack of demand for immunization services among these population groups. The analysis of CES results on partial or non-immunization showed that 1% of children in urban areas has never received any vaccines. The main reason for partial vaccination were that mothers/caregivers were too busy (17.2%), lack of information about vaccination of subsequent doses (14%) and sickness of child at the time of vaccination (15.9 percent). The analysis showed critical importance of targeted and focused communication with caregivers in order to improve urban vaccination coverage. [1]

Figure 41: Reason for Never and Partial Vaccination in Urban Areas

Never Vaccination		*Partial Vaccination*	
Reasons	***%***	***Reasons***	***%***
Mother was not at home during vaccination	22.1	Was busy and so couldn't give vaccine	17.2
Didn't know that my child should be given vaccine	19.1	Child was sick, was not taken for vaccination	15.9
Don't believe in vaccination	14.4	Don't remember	14.0
Fearing side effects	7.1	Didn't know when to go for vaccine of MR	13.2
Child was sick, was not taken for vaccination	6.4	Fearing side effects	6.3
Didn't know where to go for vaccine	4.3	Didn't know that my child should be given vaccine	4.8
They charge money to take vaccine	3.6	The session time was inconvenient	4.4
Was busy and so couldn't give vaccine	2.6	Didn't know when to go for the second/third dose	4.3

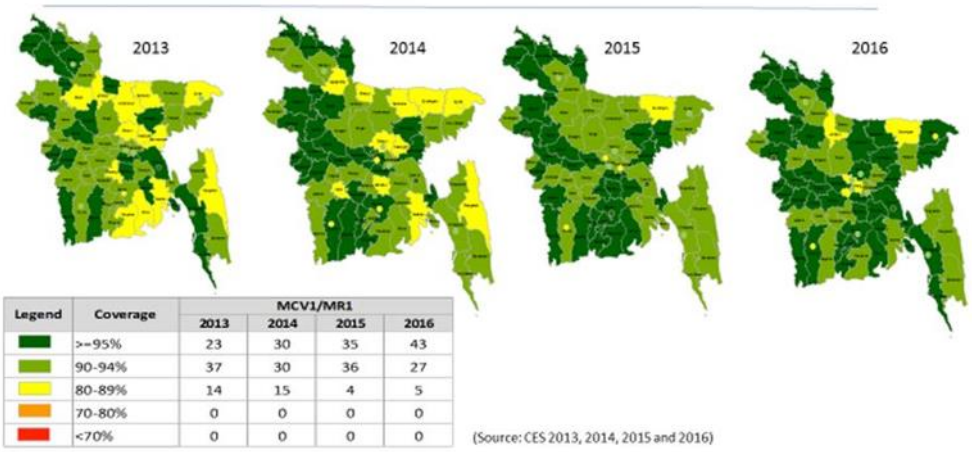
Another key reason for insufficient immunization coverage in the urban areas could be related to the weaknesses in the health system and service delivery. All immunization services in urban areas are provided as part of Health, Nutrition and Population services (Detail information on immunization service delivery in urban areas are provided in the sub-section Immunization service delivery on page 54 below).

(3) Inequalities in Measles coverage

The number of districts and city corporations gradually achieving high levels of routine immunization as it is illustrated by a consistent increase of MCV1 and MCV2 coverage. From 2013 to 2016, the number (and percentage) of districts and city corporations achieving at least 95% crude MCV1 coverage increased from 23 (31%) to 43 (57%), whereas the number with less than 90% dropped from 14 (19%) to 5 (7%) as it is represented in the Figure 42 on the page 46 below.[50]

[50] Strategic Plan for Measles and CRS Elimination

Figure 42: MCV1/MR1 crude coverage by 23 months



Legend	Coverage	MCV1/MR1			
		2013	2014	2015	2016
	>=95%	23	30	35	43
	90-94%	37	30	36	27
	80-89%	14	15	4	5
	70-80%	0	0	0	0
	<70%	0	0	0	0

Source: Strategic Plan for Measles, Rubella, and CRS Elimination. Draft # 2, 2017

Improvement in valid coverage of MCV1 by 12 months was not as impressive. However, the number of districts with 70-79% coverage decreased from 8 in 2013 to 2 in 2016 and the number of city corporations with this level of coverage increased from 3 to 5.

The incidence was at near-elimination levels in 2014 and 2015 following the MR catch-up SIA. In 2016 the incidence rate slightly increased which then followed by increase in 2017 (as of June 30). Measles resurgence in 2017 likely originated with an outbreak in Cox's Bazaar that had its source in refugees residing in the refugee camps. The outbreak spread to susceptible Bangladeshis in neighbouring areas and from there to Sylhet and Dhaka. Outbreak Response Immunization (ORI) implemented in Cox's Bazaar and in all four districts of Sylhet Division in May 2017, appears to have stopped the outbreaks in the affected areas, but transmission has continued throughout Bangladesh.

National Coverage Evaluation Survey indicated differences in coverage across districts as well as pockets of unvaccinated children within some areas, there has been a stark increase in the number of measles outbreaks reported in early 2017. A total of 2429 confirmed measles has been reported in 2017 (as of June 2017), and annual incidence rate of measles is now 29.8 per million population. The geographical distribution of measles cases is concentrated in certain districts and Upazilas, indicating inequities in coverage. Coverage of measles-rubella vaccine first and second dose were low in Sylhet, Dhaka and Chittagong divisions, where there was also high incidence of measles cases. The age distribution of cases reported from laboratory outbreaks have shown that about 65% of confirmed measles and rubella cases were among children under 5 years old and around 53% of measles cases did not receive any vaccines.

Socioeconomic inequities

DTP3 coverage was 94.2% for male children and 92.9% for female children at the national level according to the CES 2015. The 2016 Coverage Evaluation Survey confirmed that there are no significant gender inequities in immunization coverage at any level. The survey also found no significant gender inequities at subnational level.[1]

Immunization equity if measured by measles coverage[51] for different groups of children by lengths of mother education, residence type, and economic status are presented in Figure 43 on page 47 on page 47:

[51] Defined as "The percentage of children aged 12-59 months who have received at least one dose of measles-containing vaccine"

- A gap in MCV1 coverage between the richest and poorest quintiles was 0.2 percent points in 2016, down from 26.9 points in 1999
- Children born to mothers with education history 12 or more years have much higher probability of being vaccinated than ones born to illiterate mothers: 90.4% vs 81% in 2016 respectively.
- A gap in MCV1 coverage among children living in urban and rural areas reduced to 5.7 percent point in 2016 (down from 11 points in 1996).
- DTP3 coverage was the highest in 1th (poorest quintile (98.4%) in 2016 compared to the lowest coverage 81.3% in the 5th (richest) quintile. A gap in DTP3 coverage between the highest and lowest income quintiles had reduced from 6.1 percent points in 2011 to 0.8 points in 2014.[52]

Figure 43: DTP3 and MCV1 Valid Vaccination Coverage (by age of 12 months) by income groups, residence and mother's education

DTP3 Coverage

By Income Groups

	2011	2013	2014	2015	2016
Q1 (poorest)	**86.2**	**90.2**	**91.1**	**92.2**	**89.4**
Q2	88.7	92.2	92.3	93.6	91.7
Q3	90.2	92.3	92.9	94.0	90.5
Q4	91.0	91.3	**93.8**	93.9	90.0
Q5 (Richest)	**92.3**	**94.1**	94.8	94.3	**88.6**
National Average	**89.6**	**92.0**	**93.0**	**93.6**	**90.1**

By length of mother's educaiton

	2011	2013	2014	2015	2016
Illiterate	**86.0**	**88.4**	**89.8**	**90.0**	**87.3**
Primary	**88.0**	**91.2**	**92.2**	**93.0**	**89.0**
Secondary	**91.8**	**92.9**	**93.5**	**94.2**	**91.2**
SSC	91.7	93.9	95.9	95.7	89.6
HSC	94.9	94.9	95.3	95.6	92.5
Degree	94.4	95.3	92.5	97.0	90.8
Masters	90.1	**95.9**	**97.0**	93.2	91.1
National Average	**89.6**	**92.0**	**93.0**	**93.6**	**90.1**

By residence

	2011	2013	2014	2015	2016
Rural	89.7	92.5	92.7	94.0	90.6
Urban	89.2	91.1	92.1	91.8	87.7
National Average	**89.6**	**92.0**	**93.0**	**93.6**	**90.1**

[52] BDHS 2014

Measles Coverage

By Income Groups

	2011	2013	2014	2015	2016
Q1 (poorest)	**81.0**	**81.7**	**84.6**	**85.2**	**86.8**
Q2	85.4	84.8	84.5	88.6	88.2
Q3	86.4	86.6	87.8	88.6	89.1
Q4	86.2	86.3	**88.5**	87.1	86.6
Q5 (Richest)	**88.7**	**88.1**	87.4	87.3	**86.6**
National Average	**85.5**	**85.5**	**86.6**	**87.4**	**87.5**

By length of mother's educaiton

	2011	2013	2014	2015	2016
Illiterate	**79.8**	**79.7**	**81.2**	**81.7**	**81.0**
Primary	83.6	83.2	85.2	86.7	85.3
Secondary	87.8	87.3	87.9	88.5	89.0
SSC	90.6	89.9	**90.0**	88.6	90.1
HSC	92.5	90.6	89.7	**92.3**	**91.8**
Degree	92.6	**92.1**	88.1	90.1	91.1
Masters	**96.2**	91.8	89.8	88.9	88.4
National Average	**85.5**	**85.5**	**86.6**	**87.4**	**87.5**

By residence

	2011	2013	2014	2015	2016
Rural	85.9	86.4	87.1	88.4	88.5
Urban	83.5	84.3	84.7	83.3	82.8
National Average	**85.5**	**85.5**	**86.6**	**87.4**	**87.5**

Source: CES 2011-2016

Bangladesh adopted new methodology for implementation of the national Coverage Evaluation Survey in 2016. Although according to the national Coverage Evaluation Surveys coverage gap between the richest and the poorest children does not exist, Bangladesh Health and Demographic surveys present a different picture as shown in Figure 44 on page 49 below:

Figure 44: DTP3 and MCV1 Crude full vaccination coverage (by age of 23 months) by economic status, level of mother's education and residence, Bangladesh Demographic and Household Surveys

DTP3 Coverage by economic status

	1993-1994	1996-1997	1999-2000	2004	2007	2011	2014
Q1 (Poorest)				**70.7**	**92.4**	**90.3**	**81.3**
Q2				80.9	86.5	**90.1**	**93.0**
Q3				82.4	89.9	93.2	93.2
Q4				84.9	92.2	96.3	93.9
Q5 (Richest)				**91.1**	**94.7**	**97.8**	**97.0**
National Average				**81.0**		**93.4**	**91.3**

MCV1 Coverage:

By Income Groups

	1993-1994	1996-1997	1999-2000	2004	2007	2011	2014
Q1 (Poorest)				**59.5**	**80.2**	**79.2**	**73.4**
Q2				79.2	77.0	87.5	85.7
Q3				76.3	80.1	88.1	88.8
Q4				80.5	89.5	90.4	91.0
Q5 (Richest)				**90.5**	**89.2**	**93.6**	**93.6**
National Average				**75.7**		**87.5**	**86.1**

By the level of mother's educaiton

	1993-1994	1996-1997	1999-2000	2004	2007	2011	2014
No education	**61.0**	**63.2**	**63.7**	**62.3**	**73.7**	**78.3**	**75.6**
Primary incomplete	**72.5**	**76.1**	**63.0**	**76.3**	**79.5**	**78.0**	78.5
Primary complete	**77.7**	**69.2**	**79.5**	**81.1**	**78.8**	**85.8**	79.1
Secondary incomplete				85.4	88.0	93.2	89.7
Secondary/Higher	**87.8**	**87.8**	**85.1**	**94.2**	**93.7**	**97.2**	**97.5**

By residence

	1993-1994	1996-1997	1999-2000	2004	2007	2011	2014
Rural	72.6	76.4	72.8	79.7	89.1	84.5	89.7
Urban	80.0	87.3	80.8	82.1	90.6	86.3	90.7

DTP3 coverage gap between the richest and poorest increased from 7.5 percent points in 2011 to 15.3 in 2014, while measles coverage gap reached 20.2 points (from 14.4 points in 2011).

EQUIST analysis in Sylhet Division: review of immunization data

The Government of Bangladesh's 4th Health, Nutrition, and Population Sector Development Program (HNP) is designed to achieve universal coverage for maternal, newborn, child and adolescent health (MNCAH). Despite the overall progress towards achievement of the program objectives, inequities in health and nutrition remain unresolved problem, especially among disadvantaged groups. Improvement equity in health service delivery, therefore, remains one of the most critical challenges of the Government to promote and achieve universal coverage of population.

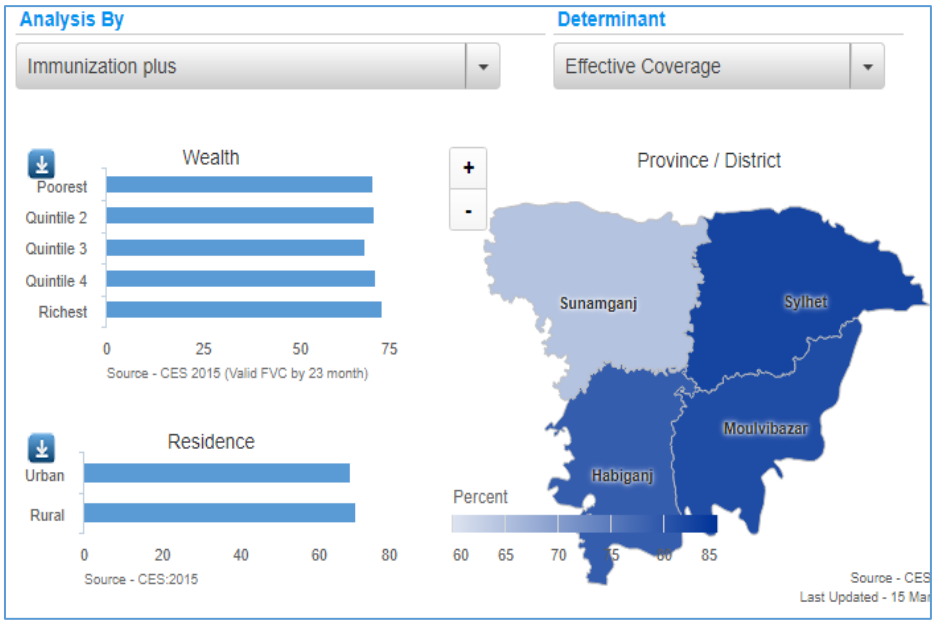
Sylhet and Chittagong are one of the most underserved divisions in Bangladesh. Most part of the hard-to-reach areas of the country is situated in Chittagong Hill Tracts (CHT) due to its geographical diversity. Critically low performance of Chittagong and Sylhet divisions calls to immediate attention and requires acceleration of the progress to catch up with national trends and help the country to achieve Sustainable Development Goals (SDG) 3.

Results of the EQUIST analysis carried out in these two divisions in 2017 confirmed common perception about performance of these districts. The analysis was instrumental for defining the main immunization bottlenecks in Chittagong and Sylhet and for informing planning of essential interventions to address existing challenges. The EQUIST analysis included city corporations and the data review and development of equitable strategy for improving immunization system performance was carried out with participation of all 15 districts. The most recent data was used for Chittagong and Sylhet equity profile analysis.

Results of EQUIST analysis proved that although some population groups within these two divisions (such as people living in remote, hard-to-reach Upazilas or in Sunamganj District) are less

likely to access and utilize key health interventions, there is no significant variation in wealth quintile and urban-rural coverage within divisions as it is shown in Figure 45 below.

Figure 45: FVC analysis in Sylhet on the basis of geographic and wealth quintile



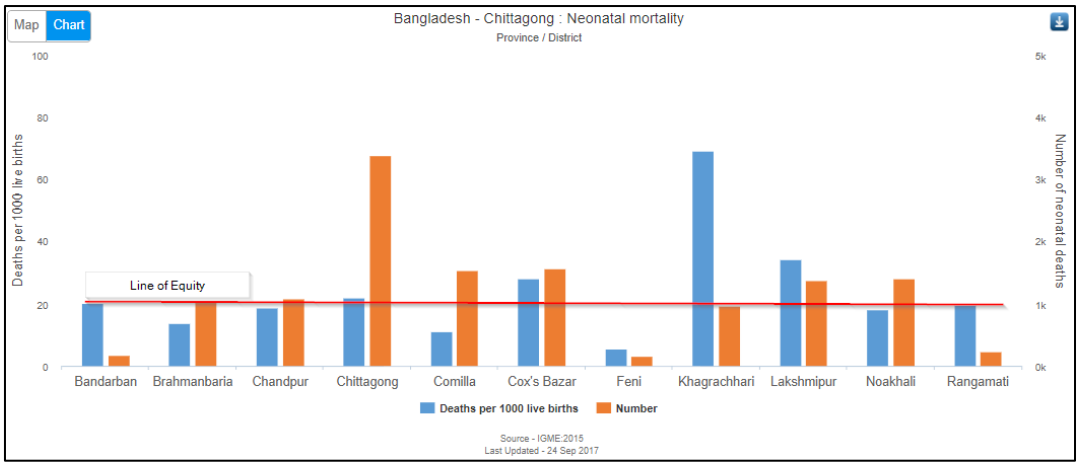
Source: EPI/UNICEF

The analysis revealed a coverage gap among Upazilas in some districts. Particularly, in Sylhet, Habiganj and Moulvibazar FVC rate is more than 82%, but in Sunamganj the rate accounts for only 65%.

Results of the analysis also showed that children living in very poor and remote areas of Chittagong are much less likely to benefit from immunization services than wealthy and urban families. According to the report of Civil Surgeon from Bandarban District there are parts in his District that have never received services, while other parts are only accessible by boat during the rainy season.

11 indigenous groups living in Chittagong Hill Tracts face striking inequities in terms of access to the health services (including immunization services) which leads to the highest numbers of newborn deaths and the neonatal mortality rate across Districts as it is shown in Figure 46 below.

Figure 46: Inequalities in NMR among different regions of Chittagong



Source: EPI/UNICEF 2017

Bottleneck analysis showed significant gaps in availability of human resources, high out-of-pocket expenditure and sociocultural factors, that might have impacted the full immunization coverage rates.

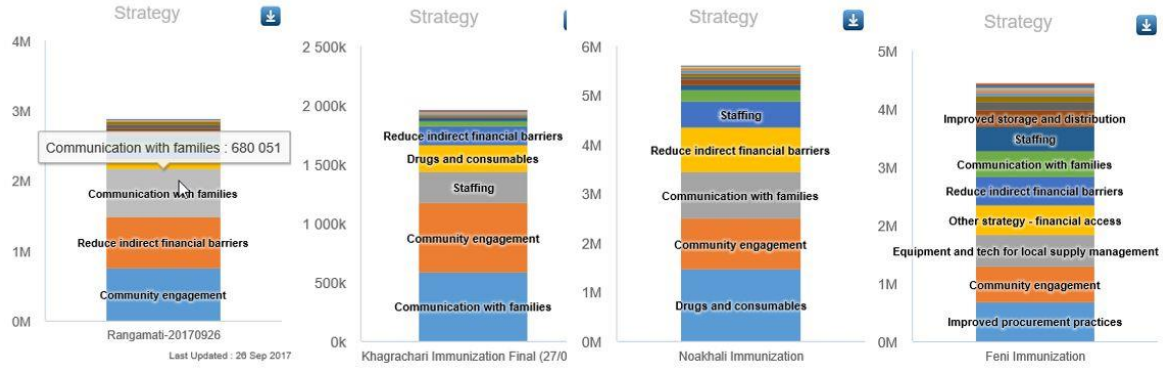
Figure 47: Bottleneck analysis for immunization in Sylhet Division

Indicators	Coverage	Date Source
Availability of commodities - BCG Crude Coverage	**97.9%**	CES 2015
Geographic Access - Calculated Heath Equity profile	**94.0%**	Health Equity profile UNDAF 2012-16
Availability of Human Resources: Calculated average	**47.6%**	HRM 2017
Financial access – OOPS as of % of total health expenditure	**63.0%**	Health Facility survey 2014
Socio-cultural access - Calculated using (Women's final say on own health care)	**50.8%**	Household survey 2014

The EQUIST tool project the cost estimates and live save through designing different strategies depending on the need of a district. The analysis of Sunamganj district estimated that over the 5-year period approximately 8 million US$ will be required to achieve 10% increase in full immunization coverage, which would translate into 250 saved children, while in Moulvibazar – saving lives of approximately 150 children would require approximately 800,000 US$.

EQUIST analysis has been conducted for each district to estimate costs for various priority strategies. The costs required by Rangamati, Khagrahari, Noakhali and Feni Districts are shown in Figure 48 below:

Figure 48: Different cost scenarios of strategies to address immunization bottlenecks in Chittagong Division, 2017

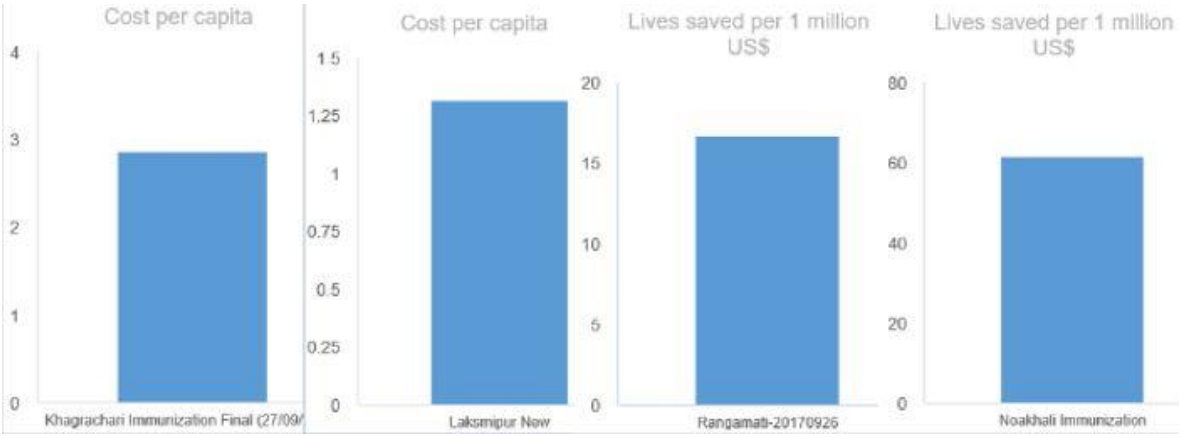


Source: EPI/UNICEF 2017

Overall, the costs of the strategies for resolving immunization inequities in hard-to-reach areas, estimated through EQUIST analysis were much lower than anticipated. The districts with the lower population would not be able to save as many lives as those with more population numbers, where the population is more dispersed in remote areas. All these leads to the significant variation between the per capita costs across the districts of Chittagong division.

The Figure 49 **Error! Reference source not found.** shows that the per capita costs were less than 3.0 US$ in Khagrachari District, and amounted to 1.25 US$ in Laksmipur District that amounts respectively to 9.7% and 4.1% of the Total Health Expenditure (THE) per capita that was 30.8 US$ in 2016 (see details in the respective section of the cMYP). The lives saved per 1 million US$ were around 16 in Rangamati and 60 in Noakhali.

Figure 49: Per capita costs for addressing immunization inequities in selected Districts of Chittagong Division, 2017



Source: EPI/UNICEF 2017

Overall the EQUIST analysis revealed three key three key bottlenecks for immunization in Sylhet and Chittagong: 1) geographical accessibility, 2) financial affordability and 3) sociocultural acceptability, which led to the conclusion that the availability of human resources and socio-cultural barriers are the two main causes of inequity in coverage and therefore, human resource gaps and socio-cultural barriers need to be addressed for improving immunization coverage in Sylhet and Chittagong divisions.

1.3.3 Immunization system performance by components

(1) Governance / decision making

The principal agency for making technical recommendations on the immunization schedule, immunization practices, and new vaccines and technologies is the National Committee for Immunization Practice (NCIP). The NCIP appoints sub-committees for immunization related programs for disease prevention and control, elimination, eradication and safety.

The main agency for regulation and licensing of vaccines in Bangladesh is the Directorate General of Drug Administration (DGDA). It is the policy commitment of the MOHFW that all licensing and registration of vaccine production and marketing should come under the single regulatory umbrella of the DGDA.

The MOHFW upgrades and maintains the capacity of DGDA to undertake the six core regulatory functions of (i) a published set of requirements for licensing, (ii) surveillance of vaccine field performance, (iii) introduction of systems of lot release, (iv) use of laboratory when needed, (v) regular inspections for good manufacturing performance and (vi) evaluation of clinical performance.

The DGDA takes the primary responsibility for post marketing pharmaco-vigilance. The principal mechanisms for coordination of national and international resources for immunization is the Inter Agency Coordination committee, or any other sector coordination agency appointed by the Government.

The principal agency responsible for ensuring the quality and safety of implementation of the routine public immunization schedule and immunization campaigns is the National Immunization Program, Directorate General of Health Services of MOHFW.

The Department of communicable Disease Control, Directorate-General of Health Services, MOHFW has the primary responsibility for implementation of non-EPI vaccination programs (rabies

prevention, seasonal influenza vaccination and traveller's vaccination, (including for Haj Pilgrims in collaboration with the Ministry of Religious Affairs and with overseas workers through Ministry of Expatriates Welfare and Overseas Employment). Overall coordination of national immunization services still remains the primary responsibility of the National Immunization Program, Directorate-General of Health Services, MOHFW.

NGOs supplying immunization services through City Corporations or Municipalities provide immunization services that conform to public sector immunization policies and standards in relation to cold-chain vaccine management, safe injection practices, and routine surveillance and immunization reporting and other immunization standard operating procedures.

According to the MOHFW policy the City Corporations and Municipalities identify and mobilize immunization human resource numbers and operational costs that meet the standard and procedures for management of the public-sector immunization services elsewhere in the country.

Changing the Immunization Schedule

Changes to the routine immunization schedule are technically reviewed by and recommended by the scientific and technical subcommittee and is endorsed by the National Committee on Immunization Practice (NCIP – including representatives from ICC). Changes are based on updated research evidence of disease burden, vaccine efficacy, vaccine safety or program feasibility, as recommended by NCIP) and assessed by the Directorate General of Drug Administration, based on information from the following sources:

1 National vaccine trails, post marketing survey and program evaluations;

2 The latest international evidence as reflected in updated WHO Position papers;

3 The NCIP recommendations on the routine public sector national immunization schedule (EPI vaccines) but will also consider making recommendations on vaccine schedules for additional vaccines provided through the private sector, NGOs or other departments (non-EPI Vaccines), with these recommendations based on the latest scientific evidence as indicated in the most recent WHO position papers.

New vaccine introduction

The process for Decision making on introduction of new vaccines into the public-sector routine immunization schedule is made according to the following systematic steps:

1. Assessment of burden of disease (through surveillance data, research study, disease burden estimates);
2. A review of global recommendations and latest international evidence as described in the most recent WHO Position Papers on vaccine efficacy and safety;
3. Assessment of system readiness and programmatic feasibility to adopt the new vaccine into the national immunization schedule (cold chain capacity, surveillance capacity and safety requirements)
4. Conducting of vaccine trials to test the efficacy and safety of the proposed new vaccine in the Bangladesh context in cases where there are questions raised concerning either efficacy or safety (as assessed by the NCIP or DGDA);
5. Assessment of costs and financing gaps, and, where possible, economic impacts, including clearance by the Ministry of Finance;

6. Preparation of an introduction plan that includes a public communication strategy, preparation of service providers and plan for post marketing surveillance;
7. Review of the above documentation by the National Committee for Immunization Practice (NCIP), DGDA and recommendation to the MOHFW;

Endorsement by the Ministry of Health and Family Welfare based on the NCIP/DGDA recommendations.[53]

(2) Immunization service delivery

EPI Services in Rural Areas

The immunization service delivery in rural areas is managed by the government under the MOHFW. The Directorate of Health Services and the Directorate of Family Planning have assigned staff from district to field level for delivery of immunization services. the EPI services are provided within the Essential Service Package and service provision is based on the administrative structure of the country which is presented in the Figure 50 below:

Figure 50: Administrative Division of Bangladesh

Administrative unit	# of units
Districts	64
City Corporations and Municipalities	11
Upazilas	482
Unions	4,498
Wards	13,494
Sub-blocks	108,000

Source: EPI Bangladesh

There is an EPI outreach/vaccination site in each sub-block where routine EPI services are provided on a monthly basis. The catchment area of these outreach/vaccination sites is approximately 1,000 people. During a calendar week, the vaccination sessions are provided in two outreach/vaccination sites to cover eight sites of a ward in a month.

The vaccinations are administered by the Health Assistant (HA) (GDHS) who usually is assisted by the Family Welfare Assistant (FWA) (DGFP). The immunization sessions are supported by a Porter, employed by the EPI, who is responsible for vaccine delivery from the Upazila Health Complex (UHC) to the field worker of service delivery point – a vaccination site.

The Medical Technologist (MT-EPI) at the Upazila Health Complex is the key person in providing technical support to the front-line staff. Thus, the Health Assistant, Family Welfare Assistant, Porter are the driving force of the EPI service delivery infrastructure in rural areas.

The immunization service provision in rural areas is supported by the field workers and volunteers who are involved in mobilizing communities and parents for vaccination sessions.

The immunization service provision is based on application of annual micro-plans, which are prepared basis on the REC (reach every community) strategy. The Micro-plans are updated annually

[53] National Immunization Policy, 2014

at ward and Upazila levels and submitted to district and higher levels for approval and allocation of funding, vaccines, injection supplies and logistical requirements for supportive supervision.[72]

EPI Services in Urban Areas

The service delivery in urban areas is managed by city corporations and municipalities under the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC). Vaccines, immunization supplies, and equipment are provided by the national EPI, which also provides programmatic support for immunization service delivery.

City Corporations and Municipalities directly employ City Health Officers, public health officers and service providers for delivery of a range of public health services to their respective population. These services include, PHC services, vector control, food and sanitation, waste management and immunization services.

Due to inadequate number of permanent health workers and health care infrastructure, a greater part of the HPN services are provided through the network of NGOs, contracted for this purpose by the local governments. The significant share of services provided by the NGOs are associated with two major projects: The Smiling Sun Franchise programme (SSFP) funded by USAID, and the Urban Primary Health Care Project (UPHCP) funded by a consortium formed by DFID, SIDA and UNFPI and led by the Asian Development Bank (ADB).[54]

The service delivery is organized through the network of clinics and outreach posts established across the administrative zones of City Corporations. The NGO facilities operating in an urban slum and non-slum areas, covering 58% of slum and 53 % of non-slum communities. The remaining areas are covered by the government and private health facilities.

A number of recent surveys found[55] general improvement of public health service delivery in urban areas of the country, but also revealed critical weaknesses and need for major improvements for achievement of health and immunization system objectives in city corporations and municipalities.

Internal migration: Internal migration to the larger cities and towns raises ongoing concerns with regard of effectiveness of service delivery and its outcome in urban slum areas. According to the Urban Health Survey (2013) crowded living conditions and chronic malnutrition remains persistent public health problem, which is aggravated by the growth of peri-urban populations around the developing city Centres, taking into account that these areas lack adequate basic health care infrastructure and health personnel.

Registration: Inadequate systems for effective recording and registration and lack of capacity among urban service providers to maintain registration systems, limits capacity of immunization system to reach out the migrant population with immunization services.

Organization of Service delivery and communication: In the most urban areas, service delivery is not coordinated. The work performed by satellite/outreach centers is not properly organized leading to the overlapping of immunization activities by different providers. According to the documented evidence, in many of urban areas, the number of satellite/outreach centres is not sufficient to cover all target geographic areas in a ward, however the immunization sessions are conducted are conducted 3-4 times in the same location rather than in hard-to-reach areas. The number of immunization target population in the urban areas is much lower than in the rural parts of

[54] EPI and VPD Surveillance Review and Post-introduction Evaluation of Hib, 2012
[55] Urban immunization strategy, BGD

the country. The awareness and knowledge of parents on immunization and vaccination sessions is much lower than in rural areas. No attempts are made by service providers to follow-up and reach missing children.[56]

Financial sustainability: There are concerns regarding the over reliance on international financing and NGO service provision in urban areas,[57] raising concerns regarding the vulnerability of the urban health care systems to external political or financial shocks.[58]

(3) Program management

The National EPI of Bangladesh has strong, centralized management system. The overall management functions of EPI are assigned to the Line Director of the MNC&AH OP, who is also responsible for overseeing implementation of the other major components of the MNC&AH OP such as: Maternal health, National Newborn Health Program (NNHP), Integrated Management of Childhood Illness (IMCI), Adolescent Health and School Health (AH&SH).

Responsibility for day-to-day management of EPI at all levels is assigned to the EPI Program Manager and four Deputy Program Managers (DPM): DPM-EPI and Surveillance, DPM- Procurement and Supplies, DPM- Field Services and DPM- IEC and SBC[59].

At the district level Civil Surgeon is responsible for implementation of EPI program. The District EPI superintendent and Cold Chain Technicians are responsible for management of vaccine, cold-chain operations and logistics, while the Assistant Storekeeper carries out all vaccine logistics related activities.

At Upazila level, Upazila Health and Family Planning Officer (UHFPO) is responsible for implementation of EPI program. Medical Technologist-EPI supervise vaccine distribution and cold chain management issues and EPI porters are responsible for distribution of vaccines among the respective unions and maintenance of distribution related accounting and paperwork.

Union level supervision of immunization service delivery is provided by the Assistant Health Inspector (AHI), employed by the DGHS and Family Planning Inspector (FPI) – employed by the DGFP.

(4) Workforce

High rates of staff turnover remain problematic for adequate implementation of high quality immunization services at all levels. Although the NGOs provide substantial support for immunization service delivery, but not enough to overcome HA staffing shortages. In 2017 Gavi funds were used to recruit “volunteers” and to make up part of the shortfall, but this funding ended in July 2017. Currently only 75.6% of sanctioned health assistance posts are filled.

Figure 51: Staffing of front-line service providers (as of July 2017).

Division	Sanction HA Position	Filled HA Position	Vacant HA Position
Barisal	1,939	1,617	322
Chittagong	4,219	3,066	1,153
Dhaka	5,912	4,612	1,300
Khulna	2,430	1,544	886

[56] EPI and VPD Surveillance Review and Post-Introduction Evaluation of Hib, 2012
[57] According to the EPI and VPD Surveillance Review and Post introduction Evaluation on HIB, 2012
[58] Urban Immunization Strategy. Draft 3 February, 2017
[59] Social and Behavioral Change

Rajshahi	2,662	2,041	621
Rangpur	2,180	1,678	502
Sylhet	1,528	1,213	315
National	**20,870**	**15,771**	**5,099**

As per Strategic Plan for Measles, Rubella and CRS Elimination, other human resource issues relate to the insufficient allocation of funds for human resources. During the formative years of EPI (until the mid-2000s), in additional to the EPI National Staff, every Upazila health complex had the EPI Medical Officer (MO) and Medical Officer-Disease Control (MODC) (for surveillance). Now there are only 2 MO posts at the National EPI Office and the posts of MO and MODC at the Upazila no longer exist.

Since 1998 approximately 32 WHO-supported Surveillance Medical Officers[60] (SMO) and approximately 32 Gavi-supported District Maternal Child Health and Immunization Officers (DMCHIOs providing service since 2013)[61] have been providing technical and operational assistance to the immunization program in various fields, such as surveillance, outbreak investigation, supplementary immunization activities, and response activities at the district, city corporation, municipality and Upazila level. Direct management of SMOs was provided by the WHO CO and the government was responsible for management of the DMCHIOs. Recently, the management responsibility of both SIMOs and DMCHIOs was assigned to WHO CO. To optimize immunization, function the term of reference of SMO were changed and title was changed to Surveillance and Immunization Medical Officer and started implementation of the plan for deployment of 64 SIMOs in all districts of the country (48 positions are filled as of August 2017). An external review of the value added by the WHO SMO network, conducted by independent expert through the WHO technical assistance in 2016 concluded that SMOs were critical to the ongoing success of the EPI programme and should be continued for at least the next 5 years. However, considering gradual decrease of global polio eradication initiative (GPEI) funds by 2019 and availability of GAVI funds until 2019 a transition plan elaborated by the WHO will be implemented to integrate all posts of surveillance and immunization medical officers into government health structures. After 2019 and until the full integration into government system the SIMO network will be supported either through SWAp or the external support.

The details about availability and distribution of the immunization staff in Dhaka City Corporation was described in the BGD PCV/IPV post introduction evaluation report (2016). According to the report the number of staff managing, coordinating and supervising immunization activities in DCC (1 Community Health Officer (CHO), 1 Health Officer (HO) 5 Assistant Health Officers (AHO) and 5 EPI supervisors) is totally insufficient taking into account the total target population of 4.3 million, including around 75,000 infants. In addition to the severe staff shortage, resulted by splitting the DCC into two parts, delivery of immunization services is further aggravated by multitasking of existing staff and inadequately low priority given to the immunization service delivery which is provided along the PHC and other public health services and are included in the responsibilities of the same staff.

(5) Reporting

Bangladesh shows ongoing commitment for strong monitoring and evaluation of its immunization program, maintaining administrative data on immunization and implementing Coverage Evaluation Surveys[62] on an annual basis in order to strengthen in-country capacity for evidence- based planning, progress monitoring and decision making. Routine immunization data

[60] From 2017 called SIMOs – Surveillance and Immunization Medical Officers
[61] Originally called District Immunization Medical Officers or DIMOs
[62] Coverage Evaluation Surveys are provided through external financial support provided by the Implementing Partners

management is maintained through the strong and effective Management Information System which has been established in 1995.

The information on the immunization target population (new-borns and CBAW) and their vaccination status are recorded, collected and analyzed at all levels of the immunization system. At the union level, two separate registers are maintained by the Health Assistants, for registration immunization target groups in their respective wards and sub-blocks. These records are used as basis for targeting, tracking and following-up children for vaccination as well as for building and maintenance of communication between the immunization service providers and parents. Similarly, the CBAW register is used to record and track TT vaccination status of the childbearing age women, as well as for monitoring of outcome of the pregnancies. Two separate tally sheets are maintained for reporting daily vaccination from routine vaccination sessions for immunization target groups. Based on these daily reports the immunization service providers develop monthly reports for each reporting site. The reports are developed separately for children and CBAW.

The registration system on house-to-house visits, detailed tally sheets of daily vaccination records and a monthly report on vaccination are the key components (instruments) of the ward level management information system.

The wards prepare and submit daily reports to the respective Upazilas, through a tally forms. In addition the wards prepare monthly reports for submission to Upazilas on a monthly basis.

Upazilas forward these reports to the upper level of the system – districts. At the district level reports are computerized and the electronic version, with supporting hard copies are sent to the central (national) level. A computer-software for data entry and analysis is efficiently used in all 64 districts.

(6) Data quality

WHO and UNICEF have been facilitating the implementation of data quality self-assessments across the country and more than a half of all districts have been covered in this effort. Trainings are provided to help orientation of the district and Upazila immunization managers in data collection and reporting. In addition, EPI seeks to validate the data quality self-assessments by requiring surveillance immunization medical officers (SIMOs)[63] to re-conduct data quality self-assessments (at least two times per month). Results of the self-assessments are regularly compared for consistency and all issues are discussed between the district and immunization managers. The monitoring continues until the improvements are documented by IENIC estimates and CES.

Over the recent years administrative coverage has been repeatedly reported over 100%, which could be attributed to the denominator related problems. In 2014 EPI estimated over 3.8 million births in Bangladesh, while a UN Populations Division estimate for the same year was 3.1 million births (difference 700,000 births). Demographic evidence in favour of the Population Division estimates is beyond a reasonable doubt.[64] In June-July 2017 WHO provided technical assistance to improve Estimation of Denominator for Routine Immunization in Country.[65]

Data management of health statistics across a number of disciplines in Bangladesh is undergoing major reform with good progress made towards an eHealth system. Recently, within the

[63] Formerly known as SMOs – surveillance medical officers. Changed in January 2017
[64] Estimating Denominators for Routine immunization in Bangladesh, Final Report, 2017
[65] Estimating Denominators for Routine Immunization in Bangladesh, Final Report 2017

framework of the EVM IP implementation, the manual system on vaccine stocks and movements were digitalized and migrated into the DHIS2.

Bangladesh is progressing with DHIS2 as a health information system management package. This data warehousing and data integration package is well adapted to the real time dynamic needs of EPI data.

The number of substantial improvements were made to ensure smooth transition and integration of a paper-based system into the DHIS2:

DHIS2 is upgraded with real-time Immunization Supply Chain and Logistics (ISCL) management Information System (MIS) that includes data management for vaccine, cold-chain equipment, storage, temperature, distribution, vaccination coverage and other logistics. Cold chain and logistics MIS system (DHIS2) implemented across the country in 2016 and all the cold-chain equipment are part of this database and being monitored.

Online immunization data management system initially to district level and progressively to Upazila level and linked or integrated this with DHIS2. UNICEF supported the BoG for capacity building in 64 District Supervisors and Cold-chain personnel. Recruited national MIS consultant to support and oversee the process of transition to DHIS2 data management and timely entry and currect of EPI data at all levels. Established functional dashboard on EPI Reporting, Cold-chain, Vaccine and Logistics Management system in national live dashboard portal of DGHS, MOH&FW. Organized one orientation on Stock Management and Online reporting for EPI supervisor and store keeper of 64 districts. Provided computer support for urban areas (9 Corporations) to facilitate data management in urban areas.

(7) Cold chain and vaccine management

Vaccine procurement

According to the national policy, the country procures only WHO pre-qualified vaccine to ensure the quality and safety of vaccines used by the EPI.

In the baseline year routine immunization vaccines and injection supplies were procured through the UNICEF Procurement Mechanism (UNICEF Supply Division).

The annual forecast for vaccines and supplies is based on the number of target population that is calculated based on the National Census 2011 data. Procurement and distribution of vaccines and supplies is carried out by the national EPI based on the request received from all districts. The Government covers costs for the procurement of traditional vaccines included in the routine immunization schedule: BCG and TT, while DTP-Hib-HepB, OPV, PCV, IPV and MR vaccines are co-financed by the National Government and GAVI.

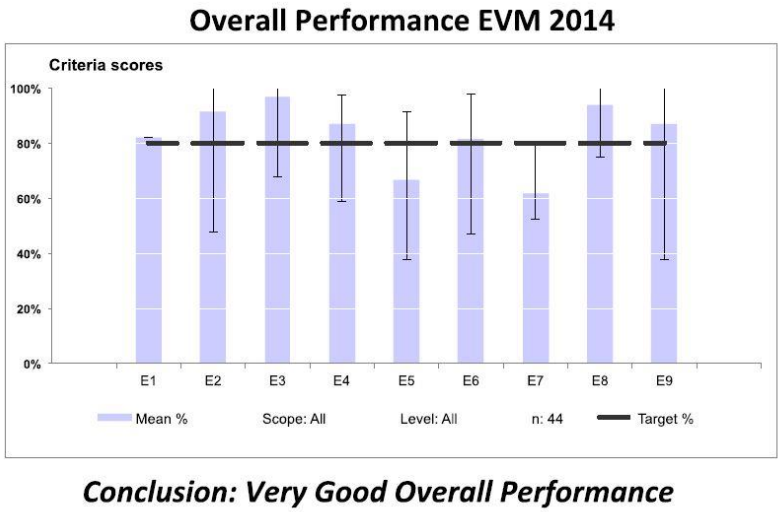
Effective vaccine management

The overall key strengths and weaknesses of the vaccine supply chain and vaccine management practices in Bangladesh assessed in 2014 are summarized in Figure 52 on page 60 below.

The performance of seven of the nine criteria assessed were equal to or better that the WHO recommended minimum levels of performance, despite some shortcomings of temperature management practices at the central store. Only two criteria fall short of the WHO recommended standard and required interventions to improve performance. EVM considered these interventions as simple to implement with small cost implications. Based on the assessment findings EVM found

performance of Bangladesh Vaccine and Cold Chain Management system as: "A very good overall performance" with an aggregate performance of 82% across all criteria and supply levels.

Figure 52: Overall Performance scores of EVM Assessment 2014



Conclusion: Very Good Overall Performance

WHO Recommended minimum performance levels achieved in 7 of the 9 Criteria

E5: Weak due to Preventive Maintenance Planning (Infrastructure)
E7: Weak due to absence of Freeze monitoring during transport of vaccines (LD & SP)

Source: Bangladesh EVM Assessment Report, 2014

Based on the EVM assessment Bangladesh developed the comprehensive Effective Vaccine Management Improvement Plan (EVM-IP) in 2014 aiming at improvement of EPI performance in EVM and upgrade cold-chain of the country taking into account the introduction of the new vaccines into the national immunization schedule.

512 fridge-tag and 11,000 irreversible freeze indicators procured and delivered to the sites for ensuring continuous monitoring of the cold-chain system. 15 central temperature monitoring systems have been installed in 9 districts, where cold-room have already been installed. 74 freezers were delivered to the sites and procurement of 200 new ILRs was initiated. Procurement of the trucks and bi-cycles is under the progress: the bidding process was completed, and the Purchase Order was issued in October 2017.

In total 23 SOPs were revised and updated, and the SOPs field testing plan was elaborated. Vaccine container and irreversible freeze indicators were piloted at the union level in Savar Upazila. The pilot will be replicated at the national level with fractional IPV vaccine.

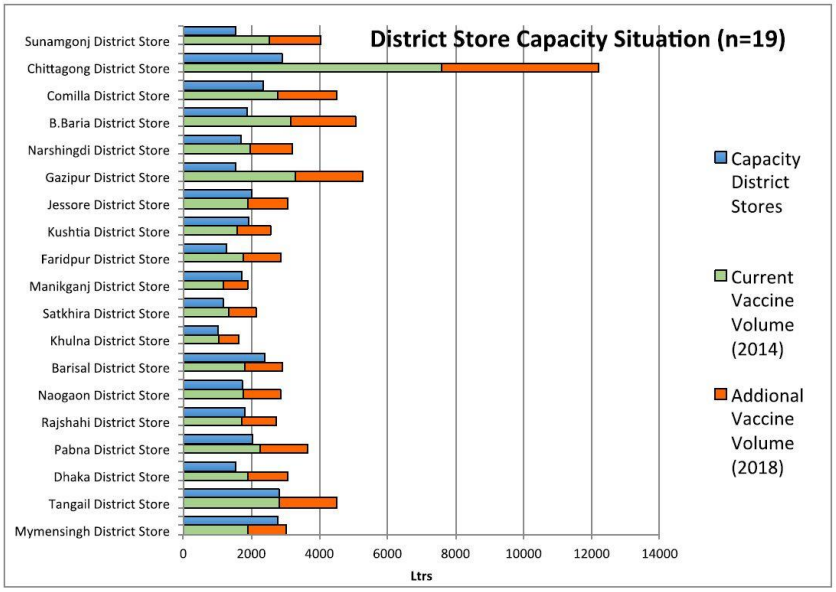
In total 20 engineers and technicians were provided with a two-week residential training course in cold-chain repair, maintenance, and management (WIC, WIF, ILR, Freezer and Voltage Stabilizer). The visit of 5 additional technicians to the NCCRC was prepared and will be carried out in Q4, 2017. Immunization staff was trained in improvement of immunization supply chain data management (district EPI superintendent, Assistant Store keeper and medical technician). In addition, the one-day training was delivered to all cold-chain technicians in installation and maintenance of the ILR-TCW3000AC and Freezer-MF314.

Storage Capacity

According to the EVM assessment, storage space deficit is observed mostly at national and district levels with the introduction of Rota vaccine.

16% of District facilities do not have adequate space for dry storage. This will increase to 26% with the introduction of new vaccines. 84% District stores use conditioned rather than fully frozen icepacks. Only 13% do not have sufficient ice pack storage capacity to meet their maximum demand. Cool packs are not currently used at District facilities. District stores use icepacks to replace those brought by Upazila personnel when the received icepacks are not sufficiently chilled. Cold Boxes and vaccines carriers are not normally used at District facilities, but stocks are available for emergencies and replacements at SP facilities.

Figure 53: Storage Capacity and requirements at District Level in selected districts



Source: EVM Assessment 2014

In order to improve storage capacity according to the commendations of EVM-IP the technical committee under Program Implementation Committee (PIC) of MoH has been formed to oversee the construction work planned according to the recommendations of the EVM-IP. The construction strategy has been finalized in consultation with MoHFW and LD MNCAH. UNICEF LTA engineering services provider: "Environment and infrastructure Management Solution" (EUMS) has conducted the assessment of the 32 districts in coordination with the Districts Civil Surgeons and UNICEF field officers, which included: initial structural integrity assessment; architectural plan verification; non-destructive test and preparation of renovation plans and reporting.

First phase renovation, started in July 2017 with construction work has started in 11 districts. According to the construction plan the work will be finalized in December 2017. Preparatory activities for implementation of the second and third phase of EVM-IP implementation are progressing.

In addition to the renovation, the Government provides support to the supply and logistics system operations. In 2017 the government secured land for construction of the new central warehouse premises. Twelve cold-rooms were purchased, distributed in 6 districts. Installation will be completed in December 2017.

(8) Surveillance, monitoring and reporting

Surveillance is very important for monitoring the status of vaccine preventable diseases. It requires that all reports are received complete and timely, from service provision to the central level.

In Bangladesh Polio Eradication and Elimination of Maternal & Neonatal Tetanus (MNT) activities started in 1995. Acute Flaccid Paralysis (AFP) and Neonatal Tetanus (NT) surveillance system

was established in 1997. In 1995 WHO supported the surveillance activities through deployment of five divisional surveillance officers. Surveillance included AFP, Measles and NT with the main focus on AFP and NT surveillance. In 1997 additional, urban surveillance officers were deployed in five city corporations.

Since 1998 approximately 32 WHO-supported Surveillance Medical Officers[66] (SMO) and approximately 32 Gavi-supported District Maternal Child Health and Immunization Officers (DMCHIOs providing service since 2013)[67] have been providing technical and operational assistance to the immunization program in various fields, such as surveillance, outbreak investigation, supplementary immunization activities, and response activities at the district, city corporation, municipality and Upazila level. Direct management of SMOs was provided by the WHO CO and the government was responsible for management of the DMCHIOs. Recently, the management responsibility of both SIMOs and DMCHIOs was assigned to WHO CO. To optimize immunization function the term of reference of SMO were changed and title was changed to Surveillance and Immunization Medical Officer and started implementation of the plan for deployment of 64 SIMOs in all districts of the country (48 positions are filled as of August 2017). An external review of the value added by the WHO SMO network in 2016 concluded that SMOs were critical to the ongoing success of the EPI programme and should be continued for at least the next 5 years. However, considering gradual decrease of global polio eradication initiative (GPEI) funds by 2019 and availability of GAVI funds until 2019 a transition plan will be needed eventually to integrate all posts of surveillance and immunization medical officers into government health structures, taking into account critical importance of technical and operational support provided by SIMOs in achievement of EPI strategies and achievement of key objectives of the national immunization program.[68] Until the full integration into government system the SIMO network should continue with support from government SWAp/GAVI fund after 2019.

The current state of the surveillance system of the country against the surveillance indicators is presented in the Figure 54 below:

Figure 54: Summary of the surveillance indicators

Component	Suggested indicators	2016	Remarks
Routine surveillance	% (Completeness) of surveillance reports received at national level from districts/city corporations	99%	
	AFP detection rate / 100,000 population under 15 years of age	2.85	
	Percentage suspected measles cases for which a laboratory test was conducted	100%	
	Sentinel surveillance for rotavirus established		
	Sentinel surveillance for meningitis (Hib / PCV) established	Yes	
	Percentage of suspected meningitis cases tested for Hib / pneumococcal diseases according to standard protocol.	Yes	
	% weekly timeliness of reports	97%	Weekly reporting system established

[66] From 2017 called SIMOs – Surveillance and Immunization Medical Officers
[67] Originally called District Immunization Medical Officers or DIMOs
[68] Strategic Plan for Measles, Rubella and CRS elimination

Component	Suggested indicators	2016	Remarks
	% weekly completeness of reports	99%	Weekly reporting system established
Coverage monitoring	% gap in match between DPT3 survey coverage and official reported figure	118-97.9=20.2	Reported DPT3 is 118% and as per CES 2016, DPT3 crude coverage is 97.9%
Immunization safety	Percentage of states that have been supplied with adequate number of AD syringes for all routine vaccines		
Adverse events	National AEFI system is active with a designated national committee	Yes	
	Number of serious AEFI cases reported and investigated	54	

Source: EPI Bangladesh 2017

VPD and AFP Surveillance System

Currently Bangladesh operates AFP and VDP Reporting systems:

1. Internal system of notifying and reporting of cases within all public hospitals (UHC, District and Medical College hospital) and selected 787 major private health facilities;
    a. Routine/passive reporting of AFP and VPD is conducted on a weekly basis through application of structured format, including ZERO reporting;
    b. Active case search reporting for AFP, NT, Measles & CRS from selected 162 health facilities (19 of these facilities are CRS specific specialized facility) is conducted on a weekly basis through application of the structured format, including ZERO reporting;
2. EPI Disease reporting is carried out on a monthly basis; as well as MIS information system reporting.

The following key personnel is involved in AFP and VPD surveillance:

- **Disease Surveillance Focal Person (DSFP)** is the local health official responsible for disease surveillance activities and serves as key focal point. At the district level, these functions are assigned to the Civil Surgeon (CS), while at the City Corporation and Upazila levels the Chief Health Officer (CHO) of Upazila Health and Family Planning Office is responsible for coordination of surveillance activities. The same functions in Municipalities are assigned to the Municipal Medical Officer (MMO).[69]
- **Local Surveillance Officer (LSO)** functions include implementation of following surveillance activities: conduct active surveillance, monitor passive surveillance, carry out case/outbreak investigation, ensure sample collection, response and prepare reports for submission to the DSFP. In districts LSO functions are assigned to the Medical Officer Civil Surgeon (MO-CS) while in the City Corporations these functions are performed by Health Officer (HO) and Assistant Health Officer (AHO). At the Upazila level, LSO functions are performed by the Medical Officer Disease Control (MO-DC). The Municipal Medical Officers' are responsible for the LSO functions in some of municipalities of the country.

[69] In those municipalities which have MMO

- **Hospital Surveillance Officer (HSO)** is responsible for implementation surveillance activities such as: facilitation and coordination of surveillance activities at hospital, development and submission of Weekly Reports (routine passive reporting) to DSFP, RMO/RP supporting and monitoring entire process.[78]
- Surveillance and Immunization Medical Officer is responsible in providing technical and operational support as well as monitoring the entire surveillance and reporting process.

Figure 55: Surveillance Staff by Administration Level

Admin. Level	DSFP	LSO
Upazila	UH&FPO	MO-DC
City Corporation	Chief Health Officer (CHO)	AHO)/Health Officer (HO)/ EPI-MO
Municipalities with MO	Municipal Medical Officer (MMO)	Municipal Medical Officer (MMO)
District (including district without MMO)	Civil Surgeon	MO-CS or as designated by local health authority

The reporting forms are completed at all levels. Surveillance and Immunization Medical Officers (SIMO) conduct active surveillance. Supervision for surveillance activities is sufficient in most reporting centres and AFP is well established. Specific performance indicators are monitored on a regular basis. Public health staff is motivated and well trained and aware about AFP notification and investigation procedures at all levels. Laboratory surveillance is well linked to the field surveillance with timely collection and transportation of stool samples to the national laboratory. The national Laboratory has been accredited over the years and reports are sent to the national programme on time. Surveillance system is depending on Surveillance Medical Officers recruited by WHO, who are providing technical support since 1999. The government has a good structure for AFP surveillance to be implemented by local surveillance officer and guided by Disease Surveillance Focal Persons. At present, however, the structure is not fully functional and its utilization is not fully explored.

Figure 56: AFP Surveillance Performance Indicators, 2011-2016

	2011	2012	2013	2014	2015	2016
AFP cases	1,610	1,567	1,412	1,478	1,413	1,437
Wild Polio	0	0	0	0	0	0
Compatibles	0	0	0	0	0	0
AFP rate	0	0	0	0	0	0
Non-Polio AFP rate	3.11	2.98	2.65	2.74	2.78	2.85
Adequate stool collection rate	95%	96%	96%	98%	97%	99%
Total stool samples collected	3,578	3,412	3,132	3,094	3,008	2,863
%NPEV isolation	18.0	13.8	18.8	22.6	20.4	21.3
Timeliness of primary result reported	93	88	97	97	98	98

Source, EPI Fact Sheet 2017

Measles surveillance

Bangladesh has made significant progress in measles control. Measles surveillance is fully integrated with AFP and other VPDs surveillance. All activities of measles case-based surveillance (case identification, reporting, investigation, and specimen collection) are conducted by staff at health facilities indicating a step forward towards developing a sustainable surveillance system.

Neonatal tetanus surveillance

Active surveillance for neonatal tetanus is also carried out by SIMOs/LSOs. The country has a successful MNT elimination programme. According to the validation conducted in 2008, maternal and neonatal tetanus has been eliminated.

AEFI Surveillance

Bangladesh has a well-established system for Adverse Events Following Immunization (AEFI) surveillance. As vaccine coverage increases over the time, and new vaccines being introduced, reports on AEFI also increases, which may have a negative impact on the EPI program perception. Rapid and effective response to any serious AEFI is pivotal to boost the confidence in the administered vaccine and prevent negative impacts on the immunization coverage and the incidence of the diseases targeted by the vaccine.

According to the exiting guidelines all HCWs who detect or get information on AEFI case from the immunization session should report to the respective supervisor and send the filled-in AEFI report within 24 hours. The supervisor ensures reporting of the case to the Upazila Health Complex. All designated health facilities detecting AEFI case should report to the respective Hospital Surveillance Officer (HSO) within 24 hours using AEFI report form. The HSO submits these reports to the Upazila Health and Family Planning Officer at the end of each week.

In case of death, hospitalization, cluster or any even insignificant parental/community concern, AEFI case must be reported immediately using AEFI report form and by telephone to the Upazila Health and Family Planning Officers (UH&FPO), who in turn immediately sends notification to the EPI Headquarters through the civil surgeon to initiate investigation through the especially formed investigation team.

For the HPV demonstration program, in addition to the regular weekly passive AEFI reporting, AEFI cases are reported on daily basis to the EPI HQ with copy to WHO by the SMO of Gazipur district. At the end of each day, the SIMO contacts all the Upazilas and zone over telephone to know whether there is any AEFI case (both serious and non-serious) and fills up the dedicated forms; then he sends those forms to the program manager EPI HQ with copy to WHO.

AEFI management guidelines and reporting forms are available at all facilities and HCWs respectively. HCWs knowledge on AEFI appears to be adequate and they know how to report and refer AEFI cases.

During the Post-Introduction Evaluation of PCV/IPV introduction the evaluation team assessed the AEFI monitoring and reporting in Bangladesh in the context of new vaccine introduction. The assessment results highlighted most critical problems in terms of AEFI reporting. Particularly, these problems were related to the inability of NGO staff providing immunization services in the urban areas to perform basic activities related to the AEFI, absence of supportive supervision and etc., which was indicating essential need for enhancing the capacity of NGO managers of middle-level managerial skills (management, coordination and supervision), as well as critical need for training of vaccinators employed by NGOs in immunization practices and reporting.

(9) Demand generation, communication and advocacy

The recent coverage evaluation survey 2014 (CES) (annex 25 a), carried out in Bangladesh, highlighted about inadequate population education in immunization area that directly has an impact on immunization coverage.

The CES explored the main reasons why children were never vaccinated: Of the respondents:

- 31 % reported about their fear of side effects.
- About 19% reported they do not believe in vaccination or could not take their children to health complex for immunizations due to the child's sickness.
- Other respondents admitted that they did not know that the child should be given vaccine (7.0%), were complacent in getting their children vaccinated (7.0%), were busy (3.3%), or could not give him/her vaccine because the child cries (3.3%).
- Another group of respondents reported that the service providers did not vaccinate the child because of child was sick (4.2%).

The reasons for partial vaccination, that is, when a child fails to receive all the doses or antigen after receiving at least one dose of any antigen was also investigated. The finding showed some mothers did not take their children to the health complex because their child was ill (16.3%), didn't know the schedule for measles vaccines (15%), were too busy to take their child to the vaccinator (13.9%), were fearful of side effects (5.8%) or did not know that the child should be given vaccine (4.0%). In order to increase coverage, it was recommended to involve NGOs in increasing population awareness about immunization benefits.

1.3.4 Accelerated disease control initiatives

Achievements of EPI in accelerated disease control against the set targets are represented in Figure 57 on page 66 below:

Figure 57: Summary of the analysis of the accelerated disease control indicatives

EPI Strategic Objectives	Indicators	cMYP Target	Achieved results by 2016
Measles	MCV1 (MCV at 9 month) national coverage	95%	
	% Districts with MCV2 coverage >90%:	>95%	4.6%
	MCV SIAs national coverage	>95%	
	% Districts with MCV SIAs coverage >95%	>80%	no data
	National Non- Measles suspected case reporting rate	≥ 2 / 100,000	2
	% Provinces reporting at least one suspected measles case / 100,000 population per year	>80%	10.3%
	% Measles cases with adequate investigation* within 48 hours of report:	>80%	54%
	% Adequate serum samples (from suspected measles cases) with laboratory results within 7 days of receipt:	≥ 80%	54%
Polio	OPV 3 national coverage:	>80%	63%
	% Districts with OPV3 coverage >80%:	>90%	21%
	Non-polio AFP rate (/100 000 children under 15 years of age):	>1	0.9
	% AFP cases with adequate stool samples within 14 days of onset:	>80%	66.7%
	% AFP cases reported within 14 days of onset:	> 80%	85%
	OPV in SIAs national coverage:	80%	no data
	% Districts with OPV in SIAs coverage >90%:	> 90%	No data
MNTE	DTP3 national coverage (DTP-HepB-Hib 3 national coverage):	>90%	62%
	% Districts with TT 2+ coverage >80%:	>90%	6.9%
	# Districts with NT / 1000 live births ≥ 1:	0	no data

EPI Strategic Objectives	Indicators	cMYP Target	Achieved results by 2016
	# High-risk districts conducting SIAs with TT:	23 in 2014 and 40 in 2015	no SIAs conducted in 2014
	% School-aged children receiving TT through the routine school health programme:	>80 (Denominator school enrolled children)	no data

Source: WHO CO, Bangladesh, 2017

(1) Polio

Bangladesh successfully stopped transmission of indigenous wild poliovirus in August 2000 and has been maintaining polio free status since the last polio case detected on 22 November 2006 following an importation from Western Uttar Pradesh (UP) of India. At that time, India was the only polio endemic country in WHO SEAR. During that outbreak, Bangladesh detected 18 cases from 12 districts in all the then 6 Divisions. Bangladesh successfully tackled that situation. Finally, on 27 March 2014 all member states under WHO SEAR were certified as polio-free.

As per polio endgame strategic plan 2013-18, the entire world including Bangladesh switched from trivalent oral polio vaccine (tOPV) to bOPV in a synchronized manner. Following SWITCH there is risk of emerging Vaccine Derived Polio Virus (VDPV) due to type 2 in low population immunization setting. The analysed data shows more than 80% reported circulating vaccine-derived poliovirus (cVPDs) were due to serotype-2.

In 2015, two cases of cVPDs type-2 were reported in the Rakhine State of Myanmar. Under-immunized communities with poor sanitation and high population density favors emergence and establish transmission of VDPV.

From the last decade until now, displaced people from the Rakhine state have moved in to the refugee camps at Naikhangchari, Teknaf and Ukhiya upazila poses a threat to the country. This unofficial movement across this border has consequences for public health. The major activities and decision in ensuring polio-free status of the country as follows:

- Last indigenous WPV reported on 22 August 2000
- WPV due to importation reported in January 2006 and contained with last case reported in November 2006
- Since establishment of AFP surveillance, no VDPV and/or cVDPV was identified
- No wild polio, VDPV and/or cVDPV since 2006
- Introduced Single dose of inactivated polio vaccine (IPV) in March 2015
- No IPV vaccinations stock out since 4/2016 due to global shortage.
- Switched from tOPV to bOPV in 23 April 2016
- Environmental surveillance commenced since Sep-2015 from selected 4 sites under Dhaka City Corporation and peri-urban area (place of world's 2nd largest Muslim congregation). Till date 'NO' WPV, VDPV and/or cVDPV identified. Even 'NO' Sabin like P2 (SLP2) identified following SWITCH of bOPV from tOPV.
- Decided to introduce fIPV from last quarter 2017

- Conducted two rounds "Mop-up" in three boarding upazilas including refugee camps (both registered and unregistered) of in response detection of cVDPV2 cases in Rakhaine province:
    - Two round in Jan & Feb 2016 Synchronized with Myanmar and ~100% children ≤59 m were vaccinate with tOPV *(before SWITCH)*
    - Due to influx of displaced people from same province through single round (Dec 2016) "Mop-up" at same upazlias and 97.6% children ≤59 m were vaccinated with bOPV *(after SWITCH)*
    - *As influx continued at unregistered camp another round "Mop-up" conducted in Jan 2017 and 5,765 children ≤59 m were vaccinated*
    - *Established regular vaccination post at all refugee camps to vaccinate children of refugee camps including new arrivals, in coordination with NGOs on ground*

(2) Maternal Neonatal Tetanus Elimination

Bangladesh has achieved and maintained MNT elimination status (<1 case per 1,000 live births in each district of the country since 2008. At of 2017, 50 NT cases have been reported from 36% of units (27/75). National incidence rate is 0.041 per 1,000 live births with the highest accidence in Magura district (0.27/1,000 live births).

As part of NT surveillance protocol, Case Response Immunization (CRI) through which 5,221 women of childbearing age (15-29 years) were screened for TT eligibility followed by vaccination of 1,517 as per TT-5 schedule. Through the same efforts additional case finding which includes searching of neonatal deaths also were carried out. Number of identified cases was 0.

(3) Measles

Epidemiologic trends

The epidemiology of measles, rubella and CRS in Bangladesh shows that the country is making progress towards elimination of MR&CRS. Following the 2014 catch up MR SIA, the number of measles and rubella outbreaks dropped sharply during 2014 and 2015 (Figure 96 on page 71). Similarly, the actual number of rubella cases dropped dramatically and has remained low (Figure 97 on page 126), with annual incidence of 1.0 – 1.2 confirmed cases per million population since 2014. However, the number of measles outbreaks has picked up in 2016 and 2017.

The number of measles cases and incidence were at near-elimination levels in 2014 and 2015 following the MR catch-up SIA , but increased slightly in 2016 and more acutely in 2017 (as of June 30). Measles resurgence in 2017 likely originated with an outbreak in Cox's Bazaar that had its source in refugees from Myanmar, most of which resided in refugee camps. The outbreak then spread to susceptible Bangladeshis in neighbouring areas and from there to Sylhet and Dhaka. Outbreak response immunization during May in Cox's Bazaar and in all four districts of Sylhet Division appears to have stopped the outbreaks in those affected areas, but transmission continues throughout Bangladesh. Figure 98 on page 81 is a spot map of measles cases by year and district and Figure 99 (on page 112) is a pattern map indicating the incidence of measles nationally and by district and city corporation from 2014-2017.

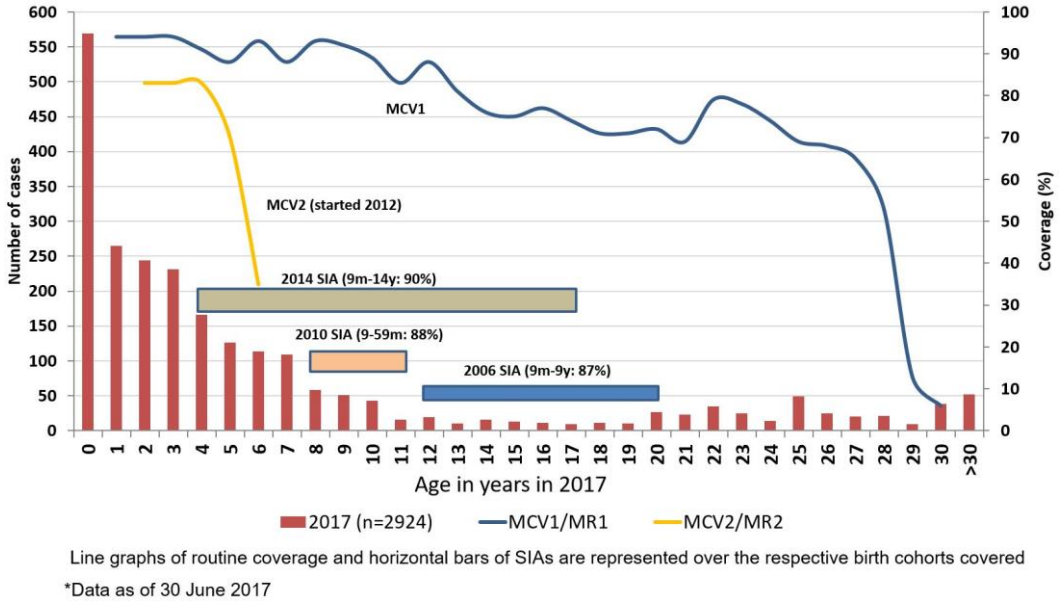
The age distribution of cases over time is consistent with a country approaching elimination status, with a general shift in age distribution to the left and the right (Figure 101 on page 112). In 2003, infants and persons 15 years and older represented 12% and 3%, respectively, of all cases. By

2017 (through June 30), the proportion of cases ion those age groups increased to 24% and 12%, respectively.

Nevertheless, most confirmed cases of measles in 2017 were 12-59 months old and not vaccinated, consistent with an ongoing immunity gap that measles virus is exploiting in order to survive, despite overall high levels of immunity (Figure 102 on page 113).

The number of measles cases by year of age indicates where the immunity gap is persisting: primarily in infants and young children up to 3 years of age, but also in children currently 4-7 years of age who were 12-59 months of age in 2014 and likely were not vaccinated during the MR catch up SIA (Figure 14 on page 23). A survey conducted after the 2014 MR catch up SIA found coverage among 9-59 month old children to be as low as 78% in Dhaka Division, 81% in Sylhet Division, 82% in Khulna Division and 84% in Barisal Division.[70] Only in Rajshahi Division was coverage among the 9-59 year old age group >90% (92.1%). In contrast, children currently 8-11 years of age, who would have been targeted when they were 9-59 months old during the measles follow up SIA in 2010 and school age children during the 2014 MR catch up SIA, did not account for as many of the measles cases in 2017. Fewer cases still occurred among persons in the 12-20 year age group, who would have been vaccinated during the catch-up measles SIA in 2005-06, and many of whom would had another opportunity for measles (and rubella) vaccination during the 2014 MR catch up SIA.

*Figure 58: Confirmed measles cases, by age, Bangladesh 2017**

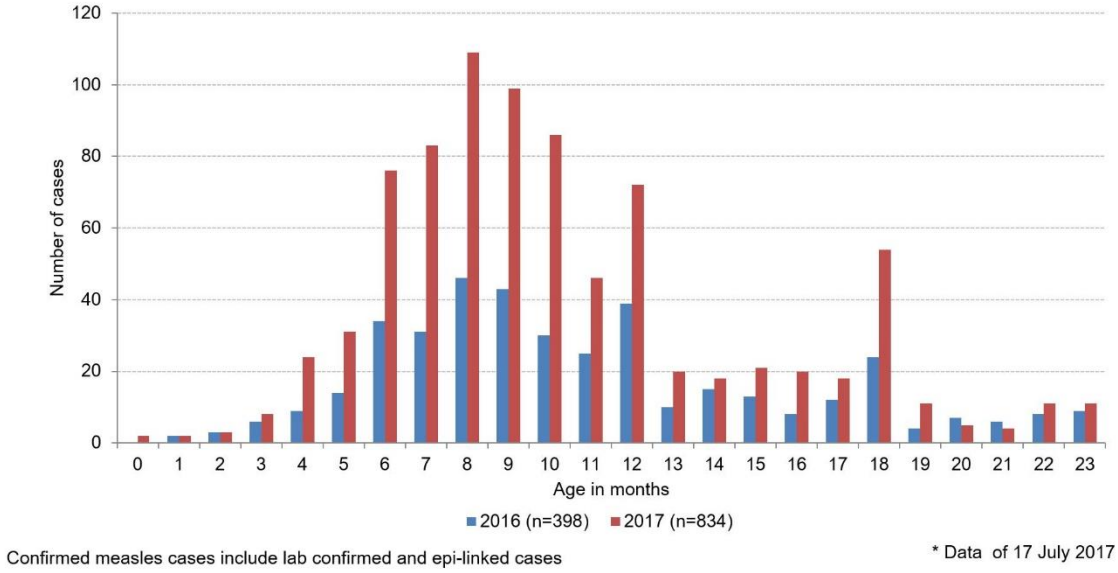


Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Among infants, many cases are occurring among children 6-8 months old (Figure 59 on page 70 below). These children are at high risk for measles as they are too young to be vaccinated yet many remain with levels of maternal antibody that are either non-protective or non-existent, probably because their mothers were vaccinated against measles as infants and their immune systems have not recently been challenged by wild measles virus antigens. Moreover, they are more likely to die for measles infection than older children.

[70] Strategic Plan for Measles, Rubella & CRS Elimination, 2017

*Figure 59: Confirmed measles cases, by month of age, Bangladesh 2016-2017**



Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

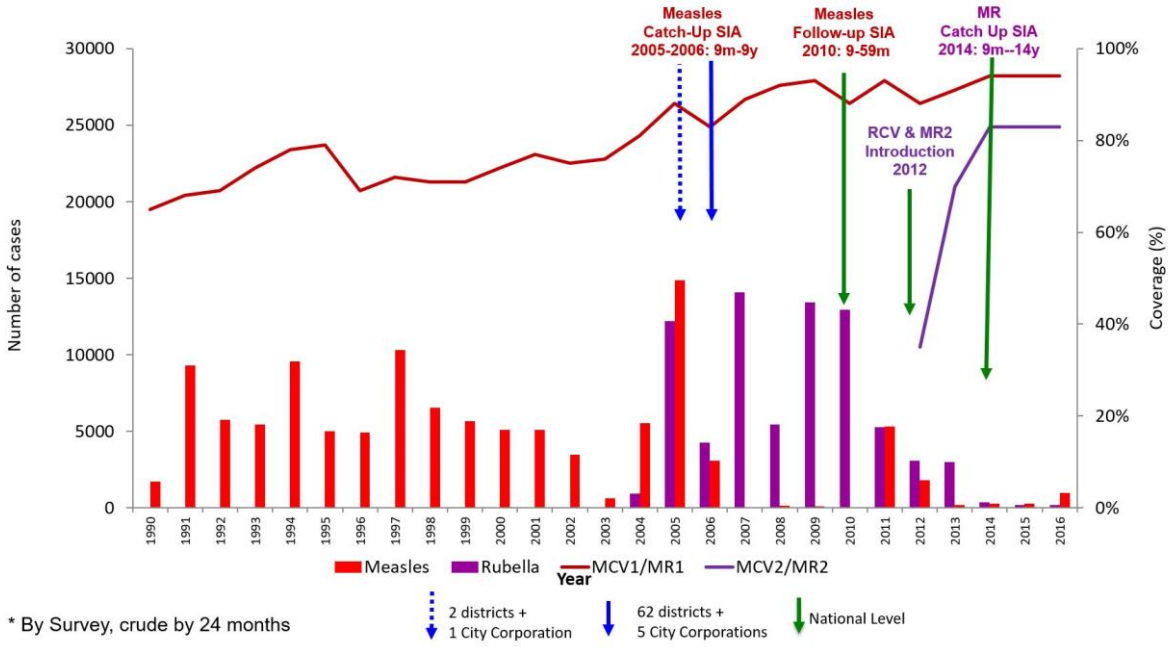
Measles genotype B3 was identified in Bangladesh in 2014 and 2015, and rubella genotype 2B was identified in 2009. However, specimens for virus detection are not being sequenced at the Bangladesh national polio and measles lab, reportedly because of a lack of reagents.

Bangladesh has made steady progress towards achieving its goal of measles, rubella and CRS elimination with respect to increasing levels of population immunity over wide age-ranges, surveillance quality and routine immunization coverage with two doses of MR vaccine. However, reaching the last 5-10 percent of children that remain unvaccinated or under-vaccinated remains a common challenge for this and all immunization programmes. Such children are often the hardest to reach. Rigorous and uniform application of the proven measles and rubella elimination strategies, in addition to developing and implementing innovative tactics for specific populations and situations, are necessary to will achieve the equity and timeliness of immunization service delivery and utilization as well as elimination-standard surveillance quality that are needed to achieve and sustain measles, rubella and CRS elimination.

Coverage details

Routine MCV1 and MCV2 coverage have progressively increased over time and, with the increased coverage and periodic SIAs, a concomitant decrease in confirmed measles cases and, after the 2014 catch up MR SIA in 2014, rubella cases.

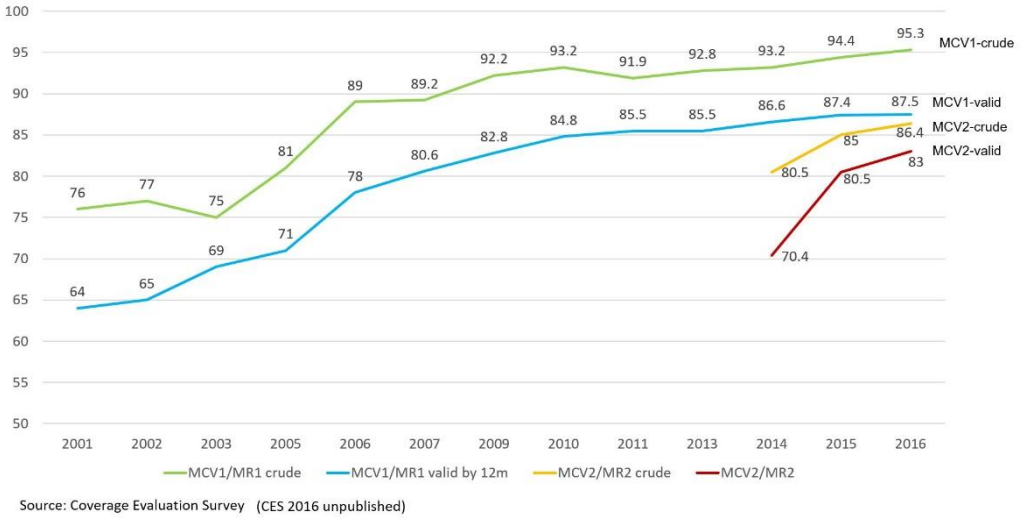
Figure 60: Measles and rubella cases and coverage, Bangladesh 1990-2016*



Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Valid coverage with MCV1 by 12 months and MCV2 by 24 months is lower than crude coverage by 24 months (as shown in Figure 61 below). According to the 2016 coverage evaluation survey, MCV1 doses were given to 3.3% children younger than 9 months and were therefore considered invalid. This suggests that among the children represented by the 7.8% difference between valid by 12 months and crude by 24 month coverage, 3.3% were vaccinated before 9 months and 4.5% were vaccinated after 11 months.

Figure 61: Survey MCV1 and MCV2 coverage, valid by 12 months and crude by 24 months of age, Bangladesh 2001-2016



Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

The number of districts and city corporations achieving high levels of routine MCV1 and MCV2 coverage is also steadily increasing, suggesting an increasing homogeneity of high coverage. From 2013 to 2016, the number (and percentage) of districts and city corporations achieving at least 95%

crude MCV1 coverage increased from 23 (31%) to 43 (57%), whereas the number with less than 90% dropped from 14 (19%) to 5 (7%) (Figure 103 on page 126).

Improvement in valid coverage of MCV1 by 12 months was not as impressive. However, it is worth noting that the number of districts with 70-79% coverage decreased from 8 in 2013 to 2 in 2016; however, the number of city corporations with this level of coverage increased from 3 to 5.

MCV2 was introduced in 2012 and since that time has seen a rapid increase in coverage, 86.4% crude coverage by 24 months according to the 2016 CES. The number of districts and city corporations that achieved at least 90% coverage increased from 5 (7%) in 2014 to 29 (39%) in 2016. Still, coverage is not homogeneous: in 2016, 38 (51%) districts and city corporations had 80-89% coverage and 8 had coverage <80%. The authors of the 2016 CES defined a valid MCV2 dose as one received at 15 months of age or later, i.e., according to the EPI Schedule. However, it is not clear that MCV2 provided earlier than 15 months is substantially less immunogenic than MCV2 administered at 12 months of age. Therefore, we shall rely on the crude MCV2 coverage as an indicator of protection.

Measles and Rubella surveillance

Bangladesh's measles and rubella surveillance has satisfied most performance indicator targets for several years (see Figure 106 on page 128). However, it has struggled to achieve the target discarded measles and rubella rate of at least 2 per 100,000 population per year. Nevertheless, progress has been made with this indicator, increasing from 19% in 2013 to 64% in 2017 (annualized).

Figure 100 (on page 125) depicts the progress towards achieving the target discarded measles and rubella case rate, by district and city corporation. Most districts in Chittagong and Sylhet Divisions remain with poor surveillance sensitivity in 2017.

CRS surveillance began in Bangladesh in 2012 and currently is conducted through 162 active VPD surveillance sites throughout Bangladesh as well as 19 cardiology and ophthalmology specialty clinics/hospitals. The 625 passive VPD surveillance sites may also report and refer suspected CRS cases for further evaluation. These sites identified 376 suspect CRS cases from 2012 - 2017. Of these 37 were IgM positive. No virologic testing is required in the surveillance protocol used in Bangladesh.

The sensitivity of the CRS surveillance system has increased over time from 0.06 to 0.3 cases per 10,000 live births, indicating an improving surveillance system (Figure 62 below). Laboratory specimen collection, testing and reporting is performing well. However, most suspected cases are not being detected within the first 3 months of life, thereby making case confirmation more complicated and the ability to prevent further transmission of rubella from CRS babies problematic.

Figure 62: CRS Surveillance Performance Indicators, Bangladesh 2012-2016

Indicator	Target	2012	2013	2014	2015	2016
Annual suspect cases rate (1/10,000 LBs)	≥ 1 per 10,000 live births	0.06	0.10	0.28	0.37	0.30
Completeness	≥80%	100%	100%	100%	100%	100%
Adequate blood specimen collected	≥80%	90%	94%	99%	98%	98%
Cases detected by 3 months of age	≥80%	20%	32%	39%	31%	49%
Specimens received by lab within 5 days of collection	≥80%	100%	100%	100%	98%	100%
Serologic specimens reported within 4 days of receipt	≥80%	78%	84%	88%	87%	90%

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

In addition to the above indicators, two additional indicators to monitor CRS surveillance performance are recommended: 1)Percent of suspected CRS cases with adequate specimen collected for virus detection (target ≥80%); and 2) Percent of confirmed CRS cases with follow up virologic testing to determine if viral shedding is continuing (target ≥80%). However, as noted above, Bangladesh does not currently conduct virologic testing for CRS cases.

Lessons learned

This section represents a synopsis of a number of evaluations and reports related to the performance of EPI Bangladesh and informs about the lessons learned over the course of implementation of various projects and programs at different levels, related to the new vaccine introductions, implementation of campaigns or routine immunization activities.

PEI: Polio eradication activities have provided important lessons on how to reach every child, including the most underserved communities, migrants, nomads, people living in remote and hard-to-reach areas and others, marginalized by circumstances that prevent or impede access to health services. In addition, the best practices have been developed related to mobilizing political and social support, strategic planning and policy development, partnership management and donor coordination, programme strategies and operations, and oversight and independent monitoring.

SIAs: The EPI has benefited from the accumulated knowledge and best practices on communication and community engagement, mobilizing social and community support for vaccination during the multiple vaccine introductions and SIAs carried out during the recent years. These lessons and experiences generated through implementation of projects of different type at a different scale can benefit future performance of EPI for addressing existing challenges.

PCV/IPV: EPI Bangladesh with its strong and adaptive management capacity in handling challenges related to the changes of initial plans, which was proved during the joint introduction of PCV/IPV vaccines, re-scheduling of HPV Demonstration project and adaptive management of MR campaign, highlighted importance of investment and maintenance of the EPI management capacity at all levels of immunization system.

NVS&HSS: Lessons learned from introduction of new vaccines can inform implementation of HSS and other more complicated streams of support. Particularly the new vaccine introduction experience showed that a focus for future TA should be on building EPI capacity for successful implementation of EPI activities including new vaccine introductions and strengthening systems through GAVI HSS support. Better results are achieved when EPI takes a lead in all aspects of the new grant application development process and prioritize national TA providers, who are familiar with the country context and the health systems. Engagement of national technical resources likely fosters country ownership and institutional capacity strengthening.

Governance: The independent guidance of the NCIP is of paramount importance for MOHFW for priority setting and decision-making on the introduction of new vaccines and implementation of routine immunization activities. Reviewing the existing local evidence generated through research and surveillance activities performed in the country by multiple partners are extremely important for NCIP to make an independent decision on the need of the new vaccine introduction and/or application of new strategies for routine immunization activities.

cMYP: Preparation of the high-quality comprehensive Multi-Year Plan for Immunization (cMYP) which is aligned to the national health strategy and sub-national planning, clearly highlighting all strategic decisions of EPI and is supported by the government and major implementing partners is pivotal for successful implementation of immunization program in the country.

EVM: Timely organization of EVM assessment, preparation and implementation of the cold-chain improvement plan is indispensable for bridging the incremental cold-chain capacity gaps generated due to the planned introduction of new vaccines or new requirements of the immunization program;

Advocacy&communication: Lessons learned from MR SIA showed that the door-to-door registration carried out during the preparatory phase of the campaign significantly improve quality of communication between service providers and caregivers, due to increased provider-caregiver communication, which can be used as sample practice for improving communication for routine immunization. On the other hand, involvement of community groups in Community Clinic Management Committees through regular orientations, monthly meetings and group meetings increases the ownership of the communities and can significantly contribute to demand for child and maternal health services in respective communities.

Urban areas: Special focus on urban areas, i.e. city corporations and municipalities and technical assistance provided by MOHFW to the Local Governments in relation to the key aspects of immunization service delivery is instrumental for effective implementation of EPI in urban areas which in turn will contribute in improved performance of immunization program among underserved groups in urban settings, eventually advancing overall performance of EPI.

Capacity building: The recent experience proved the crucial importance of adequate planning of trainings and other educational activities. Carefully structured cascade trainings with an adequate time allocation, inclusion of opportunities for acquiring practical skills pertinent to routine immunization vaccines and active involvement of NGO staff and new recruits in the trainings are important factors for filling-in human resource gaps at all levels of the immunization system.;

Strategies and plans

In 2002 Government of Bangladesh (GoB) endorsed measles mortality reduction goal set by UNGA Special Session on Children. In 2011 National Plan of Action of Bangladesh to eliminate measles and reduce rubella was endorsed by the GoB and included in cMYP 2011-2016. In 2012 Bangladesh introduced RCV and MCV2. In 2014 measles elimination and rubella control goal shifted to 2018. In 2014 Bangladesh conduced catch up MR campaign. One of the key objectives of the National Immunization Policy of 2016 is to achieve disease elimination and eradication goals for VPDs.

The 4th Sector Program sets target for measles elimination, rubella and CRS control by 2018.

Since its introduction in 2012, MR2 coverage has steadily increased, with crude coverage of 86% nationally according to the 2016 coverage evaluation survey. However, coverage is not uniform in all areas, with some city corporations reporting crude MR2 coverage as low as 58% (Sylhet city corporation) and districts as low as 76% (Sunamganj).[71]

In July 2017, Bangladesh started development of the Strategic Plan for the Elimination of Measles, Rubella and CRS by 2020. The Draft strategic plan was prepared and presented to the key stakeholders of health and immunization sector.

The main goal of the strategy is *"Elimination of measles, rubella and CRS by 2020 in line with global (DOV and GVAP) and regional (RC Resolution) goals"*

Strategic objectives of the Measles, Rubella and CRS elimination strategy are:

[71] Measles, Rubella and CRS Elimination Strategic Plan, draft 2017

1. Achieve and maintain 95% coverage with 2 doses of MR vaccine in every Upazila, municipality and city corporation zone through routine and/or supplementary immunization
2. Establish elimination standard measles, rubella and CRS surveillance and programme performance monitoring
3. Maintain an accredited measles and rubella laboratory to conduct serologic and virologic/molecular testing for measles, rubella and CRS
4. Prevent, prepare and respond to measles and rubella outbreaks
5. Advocacy, social mobilization and program communication to obtain political commitment for measles, rubella and CRS elimination, establish inter-sectoral and societal linkages and create demand for immunization services

Strategic and tactical approaches to achieve measles elimination and prevention of rubella and CRS incorporate principles contained in several global guidance documents including the Global Strategic Plan for Measles and Rubella Elimination, 2012-2020,[72] Global Immunization Vision and Strategy (GIVS), Global Framework for Immunization Monitoring and Surveillance (GFIMS), Decade of Vaccines Global Vaccine Action Plan, WHO position papers on measles and rubella vaccines, WHO guidelines on monitoring progress towards measles elimination, Framework for verifying elimination of measles and rubella, Planning and Implementing High-Quality Supplementary Immunization Activities for Injectable Vaccines Using an Example of Measles and Rubella Vaccines, Roadmap to Elimination Standard Measles and Rubella Surveillance, Response to Measles Outbreaks in Measles Mortality Reduction Settings, Introducing Rubella Vaccine into National Immunization Programs, A Step by Step Guide, and others. Strategies are listed below their respective target objectives.

Measles, Rubella and CRS elimination specific objectives will be incorporated in the present cMYP 2018-2022.

1.4 Summary of situational Analysis

1.4.1 SWOT Analysis

Strength and weaknesses of the immunization system described in previous section (1.3 “Immunization system”) are summarized below by immunization system components along with external factors that can benefit the immunization program (“opportunities”) or represent constraints of health system or broader context (“threats”) as described and analyzed in previous sections (1.1 “Country context” and 1.2 “Health system context”).

Program Management	
Strengths	**Weaknesses**
• Availability of legislation, rules and regulations • Availability of legislation • Availability of policy with clearly defined roles and responsibilities	• 20% of unfilled posts across the health system • Lack of mid-level managers at district and divisional levels

[72] World Health Organization. Global measles and rubella strategic plan 2012-2020. Geneva: World Health Organization, 2012

• Availability of guidelines • Availability of health sector (including immunization sector) development Agenda • Availability of an effective Management and Leadership Experience and Practices • Influential leadership • Strong surveillance system for generation of evidence basis for informed decision-making • Strong and influential program management • Centralized management system (vertical program)	• Insufficient number of trained managers and certified MLM • Inadequate mechanisms for enforcement of central level decisions at the district, upazilla and CC/municipal levels • Weak supervision and monitoring mechanisms at all levels • Poor micro-planning capacity at health facility level • Inadequate distribution of the service delivery points across the country • Absenteeism of health care providers in some districts • Cumbersome and complicated recruitment process • Maldistribution of service providers across the districts and Upazilas • Inadequate supportive supervision • Poor micro-planning capacity at health facility level • Inadequate skills/local capacity for social mobilization and demand generation
Opportunities	**Threats**
• Political commitment to provide sufficient funding to the immunization program • Political will and financial commitment to provide sufficient funding to the immunization program • More effective usage of available evidence created by effective surveillance and MIS • Improved coordination between the EPI and NGOs	• Phase out of DPs from the country or health sector • Inadequate incentive system and lack of motivation • Attitude of some service providers (in urban settings) • Natural hazards (flood)
Human Resource Management	
Strengths	**Weaknesses**
• Availability of health workforce development plan	• Inefficient HR management capacity at all levels

• Availability of health workforce development plan • Availability of guidelines and in-country training capacity at the central level • Commitment the existing staff at all levels	• In efficient l HR management at all levels • Cumbersome and complicated recruitment process • Insufficient number of the fulltime committed management and supervisory EPI staff at all levels • High proportion of vacant position at all levels • Lack of capacity for regular and effective supervision • Inadequate knowledge & skill among service providers in application of guidelines • Lack of training capacity in districts and Upazila levels • No authority to fill vacant posts due to the existing administrative procedures and rules
Opportunities	**Threats**
• "window" in legislation – possibility to outsource service providers • MLM trainings • Training of service providers • Task shifting • Involvement of communities	• Shortage of human resources with 20% of vacant posts in the health system • Training programs heavily dependent donors funding • Inequitable distribution of health work force in urban and rural areas • Workforce composing surveillance network fully depends on development partner funding
Costing and Financing	
Strengths	**Weaknesses**
• EPI activities are included in the Sector Program budget • Commitment of the Government to provide funding for EPI implementation, ensuring procurement of vaccines and other activity funding	• Inadequate knowledge of EPI managers in costing and budget development • EPI funds are not earmarked • Prolonged and complex procedures for releasing of fund for EPI program at the central level
Opportunities	**Threats**

• Advocacy of EPI activities with the Key Policy- and decision-makers at the national level • Donor support from GAVI and other development partners	• Heavy dependence on development partner funding threatening sustainability
Vaccine security and logistics	
Strengths	**Weaknesses**
• Commitment of Government to allocate budget for vaccine procurement and co-financing of GAVI vaccines • Availability of the EVM improvement plan • Availability and use of UNICEF SD mechanism for procurement of vaccines, injection supplies and cold-chain equipment	• Lack of storage capacity at district and insufficient storage capacity at Upazila level considering new vaccine introduction and current requirements • Shortage of cold-chain management staff (central level cold-chain manager) • Inadequate vaccine management practices in some districts • Old cold-chain equipment • Lack of effective logistical systems and non-availability of assessment tools for regular assessment of the Cold Chain performance • Inadequate data collection tools • Shortage of trained personnel to handle maintenance of the cold chain equipment. • Insufficient immunization waste management equipment in system.
Opportunities	**Threats**
• Presence of development partners willing to support and collaborate in providing immunization services	• Shortage of supply chain management staff at district and Upazila levels • Difficult in access to the Hard-to-reach areas (due to terrain and climate conditions)
Immunization Service Delivery	
Strengths	**Weaknesses**
• Good network of service providers across the country • Presence of functioning cold-chain and vaccine distribution system • Well-functioning MIS	• Existence of nonfunctional health facilities • Inadequate access to services in some districts • Practice of charging for services in some urban areas

	• Lack of skilled front-line service providers - (health HAs) • Inadequate distribution of the service delivery points across the country • Absenteeism of health care providers in some districts • Unfavorable weather & other conditions to reach hard-to-reach population; • Lack of human resources for providing outreach vaccination sessions • Existence of pockets of unvaccinated people • Denominator problems at all levels • Weak community engagement in RI service delivery (also attributed to the advocacy, communication and demand generation) • Poor attitude of some service providers at the service delivery points • Inadequate record keeping capacity or procedures
Opportunities	**Threats**
• Capacity strengthening of the management systems • Capacity strengthening of front-line service providers	• Poor commitment of higher level political leaders to immunization services • Inadequate funding for RI at all levels due to decline in national revenue • Shortage of human resources for improving service delivery • Security issues all over the country • Poor integration of MCH and EPI services • Inadequate knowledge of guidelines • Ineffective defaulter tracking mechanism
Accelerated Disease Control and Surveillance	
Strengths	**Weaknesses**
• Availability of the strong surveillance network • Availability of the AFP surveillance system	• High dependence on development partners for maintaining surveillance system

• Availability of the accelerated disease control surveillance system • Availability of lab facilities	
Opportunities	**Threats**
• Strengthening surveillance system at all levels • Task shifting of surveillance officers at the sub-national level • Use EPI advocacy capacity for ensuring financial sustainability of surveillance network	• Lack of capacity of the existing health system to properly perform functions of surveillance system
Advocacy, Communication and Demand Creation	
Strengths	**Weaknesses**
• Strong and capable leadership in MOHFW • Awareness of key stakeholders of the sector on importance of EPI and its benefits	• Lack of awareness on immunization service availability in some areas • Low demand in immunization services among migrant groups, ethnic minorities • Inadequate skills/local capacity for social mobilization and demand generation • Lack of comprehensive knowledge in advocacy and communication at high levels • Lack of social mobilization plans (especially at District and Upazila levels) • Low capacity of personnel / Lack of skilled service providers (especially in rural/ hard to reach areas) • Personnel are inadequately equipped with skills and materials for effective communication and demand generation • Inadequate funding of advocacy / communication activities (at all levels) and outreach services due to the given low priority • Social mobilization activities are more focused during the campaigns
Opportunities	**Threats**

• Development partners support • Involvement of top political leadership in EPI • Media, E-health, Social media	• Problems to fill vacant posts resulting in continuous staff shortage at the service delivery points • Low literacy rates in some population groups
Management Information System	
Strengths	**Weaknesses**
• Strong political commitment to support HMIS	• Inaccurate assessment of target population; • In some cases, inadequate/inaccurate reporting from the service delivery level • Denominator issues: Varying target populations for RI • Inadequate data quality management systems at Upazila and district levels • Dependence on DP capacity for MIS operations • Inadequate supportive supervision (SS) especially at the subnational levels
Opportunities	**Threats**
• Training of staff at all levels in application of data collection, management and reporting • Availability of strong management and training capacity • Willingness of Partners to support government to improve data quality	• Lack of skills among service providers to adequately maintain and utilize MIS tools • Reliance on development partners for maintaining MIS

1.4.2 Root cause analysis

(1) Current situation

The major issues highlighted in the SWOT analysis table above are further scrutinized for identification of cause-result relationship as presented below:

Figure 63: Root cause analysis of the current immunization preformance

		Evidence	Importance
Block A	**SUBOPTIMAL VALID RI COVERAGE**		
A1	**MISSED OPPORTUNITIES**		
A1.1	**Stock outs of vaccines**	**Weak**	**Medium**
A1.1.1	Insufficient buffer stocks at district and Upazila levels	Weak	Medium

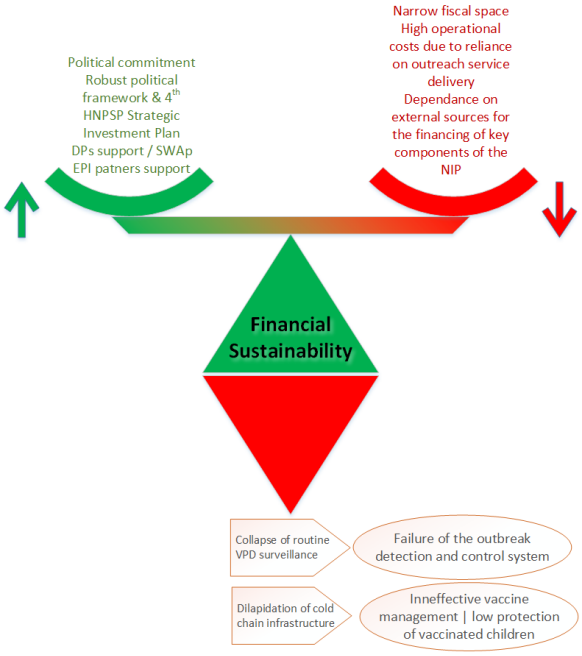
		Evidence	Importance
A1.1.1.1	Low capacity for buffer stock projection	Weak	High
A1.1.1.2	Weak logistical support to maintain the buffer stock	Weak	Medium
A1.1.2	Inadequate distribution of vaccines	Weak	Low
A1.1.2.1	Logistical difficulties	Weak	Medium
A1.1.2.2	Gaps in stock management	Weak	Medium
A1.1.2.3	Ineffective enforcement mechanisms	Absent	Low
A1.1.3	High wastage for some vaccines	Strong	Low
A1.2	**Inadequate service delivery**	**Strong**	**High**
A1.2.1	Lack of Health Assistants and vaccinators service delivery points (inadequate number in proportion to the population), (provider population ratio)	Strong	Medium
A1.2.2	Low qualification of HAs	Strong	High
A1.2.3	Lack of transport or financial resources for outreach (insufficient allocations for transportation)	Absent	High
A1.3	**Inadequate tracking of defaulters**	**Strong**	**High**
A1.3.1	Non-functional defaulter tracking system	Strong	High
A1.3.2	Insufficient incentives and enforcement mechanisms	Strong	Low
A2	**LOW UPTAKE OF VACCINATION SERVICES**	**WEAK**	**MEDIUM**
A2.1	Financial barriers in some NGO clinics in urban settings and private clinics	Weak	Low
A2.2	Geographic and other access barriers	Strong	High
A2.3	Low demand for vaccination/immunization services	Strong	Medium
A3	LOW PROTECTION AGAINST VPD AMONG IMMUNIZED CHILDREN	STRONG	MEDIUM
A3.1	**Invalid dose (inappropriate vaccination)**	**Strong**	**High**
A3.1.1	Knowledge gap – (related to guidelines, timeliness) - Poor record keeping (vaccination cards, registries	Weak	High
A3.1.2	Not careful – not following guidelines – inappropriate practice - Poor record keeping	Weak	low
A3.2	**Vaccines administered were not effective**	**Weak**	**Low**
A3.2.1	Sub-optimal EVM practices	Weak	Low
A3.2.2	…		
Block B	**INADEQUATE OUTBREAK PREVENTION MECHANISMS**		
B1	**INSUFFICIENT MANAGEMENT OF PREVENTION MECHANISMS**	**WEAK**[73]	**MEDIUM**
B2	**LACK OF OUTBREAK PREVENTION STRATEGY AND STRATEGY IMPLEMENTATION PLAN**	**STRONG**[74]	**HIGH**
B2.1	Inadequate outbreak response capacity	Weak	High

[73] Measles Outbreak, 2017
[74] Measles Outbreak, 2017

		Evidence	Importance
B2.2	Inadequate resource and systems – commodities and logistics	Weak	Medium
B3	**NO STRATEGIC RESERVES OF VACCINES FOR RAPID RESPONSE**	**STRONG**	**MEDIUM**

(2) Concerns related to financial sustainability

Some of the key components of the EPI, such as surveillance and Management information system, staff capacity strengthening (various topic trainings) and cold-chain network are fully funded through the external support.



The Government of Bangladesh (GoB) declared its strong commitment to support National Immunization Program (EPI) and formalized these declarations in key policy documents and implementation action plans. The 4th Health, Nutrition and Population Sector Program included immunization in the Operation Plan of Maternal, Neonatal, Child and Adolescent Health and supported the OP with the respective budget. Despite of these declarations, there is a little evidence or efforts to ensure overall financial sustainability of EPI and undertake responsibility for funding of all key components of the program rather than those traditionally funded by the Government and are mostly related to the shared system costs, such as shared staff salaries, utility costs and maintenance of buildings and capital assets.

EPI Component-wise financial sustainability analysis shows that the most efficient and evolving program components such as surveillance with its unique countrywide surveillance network, national cold-chain system and HR development and capacity building has been traditionally and exclusively financed through external financial sources, while government (also traditionally) has been providing financing for traditional vaccines and shared health system costs.

Core and the main asset of the EPI surveillance system is the surveillance nationwide network built by surveillance and immunization medical officers. The network covers the whole country and has proven capacity to implement all necessary surveillance activities according to the best standards as well as support EPI to implement other emergency activities, such as outbreak response and/or social mobilization.

The most recent EVM assessment conducted in 2014, evaluated performance of the cold-chain and logistics system of the country as “A very good overall performance”. The assessment provided EVM improvement plan to fine-tune cold chain activities and address remaining challenges to ensure high quality of EPI vaccines at the vaccination posts, which in turn will ensure high quality of services provided to the population and sufficient protection of immunized children and women from the vaccine preventable diseases.

The overall situational analysis of the most recent developments in health sector revealed several important aspects that potentially have substantial impact on the financial sustainability and overall performance of the National Immunization Program and affect the achievement of the goals and objectives of the overall health sector set by the political leadership of the country. These aspects are:

1. Phase out of development partners from the country;
2. Changing strategic priorities and agendas by the main Development Partners;
3. Cumbersome bureaucratic system of the government preventing from the rapid response to emerging challenges;
4. Complicated bureaucratic mechanisms to initiate and implement substantial structural changes;
5. Limited health care budget and Inadequate fiscal space in the central budget for allocating additional funds for EPI support;
6. Relatively high operational costs of EPI due to the full reliance on outreach services provision, high cost of vaccines and expensive infrastructure;

EPI program in the country is implemented within the framework of 4th HPN operations plan (OP) and the financing is provided from the approved OP budget for the maternal, neonatal, children and adolescent health operations plan. If during the previous years, EPI operations were funded through direct funding to EPI and Development Partners, with introduction of Sector Wide Approach by the GoB, the initial decision for the 4th SWAp was made to channel external assistance to the country through the pooled fund and utilize these funds through SWAp. Through the extensive consultations between the GoB and Gavi the new decision was made to channel part of the GAVI assistance through the program direct funding for ensuring improvement of EPI performance in all parts of the country and undertake more focused interventions to reach out underserved population groups both in the rural and urban settings of the country.

The major development partners of EPI (UNICEF, WHO) have secured funding to cover all planed operations until 2019. Beyond this date, the responsibility for EPI operations should be undertaken by the GoB and these operations should be funded through SWAp mechanisms. Although this financing approach proved to be effective, it has posed certain risks, taking into account that there is no earmarked funds in the SWAp and thus the external funding that originally aimed at EPI strengthening, could be distributed across the whole health system rather than used for strengthening EPI. Taking into account complicated procurement procedures and processes, as well as time consuming bureaucratic procedures related to the international procurment channeling external assistance exclusively through SWAp mechanism can lead to either delay of EVM improvement plan implementation or revision of GoB policy to use UNICEF procurement mechanism for procurement of EPI vaccines, supplies and cold-chain equipment.

Financial sustainability of surveillance and cold-chain system components are essential for national immunization program, as well as the whole health sector, since the collapse of surveillance system (which might take place in case of underfunding, or insufficient funding) will lead to the failure of outbreak detection and control systems. At the same time, the complicated procurement process may lead to the delay in implementation of EVM improvement plan and upgrade of national cold-chain infrastructure, which will make impossible to maintain vaccine management according to the highest standards and ensure quality of distributed vaccines and high protection of vaccinated children and women.

Finding efficient solution is essential for addressing these critical challenges of the national immunization program of Bangladesh.

2 Immunization program objectives and strategies

2.1 Program objectives, strategies and main activities

The following objectives and strategies have been based on the 4th HPNSP policy and implementation framework for EPI in 2017-2022:

Objective and sub-objectives	Strategy	Activities
1. Improved full immunization coverage among children under one and CBAW **1.1 At least 95% fully immunization coverage among under the age of one at national level and 85% full immunization coverage at each district level** **1.2 TT5 coverage among women of childbearing age reached at least 80% at national level and 75% at each district level**	1 Implement Reach Every Community (REC) district, municipality and City Corporation	1.1 Update REC strategy for each Upazila, union and ward with involvement of communities and consideration of the "Female community health volunteers'" concept 1.2 Update REC strategy for each Upazila, union and ward with involvement of communities and consideration of the "Female community health volunteers'" concept 1.3 Explore need and opportunities for increasing immunization service delivery beyond infancy 1.4 Establish immunization sites based on population and geographical difficulties 1.5 Implement IEC/SM, Demand Generation activities to ensure community participation and ownership towards immunization 1.6 Integrate EPI with other HPN services 1.7 Optimize existing annual micro-plans to ensure service quality improvement and reduction of vaccine wastage 1.8 Develop and regularly update list of low performing districts and Upazilas based on coverage monitoring 1.9 Strengthen staff capacity of front-line service providers to ensure high quality of provided services 1.10 Conduct trainings and refreshment trainings in REC micro-planning 1.11 Provide regular supportive supervision through field visits of supervisors in each Upazila at least once per months 1.12 Develop and introduce supervision and monitoring checklist and train the staff in application of these instruments 1.13 Organize and hold special events during the immunization week 1.14 Regularly review coverage performance of districts and Upazilas and update the list of low performing districts and Upazilas. 1.15 Strengthen communication and collaboration between MOLFW and MLGRDC for improvement of immunization service delivery to the urban population 1.16 Map EPI service providers in City Corporations and Municipalities 1.17 Map immunization service delivery in public and private hospitals 1.18 Train hospital staff (involved in immunization) in high quality immunization service delivery, IEC and mandatory reporting procedures

Objective and sub-objectives	Strategy	Activities
		1.19 Map the low-performing areas in CCs and Municipalities 1.20 Conduct registration of unvaccinated children and CBAW in the CC and municipality pockets 1.21 Establish the network of service delivery posts in city corporations based on the mapping results and needs 1.22 Build and maintain effective communication channels with mid-level management and service provider staff of NGOs 1.23 Build mid-level management capacity of immunization service provider NGOs in VPD surveillance and reporting and MIS management and reporting 1.24 Conduct quarterly review meetings 1.25 Develop specific micro-plans for service delivery with the major focus on the pockets of unvaccinated children and CBAW 1.26 Strengthen capacity of NGO front-line staff in: - immunization service delivery and reporting procedures; - application of defaulter tracking system 1.27 Conduct IEC/Social Mobilization and Demand Generation activities
	2 Improve EPI performance and reach coverage targets in City Corporations and Municipalities	2.1 Strengthen communication and collaboration between MOLFW and MLGRDC for improvement of immunization service delivery to the urban population 2.2 Ensure availability of Urban Immunization Coordinator 2.3 Map EPI service providers in City Corporations and Municipalities 2.4 Map immunization service delivery in public and private hospitals 2.5 Train hospital staff (involved in immunization) in high quality immunization service delivery and mandatory reporting procedures 2.6 Map the low-performing areas in CCs and Municipalities 2.7 Conduct registration of unvaccinated children and CBAW in the CC and municipality pockets 2.8 Establish the network of service delivery posts in city corporations based on the mapping results and needs 2.9 Build and maintain effective communication channels with mid-level management and service provider staff of NGOs 2.10 Build mid-level management capacity of immunization service provider NGOs in VPD surveillance and reporting and MIS management and reporting 2.11 Conduct quarterly review meetings 2.12 Develop specific micro-plans for service delivery with the major focus on the pockets of unvaccinated children and CBAW 2.13 Provide regular supportive supervision through field visits of supervisors in each Upazila at least once per months

Objective and sub-objectives	Strategy	Activities
		2.14 Strengthen capacity of NGO front-line staff in: 2.14.1 immunization service delivery and reporting procedures; 2.14.2 application of defaulter tracking system 2.14.3 IEC/Social Mobilization and Demand Generation
	3 Develop, formalize and implement Specific strategy for improvement of EPI performance and increase coverage of full vaccination in hard-to-reach areas	3.1 Design Special Strategy focusing on the needs of hard-to-reach population groups in rural areas 3.2 Ensure availability of the Strategy Implementation coordinator 3.3 Mapping of specific target groups with the major focus on Sylhet and Chittagong divisions 3.4 Mapping of specific target groups with the major focus on Haor, Char, and Tea Gardens areas 3.5 Map the network of existing service providers in these specific geographic areas 3.6 Develop specific, micro-plan, custom tailored to the needs of population above geographic areas 3.7 Design and implement IEC/Social Mobilization and demand generation activities in the identified geographic areas 3.8 Strengthen capacity of the front-line service providers in best practices of service provision through specific trainings and refreshment trainings, which include specific aspects related to the geographic area 3.9 Increase capacity of front-line service providers and MLM in monitoring VPD surveillance, MIS, and reporting 3.10 Provide regular supportive supervision through field visits of supervisors in each Upazila at least once per months 3.11 Conduct regular review meetings
	4 Develop, formalize and implement Specific strategy for improvement of EPI performance and increase coverage of full vaccination among the high-risk groups	4.1 Design Specific Strategy focusing on specific immunization needs of specific high-risk populations with major focus on ethnic/tribal and migrant/refugee groups 4.2 Ensure availability of the Strategy Implementation coordinator 4.3 Mapping of specific high-risk groups with the particular focus on ethnic, tribal, refugee and migrant groups 4.4 Map the network of existing service providers in these specific geographic areas 4.5 Develop specific, micro-plan, custom tailored to the needs of these high-risk groups 4.6 Design and implement IEC/Social Mobilization and demand generation activities in the identified geographic areas 4.7 Strengthen capacity of the front-line service providers in best practices of service provision through specific trainings and refreshment trainings, which include cultural and behavioral aspects of a particular high-risk group 4.8 Increase capacity of front-line service providers and MLM in monitoring VPD surveillance, MIS and reporting

Objective and sub-objectives	Strategy	Activities
		4.9 Provide regular supportive supervision through field visits of supervisors in each Upazila at least once per months 4.10 Conduct regular review meetings
	5 Maintain high standards of data management, monitoring and VPD surveillance	5.1 Review and analyze coverage and VPD surveillance data at all level and disseminate feedback to stakeholders 5.2 Build staff capacity in VPD data management 5.3 Develop and implement annual training plan for staff capacity strengthening in application of VPD tools 5.4 Build staff capacity in application and reporting of DHIS2 at all levels, through 5.4.1 Conducting MLM and staff trainings; 5.4.2 Conduct regular refreshment trainings for maintenance and usage of the DHIS2 5.5 Develop plan for integration of existing SIMO VPD Surveillance and EPI network into the broader health system; 5.6 Implement integration plan
	6 Ensure effective vaccine and cold-chain management and uninterrupted supply of high-quality, potent vaccines and injection supplies at all levels	6.1 Implement EVM Improvement Plan 6.2 Review and implement policy on vaccine and logistics forecast, procurement, storage and distribution 6.3 Ensure timely and accurate forecast of vaccines at all levels 6.4 Develop and follow cold-chain rehabilitation and expansion plan for each level of the system 6.5 Ensure best practices in cold-chain management that are in-line with EVM standards 6.6 Maintain adequate buffer stocks at all levels according to the national guidelines 6.7 Develop an annual training plan in vaccine and cold chain management, including the plan for refreshment trainings 6.8 Train staff at all levels according to the annual training plan 6.9 Ensure appropriate storage of vaccines at all levels of the system 6.10 Conduct periodical EVM assessments and develop and implement EVM improvement plan
	7 Ensure adequate human resource capacity at all levels of EPI	7.1 Strengthen national level Capacity of EPI in HR management and cold-chain operations 7.2 Organize exchange visits in neighboring countries 7.3 Ensure availability of the qualified staff at all levels, through staff recruitment and/or application of various different strategies, like in-house recruitment, task shifting, on-the-job training and etc. 7.4 Develop annual training plan for training of the different level staff in: 7.4.1 Immunization service delivery; 7.4.2 Defaulter system application;

Objective and sub-objectives	Strategy	Activities
		7.4.3 Micro-planning; 7.4.4 Surveillance and reporting 7.4.5 Application of IEC/SM and Demand generation methods, tools and strategies; 7.5 Design and introduce incentive system for high performance 7.6 Conduct regular, refreshment staff trainings at all levels (service providers and MLM)
2. Maintain polio free status	8 Ensure early detection and appropriate response to outbreak of poliovirus of any type through cortication standard AFP surveillance, environmental surveillance and outbreak response plan in place	8.1 Conduct regular orientation on AFP surveillance to health staff including private sector providers 8.2 Achieve AFP performance indicators not only at national but divisional and district level 8.3 Update outbreak response plan 8.4 Expand environmental surveillance to other sites
	9 Ensure high population immunity against poliovirus through high routine OPV and IPV coverage	9.1 Identification of area with low routine OPV coverage. Develop, implement and monitor strategies to achieve high coverage 9.2 Introduce fIPV and monitor the coverage 9.3 Develop special vaccination strategy for migrant or refugee population 9.4 Conduct high quality supplementary polio campaign as required 9.5 Integrate polio vaccine during other campaign such as MR or other
	10 Ensure containment of poliovirus as per GAP III and polio certification	10.1 Provide support to NPCC, involvement of NCCPE members in monitoring of polio status or SIAs or outbreak response as appropriate 10.2 Conduct polio containment activities as per GAPPIII
	11 Ensure appropriate transition of polio surveillance network and assets	11.1 Support NPML 11.2 Procurement of kits and equipment 11.3 Conduct capacity building trainings 11.4 Develop and implement polio transition plan
3. Maintain MNTE status	12 Ensure periodic review of MNTE status	12.1 Update operational guidelines for periodic risk assessment 12.2 Identify high risk areas (low immunization coverage, sub-optimal antenatal care, low institutional delivery and inadequate NT surveillance)
	13 Achieve and maintain high TT coverage level	13.1 Identify areas with low TT coverage 13.2 Develop and implement, specific micro-plan for ensuring coverage increase 13.3 Explore school TT immunization option 13.4 Coordinate with Maternal and child health programs and ensure community participation 13.5 Conduct TT follow up campaigns in high risk Upazilas and districts
	14 Strengthen MNT surveillance	14.1 Conduct regular orientation of surveillance

Objective and sub-objectives	Strategy	Activities
		14.2 Identify low performing areas and intensify surveillance activities 14.3 Conduct refreshment trainings in MNT surveillance
4. Elimination of measles, rubella and CRS by 2022	15 Achieve and maintain 95% coverage with 2 doses of MR vaccine in every Upazila, municipality and city corporation zone through routine and/or supplemental immunization	15.1 Prepare annual REC micro-plan for districts and Upazilas to reach every child and CBAW 15.2 Optimize annual REC micro-plans with the major emphasis on the best service delivery and reduction of vaccine wastage. 15.3 Develop the list of low performing districts and Upazilas based on analysis of coverage and identification of the low performing Upazilas and districts. 15.4 Provide regular supportive supervision through field visits of supervisors in each Upazila at least once per months 15.5 Conduct Supplemental Immunization Activities in 2019 and 2021 15.6 Establish the network of service delivery posts in city corporations 15.7 Regularly review coverage performance of districts and Upazilas and update the list of low performing districts and Upazilas.
	16 Establish Elimination Standard measles, rubella and CRS surveillance and programme performance monitoring	16.1 TBD – pending completion of Measles elimination strategy
	17 Maintain an accredited measles and rubella laboratory to conduct serologic and virologic/molecular testing for measles rubella and CRS	17.1 TBD – pending completion of Measles elimination strategy
5. Enhance prevention of diseases protected by new and underused vaccines	18 Introduce Rota vaccine in 2018	18.1 Revise national immunization schedule 18.2 Revise practice guidelines and forms 18.3 Train health care personnel in the administration of vaccines 18.4 Include new vaccine introduction into district micro plans
	19 Roll out HPV vaccination at the national level in 2019	19.1 Select Scenario for HPV roll-out at nation-wide level 19.2 Develop proposal and submit to the government for endorsement and approval 19.3 Carry out all formal procedures to secure Gavi support for the HPV vaccine roll-out 19.4 Revise national immunization schedule 19.5 Revise practice guidelines and forms 19.6 Train health care personnel in the administration of vaccines 19.7 Include new vaccine introduction into district micro plans
	20 Explore need and opportunities for introducing Td, Hep B birth dose	20.1 Conduct disease burden assessment for Td, Hep B birth dose and JE vaccines 20.2 Conduct Cost effectiveness study

Objective and sub-objectives	Strategy	Activities
	and JE vaccines into the national immunization schedule	20.3 Review the most recent WHO position papers on vaccine efficacy and safety 20.4 Assess system readiness and programmatic feasibility for introduction
	21 Control JE and other VPD	21.1 Integrate JE surveillance with AFP surveillance 21.2 Conduct refresher orientation on VPD 21.3 Conduct JE SIAs in high-risk areas based on disease burden
6. Sustain operation of critical immunization system components while transitioning from foreign to domestic sources of financing	22 Integration of EPI critical components into the broader health system	22.1 Development, endorsement and implementation of transition strategy for surveillance and program management components into the broader health system 22.2 Define, agree on and implement activities for implementation of transition strategy 22.3 Conduct advocacy meetings with key policy- and decision-makers
	23 Ensure sufficient fund allocation and release for funding of EPI critical components after their integration in the broader health system	23.1 Advocate with government for allocating and timely and fully releasing funds for financing critical components of EPI such as: Vaccine procurement, cold-chain upgrade and rehabilitation, disease surveillance and program management 23.2 Conduct fund-raising and advocacy activities for ensuring implementation of MR follow-up campaign in 2022 according to the objectives of cMYP and Measles, Rubella and CRS elimination strategy

As it is shown in the hierarchy of the program the proposed strategy: "Design and implement Specific Focused strategies for reaching out to the different types of the risk groups" will contribute to fine-tuning and acceleration of EPI service delivery that in turn will contribute in achievement of the Objective 1 of the program: "Improve immunization coverage among children under one and women of childbearing age".

Considering diversity of the unvaccinated risk groups of the population in the hard-to-reach geographic areas and the pockets of unvaccinated people in urban slums, the new cMYP 2018-2022 proposes the application of a number of Specific and Focused Strategies that are custom tailored to the needs of different types of the risk groups, that have different locations, cultural roots and/or behavior.

The logic behind elaboration and implementation of the several different types of Specific Focused Strategies is to custom tailor each of these strategies to the specific needs of the different high-risk groups. These Specific Focused Strategy will be built upon analysis of specific root causes of absence of or partial vaccination of each group. These specific reasons will be further analyzed and will be used for design of corrective interventions, or Specific and Focused Strategy which will be most efficient for addressing needs of a specific risk group targeted by a particular intervention.

The corrective intervention of the Strategy will be designed the way that it will address the needs of a particular group and thus, contributes to the achievement of the program goals. For instance, in the tribal groups, emphasis will be done on Social mobilization through supporting community leaders, while in the hard-to-reach areas, the key component of the Strategy might be increasing access to the immunization services through establishment of the fixed site and etc.

Based on the situational analysis, the cMYP identified four types of the risk groups that have different risks and require tailored approach for the effectiveness of Specific Focused strategy implementation:

- Children / child-bearing age women (CBAW) living in Urban slums
- Ethnic minorities and Tribal communities living in mountainous areas
- Ethnic minorities and Tribal communities living in plain lands
- Migrant population (including refugees)

The logic for distribution of Specific Focused Strategies and interventions tailored to hard-to-reach groups are presented in the table below[75]:

		Children / CBAW living in Urban slums	Tribal and/or ethnic minorities – Highlanders	Tribal population in plain lands	Migrant population
1. Social mobilization	1.1 Mass media campaigns				
	1.2 Securing support of community leaders or faith base organization				

[75] Green color denotes that the intervention is deemed the most effective for the effectiveness of the Specific Strategy for a particular hard-to-reach group. Orange/brown color corresponds to medium importance of the intervention, and yellow – to relatively low importance.

		Children / CBAW living in Urban slums	Tribal and/or ethnic minorities – Highlanders	Tribal population in plain lands	Migrant population
2. Improve access to fix service delivery sites	1.3 Establish or make operational service delivery sites in under-served areas				
	1.4 Increase service window through				
	a) better micro-planning in existing service sites				
	b) task shifting				
3. Accelerate outreach services:	1.5 Introduce more efficient approaches such as crash				
	1.6 Engage other community level health workers in immunization activities (domicile visitors)				
4. Carry out tailored supplementary immunization activities	1.7 AAA (TBD)				
	1.8 BBB (TBD)				

2.2 Alignment with the Regional (SEARVAP) and Global Goals (GVAP)

Alignment of the cMYP 2018-2022 with the Strategic objectives of the 4th Sector Plan and Regional and Global Goals is shown in the table below:

GVAP Goals	SEARVAP Goals	National Goals / Objectives 4th HPNSP Strategic Objectives	cMYP 2018-2022 Objectives and Sub-objectives
Achieve world free of poliomyelitis	Polio free status is maintained in the region	**Strategic Objective 7:** To improve equitable access to and Utilization of Quality Health, Nutrition and Family Planning Services	**Objective 3:** Maintain polio free status
Meet global and regional disease elimination targets (MNT, MR elimination targets)	• Elimination of Maternal and Neonatal Tetanus is sustained • Measles is eliminated and Rubella is controlled • Control of JE is accelerated • Control of Hepatitis B is accelerated		**Objective 2:** TT5 coverage among women of child bearing age to be reached at least 80% at national level and 75% at each district by 2021
			Objective 3: Maintain MNTE Status
			Objective 4: Elimination of Measles, Rubella and CRS by 2020
Meet vaccination coverage targets in every region, country, and community	Routine Immunization systems and services are strengthened		**Objective 1:** Improved full immunization coverage among children under one and CBAW
			Sub-objective 1.1: At least 95% full immunization coverage among under one at national level and 85% full immunization coverage at each district level

GVAP Goals	SEARVAP Goals	National Goals / Objectives 4th HPNSP Strategic Objectives	cMYP 2018-2022 Objectives and Sub-objectives
			Sub-objective 1.2: TT5 coverage among CBAW reached at least 80% at national level and 75% at each district level
			Objective 6: Sustain operation of critical immunization system components while transitioning from foreign to domestic sources of financing
Develop and introduce new and improved vaccines and technologies	• Introduction of new vaccines and related technologies are accelerated • Adequate production and availability of safe and efficacious vaccines is ensured		**Objective 5**: Improve protection of people against VPD along with the advancements in bio-medical science and technologies
Exceed MDG4 target for reducing child mortality			

2.3 Monitoring and Evaluation

The Planning Unit of MOHFW is responsible for Monitoring and Evaluation of the 4th HNPSP through the routine data collection for all impact and most of outcome level indicators. In addition to administrative data collection and reporting, the MOHFW collects data on immunization coverage and equity indicators from the household surveys such as national immunization Coverage Evaluation Surveys and BDHS.

The M&E of EPI will be carried out as part of routine M&E activities of HNPSP and will be mainstreamed into SWAPs to strengthen the health system in overall.

The indicators of national EPI were elaborated and selected by HNPSP. The EPI and MOHFW team will be directly involved into M&E process of EPI implementation. Notably, VPD surveillance system based on the web-software will be developed and integrated into routine HMIS. Consequently, data will be collected as part of the country's MIS (HMIS) supplemented by the EPI from it's own data sources until they are fully integrated. The data collection will be computerized and will include information from regular surveys such as BDHS, MICS, CES and immunization Program Reviews. From city corporations and municipalities, the data will be collected from LGD/MLGRDC.

3 Immunization Program Costs and Financing

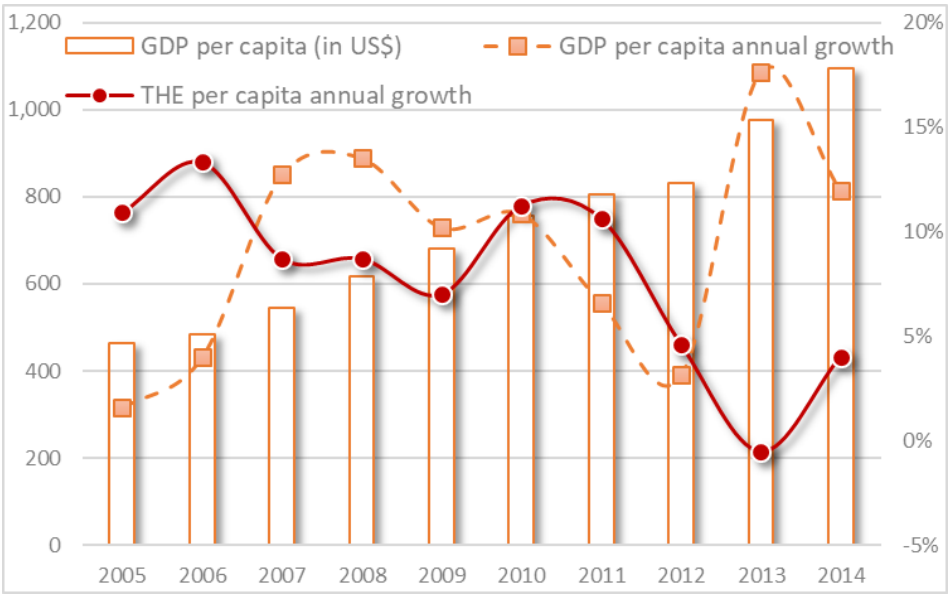
3.1 Macroeconomic context and Fiscal space for immunization

The following assumptions have been used for macroeconomic projections for Bangladesh cMYP 2018-2022 costing exercise:

- Gross Domestic Product (GDP) per capita (in current US$) for baseline year (2016) was indicated at 1,359 (according to the WB world development indicators, July 2017). GDP for projection years was estimated considering 6% annual GDP growth (in accordance to the WB world development indicators, July 2017).

- Total Health Expenditure (THE) per capita was 31 US$ in 2014 (in accordance with the WHO NHA GHED[76]). No data was available for the baseline year of 2016 and thus, the constant of 2014 was used for the projection years.
- THE per capita projections were calculated using the GDP per capita annual growth rate (range 6% in accordance with the WB annual GDP growth rate forecast).
- GHE as % of THE – constant value at the rate for baseline year (2016) – 27.9% (in accordance with the WHO NHA GHED).
- Inflation rate (Consumer price index) was estimated at the level of 6 – 7% in previous 3 years (according to the World Bank World Development Indicators).

Figure 64: Macroeconomic trends and healthcare financing dynamics



Source: WHO Global Health Expenditure Database

The total population was estimated at 149,772,364 in 2016 (EPI Bangladesh, based on the Census 2011 data):

- The population growth was projected at the annual growth rate of 1.37% in 2018, 1.41% in 2019, 1.43% in 2020 and 1.45% in 2021 and 2022 (in accordance with the EPI Immunization Target Population Projection). [77]
- Infant mortality at the rate of 38 per 1000 live birth in 2016 in accordance with the Ministry of Health and Family Welfare data. Due to unavailability of infant mortality rate estimates for projection years the constant rate was used for cMYP costing and financing analysis.
- The According to the information provided by EPI Bangladesh in 2016 the number of surviving infants was 2,939,253, that translates into 3,055,356 newborns at the infant mortality rate of 38 per 1,000 live births (or 2.04% of the total population in 2016).

According to the EPI projections of immunization target groups, based on 2011 census data number of childbearing age women in Bangladesh was 44,310,797 in the baseline year, which accounted for 29.6% of total population.

[76] WHO Global Health Expenditure Database
[77] *"Target Population Projection for National EPI Program of Bangladesh 2014-2021"* – EPI, August 2014

3.2 Current program costs and financing

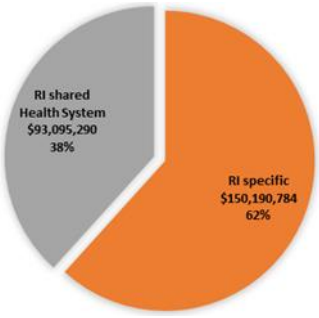
3.2.1 Expenditures on immunization in the baseline year

The national immunization program expenditures in 2016 amounted to 243.3 million US$ (with shared health system costs) as shown in Figure 65 below:

Figure 65: Baseline Indicators (2016)

Total Immunization Specific Expenditures	**$150,255,020**
Supplemental immunization activities	**$0**
Routine immunization only	**$150,255,020**
Per capita	$1.0
Per DTP3 immunized child	$53
% Vaccines and Supplies	62.5%
% Government Funding	44.5%
% Of Total Health Expenditures (THE)	3.3%
% Government Health Expenditures	11.7%
% GDP	0.1%
Total shared costs	**$93,095,290**
% Shared Health Systems Cost	38.3%
Total Immunization Expenditures	**$243,350,310**

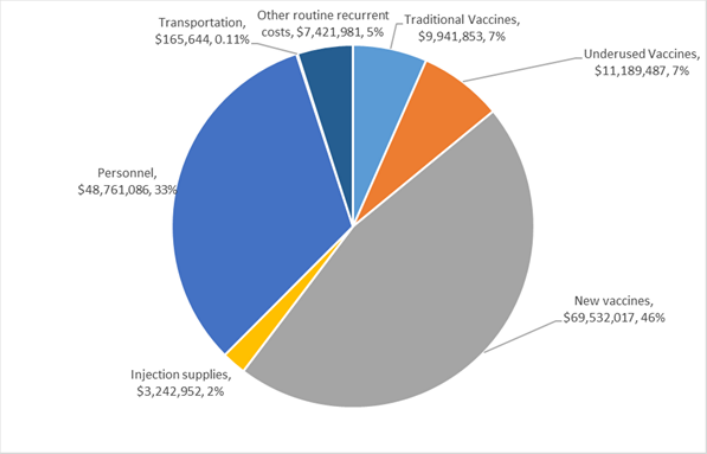
Shared health system costs accounted for 38.3% of the total routine immunization expenditures (or 93.1 million US$) in 2016. The rest of funds in the baseline year was spent on routine immunization. The cost of fully (DTP3) immunized child was 53 US$ and per capita cost of routine immunization was amounted to 1.00 US$.



3.3% of the total health expenditures (or 11.7% of the government health expenditure) was spent on routine immunization in 2016.

"Vaccine and injection supplies" was the major cost driver of the total routine immunization expenditures in the baseline year accounting for 62.5% (or 93.9 million US$) of all expenditures as shown in Figure 66 on page 97 below:

Figure 66: Routine Immunization baseline cost structure



"Personnel" expenditures constituted 32.5% (or 48.8 million US$) of the total routine immunization costs. 4.9% (or 7.4 million US$) was spent on "other routine recurrent costs" and 0.11% (or 165.644 US$) was spent on "transportation" in 2016.

3.2.2 Routine immunization cost structure

Personnel

Out of the total of 88,036 persons engaged in the national immunization program, only 17,686 (or approximately 20%) persons dedicate full work time to immunization with payroll of 48.5 million US$ in 2016 (accounting for 34% of total salaries of both immunization specific and non-immunization specific staff and 32.5% of total immunization specific expenditures). The rest of the staff are shared health system personnel, allocating from 5 to 70% of their work time to the immunization program as shown in Figure 107 on page 128.

Vaccines and injection supplies

The total expenditures on vaccines and injection supplies amounted to 93.9 million US$ (or 62.5% of total program costs).

Out of this amount 9.9 million US$ (6.62% of total program cost) was spent on traditional vaccines, 11.2 million US$ (or 7.45% of total program cost) – on underused vaccines and 46.3% (or 69.5 million US$) was spent on new vaccine procurement. 2.16% (or 3.2 million US$) of the total routine immunization costs was spent for procurement of injection supplies.

Other Routine Recurrent Costs

The total for "other routine recurrent costs" amounted to 7.4 million US$. "Program management" was the main cost driver of "other routine recurrent costs" accounting for 39.6% of other routine recurrent costs (or 2.9 million US$), followed by "disease surveillance" – accounting for 34.7% (or 2.6 million US$) of other routine recurrent costs. "Cold-chain maintenance and overhead" consumed 18.2% (or 1.3 million US$) and "short-term trainings" – 3.23% (or 239.707 US$) of other routine recurrent costs. "IEC/Social Mobilization" and "building overheads (electricity, water, etc.)" accounted to 3.04% (or 225,786 US$) and 1.28% (or 95,145 US$) of total other recurrent costs respectively.

Vehicles and Transportation

Transportation expenditures for vaccine distribution from the Central level to the sub—national levels accounted for 0.11% of total program costs (or 165,644 US$) in baseline year.

No vehicles or any other transportation means were procured in the baseline year (2016).

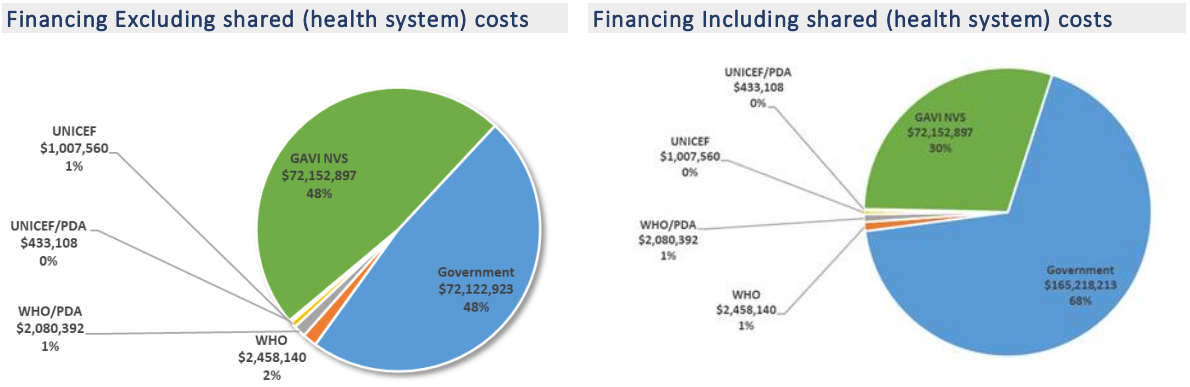
3.2.3 Supplementary immunization costs

No Supplemental Immunization Activities (SIAs) were implemented in the baseline year.

3.2.4 Immunization financing in baseline year

The Government was the major source of financing of the national immunization program accounting for 48% of all funds if shared health system costs are excluded and 68% if shared health system costs are included as shown in Figure 67 below:

Figure 67: Immunization financing profile – baseline year



Gavi was the second major funding source in 2016 channeling its contribution to EPI through the following different mechanisms:

- Through its *New Vaccine Support Program (NVS)* Gavi provided 72.2 US$ (or 48% of all funding if the shared health system costs are excluded and approximately 30% - if shared costs are included);
- *Through Health System Strengthening Cash Support (HSS2) Grant* Gavi contributed 2.51 million US$ (or 1.67% of program costs, excluding shared health system costs or 1.03% of total funding including shared health system costs). The implementation of the three-year HSS2 program started in 2016 and will be finished in July 2019. The HSS2 funds were channeled through Direct Project Aid (DPA) to UNICEF and WHO.

WHO contributed 2% (or 2.5 million US$) of the total financing and UNICEF – 0.67% (or approximately 1 million US$) of total financing in the baseline year (excluding shared health system costs).

3.3 Future resource requirements

3.3.1 Overview of the resource requirements' structure

The total resource requirements for 2018-2022 National EPI Program were estimated at 1,269 million US$ (including shared health system costs) or at approximately 803 million US$ without shared health system costs as shown in Figure 68 below:

Figure 68: National immunization program costs summary by system components and years – basic scenario

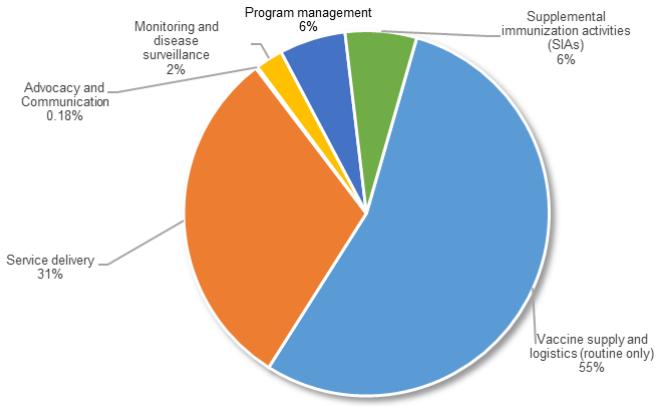
Immunization system components	Expenditures	Future resource requirements					
	2016	2018	2019	2020	2021	2022	Total 2018 - 2022
Vaccine supply and logistics (routine only)	95,253,945	80,784,584	96,077,357	88,223,877	86,361,461	86,616,071	**438,063,351**
Service delivery	48,712,080	49,061,131	49,353,840	49,378,160	49,214,883	49,227,638	**246,235,651**
Advocacy and Communication	225,786	115,466	390,500	314,085	259,085	384,085	**1,463,221**
Monitoring and disease surveillance	2,786,287	6,813,930	3,033,181	3,262,367	3,094,472	3,371,787	**19,575,737**
Program management	3,276,922	10,537,634	10,535,602	5,537,407	10,168,583	10,298,235	**47,077,460**
Supplemental immunization activities (SIAs)	0	24,704,682	0	0	0	26,073,567	**50,778,249**
Total immunization Immunization costs	**150,255,020**	**172,017,428**	**159,390,480**	**146,715,895**	**149,098,484**	**175,971,383**	**803,193,670**
Shared Health Systems Costs (EPI Portion)	93,095,290	93,098,934	93,102,650	93,106,440	93,110,306	93,114,250	**465,532,579**
Total immunization resource requirements	**243,350,310**	**265,116,361**	**252,493,130**	**239,822,335**	**242,208,790**	**269,085,633**	**1,268,726,249**

The details of future resource requirement (by cost categories) is presented in Figure 123 on page 146 below.

3.3.2 Description of cost drivers of the future resource requirements

For the cMYP period (2018-2022) the resources required for "vaccine supply and logistics" will account for approximately 55% of the total immunization specific costs (excluding shared health system costs) as shown in Figure 69 below. "Service Delivery" is the second major cost driver will account for 31% of future immunization specific resource requirements. "Program Management" and "Monitoring and Disease Surveillance" will account for 6% and 2% of total immunization specific resource requirements respectively. "Advocacy and communication" will require 0.18% of total immunization specific resource requirements. "Shared health system costs" are estimated at 58% of future immunization specific resource requirements and Supplemental Immunization Activities – for approximately 6% of total immunization costs.

Figure 69: The future total resource requirement structure by cMYP components (shared costs excluded)



During the cMYP projection period (2018-2022) the resource requirements for national immunization program per annum will vary between 147 million US$ in 2020 and 176 million US$ in 2022 (excluding shared health system costs):

- In the first projection year (2018) the resource requirements will increase by approximately 14% (approximately 22 million US$), when compared with the baseline year (2016). This increase could be attributed to the planned MR follow-up SIA and significant investment in program management activities, typically requiring substantial financial resources.

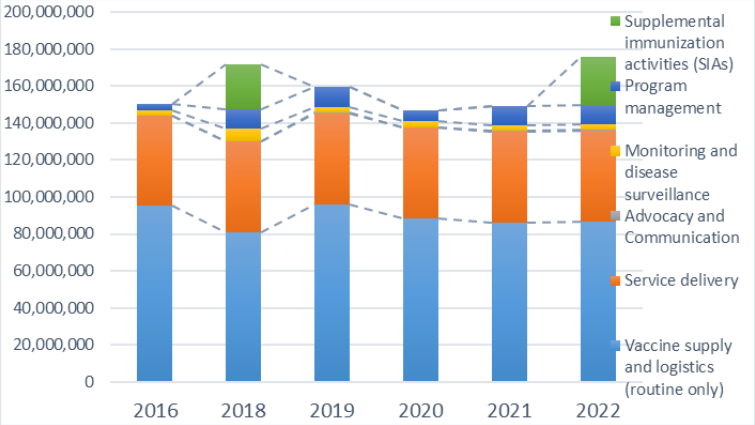
- In the second and third year of projection (2019 and 2020) resource requirement will decrease by 7% and 8% (or approximately 12.6 and 12.7 million US$ respectively) which could be explained by relative stabilization of EPI performance, which will be mostly focused on improving routine immunization activities during these two years.

- In 2021 resource requirement will modestly increase by 2% (or approximately 2.4 million US$) which will follow by more significant increase in the final year of projection by 18% (or approximately 26.9 million US$) which can be attributed to another MR follow-up campaign planned by EPI in the final year of projection (2022).

- The analysis of resource requirement fluctuation shows that in general it will be driven by "SIAs" and "Program Management" components of immunization program shown in Figure 70 below. The fluctuations in resource requirement can be logically explained taking into account implementation of the HSS3 program which will provide significant investments for strengthening of EPI and NGO capacity for immunization service delivery in rural and urban parts of the country,

improving capacity and performance of the cold-chain and strengthening overall capacity of MoHFW for effective guidance and management of EPI in all parts of the country.

Figure 70: The structure of future resource requirements by cMYP components and years (shared costs excluded)



Vaccines and injection supplies

The following assumptions were used for projection of vaccine and injection supplies' requirements:

- Coverage rates were set in line with the objective and targets of National EPI by 2020 (>=95% by 2022.
- Wastage rates are estimated at 80% for BCG; 40% for MR vaccine (routine immunization); 30% for OPV and TT vaccines; 10% for IPV and PCV vaccines and 5% for Pentavalent and Rotavirus Vaccines.

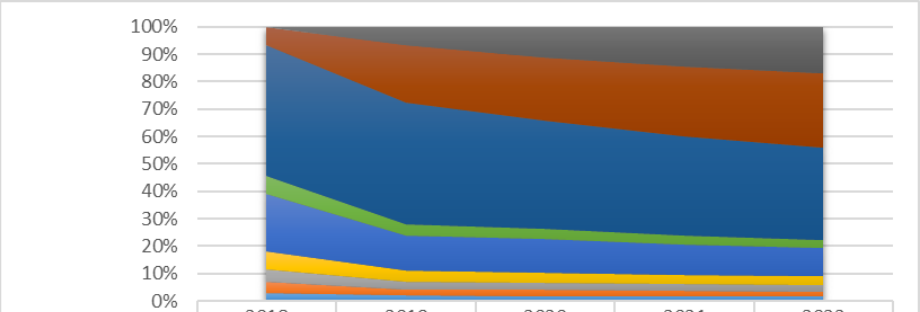
The present projections are based on vaccine price estimates provided by the UNICEF Supply Division and include UNICEF handling fee (3-4%), freight, insurance and inspection (5-15%) costs.

The resource requirement projections for routine immunization vaccines (basic scenario) envisages costs of following vaccines:

- Traditional vaccines: BCG, OPV and TT vaccines;
- Underused vaccines: Pentavalent and MR vaccines;
- New vaccines: IPV (introduced in the routine immunization schedule in 2015), PCV10 (introduced in the routine immunization schedule in 2015) and Rotavirus (planned for introduction in 2018) vaccines for the Baseline Scenario. For Scenario
- For Scenarios A, B and C the projections are based on the nation-wide scale-up of the HPV vaccine among 10-year-old girls (Scenario A), roll-out of HPV vaccines among the 9-11-year-old girls (Scenario B) and scale-up HPV vaccine among the 9-13-year-old girls at the national level (Scenario C).

Figure 71 below illustrates the cost structure of routine immunization vaccines and injection supplies by vaccines and years including Rotavirus introduction and HPV Vaccine roll-out according to the Scenario A during the cMYP projection period.

Figure 71: Vaccine and injection supply cost projections (routine immunization. Scenario A (Rotavirus - 2018 and HPV - 2019).

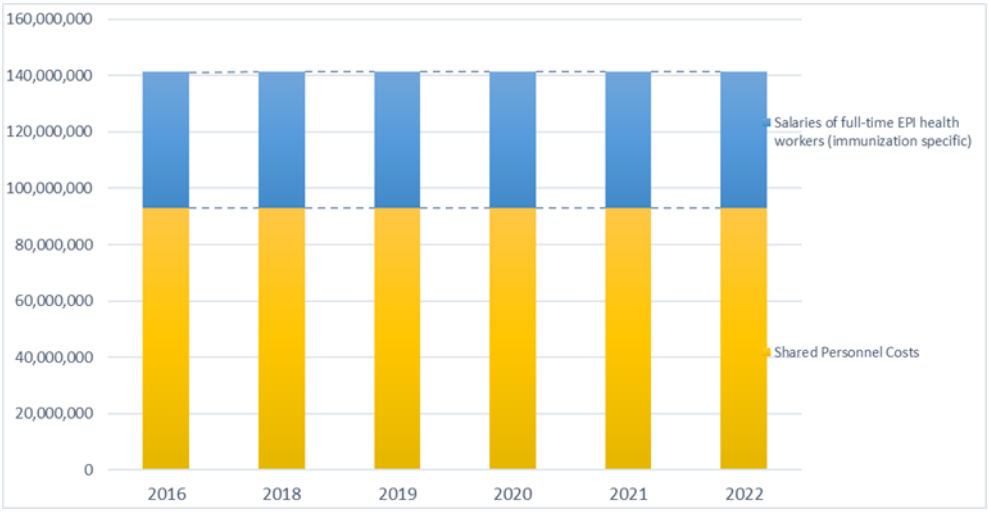


	2018	2019	2020	2021	2022
HPV	$0	$7,633,793	$13,961,342	$20,472,943	$25,576,310
Rotavirus	$4,778,004	$25,000,358	$28,789,534	$35,442,311	$40,592,865
PCV10	$34,136,341	$51,813,826	$49,597,414	$50,069,617	$50,227,562
MR	$4,624,169	$4,666,287	$4,709,900	$4,754,740	$4,769,766
DTP-HepB-Hib	$14,939,107	$15,075,176	$15,216,074	$15,360,939	$15,409,473
TT	$4,633,343	$4,675,547	$4,719,241	$4,764,165	$4,779,378
IPV - fractional	$3,370,171	$3,400,868	$3,432,652	$3,465,331	$3,476,330
OPV	$2,732,247	$2,757,133	$2,782,903	$2,809,398	$2,818,254
BCG	$2,166,703	$2,186,438	$2,206,872	$2,227,882	$2,234,944

Personnel

Total personnel cost will amount to approximately 709 million US$ in 2018-2022. Salaries of the shared personnel will account for 66% (or 465 million US$) of the total personnel cost.

Figure 72: Personnel costs by cost categories and years (routine immunization)



Annual costs for the personnel, per diems for supervision and monitoring will remain constant over the course of cMYP implementation period as it is shown in Figure 118.

Cold chain equipment

In total 31 million US$ will be spent on the cold-chain during the projection period. Cold-chain equipment procurement costs will account for 64% (or approximately 20 million US$) of cold-chain related resource requirements. The cold – chain maintenance and overhead costs will account for 36% (or approximately 11 million US$) to cover the cold chain related needs as shown in Figure 73 below.

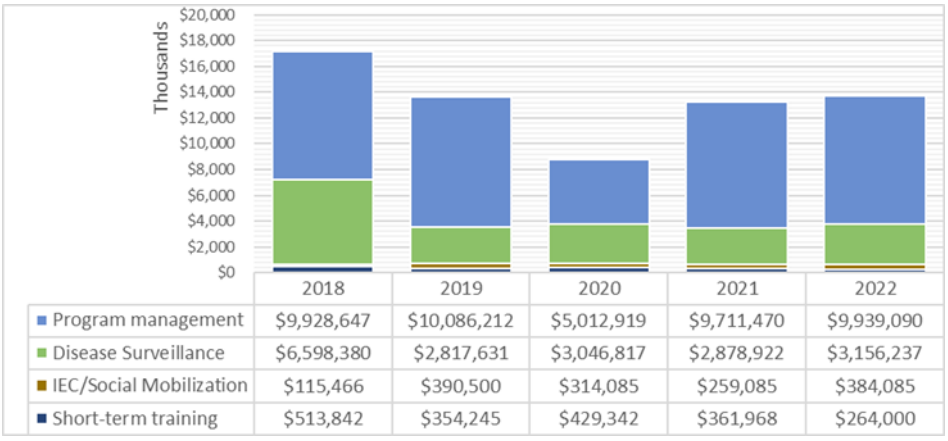
Figure 73: Cold chain related resource requirements

	2016	2018	2019	2020	2021	2022	Total 2018-2022
Cold chain maintenance and overhead	$1,347,636	$1,851,326	$2,526,148	$2,870,296	$1,727,076	$1,900,028	**$10,874,875**
Cold chain equipment		$6,677,066	$8,178,620	$2,625,990	$1,182,313	$1,000,336	**$19,664,324**
Total	**$1,347,636**	**$8,528,392**	**$10,704,769**	**$5,496,286**	**$2,909,388**	**$2,900,364**	**$30,539,199**

Other recurrent costs

Out of the total 78 million US$ required for "Other Routine Recurrent Costs", 57% or 45 million US$ will be required to cover "program management" costs, followed by "disease surveillance", which will require 23% (or 18.5 million US$). "Maintenance and overhead Costs" will account for 14.6% (or approximately 11 million US$) and includes "cold-chain maintenance and overhead" and "building overheads (electricity, water and etc.) costs accounting for 14% (or 10.9 million US$) and 0.6% (or 475,725 US$) respectively (see Figure 74 below).

Figure 74: The future resource requirements for "Activities and other recurrent costs"



	2018	2019	2020	2021	2022
Program management	$9,928,647	$10,086,212	$5,012,919	$9,711,470	$9,939,090
Disease Surveillance	$6,598,380	$2,817,631	$3,046,817	$2,878,922	$3,156,237
IEC/Social Mobilization	$115,466	$390,500	$314,085	$259,085	$384,085
Short-term training	$513,842	$354,245	$429,342	$361,968	$264,000

Supplementary immunization activities

Resource requirement for MR follow-up campaigns, planned by EPI Bangladesh in 2018 and 2022 will amount to 50.8 million US$ and include 33 million US$ required for procurement of vaccine and injection supplies and 17.3 million US$ will be required to cover operational costs of the campaigns. More specifically:

- 2018 MR follow-up campaign will require vaccine and injection supplies for approximately 16 million US$ and 8.6 million is required to cover SIA operational costs (taking into account cost per child targeted by SIA – 0.55 US$);
- Cost of vaccines and injection supplies in 2022 MR follow up campaign will require approximately 16.9 million US$ and the SIA operational costs –9.1 million US$

3.3.3 Description of scenarios for introduction of new vaccines

Scenario building parameters

Costing and financing analysis developed four different scenarios for Bangladesh cMYP 2018-2022:

- **Basic Scenario** – envisions implementation of existing routine immunization program and introduction of Rotavirus vaccine in 2018 in the national routine immunization schedule.
- **Scenario A** – considers nationwide roll out of HPV vaccine in 2019 targeting a single cohort of 10-year-old girls *in addition to the Basic Scenario*.

- **Scenario B** – considers nationwide roll out of HPV vaccine in 2019 targeting 9-11 age groups girls *in addition to the Basic Scenario*.
- **Scenario C** – considers nationwide roll out of the HPV vaccine in 2019 targeting 9-13-year-old girls *in addition to the Basic Scenario*.

Results – financial implications of new vaccine introduction

The implication of resource requirements for vaccines and injection supplies by scenarios and years is presented in Figure 75 and Figure 76 and Figure 77 below.

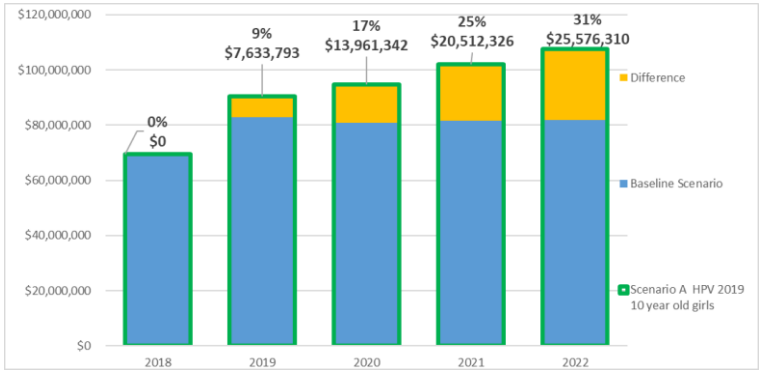
Analysis of Scenario A with HPV nationwide roll out among the single cohort of 10-year-old girls considers costs and financial implications of vaccines and injection supplies' costs, as well as the costs of cold chain-expansion and all other introduction-related activities such as: IEC/Social Mobilization, disease surveillance and program management activities.

The costs estimates for HPV roll-out activities for the Scenario A are based on Gavi HPV Guidelines dated by November 2016 and consider one-time support from Gavi through Vaccine Introduction Grant (VIG) of 100,000 US$.

All **cost implications related** to the HPV vaccine roll-out according **to the Scenarios B and C** presented in this cMYP are "indicative" and should be used for strategic decision making and advocacy purposes only. Therefore, in case of selection of B or C scenario, it will be mandatory to assess readiness and capacity critical components of EPI such as Program Management and Cold-chain to ensure effective roll-out of HPV vaccine at the national level.

Figure 75 below compares the resource requirements for vaccines and injection equipment of the **Baselines scenario** and **Scenario A** and shows that targeting the HPV vaccination among the single cohort 10-year-old girls will increase annual resource requirement for vaccines and injection supplies by 9% (or approximately 7.6 million US$) in the first year of introduction (2019). In 2020, resource requirements for vaccines and injection supplies will further increase by 17% (or approximately 14 million US$) in comparison with the previous year. In 2021 the vaccine and injection supplies' resource requirement will increase by 25% (or 20.5 million US$) and in the final projection year increase will reach its maximum level of 31% (or approximately 26 million US$) during projection period.

Figure 75: Commparison of resource requirements for vaccines and injection supplies between the Baseline Scenario and Scenario A by years



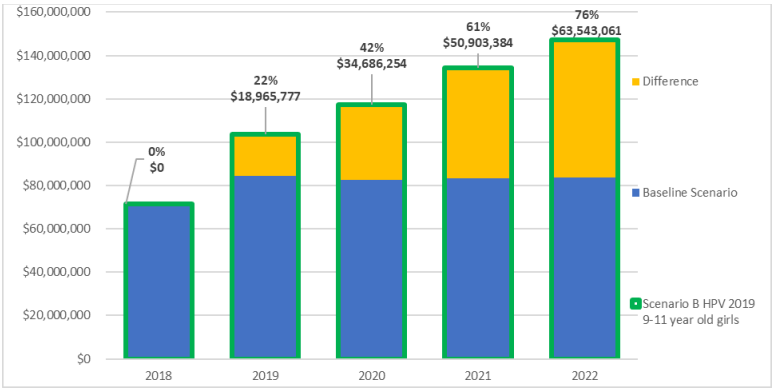
Overall, implementation of the Scenario A will increase required financial resources for vaccines and injection supplies by 17% or 67.6 million US$ over the cMYP projection period – 2018-2022.

Figure 76 shows **comparison** of resource requirements for vaccines and injection supplies between the **Baseline Scenario** and **Scenario B**.

Targeting HPV nationwide roll-out of HPV among 9-11 years-old of girls will increase annual resource requirement for vaccines and injection supplies by 22% (or 19 million US$) in the first year of roll-out (2019). In 2020 the resource requirement will further increase by 42% or 35 million. In 2021, the resource requirement of EPI implementation will further increase by 61% (or nearly 51 million USE) and in the final year of cMYP projections increase will reach its maximum – 76% (or 64 million USE).

Overall implementation of the **Scenario B** will require by 41% (or 168 million US$) more resources for vaccines and injection supplies than implementation of the **Baseline Scenario**.

Figure 76: Commparison of resource requirements for vaccines and injection supplies between the Baseline Scenario and Scenario B by years

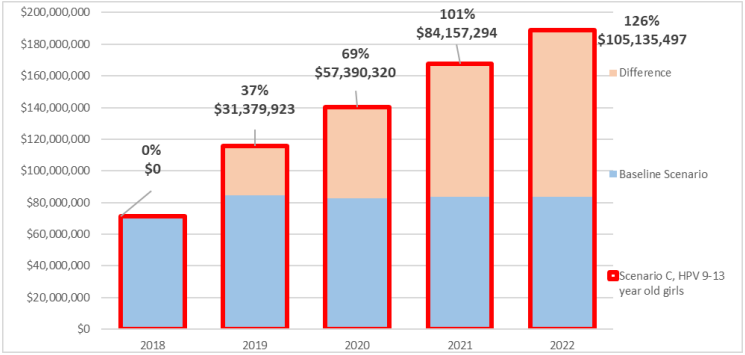


Error! Reference source not found. Error! Reference source not found. shows comparison of th e Baseline Scenario and Scenario C which considers roll-out of HPV vaccine among 9-13-year-old girls at the national level.

In this scenario, the roll-out of the HPV vaccine will increase total resource requirement for vaccines by 68.5% (or 278 million US$) over the cMYP period.

During the first year (2019) resource requirement will increase by 37% (or 31 million US$), in the second year (2020) the vaccine and injection supplies' procurement will require by 69% more resources (or 57 million US$) compared to the previous year. In 2021, increase in resource requirement will continue up to 101% (or 84 million US$) and in the final year of cMYP period resource requirement will reach its maximum – 126% (or 105 million US$).

Figure 77: Commparison of resource requirements for vaccines and injection supplies between the Baseline Scenario and Scenario C by years



Comparison of costs of vaccines and cold-chain across all four different scenarios (Baseline, A, B and C scenarios) shows that HPV roll-out according to the Scenario B and C will require significant increase of EPI funding for vaccine procurement alone. Moreover, introduction of these two scenarios will be related to the substantial investments for i) assessment and identification of cold-chain and supply system requirements, ii) upgrading cold-chain system to meet standards and capacity for accommodation of the new vaccines and (iii) strengthening EPI service delivery capacity, through undertaking complex efforts for building staff capacity for high-quality service delivery and effective management of cold-chain and supply system at all levels.

3.4 Future financing and funding gaps

The detail information on Baseline[78] program funding is presented in Figure 108.

The total financing of National Immunization Program during the period 2018-2022 will amount to approximately 1,269 million US$ (including shared health system costs) or 803 million US$ (excluding shared health system costs).

Government of Bangladesh will be the major source of financing of Bangladesh National EPI program contributing in total 370 million US$ which will constitute 45% of total funding when shared health system costs are excluded or 836 million US$ accounting for 65% of all program funding when share health system costs are included.

Gavi will be the second major source of financing of Bangladesh EPI contributing 414.7 million US$ accounting for 53% of total funding when shared health system costs are excluded or 34% of total funding when shared health system costs are included.

The Gavi financing is expected to be channeled through different support windows:

- *New Vaccine Support (NVS)* program – 344.9 million US$ (43% of all funding without shared health system costs or 27% including shared health system costs);
- *Health System Strengthening 2 Cash Support (HSS2)* – approximately 17 million US$ which constitutes 2.1% of total funding excluding shared health system costs or 1.3% of total secured financing when the shared health system costs are included. The HSS2 funding has already been approved by Gavi and continues irrespective of the approval of the HSS3 funding reflected below. Taking into account the duration of HSS2 program (July, 2016-July, 2019) the HSS2 funding was carried forward from the previous cMYP and HSS cycle as actual expenditures are expected over the course of implementation of this cMYP (2018-2022).
- *Health System Strengthening 3 Cash Support (HSS3)* – approximately 50.7 million US$ (6.3% of all funding excluding health system costs or 4% of total funding including shared health system costs). This amount will be channeled through the Direct Project Aid (DPA) to the MoHFW, WHO and UNICEF and includes funding for *Cold Chain Equipment Optimization Platform (CCEOP) – amounting to 2.2 million US$, which will account for 0.3% of all funding excluding shared health system costs or 0.2% of total funding including share health system costs.*
- *Health System Strengthening 3 Cash Support (HSS3)* – approximately 39.3 million US$ that will be channeled through SWAp for supporting Bangladesh Health Sector Support Project

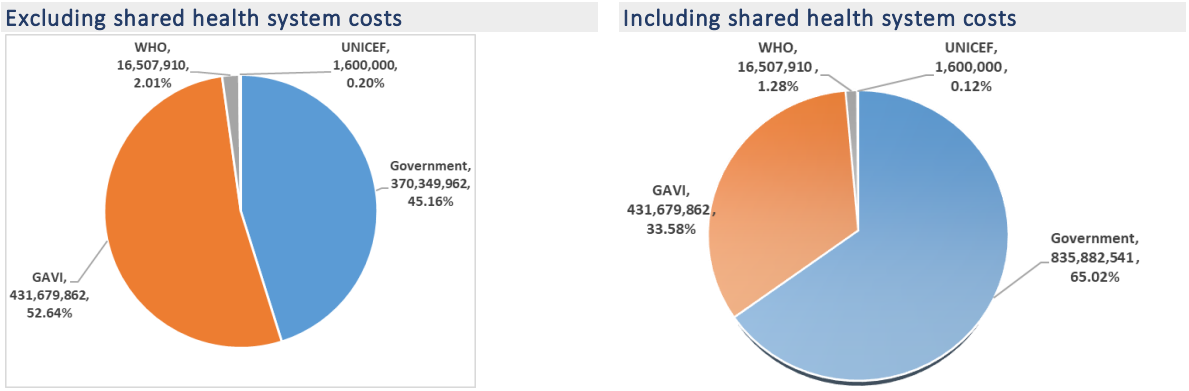
[78] Basic program details are presented in Baseline Scenario description in the section *1.3.3 Description of scenarios for introduction of new vaccines*

aiming at *strengthening core management systems in health and delivery of essential HNP services with a focus on Chittagong and Sylhet divisions* that have been demonstrating sub-optimal immunization coverage for years. More details of the HSS3 SWAp funding are provided in the Section 1.2.5 Healthcare financing on page 32.

WHO will contribute in total approximately 16.5. million US$ which will constitute 2% of total secured funding when shared health system costs are included or 1.3% when shared health system costs are excluded.

Total contribution of **UNICEF** in total program funding will be 1.6 million over the cMYP period, which will account 0.12% of total secured financing when shared health system costs are included or 0.20% - excluding shared health system costs (see details in Figure 78 below):

Figure 78: The future financing (with secured and probable funds) structure



85% (or 685 million US$) of total funding (803 million US$) is considered to be secured (excluding shared health system costs) as shown in Figure 108.

When only secured funding is considered (excluding shared health system costs):

- The Government financing accounts for approximately 46% of total secured funding;
- The share of Gavi contribution in total secured funding is 45%
- Who expected contribution accounts for 0.4% of total secured program funding; and
- The UNICEF is expected to contribute approximately 0.11% of total secured funding.

When both secured and probable funds are considered (excluding shared health system costs):

- The share of Government contribution is approximately 46% of total secured and probable funding;
- Gavi contribution accounts for 51.6% of total probable and secured funding;
- WHO contribution constitutes 2% of secured and probable funding; and
- UNICEF contribution will account for 0.2% of total secured and probable funding.

The total secured financing amounts to 685 million US$ and is sufficient to cover 85% of the total immunization specific resource requirements in 2018-2022 (without shared health system costs).

The total funding gap with only secured financing accounts for 15% (or 118 million US$) of total resource requirements per 5-year period as shown in Figure 79 below.

Figure 79: Financing by sources and funding gap by years (with secured funds only, excluding shared health system costs)

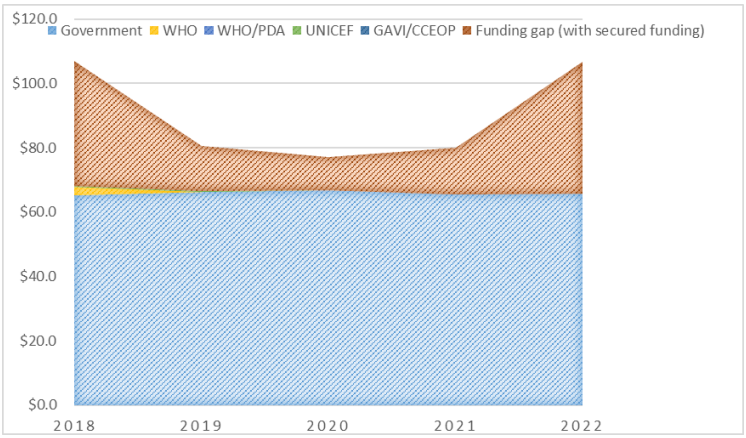
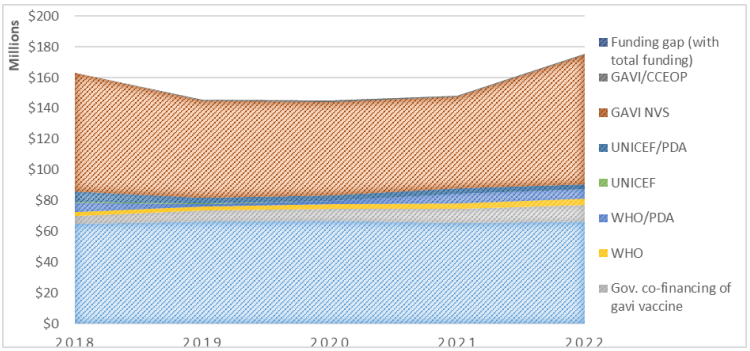


Figure 80 illustrates funding conditions of the national immunization program with secured and probable funding and shows that in case if probable funds are secured the available financing will be fully sufficient to cover 100% of the total resource requirement for 2018-2022.

Figure 80: Financing by sources and funding gap by years (with secured and probable funds, excluding shared health system costs)



3.5 Funding gap analysis and sustainability

3.5.1 Implications of the funding gap on immunization system performance

Analysis of funding gap with secured funds only showed that the funding gap in the amount of approximately 118 million US$ will affect three important components of the immunization system: “Activities and other recurrent costs”, “SIAs” and “Logistics (vehicles, cold chain and other equipment)”. The funding gap related to “activities and other recurrent costs” (63 million US$) accounts for 53% of total funding gap; the gap related to SIAs (approximately 51 million US$) constitutes 43% of total funding gap and the funding gap related to the “logistics” accounts for 4% of total funding gap (see Figure 81below).

Figure 81: Funding gap (with secured and secured and probable financing only) structure by years

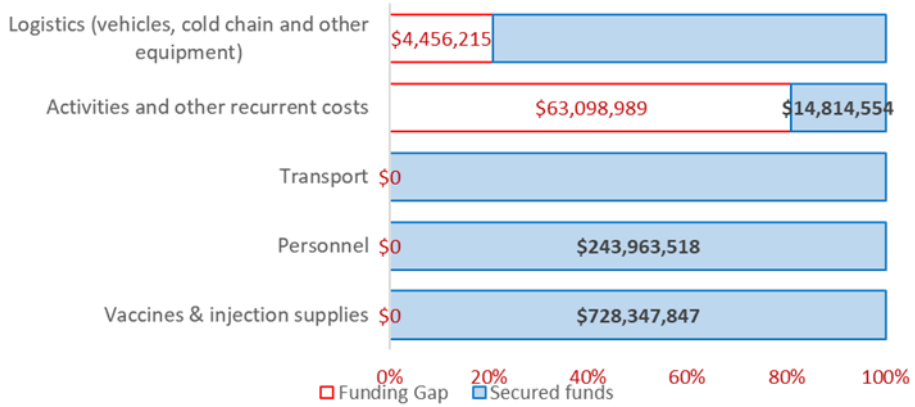
	2018	2019	2020	2021	2022	Total
With secure financing						
Vaccines & injection supplies	0	0	0	0	0	**0**
Personnel	0	0	0	0	0	**0**
Transport	0	0	0	0	0	**0**
Activities and other recurrent costs	14,072,381	13,268,588	8,803,164	13,211,444	13,743,412	**63,098,989**
Logistics (vehicles, cold chain and other equipment)	0	628,748	1,686,418	1,167,941	973,109	**4,456,215**
Supplemental immunization activities	24,704,682	0	0	0	26,073,567	**50,778,249**
Total funding gap	**38,777,064**	**13,897,336**	**10,489,581**	**14,379,385**	**40,790,087**	**118,333,454**
With secure and probable financing						
Vaccines & injection supplies	0	0	0	0	0	**0**
Personnel	0	0	0	0	0	**0**
Transport	0	0	0	0	0	**0**
Activities and other recurrent costs	0	0	0	0	0	**0**
Logistics (vehicles, cold chain and other equipment)	0	0	0	0	0	**0**
Supplemental immunization activities	0	0	0	0	0	**0**
Total funding gap	**0**	**0**	**0**	**0**	**0**	**0**

More detailed analysis of the funding gap structure (with secured funds only) shows (see Figure 82 below) that the funding gap related to the "activities and other recurrent costs" will account for 81% of total resource requirement for this cost category implying that if the sufficient funding is not secured, EPI Bangladesh will not be able to implement the greater part of the planned activities and thus will have to revise its original strategy and implementation action plans related to all components of program activities, such as trainings, IEC/Social mobilization, disease surveillance and program management, which in the current context of EPI in Bangladesh have critical importance.

SIA related funding gap in the amount of 50.8 million US$ will account for 100% of the total resource requirement for this category, which means that if the additional funding is not secured, EPI Bangladesh will not be able to implement MR follow-up campaign in 2018 and 2022 and thus will face substantial challenges in achievement one of the key objectives of the cMYP 2018-2022 – measles and rubella elimination and CRS control and therefore Bangladesh will not be able to achieve regional and global targets in terms of measles and rubella elimination and CRS control. All these in turn will require to revise its immunization service delivery strategy and consider alternative scenarios to reach and maintain high MR coverage levels throughout the cMYP period.

The funding gap (with secured funds only) for "Logistics, (vehicles, cold chain and other" accounts for 4% of resource requirement for this category, suggesting that if probable funds are not secured EPI will not be able to realize all its plans with regards of the implementation of the EVM Assessment Improvement Plan and rehabilitation of the cold-chain system, which could put under the high-risk effectiveness of Rotavirus vaccine introduction, roll-out of HPV vaccine at the national level, as well as will limit capacity of EPI to improve vaccine management practices and ensure delivery of high quality immunization services to the population.

Figure 82: Funding gap (with secured funds only) structure by the major cost categories



Analysis of the program funding with secured and probable funding shows that existing funding gap of approximately 70 million US$ will be fully filled if all probable funds are secured, enabling EPI Bangladesh to ensure programmatic and financial sustainability of the EPI and achievement of its strategic objectives.

3.5.2 Financial sustainability strategies

The main and most important strategies to ensure financial and programmatic sustainability of the EPI during the cMYP 2018—2022 period will be directed towards following main directions:

1. Securing probable funds, through:
    a) Increasing government funding for national immunization program for meeting increased resource requirements in the context of expansion of Routine Immunization schedule with the new vaccines;
    b) Advocate with government for timely and fully releasing funds for financing critical components of EPI such as vaccine procurement, cold-chain rehabilitation, disease surveillance and program management;
    c) Conducting fundraising and advocating activities to secure additional financial support for implementation of National MR follow-up campaign in 2022 according to the objectives and strategies outlined in this cMYP;
2. Select scenario and roll-out HPV vaccine in the national level to decrease disease burden of cervical cancer in the country;
3. Increasing reliability of financing from the domestic sources;
4. Revision of the service delivery strategy to decrease the costs related to the SIA - the major cost driver of existing total funding gap.
5. Optimization of and selection of the most cost-effective modality for implementation of the "program activities" – the major cost driver for expected funding gap.

This could include following:

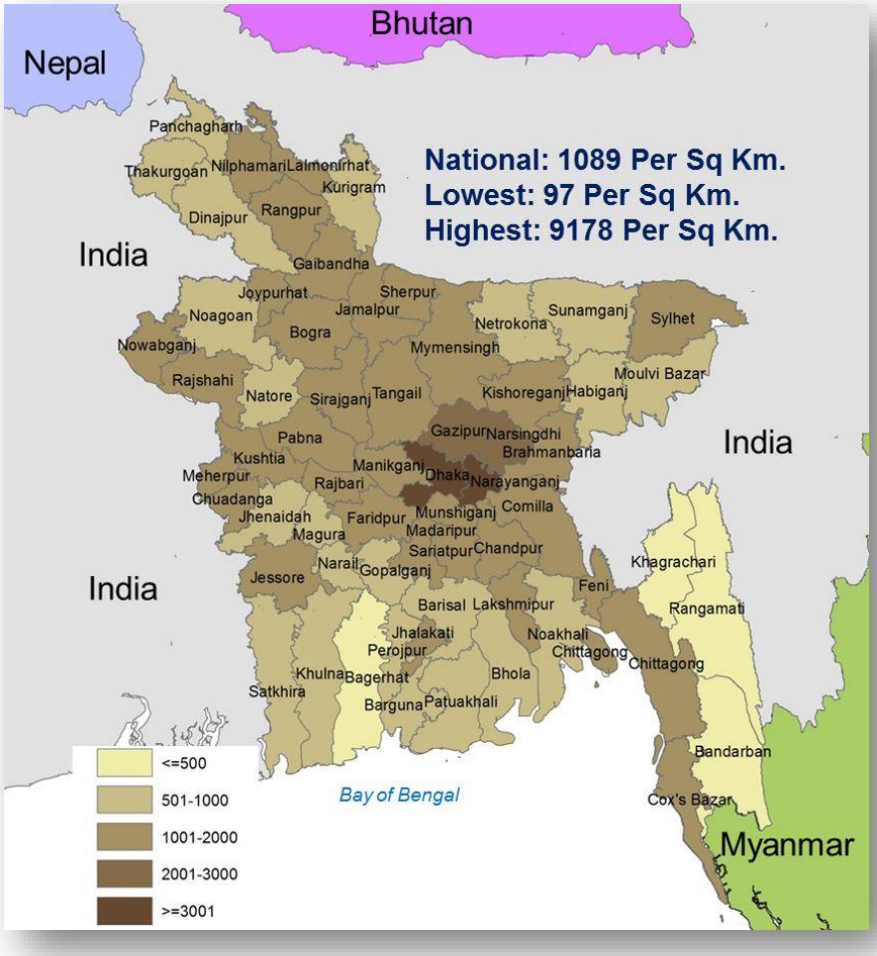
- Advocate for increase of budget allocations and timely release of funds for implementation of all components of national EPI at all levels, including budget allocations for introduction/roll-out of the new Rotavirus and HPV vaccines;

- For securing probable funds, accelerate communication and collaboration with international development partners to provide evidence-based information and strong justification of the need in implementation of all planned program activities over the course of cMYP 2018-2022.
- Provide national level decision makers with evidence-based information on the essential need in implementation of MR National Campaign in 2022 for meeting objectives of national EPI as well as regional and global goals in terms of measles, rubella and CRS elimination;
- Revision and development of alternative and more cost-effective set of program activities which will be implemented in the period 2018-2022;
- Conducting fundraising activities and work with donor community over the course of cMYP cycle to secure alternative funding for filling program funding gaps;
- Revise existing immunization service delivery strategy, with major emphasis of routine immunization activities for reaching and maintenance of immunization coverage targets during the cMYP 2018-2022 period.

Immunization program sustainability indicators are presented in Figure 124 on page 148 below

4 Annexes

Figure 83: Population density by administrative units in Bangladesh



Source: EPI, 2016

Figure 84: Distribution of population across the Divisions of Bangladesh

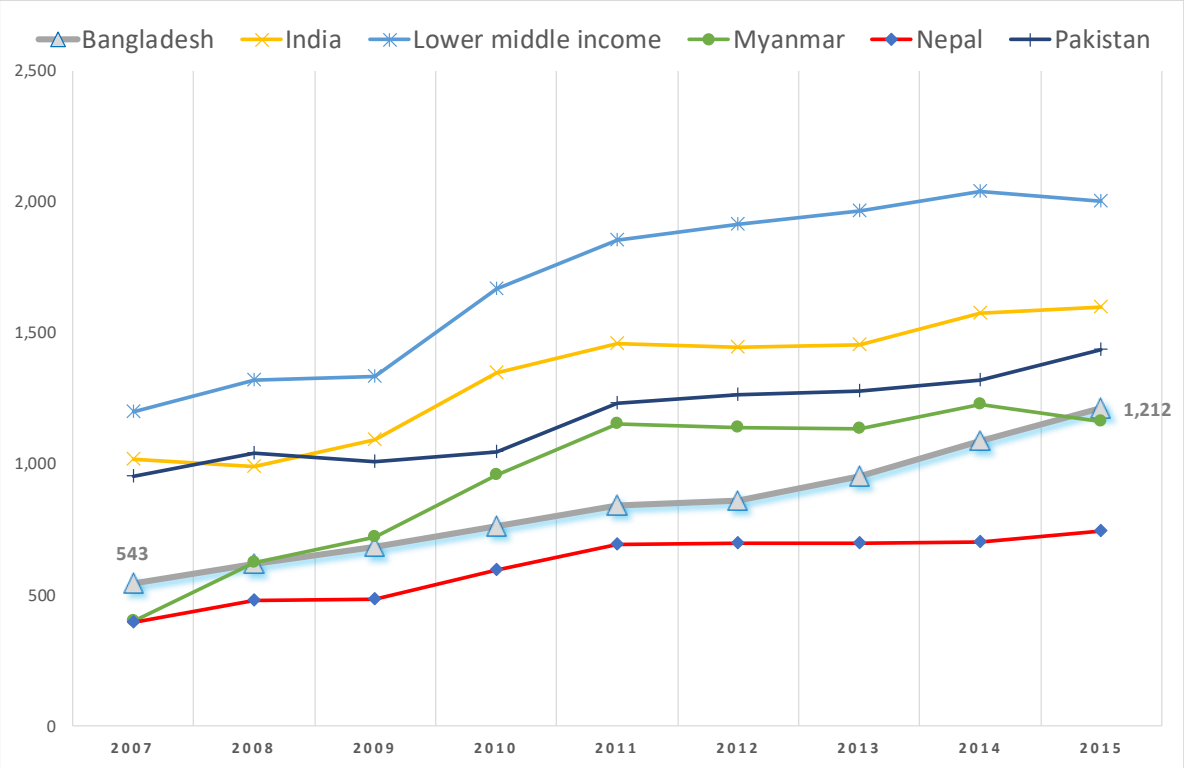
	Population (all ages)	%	Children 0-4	%
Barisal	8,652,324	5.8	896,388	5.7
Chittagong	29,553,857	19.7	3,412,563	21.7
Dhaka	49,321,688	32.9	5,048,078	32.1
Khulna	16,309,304	10.9	1,462,527	9.3
Rajshahi	19,225,909	12.8	1,839,954	11.7
Rangpur	16,412,287	11	1,745,597	11.1
Sylhet	10,296,995	6.9	1,320,992	8.4
Total	**149,772,364**	**100**	**15,660,990**	**100**

Source: EPI Bangladesh, 2016

Figure 85: Comparison of Healthy life Expectancy (at birth and age 60) by years with regional and global averages

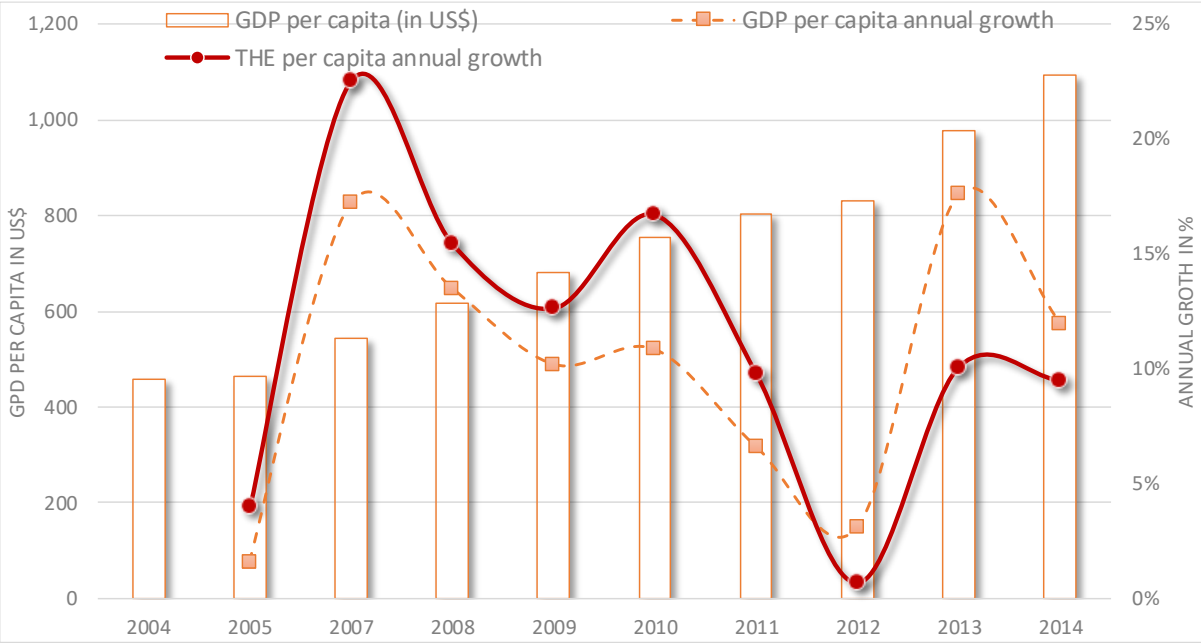
	Healthy life expectancy (HALE) at birth (years)						Healthy life expectancy (HALE) at age 60 (years)					
	Both sexes		Male		Female		Both sexes		Male		Female	
	2000	2015	2000	2015	2000	2015	2000	2015	2000	2015	2000	2015
Bangladesh	**56.3**	**62.4**	**56.3**	**61.9**	**56.3**	**62.9**	**12.6**	**14.0**	**12.5**	**13.8**	**12.7**	**14.3**
South-East Asia	55.5	60.6	54.9	59.6	56.2	61.6	12.3	13.5	11.6	12.9	12.9	14.1
Global	58.5	63.1	57.0	61.6	60.1	64.6	14.4	15.8	13.3	14.8	15.4	16.8

Figure 86: Gross Domestic Product (GDP) per capita (in current US$) by contries and country groups



Source: World Bank, World Development Indicator

Figure 87: Trend s in GDP per capita and THE per capita growth for 2004-2014



Source: WHO Global Health Expenditure Database

Figure 88: Composition of Essential Service Package (ESP)

1) Maternal, Neonatal, Child and Adolescent Health Care
   - Maternal and Newborn Care
     - Maternal care: pre-conception, antenatal, delivery, postnatal
     - Newborn care: during delivery, after delivery
     - Obstetric and neonatal care
   - Child Health and Immunization
     - Integrated Management of Child Illnesses (IMCI)
     - Expanded Programme of Immunization (EPI)
   - Adolescent Health
     - Adolescent Sexual and Reproductive Health
     - Adolescent Nutrition
     - Adolescent Mental Health
     - Risk taking behaviour
2) Family Planning
     - Pre-Conception
     - Post-partum
     - Post-abortion
     - Post-MR
3) Nutrition
     - Child Nutrition: assessment of nutrition status, prevention of malnutrition, management of malnutrition
     - Maternal Nutrition
     - Adolescent Nutrition
4) Communicable Diseases
   - Tuberculosis
   - Malaria
   - HIV/AIDS
   - Neglected Tropical Diseases: Kala-Azar, Lymphatic Filariasis, Leprosy, Dengue,
   - Rabies, Intestinal Parasites
   - Other Communicable Diseases
5) Non-Communicable Diseases (NCD)
   - Hypertension
   - Diabetes Mellitus
   - NCD screening and management based on total risk assessment
   - Cancer: breast, cervical
   - Other NCDs: Arsenicosis, Chronic Obstructive Pulmonary Disease (COPD)
   - Mental Health, Autism and Neurodevelopment Disorder
   - Sexual and Gender-Based Violence (SGBV)
6) Management of other common conditions
   - Eye care
   - Ear care
   - Dental care
   - Skin care
   - Emergency care
   - Geriatric care

Figure 89: 4th HPNSP Results Framework

Results		Indicators	Baseline value	Source, Year	Target, 2022
Component 1	**MOHFW's governance and stewardship roles strengthened**				
Result 1.1	Legal and operational framework on governance and stewardship in place	1.1.1 Governance and stewardship action implemented in line with the milestones	GSAP developed and approved	Planning Wing 2016	
Result 1.2	Overall sector governance improved	1.2.1 Number of public and non-public facilities accredited	Process initiated	Planning Wing 2016	
		1.2.2 % of DPs submitting annual performance reports on off budget activities	54%	MPIR 2014	100%
		1.2.3 Incremental budget for MOHHFW ensured	14% increase of MOHPW budget	MOF, FY 15-16	Annual increment of MOHFW budget >15%
Component 2	**Health systems strengthened to increased performance and efficiency**				
Result 2.1	Quality workforce made available in health sector	2.1.1 % of service provider positions functionally vacant in district and upazila-level public facilities, by category (physician, nurse /midwife)	Physicians: 37.8% Nurse/Midwife: 19.3%		Physicians: 19% Nurse/Midwife: 10%
Result 2.2	Core systems (FM, infrastructure, procurement) strengthened	2.2.1 Increase in the number of Operational Plans (OPs) with annual budget execution over 80%	13	APIR 2015	19
		2.2.2 Procurement lead time reduce fore packages tracked through SCMP	573 weeks	SCMP 2014-15	40 weeks
Result 2.3	Strengthened performance monitoring to promote evidence-based decision making	2.3.1 Number of performance monitoring reports prepared and disseminated annually	3 (HB, APRI, SmPR)	APIR 2015	08 (APIR, SmPR, MISs, NIPORT, DGDA, DGNM, HEU)
		2.3.2 Number of UHFWCs under e-MIS scale up	30	2016, E-MIS / DGFP	1,500
		2.3.3 Number of districts implementing comprehensive maternal and newborn death review	10	CIPRB / DGHS 2014	64
Component 3	**Quality basic services reach the disadvantaged population to progress towards UHC**				
Result 3.1	Public health services strengthened to promote healthy behavior	3.1.1 % of newborn received essential newborn care (ENC)	6.1%	BDHS 2014	25%
		3.1.2 % of infants age 6-23 month are fed with minimum acceptable diet	22%	BDHS 2014	4%

Results		Indicators	Baseline value	Source, Year	Target, 2022
		3.1.3 % of women age 15-19 who have begun childbearing	30.8%	BDHS 2014	25%
		3.1.4 % of population of age 35 years or above use tobacco	51%	NCD-RF	45%
Result 3.2	Equitable coverage of ESP ensured	3.2.1 Contraceptive prevalence rate (CPR)	62.4%	BDHS 2014	75%
		3.2.2 CPR (modern methods) in lagging regions	Syl: 49.9%, Ctg 47.2%	BDHS 2014	60%
		3.2.3 Antenatal care coverage (at least 4 visits)	31.2%	BDHS 2014	50%
		3.2.4 % of delivery attended by skilled birth attendant (SBA)	42.1%	BDHS 2014	65%
		3.2.5 % mothers with non-institutional deliveries receiving postnatal care from a medical trained provider within 2 days of delivery	5.4%	BDHS 2014	100%
		3.2.6 Ratio of birth in health facilities of the riches wealth quintile to the poorest quintile (Q1-Q5)	14.9% : 70.2% = 1: 4.7	BDHS 2014	1 : 3.5
		3.2.7 % of public health facilities/public service delivery points without stock-out of essential medicines/FP supplies	Drugs: 66%, FP Methods: >98%	BHFS 2014	Drugs: 75%, FP methods >98%
		3.2.8 Tuberculosis case detection rate	53%	GTBR	75%
		3.2.9 Measles-Rubella (MR) immunization coverage among children under 12 months	86.6%	CES 2014	90%
Result 3.3	Quality of care improved	3.3.1 % of public health facilities with at least one staff trained in pregnancy and child birth	9.9%	BHFS	50%

Figure 90: Operational Plans (OPs) and Coordination linkages between OPs and implementing agencies under 4th Health, Nutrition and Population Sector Program

Operational Plan (OP)	Designated OP Lead	Implementation/Coordination Agencies	Linked/Supporting OP
Component 1 – Strengthening Governance and Stewardship			
1. Sector-Wide Programme Management & Monitoring (SWPMM)	JC (Planning), MOHFW	MOHFW, DGHS, DGFP and other agencies	All the OPs of the 4th HPNSP

Operational Plan (OP)	Designated OP Lead	Implementation/Coordination Agencies	Linked/Supporting OP
2. Planning, Monitoring & Research (PMS)	Director (Planning and Research), DGHS	DGHS, DGPF, MOHFW	SDAM, SWPMM and all OPs of DGHS
3. Planning Monitoring & Evaluation (MPE)	Director (Planning) DGFP	DGFP, DGHS, MOHFW	SDAM, SWPMM, TRD and all OPs of DGFP
4. Health Economics & Financing (HEF)	DG, HEU, MOHFW	MOHFW, DGHS, DGFP and other agencies	SWPMM, PMR,PME
5. Strengthening of Drug Administration (SDAM)	DG, DGDA	MOHFW, DGHS, DGFP and all other agencies	SWPMM, PMR, PME, PFD, PSSM-HS, HIS & e-H MIS
Component 2 – Health Systems Strengthening			
6. Health Information Systems & e-Health (HIS & e-Health)	Director (MIS), DGHS	DGHS, DGFP, MOHFW	SWPMM, PFD, MIS, all other OPs of DGHS
7. Management Information System (MIS)	Director (MIS) DGFP	DGFP, DGHS, MOHFW, Register General of CR VS, BBS, MOPA	SWPMM, HIS & e-H, TRD, HRD, PFD, and all other OPs of DGFP
8. Medical Education and Health Manpower Development (ME&HMD)	Director (Medical Education), DGHS	DGHS, with linkage to specific OPs for IST activities	SWPMM, PMR, HRD,
9. Procurement, Storage and Supply Management – Health Services (PSSM-HS)	Director (CMSD) DGHS	DGHS, MOHFW, MOPA, MOF	SWPMM, PFD and all other OPs of DGHS
10. Procurement, Storage and Supply Management – Family Planning (PSSM-FP)	Director (Logistics) DGFP	DGFP, MOHFW	SWPMM, PFD and all other OPs of DGFP
11. Physical facilities development (PFD)	Addi. Sec./Joint Sec. (Development), MOHFW	MOHFW, DGHS, DGFP, DGNM	SWPMM, RSM, CBHC, NMES, HRD, MCRAH, TRD, SDAM, PSSM-HS, HIS & e-H, PSSM-FP , MIS
12. Human Resource Development (HRD)	One Addl. Sec. MOHFW	MOHFW and its agencies	SWPMM, PMR, PME, ME&HMD, NMES, AMC, TRD
13. Improving Financial Management (IFM)	Addl. Sec/Joint Sec. (FMA), MOHFW	MOHFW and its agencies	All OPs of 4th HPNSP
14. Training, Research and Development (TRD)	DG, NIPORT	DGFP, MOHFW	SWPMM, PMR, PME, HIS & e-H, MIS, IEC, CBHC, MCRAH, HSM, MNCAH, CBHC, HRD, NMES, PFD
15. Nursing and Midwifery Education and Services (NMES)	DG, DGNM	DGHS, DGFP, MOHFW	SWPMM, HIS & e-H, CBHC, MNCAH, MCRAH, HSM, MIS, HRD, TRD
Component 3 – Provision of Quality Health Care Services			
16. Maternal, Neonatal, Child & Adolescent Health (MNC&AH))	Director (PHC), DGHS	DGHS, DGFP, DGNM	SWPMM, PMR, MCRAH, NNS, CBHC, HSM, LHEP, IEC, HIS & e-H, MIS, HRD, PSSM-HS, ME&HMD

Operational Plan (OP)	Designated OP Lead	Implementation/Coordination Agencies	Linked/Supporting OP
17. Maternal, Child, Reproductive and Adolescent Health (MCRAH)	Director (MCH), DGFP	DGFP, DGHS, DGNM	SWPMM, PME, MNCAH, NNS, CBHC, LHEP, IEC, MIS, HRD, PSSM-FP, TRD, FPFSD, CCSD
18. National Nutrition Services (NNS)	Director (IPHN), DGHS	DGHS, DGFP, MOHFW, and other concerned Ministries/ Agencies	SWPMM, PMR, LHEP, IEC, MNCAH, CBHC, CDC, TB-L&ASP, NCDC, HSM, MCRAH,
19. Communicable Disease Control (CDC)	Director (Disease Control), DGHS	DGHS, IEDCR, NIPSOM, IPH, BITID, IDH	SWPMM, PMR, CBHC, HIS & e-H, HSM, PSSM HS, LHEP
20. TB-Leprosy and AIDS and STD Programme (TB-L & ASP)	Director, MBDC,DGHS	DGHS, IEDCR, NIPSOM, IPH, BITID, IDH	SWPMM, PMR, CBHC, HIS & e-H, HSM, PSSM, HS, LHEP
21. Non-communicable Disease Control (NCDC)	Director, DGHS	DGHS, MOHFW, and other concerned Ministries/ Agencies	SWPMM, PMR, HIS & e-H, LHEP, HSM, CBHC
22. National Eye Care (NEC)	Director, NIO, DGHS	DGHS, IEDCR, NIPSOM, IPH,	SWPMM, PMR, CBHC, HIS & e-H, HSM, PSSM - PSSMHS, LHEP
23. Community-based Health Care (CBHC)	ADG,DGHS	DGHS (including IPH), DGFP, DGNM, HED,	SWPMM, PMR, MNCAH, MCRAH, NNS, HSM, CDC, NCDC, CCSDP, FPFSD, LHEP, IEC, HIS & e-H, MIS, HRD
24. Hospital Services Management (HSM)	Director (Hospitals and Clinics) DGHS	DGHS (including CMSD), HED, PWD, BSMMU, Private Medical Colleges, Diagnostic Lab, Local Govt. Institutions, DFDA, MOWCA	SWPMM, PMR, PSSM-HS, CDC, NCDC, MNCAH, ME&HMD, SDAM, HIS & e-H
25. Clinical Contraceptive Services Delivery Program (CCSDP)	Director, DGFP	DGFP, DGHS, MOHFW,	SWPMM, PME, FPFSD, MCRAH, PSSM-FP, MNCAH, CBHC, HSM, IEC, MIS, LHEP
26. Family Planning Field Services Delivery (FP-FSD)	Director, DGFP	DGFP, DGHS, MOHFW,	SWPMM, PME, CCSDP, MCRAH, PSSM-FP, MNCAH, CBHC, HSM, IEC, MIS, LHEP
27. Lifestyle, and Health Education & Promotion (LHEP)	Director (BHE), DGHS	MOHFW, DGHS, DGFP, IPH and other relevant ministries	SWPMM, PMR, NNS, IEC, CBHC,CDC, NCDC,HSM, HIS &e-H
28. Information, Education and Communication (IEC)	Director (IEM)	MOHFW, DGFP, DGHS, LHEP and other relevant ministries	LHEP, MCRAH, MNCAH, FPFSD, CCSDP, CDC, NCDC, NNS
29. Alternative Medical Care (AMC)	Director (Homeo and indigenous Medicine)	MOHFW, DGHS, DGFP and other relevant Ministries	RSM, CBHC, NCDC, SWPMM

Figure 91: Total Number and Categories of Sanctioned Posts in 2015 (Primary and Secondary Levels)

#	HWF Category	Current Sanctioned Posts	Est. Adjusted Sanctioned Posts
Primary Level - posted only at this level			
1	Health Assistant (HA)	20,877	40,083
2	Assistant Health Inspector (AHI)	4,205	9,100
3	Health Inspector	1,399	2,275
4	Family Practice Inspector (FPI)	4,500	4,550
5	Family Welfare Assystant (FWA)	23,500	40,950
6	Community Health Care Practitioners (CHCP)	13,861	26,722
7	SACMO	7,811	11,994
8	Midwife	1,200	5,612
Primary level - posted at Primary and Other levels			
1	Medical Officer (MO)	11,433	20,808
2	Dental Surgeon (DS)	421	401
3	Senior Staff Nurse (SSN)	5,222	6,988
4	Nurse Supervisor (NS)	397	401
5	Pharmacist	3,059	8,532
6	Medical technologist (Lab)	1,109	914
7	Medical technologist (all others)	1,793	1,944
8	Family Welfare Visitor (FWV)	5,458	8,543
Secondary level			
1	Superintendents	28	28
2	Assistant Directors	14	14
3	Sr. Consultants	443	443
4	Jr. Consultants	538	538
5	Resident surgeons/Resident physicians	47	47
6	Resident medical officers	75	75
7	Anesthesiologist	54	54
8	Pathologists/Radiologists	141	141
9	Assistant Surgeons/equivalent	110	110
10	Registrars/assistant registrars	205	205
11	Medical officers (unani, ayrvedi & homeopathy)	53	53
12	Dental surgeons	64	64
13	Nursing Superintendents	30	30
14	Deputy Nursing Superintendents	31	31
15	Nursing Supervisors	230	230
16	Sr. Staff Nurses	2,802	2,802
17	Pharmacists	209	209
18	Medical technologists (Lab)	107	107
19	Medical technologists (all others)	98	98
20	Medical technologists (Biochemistry, Hematology, blood bank)	33	33

Source: HR Projection and Career Development Plan (JDTF, 2016)

Figure 92: Penta3 Valid Coverage by 12 months and Fully Vaccinated Children Valid Coverage by 12 months across 64 districts

#	District/City Corporation	Penta3 Valid Coverage by 12 months	FVC Coverage by 12 months
1	Sunamganj	81.6	68.5
2	Dhaka	80.1	72.5
3	Jamalpur	88.2	74.5
4	Narayanganj	86.1	76.7
5	Comilla	85.4	77.5
6	Kishoreganj	89.1	78.1
7	Narail	90.2	78.8
8	Gopalganj	87.8	79.1
9	Natore	88	79.1
10	Feni	90.3	79.6
11	Patuakhali	89.7	79.9
12	Narsingdhi	89.5	80
13	Joypurhat	88.6	80.4
14	Thakurgoan	84.9	80.6
15	Khagrachari	90.9	80.6
16	Rangpur	90.2	80.8
17	Bandarban	87.8	80.9
18	Satkhira	90.7	80.9
19	Sherpur	88.5	81
20	Rangamati	86.6	81.3
21	Lakshmipur	88.9	81.4
22	Madaripur	90	81.5
23	Kurigram	91.9	81.5
24	Rajbar	91.5	81.6
25	Netrokona	89.3	81.7
26	Jhenaidah	91.3	81.8
27	Gaibandha	92.6	82
28	Meherpur	88.4	82.2
29	Nilphamari	89.5	82.8
30	Sariatpur	92.6	82.8
31	Gazipur	90.1	83
32	Tangail	90.6	83.4
33	Lalmonirhat	91.8	83.4
34	Cox's Bazar	92.3	83.4
35	Moulvi Bazar	92.4	83.6
36	Panchagarh	88.9	83.7
37	Khulna	89.3	83.7
38	Sylhet	90.5	83.8
39	Sirajganj	91.4	83.8
40	Magura	88.8	84
41	Noakhali	91	84.1
42	Jhalokati	92	84.1
43	Chapai Nawabganj	90.5	84.3

#	District/City Corporation	Penta3 Valid Coverage by 12 months	FVC Coverage by 12 months
44	Faridpur	91.4	84.3
45	Habiganj	91	84.4
46	Rajshahi	92.5	84.8
47	Pabna	92	85.6
48	Jessore	91.7	85.7
49	Chandpur	91	85.8
50	Dinajpur	91.4	85.9
51	Chuadanga	91.9	86.4
52	Bogra	93.6	86.5
53	Bagerhat	90.8	86.8
54	Mymensingh	93.1	86.9
55	Perojpur	94.3	87
56	Munshiganj	95.1	87.3
57	Barguna	93	87.6
58	Chittagong	92.9	88
59	Naogaon	93.9	88
60	Manikganj	93.9	89.7
61	Barisal	95.5	91
62	Bhola	94.5	91.3
63	Brahmanbaria	95.1	91.5
64	Kushtia	95.2	92.6

Source: CES 2016, WHO CO, 2017

Figure 93: Drop-out rates (DTP1-DTP3 and BCG-MCV1) by years (Official Estimates)

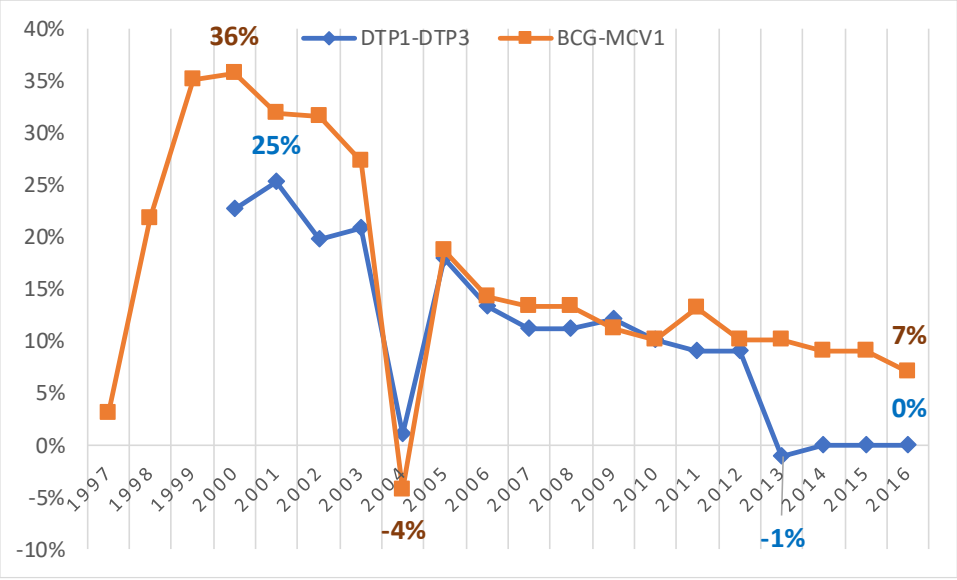


Figure 94: DTP3 coverage comparison by data sources (WUENIC, based on adminitratively reported data and official estiamtes) by years

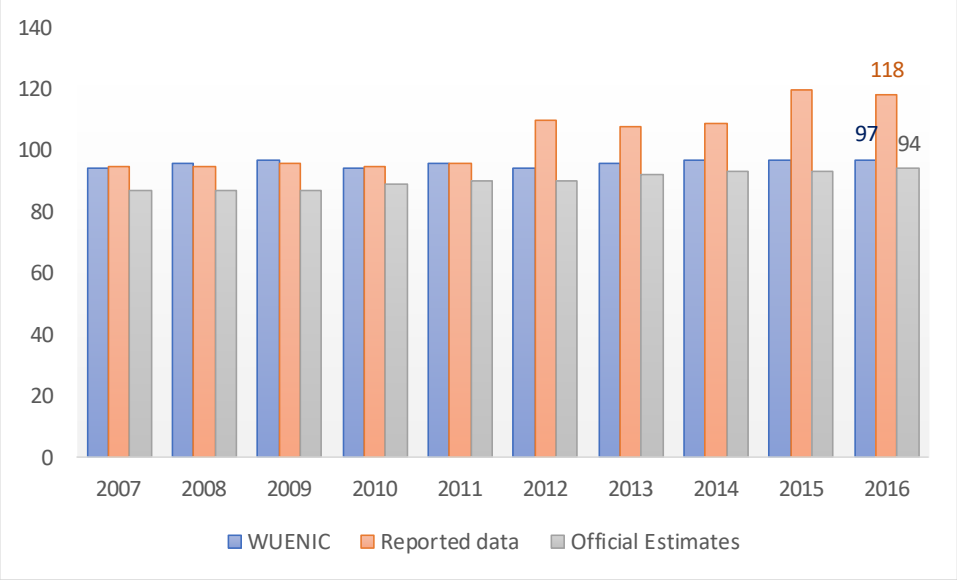
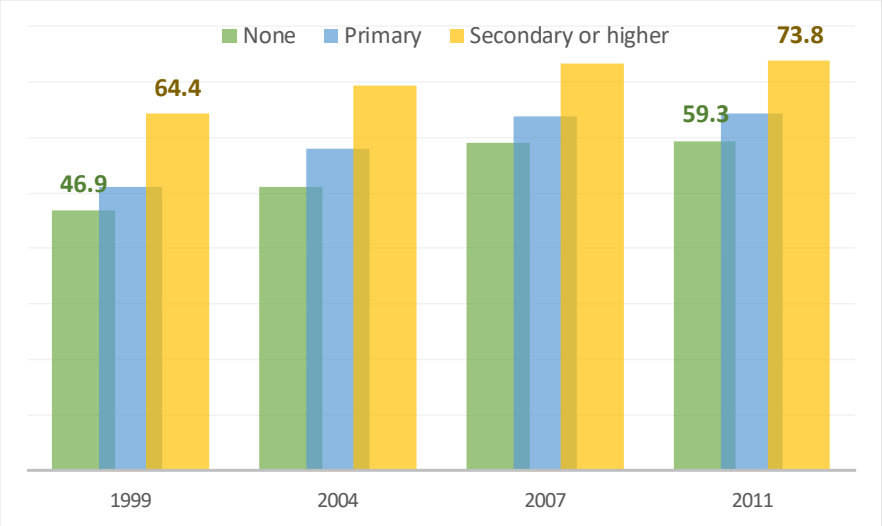
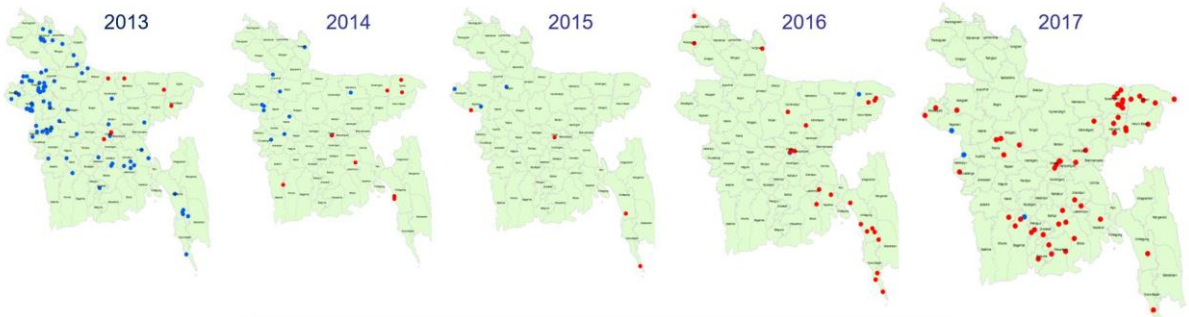


Figure 95: Comparison of Composite Coverage Index (in %) by education level of mothers by years



Source: DHS / WHO GHO

*Figure 96: Laboratory-confirmed measles and rubella outbreaks, Bangladesh 2013-2017**

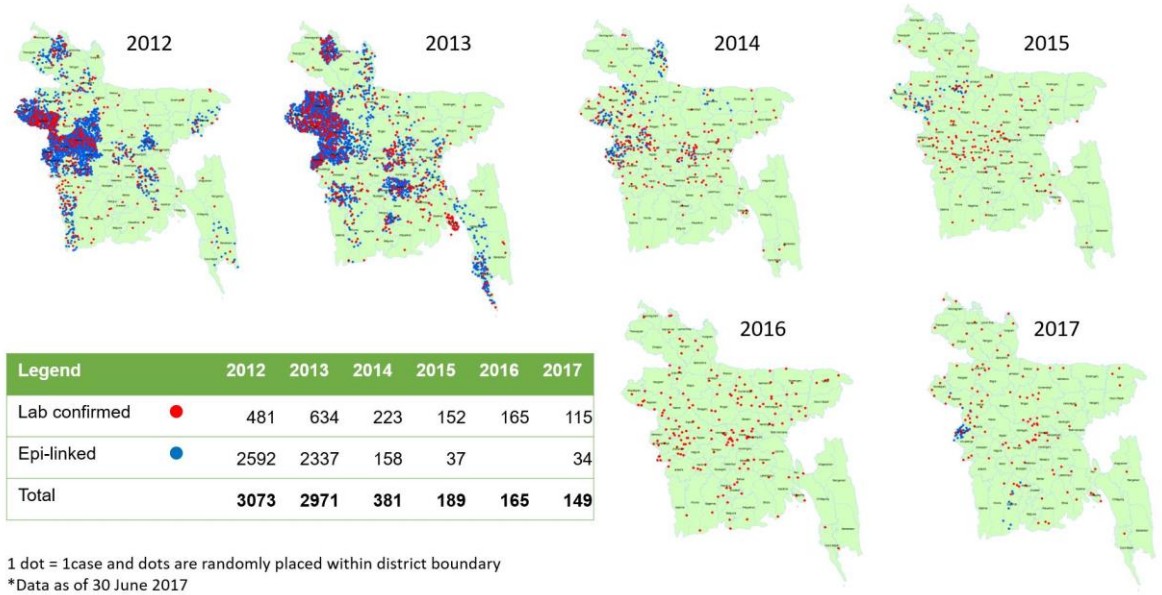


Legend	2013	2014	2015	2016	2017
Lab confirmed Measles outbreak	7	9	4	23	54
Lab confirmed Rubella outbreak	87	11	3	2	3
1 dot represents one outbreak and dots are randomly placed within district boundary					

*as of June 30, 2017

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

*Figure 97: Confirmed Rubella Cases, by district and year, Bangladesh 2012-2017**

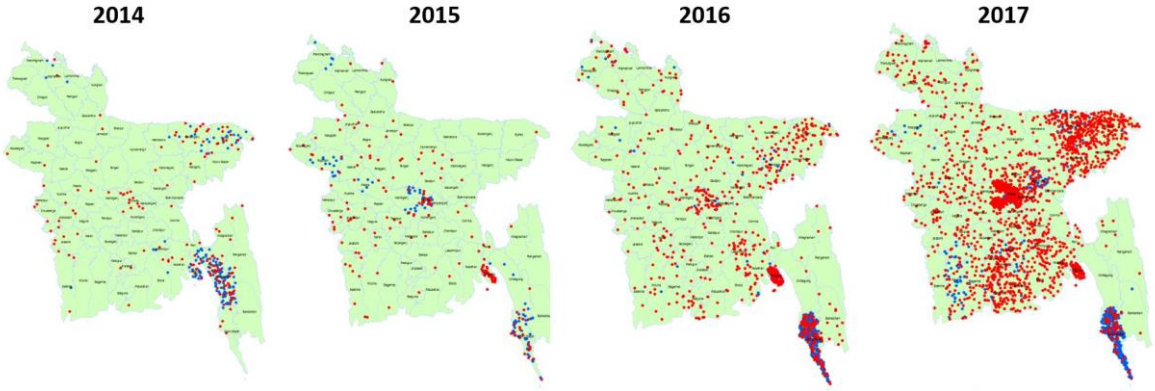


Legend	2012	2013	2014	2015	2016	2017
Lab confirmed	481	634	223	152	165	115
Epi-linked	2592	2337	158	37		34
Total	**3073**	**2971**	**381**	**189**	**165**	**149**

1 dot = 1case and dots are randomly placed within district boundary
*Data as of 30 June 2017

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

*Figure 98: Confirmed measles cases, by district and year, Bangladesh 2014-2017**



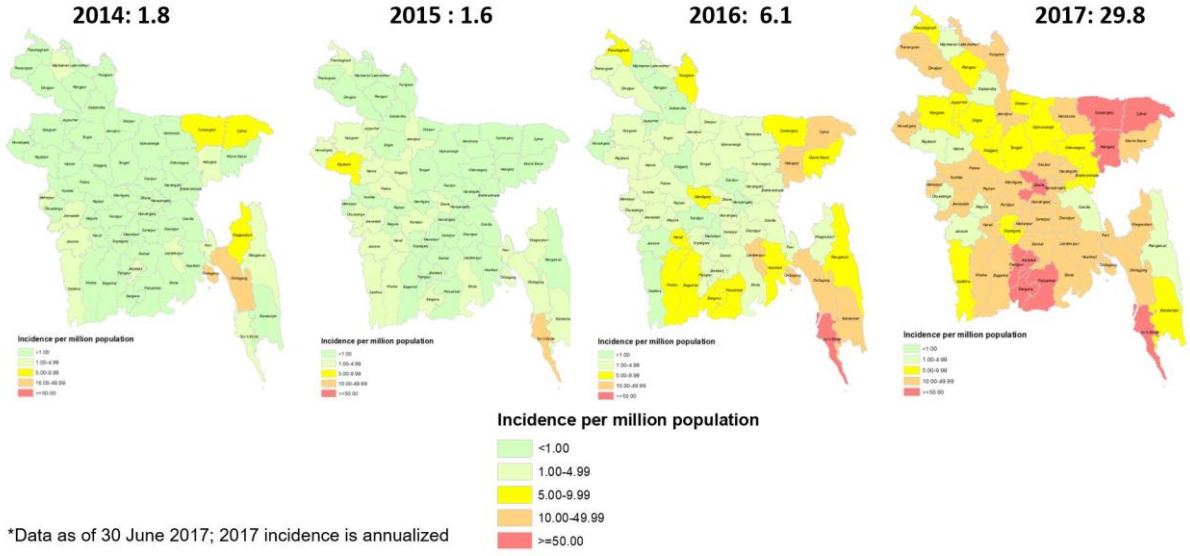
1 dot = 1 case and dots are randomly placed within district boundary

* Data as of 30 June 2017

Legend	2014	2015	2016	2017
Lab confirmed	143	158	619	1,871
Epi-linked	143	92	354	558
Total	**286**	**250**	**973**	**2,429**

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

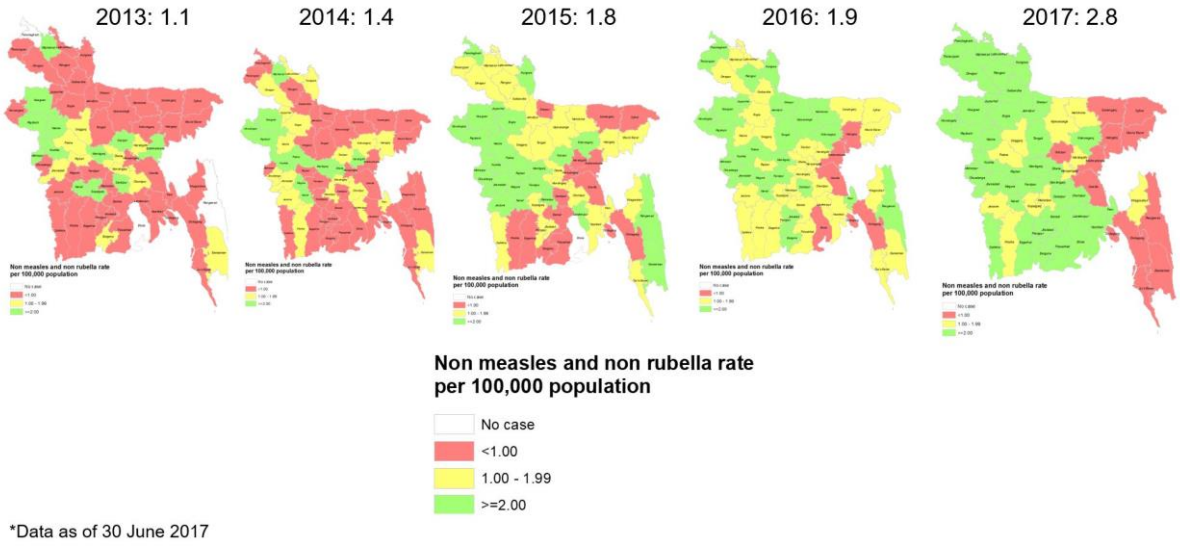
*Figure 99: Measles incidence per million population, by district and year, Bangladesh 2014-2017**



*Data as of 30 June 2017; 2017 incidence is annualized

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

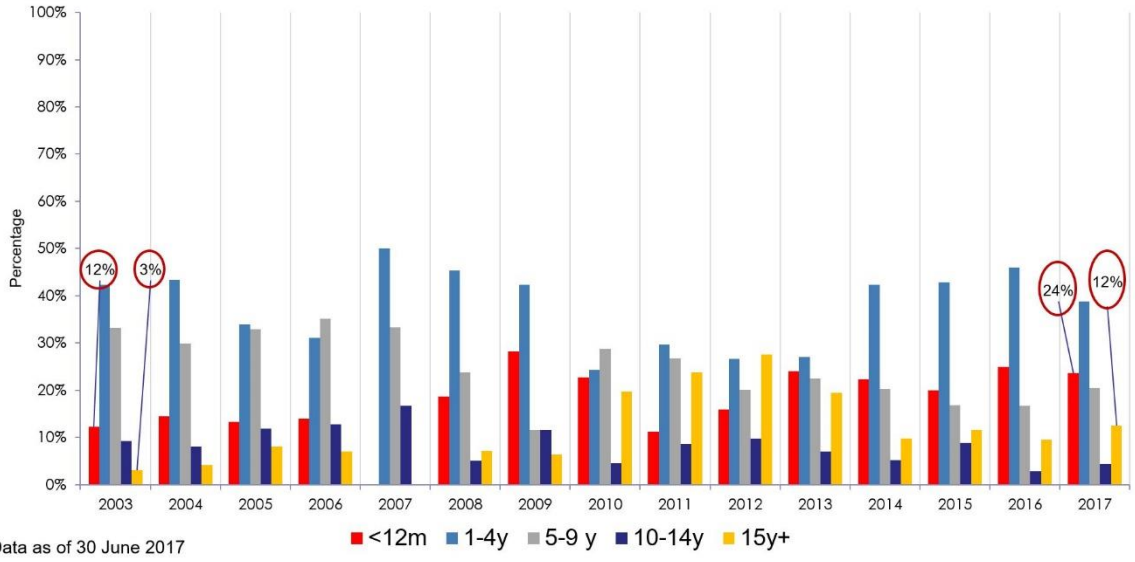
*Figure 100: Non-Measles and Non-Rubella Reporting Rate per 100,000 population, 2013-2017**



*Data as of 30 June 2017

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

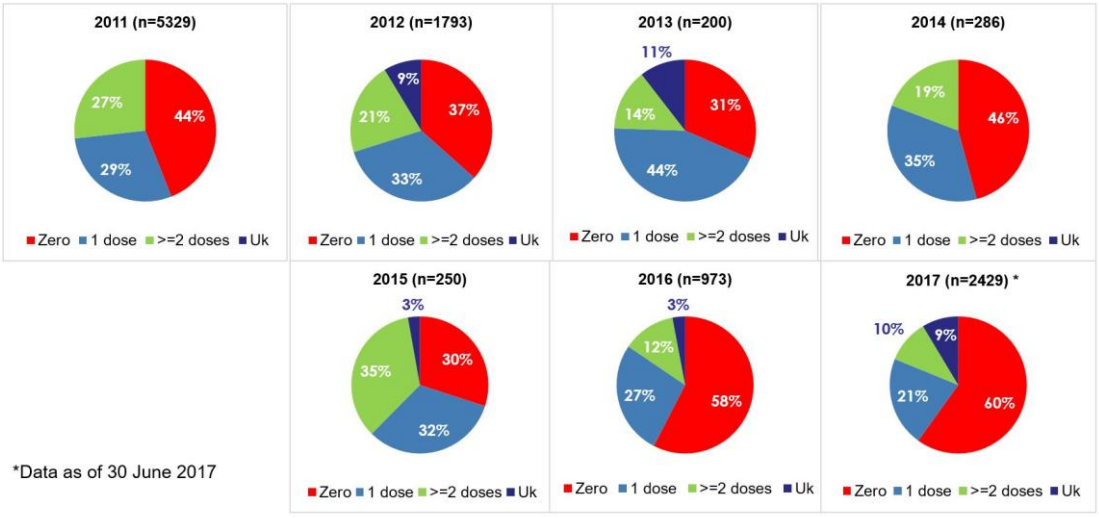
*Figure 101: Age distribution of confirmed measles cases, Bangladesh, 2003-2017**



*Data as of 30 June 2017

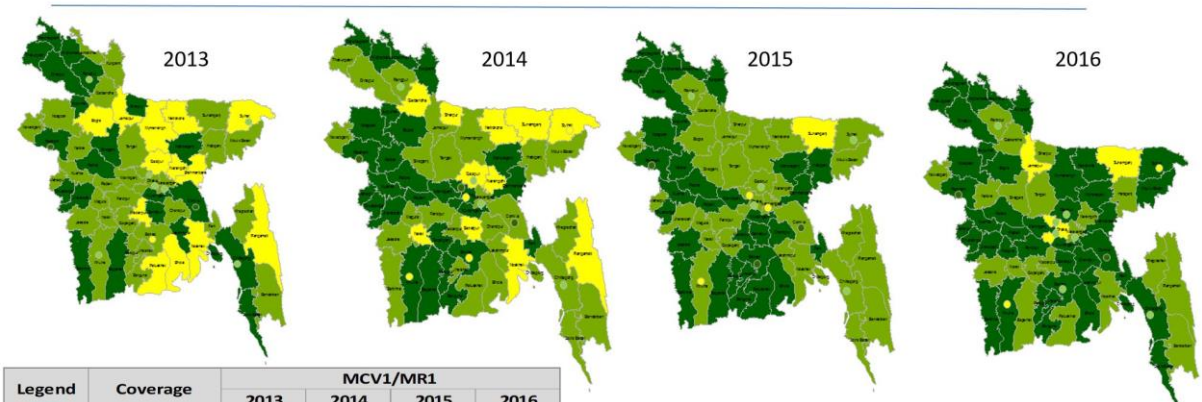
Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

*Figure 102: Vaccination Status of Confirmed Measles Cases, Bangladesh, 2011-2017**



Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Figure 103: MCV1/MR1 crude coverage by 24 months, by district and city corporation, Bangladesh 2013-2016

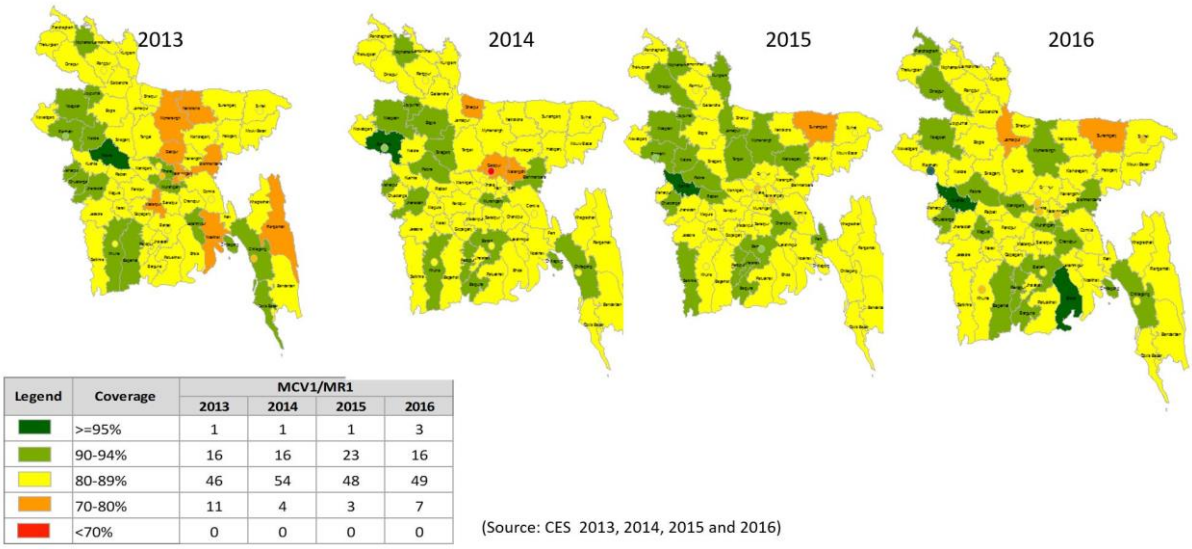


Legend	Coverage	MCV1/MR1			
		2013	2014	2015	2016
	>=95%	23	30	35	43
	90-94%	37	30	36	27
	80-89%	14	15	4	5
	70-80%	0	0	0	0
	<70%	0	0	0	0

(Source: CES 2013, 2014, 2015 and 2016)

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Figure 104: MCV1/MR1 valid coverage by 12 months, by district and city corporation, Bangladesh 2013-2016

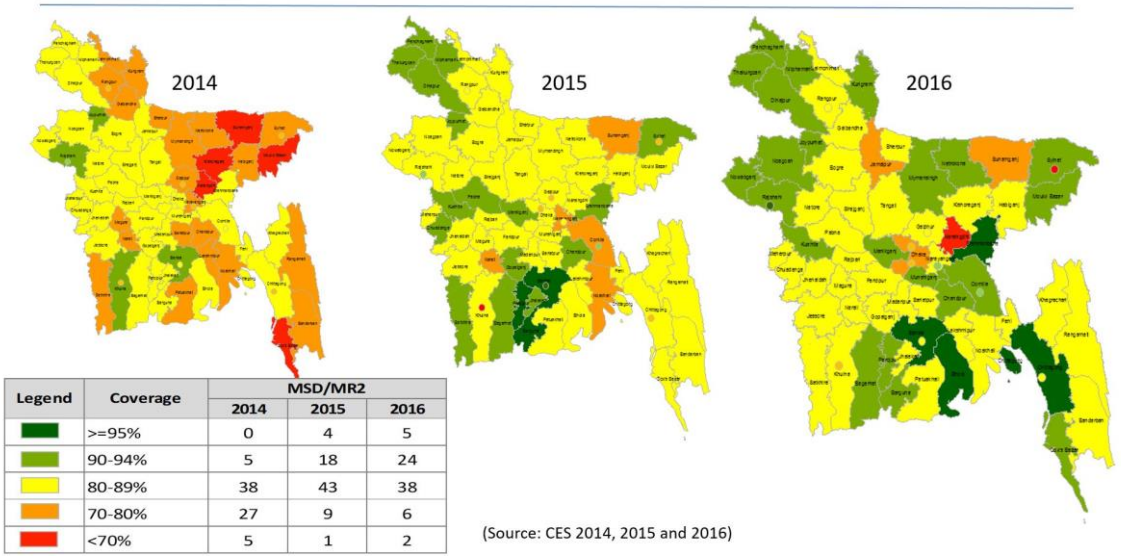


Legend	Coverage	MCV1/MR1			
		2013	2014	2015	2016
	>=95%	1	1	1	3
	90-94%	16	16	23	16
	80-89%	46	54	48	49
	70-80%	11	4	3	7
	<70%	0	0	0	0

(Source: CES 2013, 2014, 2015 and 2016)

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Figure 105: MCV2/MR2 crude coverage by 24 months, by district and city corporation, Bangladesh 2014-2016



Legend	Coverage	MSD/MR2		
		2014	2015	2016
	>=95%	0	4	5
	90-94%	5	18	24
	80-89%	38	43	38
	70-80%	27	9	6
	<70%	5	1	2

(Source: CES 2014, 2015 and 2016)

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Figure 106: Measles and rubella surveillance performance indicators, 2012-2017

Indicators	Regional target	2012	2013	2014	2015	2016	2017
Reporting rate of discarded non-measles non-rubella cases per 100,000 population	>=2	1.9	1.1	1.4	1.8	1.9	2.8
Proportion of districts & CCs reporting at least 2 discarded non-measles/rubella cases per 100,000 population	≥80%	30% (21/70)	19% (13/70)	18% (13/71)	38% (27/71)	44% (33/75)	64% (48/75)
Percentage of suspected measles cases tested in a proficient laboratory	≥80%	81.2%	84.3%	89.8%	98.5%	99.7%	96.1%
Percentage of suspected outbreaks fully investigated	≥80%	100%	100%	100%	100%	100%	100%
Percentage of specimen received at laboratory within 5 days of collection	≥80%	99%	99%	99%	99.8%	99.4%	99.4%
Proportion of results reported by the laboratory within 4 days of receiving the specimen	≥80%	32%	82%	99%	87.0%	94.4%	66.6%
Timeliness of reporting	≥80%	85%	85%	89%	92%	97%	99%
Completeness of reporting	≥90%	91%	91%	96%	97%	99%	100%
Annualized incidence of confirmed measles cases per million population	<5	11.8	1.3	1.8	1.6	6.1	29.8
Annualized incidence of confirmed rubella cases per million population		20.2	19.3	2.4	1.2	1.0	1.8

*Data as of 30 June 2017

Source: Strategic Plan for the Elimination of Measles, Rubella and CRS in Bangladesh by 2020 DRAFT: 8-07-2017

Figure 107: Health workforce for immunization by levels and type (dedicated and shared)

			Full time equivalent (FTE)		
	Number of positions filled	% Time working for Immunization	**Dedicated**	**Shared**	**Total**
Central					
Line Director - MNC&AH	1	50%	-	1	1
Deputy Director - EPI & Sureillance	1	100%	1	-	1
Programme Manager - EPI & Surveillance	1	100%	1	-	1
Assistant Director, EPI & Surveillance	1	100%	1	-	1
Deputy Programme Manager - EPI & Surveillance	1	100%	1	-	1
Deputy Programme Manager - Procurement & Supplies	1	100%	1	-	1
Deputy Programme Manager - Field Service	1	100%	1	-	1
Deputy Programme Manager - IEC and VCC	1	100%	1	-	1
Senior Cold-chain engineer	-	100%	-	-	-
Medical Officer	2	100%	2	-	2
Cold Chain Engineer	1	100%	1	-	1
Store Manager	1	100%	1	-	1
Logistics Officer	1	100%	1	-	1
Training Officer	1	100%	1	-	1
Accounts Officer	1	100%	1	-	1
Administrative Officer	1	100%	1	-	1
Transport Operator	1	100%	1	-	1
Sub-Assistant - Engineer	6	100%	6	-	6
Computer Operator	1	100%	1	-	1
Stenographer	1	100%	1	-	1
Sr. Mechanic	1	100%	1	-	1
U.D. Assistant	4	100%	4	-	4
Statistical Assistant	2	100%	2	-	2
Store Keeper	4	100%	4	-	4
Cashier	1	100%	1	-	1
Accountant	1	100%	1	-	1
Steno-Typist	1	100%	1	-	1
Audio Visual Technician	1	100%	1	-	1
Cold Chain Technician	1	100%	1	-	1
Medical Technologist	4	100%	4	-	4
Accounts Assistant	3	100%	3	-	3

			Full time equivalent (FTE)		
	Number of positions filled	% Time working for Immunization	**Dedicated**	**Shared**	**Total**
Office Assistant - cum computer Operator	4	100%	4	-	4
Record Keeper	2	100%	2	-	2
Junior Mechanic	1	100%	1	-	1
Telephone operator	1	100%	1	-	1
Electrician	1	100%	1	-	1
Cash shaker	1	100%	1	-	1
Machine Operator	1	100%	1	-	1
Driver	18	100%	18	-	18
Truck helper	6	100%	6	-	6
M.L.S.S.	6	100%	6	-	6
Vaccine Carrier	8	100%	8	-	8
Packers	4	100%	4	-	4
Darwarn/Night Guard	2	100%	2	-	2
Mali	1	100%	1	-	1
Sweeper/Cleaner	2	100%	2	-	2
IT specialist	-	100%	-	-	-
Statistical officer	-	100%	-	-	-
Head Assistant	-	100%	-	-	-
Subtotal Central	**106**	**100%**	**105**	**1**	**106**
District					
Civil Surgeon (CS)	1	15%	-	64	64
Deputy Civil Surgeon (DCS)	1	15%	-	64	64
Medical Officer - Civil Surveon (MOCS)	1	25%	-	64	64
District EPI Superintend	1	100%	64	-	64
Cold Chain Technician	1	100%	64	-	64
Assistant Storekeeper (EPI)	1	100%	64	-	64
District Health Superintendent	1	40%	-	64	64
Public Health Nurse	1	20%	-	64	64
Senior Health Education Officer	1	20%	-	64	64
Junior Health Education Officer	1	20%	-	64	64
Statistical Assistant	1	25%	-	64	64
Sanitary Inspector	1	10%	-	64	64
Subtotal District	**12**		**192**	**576**	**768**
Upazila					
Upazila Health and Family Planning Officer (UH&FPO)	1	30%	-	488	488
Resident Medical Officer (RMO)	1	10%	-	488	488
Medical Officer - Disease Control (MODC)	1	20%	-	488	488
Medical Officer - MCH	1	10%	-	488	488
Medical Officer	1	10%	-	488	488
Upazila Family Planning Officer (UFPO)	1	20%	-	488	488
Health Inspector	2	60%	-	976	976
Medical Technologist EPI (MTEPI)	1	100%	488	-	488
Sanitary Inspector	1	20%	-	488	488
Statistician	1	25%	-	488	488
Vaccine Carriers (Porters)	4	100%	1,952	-	1,952
Medical Officer (Municipality)	1	50%	-	488	488
Sanitary Inspector (Municipality)	1	5%	-	488	488
Vaccinator Supervisor (Municipality)	1	100%	488	-	488
Secretary (Municipality)	1	10%	-	488	488
Vaccinator / NGO Worker (Municipality)	2	100%	976	-	976
Subtotal Upazila	**21**		**3,904**	**6,344**	**10,248**
Union					
Assistant Health Inspector (AHI)	1	70%	-	4,495	4,495
Family Planning Inspector (FPI)	1	30%	-	4,495	4,495
Family Welfare Visitor (FWV)	1	30%	-	4,495	4,495
Health Assistant (HA)	3	100%	13,485	-	13,485
Family Welfare Assistant (FWA)	6	50%	-	26,970	26,970
Sub-Assistant Community Medical Officer (SACMO)	1	25%	-	4,495	4,495
Medical Assistant (MA)	1	20%	-	4,495	4,495

			Full time equivalent (FTE)		
	Number of positions filled	% Time working for Immunization	**Dedicated**	**Shared**	**Total**
Community Health Care Provider (CHCP)	3	30%	-	13,984	13,984
Subtotal Union	**17**		**13,485**	**63,429**	**76,914**
Grand Total	**156**		**17,686**	**70,350**	**88,036**

Figure 108: Financing projections by sources, years, and types of financing

	2018	2019	2020	2021	2022	Total
Secured funding						
Government	65,128,331	66,222,516	66,722,125	65,550,463	65,781,474	**329,404,909**
Gov. co-financing of gavi vaccine	4,995,034	7,167,783	7,980,530	9,264,988	10,688,323	**40,096,658**
WHO	2,703,954	-	-	-	-	**2,703,954**
WHO/PDA	-	-	-	-	-	**-**
UNICEF	380,000	380,000	-	-	-	**760,000**
UNICEF/PDA	-	-	-	-	-	**-**
GAVI NVS	52,479,873	63,375,660	60,521,551	59,889,276	58,684,271	**294,950,632**
GAVI/CCEOP	-	-	-	-	-	**-**
Govt PDA	-	-	-	-	-	**-**
UNICEF HSS2	7,553,172	8,347,185	1,002,107	14,372	27,227	**16,944,063**
Subtotal secure funding	**133,240,364**	**145,493,144**	**136,226,314**	**134,719,099**	**135,181,295**	**684,860,216**
Probable funding						
Government	-	-	-	-	848,395	**848,395**
Gov. co-financing of gavi vaccine	-	-	-	-	-	**-**
WHO	-	2,974,349	3,271,784	3,598,963	3,958,859	**13,803,956**
WHO/PDA	5,874,587	1,410,021	1,634,793	5,797,836	6,085,880	**20,803,117**
UNICEF	-	-	280,000	280,000	280,000	**840,000**
UNICEF/PDA	6,968,506	3,619,920	3,707,758	3,428,828	3,170,669	**20,895,680**
GAVI NVS	24,704,682	-	-	-	25,225,172	**49,929,855**
GAVI/CCEOP	-	314,374	843,209	583,970	486,554	**2,228,108**
Govt PDA	1,229,288	5,578,672	752,038	689,787	734,559	**8,984,344**
UNICEF HSS2	-	-	-	-	-	**-**
Subtotal probable funding	**38,777,064**	**13,897,336**	**10,489,581**	**14,379,385**	**40,790,087**	**118,333,454**
Total (secured and probable funding)						
Government	65,128,331	66,222,516	66,722,125	65,550,463	66,629,869	**330,253,303**
Gov. co-financing of gavi vaccine	4,995,034	7,167,783	7,980,530	9,264,988	10,688,323	**40,096,658**
WHO	2,703,954	2,974,349	3,271,784	3,598,963	3,958,859	**16,507,910**
WHO/PDA	5,874,587	1,410,021	1,634,793	5,797,836	6,085,880	**20,803,117**
UNICEF	380,000	380,000	280,000	280,000	280,000	**1,600,000**
UNICEF/PDA	6,968,506	3,619,920	3,707,758	3,428,828	3,170,669	**20,895,680**
GAVI NVS	77,184,556	63,375,660	60,521,551	59,889,276	83,909,443	**344,880,486**
GAVI/CCEOP	-	314,374	843,209	583,970	486,554	**2,228,108**
Govt PDA	1,229,288	5,578,672	752,038	689,787	734,559	**8,984,344**
UNICEF HSS2	7,553,172	8,347,185	1,002,107	14,372	27,227	**16,944,063**
Total funding	**172,017,428**	**159,390,480**	**146,715,895**	**149,098,484**	**175,971,383**	**803,193,670**

Figure 109: Selected World Development Indicators for Bangladesh (2000-2016)

№	Indicator Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Macroeconomic indicators																	
1	GDP growth (annual %)	5.3	5.1	3.8	4.7	5.2	6.5	6.7	7.1	6.0	5.0	5.6	6.5	6.5	6.0	6.1	6.6	7.1
2	GDP per capita (current US$)	406	403	401	433	461	484	494	541	616	681	758	836	856	952	1085	1210	1359
3	GDP per capita growth (annual %)	3	3	2	3	4	5	5	6	5	4	4	5	5	5	5	5	6
4	GDP per capita, PPP (current international $)	1,301	1,372	1,420	1,491	1,586	1,718	1,864	2,024	2,164	2,265	2,393	2,571	2,756	2,935	3,132	3,335	3,581
5	GNI per capita, Atlas method (current US$)	420	430	420	450	490	530	560	590	640	710	780	870	940	1,010	1,070	1,190	1,330
6	Inflation, consumer prices (annual %)	2	2	3	6	8	7	7	9	9	5	8	11	6	8	7	6	6
7	Tax revenue (% of GDP)		7	7	7	7	7	7	7	8	8	8	9	9	9	9	9	
8	Labor tax and contributions (% of commercial profits)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Tax payments (number)						33	21	33	21	34	22	34	33	33	33	33	33
10	Profit tax (% of commercial profits)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Total tax rate (% of commercial profits)						39	39	41	40	39	39	39	39	33	35	34	34
12	External debt stocks (% of GNI)	28	27	29	30	29	26	27	26	24	23	22	20	20	21	19	19	
13	Central government debt, total (% of GDP)		31	32	31													
14	Central government debt, total (% of GDP)		31	32	31													
15	Foreign direct investment, net inflows (BoP, current US$, in million)	280	79	52	268	449	761	457	651	1328	901	1232	1265	1584	2603	2539	3380	
16	Foreign direct investment, net inflows (% of GDP)	1	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	
17	Personal remittances, received (current US$, in million)	1,968	2105	2858	3192	3584	4642	5428	6562	8941	10521	10850	12071	14120	13867	14988	15388	13680
18	Personal remittances, received (% of GDP)	4	4	5	5	6	7	8	8	10	10	9	9	11	9	9	8	6
19	Net official development assistance and official aid received (current US$, in million)	1,174	1,045	901	1,398	1,417	1,320	1,223	1,513	2,071	1,227	1,405	1,492	2,152	2,634	2,423	2,570	
20	Official exchange rate (LCU per US$, period average)	52	56	58	58	60	64	69	69	69	69	70	74	82	78	78	78	78
	Social (Demographic, Social Protection, Labor market, Poverty)																	
21	Population ages 0-14 (% of total)	37	37	36	36	35	35	34	34	33	33	32	32	31	31	30	29	29
22	Population growth (annual %)	2.0	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
23	Population, total (in million)	132	134	137	139	141	143	145	147	149	151	152	154	156	158	159	161	163
24	Urban population (% of total)	23.6	24	25	25	26	27	28	28	29	30	30	31	32	33	34	34	35
25	Birth Rate (crude, per 1,000 people)	27.6	27	26	26	25	24	23	23	22	22	21	21	21	20	20	19	
26	Adequacy of social protection and labor programs (% of total welfare of beneficiary households)						28					9						
27	Benefits incidence in poorest quintile (%) -All Social Protection and Labor						15					9						
28	Coverage (%) -All Social Protection and Labor						14					18						
29	Adequacy of unemployment benefits and ALMP (% of total welfare of beneficiary households)											5						

30	Adequacy of social safety net programs (% of total welfare of beneficiary households)						20					4							
31	Coverage (%) - All Social Assistance						12					13							
32	Adequacy of social insurance programs (% of total welfare of beneficiary households)						50					34							
33	Benefits incidence in poorest quintile (%) - All Social Insurance						0					0							
34	Coverage (%) - All Social Insurance						2					2							
35	Unemployment, youth total (% of total labor force ages 15-24) (national estimate)	10.7			7		9					9			9				
36	Unemployment, youth total (% of total labor force ages 15-24) (modeled ILO estimate)	9.3	9	8	6	7	9	9	7	8	10	9	9	9	9	10	10	10	
37	Share of youth not in education, employment, or training, total (% of youth population)						31												
38	Unemployment, total (% of total labor force) (national estimate)	3.3			4		4					5			4				
39	Unemployment, total (% of total labor force)	3.3	3	3	4	5	4	5	4	3	5	5	5	5	4	4	4	4	
40	Poverty headcount ratio at $3.10 a day (2011 PPP) (% of population)	70.1					63					57							
41	Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	33.7					25					19							
42	Poverty gap at $3.10 a day (2011 PPP) (%)	25.6					21					17							
43	Poverty gap at $1.90 a day (2011 PPP) (%)	7.5					5					3							
44	GINI index (World Bank estimate)	33.4					33					32							
45	Poverty headcount ratio at national poverty lines (% of population)	48.9					40					32							
	Education																		
46	Pupil-teacher ratio in pre-primary education (headcount basis)	24.4	28	23															
47	Pupil-teacher ratio in primary education (headcount basis)						47	48	45	44	46	43	40				36		
48	Pupil-teacher ratio in secondary education (headcount basis)	38.4	38	34	31	27	24	25	25	27	28	28	31	32	35				
49	Effective transition rate from primary to lower secondary general education, both sexes (%)											95							
50	Expenditure on primary as % of government expenditure on education (%)	46.5		45	45	40		42	46	45	45		47	45				44	
51	Expenditure on secondary as % of government expenditure on education (%)	36.1		44	46	49		43	41	40	40		41	39				35	
52	Expenditure on tertiary as % of government expenditure on education (%)	10.1	10	11	9	12		13	12	13	14		10	15				20	
53	Expenditure on education as % of total government expenditure (%)	20.5	19	16	17	16		17	18	18	14		17	16	14				
54	Government expenditure on education, total (% of GDP)	2.1	2	2	2	2		2	2	2	2		2	2	2			2	

4. Annexes

	Health																
55	Life expectancy at birth, total (years)	65.3	66	67	67	68	68	68	69	69	70	70	71	71	71	72	72
56	Prevalence of HIV, total (% of population ages 15-49)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	Mortality rate, under-5 (per 1,000 live births)	88	84	79	75	71	67	63	59	56	53	50	47	44	42	40	38
58	Mortality rate, neonatal (per 1,000 live births)	43	41	40	38	37	36	34	33	32	30	29	28	26	25	24	23
59	Children (0-14) living with HIV	100	100	100	100	100	100	200	200	200	200	200	500	500	500	500	500
60	Prevalence of HIV, female (% ages 15-24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	Prevalence of HIV, male (% ages 15-24)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	Antiretroviral therapy coverage (% of people living with HIV)							1	1	3	5	6	8	9	12	14	15
63	Maternal mortality ratio (modeled estimate, per 100,000 live births)	399	384	365	349	333	319	303	288	273	258	242	228	214	201	188	176
64	Maternal mortality ratio (national estimate, per 100,000 live births)		322						351	348		220	210				
65	Completeness of infant death reporting (% of reported infant deaths to estimated infant deaths)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	Mortality rate, infant (per 1,000 live births)	64	61	59	56	53	51	48	46	44	41	39	37	35	34	32	31
	Healthcare Financing																
67	External resources for health (% of total expenditure on health)	7.3	8.4	8.9	9.0	9.2	8.7	7.3	7.5	7.4	8.4	8.0	7.7	8.3	9.5	11.8	
68	Out-of-pocket health expenditure (% of total expenditure on health)	57.8	56.8	56.5	58.9	57.9	59.9	58.7	61.2	60.3	61.1	61.0	61.3	63.3	66.8	67.0	
69	Out-of-pocket health expenditure (% of private expenditure on health)	97.4	97.0	96.0	96.4	96.3	93.8	93.4	94.5	90.7	92.7	92.8	91.5	93.0	93.0	92.9	
70	Health expenditure per capita (current US$)	9.1	9.6	10.3	10.8	12.0	12.4	13.5	15.2	17.6	19.8	23.1	25.4	25.6	28.2	30.8	
71	Health expenditure per capita, PPP (constant 2011 international $)	30	34	37	38	42	46	52	57	62	66	74	81	85	85	88	
72	Health expenditure, private (% of GDP)	1.4	1.4	1.5	1.5	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.1	2.0	
73	Health expenditure, public (% of total health expenditure)	40.7	41.5	41.2	38.9	39.8	36.1	37.2	35.3	33.5	34.1	34.3	33.0	32.0	28.1	27.9	
74	Health expenditure, public (% of government expenditure)	8.1	8.0	8.6	8.0	8.8	7.9	8.6	8.6	6.9	7.8	8.3	7.5	6.9	5.5	5.7	
75	Health expenditure, public (% of GDP)	0.9	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	0.8	0.8	
76	Health expenditure, total (% of GDP)	2.3	2.5	2.6	2.5	2.6	2.7	2.8	2.8	2.8	2.9	3.1	3.2	3.1	2.9	2.8	

Source: World Bank World Development Indicators (last updated July 2017)

Figure 110: Number of reported cases of vaccine preventable diseases by years, Bangladesh and South-East Asia region

Bangladesh

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CRS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	66	89	87
Diphtheria	58	21	122	73	78	117	125	34	86	43	23	27	11	16	2	13	6	2
JE	-	-	-	-	-	-	-	-	204	702	15	15	103	52	23	183	76	1,294
Measles	5,666	5,098	4,414	3,484	4,067	9,743	25,934	6,192	2,924	2,660	718	788	5,625	1,986	237	289	240	972
Mumps	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetanus (N)	479	376	436	336	390	748	341	256	206	152	121	117	98	109	108	-	117	110
Pertussis	520	252	16	587	332	140	125	46	87	33	16	17	44	13	1	12	11	1
Polio	393	198	-	-	-	-	-	18	-	-	-	-	-	-	-	-	-	-
Rubella	-	-	-	-	-	327	9,229	3,418	13,226	5,526	13,076	12,963	5,631	3,245	3,034	381	189	165
Tetanus (Total)	1,814	1,155	1,221	1,036	715	1,897	1,388	1,235	1,034	943	791	710	644	614	508	-	559	441
Yellow Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

South-East Asia region

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CRS	19	26	13	8	61	20	-	2	-	-	3	8	3	14	23	86	183	319
Diphtheria	2,170	5,470	6,045	5,596	4,919	8,874	6,502	3,377	4,133	4,399	4,049	4,120	5,179	3,953	4,080	7,666	2,504	4,016
JE	-	-	-	49	37	39	78	368	4,772	1,769	943	838	1,548	282	1,356	3,320	2,831	3,500
Measles	47,741	78,558	81,771	76,912	94,598	112,041	88,973	98,124	73,545	72,547	84,356	54,228	69,546	46,945	30,101	95,932	109,107	82,006
Mumps	34,250	9,395	14,994	13,563	13,779	12,861	14,532	13,363	10,969	14,820	49,012	46,072	50,626	47,086	36,352	38,327	42,937	31,739
Tetanus (N)	1,311	4,322	2,577	2,155	2,393	2,229	1,374	1,097	1,512	1,294	1,232	828	1,076	872	721	658	983	399
Pertussis	12,776	38,510	41,863	41,851	44,338	40,277	42,842	35,103	48,926	46,452	63,798	42,826	42,867	45,847	37,602	54,953	29,813	43,141
Polio	3,365	591	268	1,600	225	134	419	702	894	565	762	49	1	-	-	-	2	-
Rubella	5,093	1,165	983	1,187	1,475	1,231	9,834	4,135	14,073	7,436	17,208	15,275	9,810	6,877	10,434	9,690	6,515	10,361
Tetanus (Total)	6,444	11,554	7,722	14,160	7,112	7,008	6,773	5,015	9,266	4,687	3,829	3,402	4,201	3,681	4,153	7,099	3,806	5,771
Yellow Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 111 WHO UNICEF Estimates of national immunization coverage (WUENIC) by antigens and years

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BCG	92	91	92	94	95	95	93	96	97	97	98	99	99	98	99	98	99	99	99	99
DTP1	92	89	91	92	94	95	93	99	97	97	98	99	99	98	99	97	98	99	99	99
DTP3	78	77	80	82	85	83	87	99	93	94	94	96	97	94	96	94	96	97	97	97
HepB3							5	11	45	86	95	96	97	94	96	94	96	97	97	97
HIB3													97	94	87	94	96	97	97	97
IPV1																			47	7
MCV1	72	71	71	74	77	75	76	81	88	83	89	92	93	88	93	88	91	94	94	94
MCV2																35	70	83	83	93
PCV3																			48	97
Pol3	78	79	81	83	85	83	90	88	94	95	96	96	97	94	96	94	96	97	97	97
RCV1																17	91	94	94	94

Figure 112: National immunization coverage based on administratively reported data by antigens and years

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BCG	0	0	100	94	101	87	92	92	97	96	92	90	94	94	95	108	106	105	117	114
DTP1	0	0	0	111	102	89	93	97	96	95	97	95	97	98	99	112	110	110	121	119
DTP3	0	0	96	91	97	88	93	96	96	93	95	95	96	95	96	110	108	109	120	118
HepB3							5	11	62	94	95	95	96	95	96	110	108	109	120	118
HIB3													96	95	96	110	108	109	120	118
IPV1																			73	33
MCV1	0	0	96	89	94	87	91	96	94	92	95	96	98	94	96	111	108	109	120	118
MCV2																22	99	104	115	115
PCV3																			48	113
Pol3	0	0	97	90	97	88	92	96	96	93	95	95	96	95	96	110	108	109	120	117
RCV1																0	0	0	0	0

Figure 113: National Immunizaiton coverage official estimates by antigens and years

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BCG	100	92	94	95	94	95	95	92	96	98	98	98	99	99	99	99	99	99	99	99
DTP1	0	0	0	88	87	86	91	97	95	97	98	98	99	99	99	99	91	93	93	94
DTP3	98	78	66	68	65	69	72	96	78	84	87	87	87	89	90	90	92	93	93	94
HepB3							0	0	0	84	87	87	87	89	90	90	92	93	93	94
HIB3													87	0	90	90	92	93	93	94
IPV1																			73	0
MCV1	97	72	61	61	64	65	69	96	78	84	85	85	88	89	86	89	89	90	90	92
MCV2																22	0	70	70	80
PCV3																			48	0
Pol3	98	78	66	68	66	70	72	96	84	92	93	93	94	94	95	95	92	93	93	94
RCV1																0	0	0	0	0

Figure 114: 4th HPN Sector Program Strategic Investment Plan goals, objective and intermediate results ("outputs")

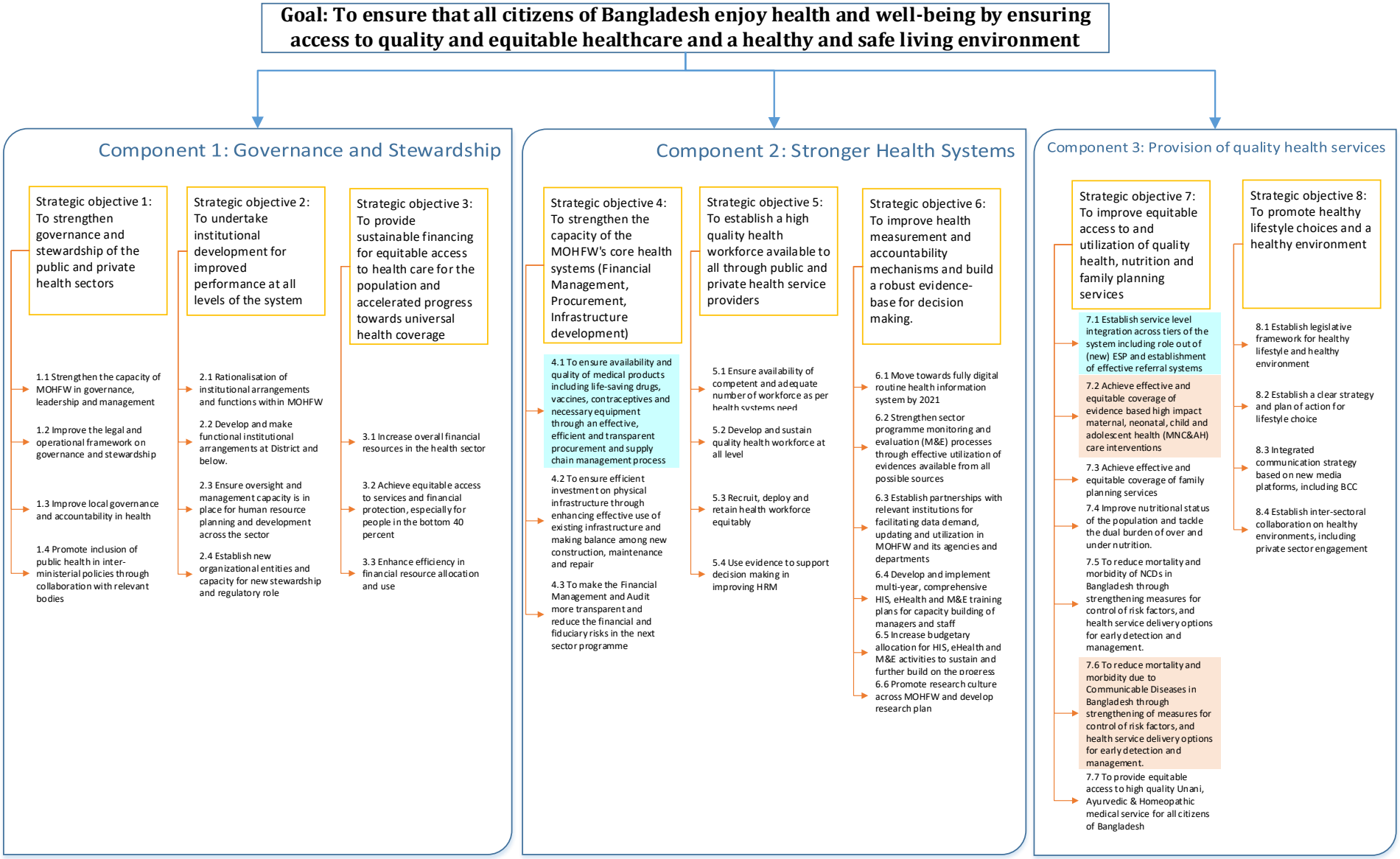


Figure 115: Project M&E framework with baseline and end target values for DLIs

Disbursement linked indicators by project components	IDA Allocations US$ mlns	Level / Results	Indicator Name	Baseline	End Target
Component 1: Governance and Stewardship					
DLI 1. Citizen feedback system is strengthened	25.0	IR	Annual GRS performance report for previous CY is published	N	Y
DLI 2. Budget planning and allocation are improved	56.0	IR	Increase in percentage from FY16 baseline in repair and maintenance expenditure at the levels of Upazila and below	0	100
Component 2: Health, Nutrition and Population System Strengthening					
DLI 3. Financial management system is strengthened	51.0	IR	MOHFW FMAU completes internal audit for the previous fiscal year	N	Y
DLI 4. Asset management is improved	18.2	IR	Increase in the number of district-level referral facilities in which AMS is implemented	1	15
DLI 5. Procurement process is improved using information technology	19.8	IR	Increase in percentage of NCTs using e-GP issued by MOHFW	0	75
DLI 6. Institutional capacity is developed for procurement and supply management	16.0		MOPA approves CMSD restructuring proposal	N	Y
DLI 7. Availability of midwives for maternal care is increased	45.5	Outcome (PDO1)	Increase in the number of Upazila Health Complexes with at least 2 accredited diploma midwives	0	150
DLI 8. Information system is strengthened, including gender-disaggregated data	20.0	Outcome (PDO1)	Increase in the number of Community Clinics providing complete essential data on service delivery, including gender-disaggregated	0	7,000
Component 3: Provision of Quality Health, Nutrition and Population Services[79]					
DLI 9. Post-partum family planning services are improved	32.7	IR	Increase in percentage of targeted public health facilities meeting readiness criteria for delivery of PPFP services in Sylhet and Chittagong divisions, reported for the previous CY	0	35
DLI 10. Utilization of maternal health care services is increased	20.6	Outcome (PDO2)	Increase in the number of normal deliveries in public health facilities in Sylhet and Chittagong division	128,805	146,000
DLI 11. Emergency obstetric care services are improved	39.2	Outcome (PDO2)	Increase in the number of District Hospitals with improved capacity to provide comprehensive emergency obstetric and neonatal care (CEmONC) services in Sylhet and Chittagong divisions	0	10
DLI 12. **Immunization coverage and equity are enhanced**	50.0	IR	Increase in the number of districts reaching at least 85% coverage of measles-rubella vaccination among children ages 0-12 months in Sylhet and Chittagong divisions	14	15

[79] Focused on Sylhet and Chittagong divisions.

Disbursement linked indicators by project components	IDA Allocations US$ mlns	Level / Results	Indicator Name	Baseline	End Target
DLI 13. Maternal nutrition services are expanded*	28.0	IR	Increase in the percentage of registered pregnant women receiving specified maternal nutrition services in Sylhet and Chittagong divisions, reported for the previous CY	0	25
DLI 14. Infant and child nutrition services are expanded*	28.0	Outcome (PDO2)	Increase in the percentage of registered children aged under 2 years receiving specified nutrition services in Sylhet and Chittagong divisions	0	35
DLI 15. School-based adolescent HPN program is developed and implemented*	25.0	IR	Orientation of teachers and peer girl students is completed in at least 30% of public secondary schools in each targeted district in Sylhet and Chittagong divisions	N	Y
DLI 16. Emerging challenges are addressed	25.0	IR	Assessment is completed of hypertension diagnosis and referral services at the primary level in at least 2 Upazilas	N	Y

Figure 116: Core indicators of the project with annual milestones and end targets

Indicators	YR1	YR2	YR3	YR4	YR5	End Target
People who have received essential health, nutrition, and population (HPN) services	**904,000**	**1,834,000**	**2,781,000**	**3,756,000**	**4,759,000**	**5,777,000**
People who have received essential health, nutrition, and population (HPN) services - Female	515,000	1,049,000	1,586,000	2,130,000	2,684,000	3,242,000
Number of children immunized	77,0000	155,0000	233,0000	312,0000	392,0000	472,0000
Number of women and children who have received basic nutrition	4,000	22,000	54,000	101,000	162,000	234,000
Number of deliveries attended by skilled health personnel	13,0000	262,000	397,000	535,000	677,000	823,000

Figure 117: Health Policy Framework and EPI: From NHPSP to cMYP

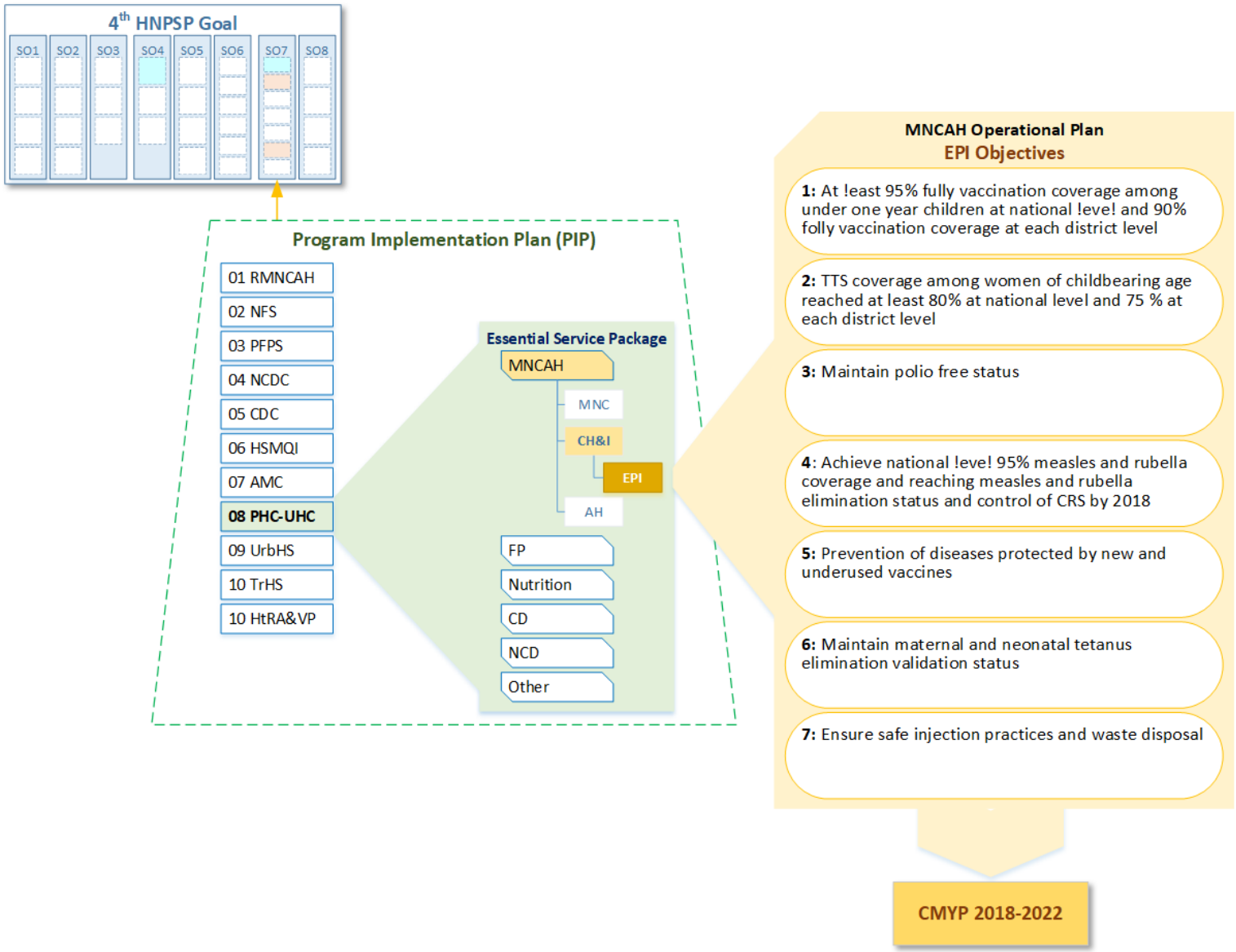


Figure 118: Salaries of EPI specific personnel by administrative levels, positions and years

	2016	2018	2019	2020	2021	2022	Total 2018-2022
Central	**$612,459**	**$643,176**	**$643,176**	**$643,176**	**$643,176**	**$643,176**	**$3,215,882**
Deputy Director - EPI & Surveillance	$12,075	$12,075	$12,075	$12,075	$12,075	$12,075	$60,375
Programme Manager - EPI & Surveillance	$14,064	$14,064	$14,064	$14,064	$14,064	$14,064	$70,320
Assistant Director, EPI & Surveillance	$10,793	$10,793	$10,793	$10,793	$10,793	$10,793	$53,966
Deputy Programme Manager - EPI & Surveillance	$11,843	$11,843	$11,843	$11,843	$11,843	$11,843	$59,213
Deputy Programme Manager - Procurement & Supplies	$11,843	$11,843	$11,843	$11,843	$11,843	$11,843	$59,213
Deputy Programme Manager - Field Service	$11,843	$11,843	$11,843	$11,843	$11,843	$11,843	$59,213
Deputy Programme Manager - IEC and VCC	$11,843	$11,843	$11,843	$11,843	$11,843	$11,843	$59,213
Senior Cold-chain engineer	$0	$8,032	$8,032	$8,032	$8,032	$8,032	$40,162
Medical Officer	$16,065	$16,065	$16,065	$16,065	$16,065	$16,065	$80,324
Cold Chain Engineer	$8,752	$8,752	$8,752	$8,752	$8,752	$8,752	$43,759
Store Manager	$12,982	$12,982	$12,982	$12,982	$12,982	$12,982	$64,909
Logistics Officer	$10,574	$10,574	$10,574	$10,574	$10,574	$10,574	$52,871
Training Officer	$10,574	$10,574	$10,574	$10,574	$10,574	$10,574	$52,871
Accounts Officer	$10,574	$10,574	$10,574	$10,574	$10,574	$10,574	$52,871
Administrative Officer	$7,941	$7,941	$7,941	$7,941	$7,941	$7,941	$39,703
Transport Operator	$8,707	$8,707	$8,707	$8,707	$8,707	$8,707	$43,534
Sub-Assistant - Engineer	$43,641	$43,641	$43,641	$43,641	$43,641	$43,641	$218,205
Computer Operator	$7,484	$7,484	$7,484	$7,484	$7,484	$7,484	$37,418
Stenogrpher	$7,484	$7,484	$7,484	$7,484	$7,484	$7,484	$37,418
Sr. Mechanic	$5,362	$5,362	$5,362	$5,362	$5,362	$5,362	$26,810
U.D. Assistant	$21,448	$21,448	$21,448	$21,448	$21,448	$21,448	$107,241
Statistical Assistant	$21,773	$21,773	$21,773	$21,773	$21,773	$21,773	$108,867
Store Keeper	$21,748	$21,748	$21,748	$21,748	$21,748	$21,748	$108,741
Cashier	$5,437	$5,437	$5,437	$5,437	$5,437	$5,437	$27,185
Accountant	$5,437	$5,437	$5,437	$5,437	$5,437	$5,437	$27,185
Steno-Typist	$6,157	$6,157	$6,157	$6,157	$6,157	$6,157	$30,786
Audio Visual Technician	$5,806	$5,806	$5,806	$5,806	$5,806	$5,806	$29,028
Cold Chain Technician	$5,881	$5,881	$5,881	$5,881	$5,881	$5,881	$29,403
Medical Technologist	$19,879	$19,879	$19,879	$19,879	$19,879	$19,879	$99,396
Accounts Assistant	$14,226	$14,226	$14,226	$14,226	$14,226	$14,226	$71,129
Office Assistant - cum computer Operator	$18,503	$18,503	$18,503	$18,503	$18,503	$18,503	$92,514
Record Keeper	$18,968	$18,968	$18,968	$18,968	$18,968	$18,968	$94,839
Junior Mechanic	$4,742	$4,742	$4,742	$4,742	$4,742	$4,742	$23,710
Telephone operator	$4,760	$4,760	$4,760	$4,760	$4,760	$4,760	$23,800
Electrician	$4,760	$4,760	$4,760	$4,760	$4,760	$4,760	$23,800
Cash shaker	$4,455	$4,455	$4,455	$4,455	$4,455	$4,455	$22,275

	2016	2018	2019	2020	2021	2022	Total 2018-2022
Machine Operator	$4,455	$4,455	$4,455	$4,455	$4,455	$4,455	$22,275
Driver	$73,645	$73,645	$73,645	$73,645	$73,645	$73,645	$368,226
Truck helper	$22,964	$22,964	$22,964	$22,964	$22,964	$22,964	$114,822
M.L.S.S.	$22,964	$22,964	$22,964	$22,964	$22,964	$22,964	$114,822
Vaccine Carrier	$28,733	$28,733	$28,733	$28,733	$28,733	$28,733	$143,664
Packers	$15,310	$15,310	$15,310	$15,310	$15,310	$15,310	$76,548
Darwarn/Night Guard	$7,505	$7,505	$7,505	$7,505	$7,505	$7,505	$37,524
Mali	$3,752	$3,752	$3,752	$3,752	$3,752	$3,752	$18,762
Sweeper/Cleaner	$14,710	$14,710	$14,710	$14,710	$14,710	$14,710	$73,548
IT specialist	$0	$8,400	$8,400	$8,400	$8,400	$8,400	$42,000
Statistical officer	$0	$8,924	$8,924	$8,924	$8,924	$8,924	$44,618
Head Assistant	$0	$5,362	$5,362	$5,362	$5,362	$5,362	$26,810
District	**$1,048,762**	**$1,048,762**	**$1,048,762**	**$1,048,762**	**$1,048,762**	**$1,048,762**	**$5,243,808**
District EPI Superintend	$376,358	$376,358	$376,358	$376,358	$376,358	$376,358	$1,881,792
Cold Chain Technician	$376,358	$376,358	$376,358	$376,358	$376,358	$376,358	$1,881,792
Assistant Storekeeper (EPI)	$296,045	$296,045	$296,045	$296,045	$296,045	$296,045	$1,480,224
Upazila	**$12,093,916**	**$12,093,916**	**$12,093,916**	**$12,093,916**	**$12,093,916**	**$12,093,916**	**$60,469,578**
Medical Technologist EPI (MTEPI)	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$12,696,906
Vaccine Carriers (Porters)	$7,010,803	$7,010,803	$7,010,803	$7,010,803	$7,010,803	$7,010,803	$35,054,016
Vaccinator Supervisor (Municipality)	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$2,539,381	$12,696,906
Vaccinator / NGO Worker (Municipality)	$4,350	$4,350	$4,350	$4,350	$4,350	$4,350	$21,750
Union	**$34,791,300**	**$34,791,300**	**$34,791,300**	**$34,791,300**	**$34,791,300**	**$34,791,300**	**$173,956,500**
Health Assistant (HA)	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$173,956,500
Total	**$48,546,436**	**$48,577,154**	**$48,577,154**	**$48,577,154**	**$48,577,154**	**$48,577,154**	**$242,885,768**

Figure 119: Salaries of shared personnel by administrative levels, positions, and years

	2016	2018	2019	2020	2021	2022	Total 2018 - 2022
Central	**$7,374**	**$7,374**	**$7,374**	**$7,374**	**$7,374**	**$7,374**	**$36,870**
Line Director - MNC&AH	$7,374	$7,374	$7,374	$7,374	$7,374	$7,374	$36,870
District	**$881,569**	**$881,569**	**$881,569**	**$881,569**	**$881,569**	**$881,569**	**$4,407,847**
Civil Surgeon (CS)	$135,014	$135,014	$135,014	$135,014	$135,014	$135,014	$675,072
Deputy Civil Surgeon (DCS)	$101,513	$101,513	$101,513	$101,513	$101,513	$101,513	$507,564
Medical Officer - Civil Surveon (MOCS)	$128,518	$128,518	$128,518	$128,518	$128,518	$128,518	$642,588
District Health Superintendant	$150,543	$150,543	$150,543	$150,543	$150,543	$150,543	$752,717
Public Health Nurse	$82,560	$82,560	$82,560	$82,560	$82,560	$82,560	$412,800
Senior Health Education Officer	$83,478	$83,478	$83,478	$83,478	$83,478	$83,478	$417,389

	2016	2018	2019	2020	2021	2022	Total 2018 - 2022
Junior Health Education Officer	$83,478	$83,478	$83,478	$83,478	$83,478	$83,478	$417,389
Statistical Assistant	$83,162	$83,162	$83,162	$83,162	$83,162	$83,162	$415,812
Sanitary Inspector	$33,303	$33,303	$33,303	$33,303	$33,303	$33,303	$166,517
Upazila	**$11,680,557**	**$11,680,557**	**$11,680,557**	**$11,680,557**	**$11,680,557**	**$11,680,557**	**$58,402,785**
Upazila Health and Family Planning Officer (UH&FPO)	$1,900,528	$1,900,528	$1,900,528	$1,900,528	$1,900,528	$1,900,528	$9,502,641
Resident Medical Officer (RMO)	$516,023	$516,023	$516,023	$516,023	$516,023	$516,023	$2,580,117
Medical Officer - Disease Control (MODC)	$783,957	$783,957	$783,957	$783,957	$783,957	$783,957	$3,919,787
Medical Officer - MCH	$391,979	$391,979	$391,979	$391,979	$391,979	$391,979	$1,959,893
Medical Officer	$391,979	$391,979	$391,979	$391,979	$391,979	$391,979	$1,959,893
Upazila Family Planning Officer (UFPO)	$783,957	$783,957	$783,957	$783,957	$783,957	$783,957	$3,919,787
Health Inspector	$3,047,257	$3,047,257	$3,047,257	$3,047,257	$3,047,257	$3,047,257	$15,236,287
Sanitary Inspector	$507,876	$507,876	$507,876	$507,876	$507,876	$507,876	$2,539,381
Statistitian	$1,016,199	$1,016,199	$1,016,199	$1,016,199	$1,016,199	$1,016,199	$5,080,995
Medical Officer (Municipality)	$1,959,893	$1,959,893	$1,959,893	$1,959,893	$1,959,893	$1,959,893	$9,799,467
Sanitary Inspector (Municipality)	$126,969	$126,969	$126,969	$126,969	$126,969	$126,969	$634,845
Secretary (Municipality)	$253,938	$253,938	$253,938	$253,938	$253,938	$253,938	$1,269,691
Union	**$80,343,630**	**$80,343,630**	**$80,343,630**	**$80,343,630**	**$80,343,630**	**$80,343,630**	**$401,718,150**
Assistant Health Inspector (AHI)	$13,828,868	$13,828,868	$13,828,868	$13,828,868	$13,828,868	$13,828,868	$69,144,338
Family Planning Inspector (FPI)	$5,056,875	$5,056,875	$5,056,875	$5,056,875	$5,056,875	$5,056,875	$25,284,375
Family Welfare Visitor (FWV)	$3,843,225	$3,843,225	$3,843,225	$3,843,225	$3,843,225	$3,843,225	$19,216,125
Family Welfare Assistant (FWA)	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$34,791,300	$173,956,500
Sub-Assistant Community Medical Officer (SACMO)	$6,911,063	$6,911,063	$6,911,063	$6,911,063	$6,911,063	$6,911,063	$34,555,313
Medical Assistant (MA)	$5,528,850	$5,528,850	$5,528,850	$5,528,850	$5,528,850	$5,528,850	$27,644,250
Community Health Care Provider (CHCP)	$10,383,450	$10,383,450	$10,383,450	$10,383,450	$10,383,450	$10,383,450	$51,917,250
Total	**$26,398,368**	**$26,398,368**	**$26,398,368**	**$26,398,368**	**$26,398,368**	**$26,398,368**	**$131,991,839**

Figure 120: Supervision per diem costs by administrative levels, positions and years

	2016	2018	2019	2020	2021	2022	Total 2018 - 2022
Central	**$8,970**	**$9,870**	**$9,870**	**$9,870**	**$9,870**	**$9,870**	**$49,350**
Line Director - MNC&AH	$450	$450	$450	$450	$450	$450	$2,250
Deputy Director - EPI & Sureillance	$900	$900	$900	$900	$900	$900	$4,500
Programme Manager - EPI & Surveillance	$900	$900	$900	$900	$900	$900	$4,500
Assistant Director, EPI & Surveillance	$900	$900	$900	$900	$900	$900	$4,500

	2016	2018	2019	2020	2021	2022	Total 2018 - 2022
Deputy Programme Manager - EPI & Surveillance	$900	$900	$900	$900	$900	$900	$4,500
Deputy Programme Manager - Procurement & Supplies	$300	$300	$300	$300	$300	$300	$1,500
Deputy Programme Manager - Field Service	$900	$900	$900	$900	$900	$900	$4,500
Deputy Programme Manager - IEC and VCC	$300	$300	$300	$300	$300	$300	$1,500
Senior Cold-chain engineer	$0	$900	$900	$900	$900	$900	$4,500
Medical Officer	$600	$600	$600	$600	$600	$600	$3,000
Cold Chain Engineer	$300	$300	$300	$300	$300	$300	$1,500
Store Manager	$300	$300	$300	$300	$300	$300	$1,500
Logistics Officer	$300	$300	$300	$300	$300	$300	$1,500
Training Officer	$300	$300	$300	$300	$300	$300	$1,500
Sub-Assistant - Engineer	$1,440	$1,440	$1,440	$1,440	$1,440	$1,440	$7,200
Cold Chain Technician	$180	$180	$180	$180	$180	$180	$900
Civil Surgeon (CS)	$12,960	$12,960	$12,960	$12,960	$12,960	$12,960	$64,800
Deputy Civil Surgeon (DCS)	$12,960	$12,960	$12,960	$12,960	$12,960	$12,960	$64,800
Medical Officer - Civil Surveon (MOCS)	$19,200	$19,200	$19,200	$19,200	$19,200	$19,200	$96,000
District EPI Superintend	$7,200	$7,200	$7,200	$7,200	$7,200	$7,200	$36,000
Cold Chain Technician	$7,200	$7,200	$7,200	$7,200	$7,200	$7,200	$36,000
Assistant Storekeeper (EPI)	$7,200	$7,200	$7,200	$7,200	$7,200	$7,200	$36,000
District Health Superintendant	$7,200	$7,200	$7,200	$7,200	$7,200	$7,200	$36,000
Upazila	**$131,760**	**$131,760**	**$131,760**	**$131,760**	**$131,760**	**$131,760**	**$658,800**
Upazila Health and Family Planning Officer (UH&FPO)	$43,920	$43,920	$43,920	$43,920	$43,920	$43,920	$219,600
Medical Officer - Disease Control (MODC)	$21,960	$21,960	$21,960	$21,960	$21,960	$21,960	$109,800
Medical Officer - MCH	$21,960	$21,960	$21,960	$21,960	$21,960	$21,960	$109,800
Medical Officer	$21,960	$21,960	$21,960	$21,960	$21,960	$21,960	$109,800
Upazila Family Planning Officer (UFPO)	$21,960	$21,960	$21,960	$21,960	$21,960	$21,960	$109,800
Total	**$140,730**	**$141,630**	**$141,630**	**$141,630**	**$141,630**	**$141,630**	**$708,150**

Figure 121: Total Resource Requirements, funding from all sources by risk types and government financing by cost categories

Cost category	Future resource requirements Total 2018-2022	Funding from all sources			Government Funding					
		Secured	Probable	Total	Secured	% of All secured funds	Probable	% of all probable funds	Total	% of Total funds
Routine recurrent costs										
Vaccines (routine vaccines only)	**632,809,602**	**632,809,602**	**0**	**632,809,602**	**347,943,871**	**55%**	**0**		**347,943,873**	**55%**
Traditional	**285,600,754**	285,600,754	0	285,600,754	285,600,754	100%	0		285,600,755	100%
Underused	**94,944,791**	94,944,791	0	94,944,791	31,584,394	33%	0		31,584,394	33%
New	**252,264,057**	252,264,057	0	252,264,057	30,758,724	12%	0		30,758,724	12%
Injection supplies	**95,538,245**	95,538,245	0	95,538,245	85,453,344	89%	0		85,453,345	89%
Personnel	**243,963,518**	**243,963,518**	**0**	**243,963,518**	**243,963,518**	**100%**	**0**		**243,963,520**	**100%**
Salaries of full-time EPI health workers (immunization specific)	**242,885,768**	242,885,768	0	242,885,768	242,885,768	100%	0		242,885,769	100%
Per-diems for outreach vaccinators/mobile teams				0	0		0		0	
Per-diems for supervision and monitoring	**1,077,750**	1,077,750	0	1,077,750	1,077,750	100%	0		1,077,751	100%
Transportation	**3,349,883**	**3,349,883**	**0**	**3,349,883**	**3,349,883**	**100%**	**0**		**3,349,884**	**100%**
Fixed Site Strategy (Incl. Vaccine Distribution)	**3,349,883**	3,349,883	0	3,349,883	3,349,883	100%	0		3,349,884	100%
Outreach strategy + Mobile strategy	**0**	0	0	0	0		0		0	
Maintenance and overhead	**11,350,600**	**11,350,600**	**0**	**11,350,600**	0	0%	0		0	0%
Cold chain maintenance and overhead	**10,874,875**	10,874,875	0	10,874,875	10,874,875	100%	0		10,874,876	100%
Maintenance of other capital equipment				0	0		0		0	
Building Overheads (Electricity, Water…)	**475,725**	475,725	0	475,725	475,725	100%	0		475,726	100%
Short-term training	**1,923,398**	160,000	1,763,398	1,923,398	0	0%	0	0%	0	0%
IEC/Social Mobilization	**1,463,221**	100,000	1,363,221	1,463,221	0	0%	0	0%	0	0%
Disease Surveillance	**18,497,987**	2,083,510	16,414,477	18,497,987	0	0%	0	0%	0	0%
Program management	**44,678,337**	1,120,444	43,557,893	44,678,337	0	0%	0	0%	0	0%
Other routine recurrent costs				0	0		0		0	
Subtotal	**1,053,574,791**	**990,475,802**	**63,098,989**	**1,053,574,791**	**606,607,872**	**61%**	**0**	**0%**	**606,607,873**	**58%**
Routine capital costs										
Vehicles (100% EPI)	**1,735,954**	1,735,954	0	1,735,954	0	0%	0		0	0%
Cold chain equipment	**19,664,324**	15,208,109	4,456,215	19,664,325	0	0%	0	0%	0	0%
Other capital equipment				0	0		0		0	
Buildings Construction (100% EPI)				0	0		0		0	
Subtotal	**21,400,278**	**16,944,063**	**4,456,215**	**21,400,279**	**0**	**0%**	**0**	**0%**	**0**	**0%**
Supplemental immunization activities (SIAs)										
MR follow-up campaign (children from 9 months to 5 years)	**50,778,249**	**0**	**50,778,249**	**50,778,249**	**848,395**		**2**	**0%**	**848,397**	**2%**
Vaccines & injection supplies	**33,044,961**	0	33,044,961	33,044,961	848,395		2	0%	848,397	3%
Operational costs	**17,733,288**	0	17,733,288	17,733,288	0		0	0%	0	0%
		0	**0**	**0**	**0**		**0**		**0**	
Vaccines & injection supplies				0	0		0		0	

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Cost category	Future resource requirements Total 2018-2022	Funding from all sources			Government Funding					
		Secured	Probable	Total	Secured	% of All secured funds	Probable	% of all probable funds	Total	% of Total funds
Operational costs				0	0		0		0	
Subtotal	**50,778,249**	**0**	**50,778,249**	**50,778,249**	**848,395**		**2**	**0%**	**848,397**	**2%**
Shared Health Systems Costs (EPI Portion)										
Shared Personnel Costs	**464,565,652**	**464,565,652**	**0**	**464,565,652**	**464,565,652**	**100%**	**0**		**464,565,653**	**100%**
Shared Transport Costs – Vehicles, Fuel and Maintenance	**966,927**	966,927	0	966,927	966,927	100%	0		966,928	100%
Shared buildings - construction				0	0		0		0	
Shared Buildings – Overhead				0	0		0		0	
Subtotal	**465,532,579**	**465,532,579**	**0**	**465,532,579**	**465,532,579**	**100%**	**0**		**465,532,580**	**100%**
Grand Total	**1,591,285,898**	**1,472,952,445**	**118,333,454**	**1,591,285,899**	**1,072,988,846**	**73%**	**2**	**0%**	**1,072,988,849**	**67%**
Routine Immunization	**1,540,507,649**	1,472,952,445	67,555,204	1,540,507,649	1,072,140,451	73%	0	0%	1,072,140,452	70%
Supplemental immunization activities	**50,778,249**	0	50,778,249	50,778,249	848,395		2	0%	848,397	2%

Figure 122: Healthcare financing trends

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total expenditure on health (THE) in million US$	**20**	**20**	**21**	**22**	**23**	**23**	**24**	**26**	**26**	**22**	**21**	**21**	**21**	**20**	**18**
Total Health Expenditure (THE) per Capita in Int$ (Purchasing Power Parity)	76	83	95	103	116	124	151	170	163	187	181	179	202	214	215
Total Health Expenditure (THE) per Capita in Int$ (PPP)	6	6	7	8	10	11	18	26	30	33	32	41	49	50	46
Total Health Expenditure (THE) % Gross Domestic Product (GDP)	4.7	4.8	5.4	5.4	5.6	5.8	6.7	6.9	6.1	6.8	6.7	6.2	7.0	6.7	6.5
General government expenditure on health (GGHE) in million US$	**10**	**10**	**11**	**11**	**12**	**12**	**12**	**13**	**13**	**11**	**11**	**11**	**11**	**10**	**9**
Ministry of Health expenditure in million US$	10	10	11	11	12	12	12	13	13	11	11	11	11	10	9
General Government Health Expenditure per Capita in Int$ (Purchasing Power Parity)	34	34	38	39	47	51	73	87	84	104	101	107	122	125	121
General Government Health Expenditure (GGHE) per Capita Int$ (PPP)	6	8	10	12	14	16	18	23	25	23	23	24	29	32	32
General Government Health Expenditure (GGHE) as % of THE	44.3	41.1	39.5	37.9	40.8	40.9	48.7	51.4	51.5	55.7	55.7	59.9	60.2	58.1	56.1
GGHE as % of General government expenditure (GGE)	12.0	11.9	10.7	10.2	11.4	11.9	14.7	14.0	13.1	13.0	11.9	11.6	12.2	13.2	11.9
GGHE as % of GDP	0.7	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1
Private Health Expenditure (PvtHE) as % of THE	56	59	60	62	59	59	51	49	48	44	44	40	40	42	44
Rest of the world funds / External resources in million US$	**0.23**	**0.22**	**0.23**	**0.25**	**0.26**	**0.27**	**0.27**	**0.29**	**0.30**	**0.25**	**0.24**	**0.24**	**0.23**	**0.22**	**0.20**
Rest of the world funds as % of THE	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
GDP per capita (in US$)	280	308	322	381	433	477	543	722	966	871	880	1,124	1,178	1,282	1,280
GGE as % of GDP	7.0	6.2	6.1	5.5	4.9	4.6	4.1	3.3	2.4	2.3	2.1	1.6	1.5	1.3	1.1
Exchange rate (KGZ Som per US$)	47.79	48.41	46.90	43.70	42.47	41.04	40.03	37.23	36.74	43.06	46.07	46.06	46.94	48.44	54.04

Source: WHO NHA

Figure 123: National immunization program expenditures and future resource requirements (basic scenario) by cost categories

Cost category		Future Resource Requirements					
	2016	2018	2019	2020	2021	2022	Total 2018-2022
Routine recurrent costs							
Vaccines (routine vaccines only)	**90,663,357**	**67,988,053**	**81,152,338**	**79,210,145**	**79,964,288**	**80,216,356**	**388,531,180**
Traditional	9,941,853	8,122,543	8,196,525	8,273,134	8,351,901	8,378,228	**41,322,332**
Underused	11,189,487	18,662,867	18,832,851	19,008,874	19,189,854	19,250,345	**94,944,791**
New	69,532,017	41,202,642	54,122,963	51,928,137	52,422,534	52,587,783	**252,264,057**
Injection supplies	3,242,952	3,392,033	3,422,937	3,454,911	3,487,785	3,499,352	**17,257,018**
Personnel	**48,761,086**	**48,792,704**	**48,792,704**	**48,792,704**	**48,792,704**	**48,792,704**	**243,963,518**
Salaries of full-time EPI health workers (immunization specific)	48,546,436	48,577,154	48,577,154	48,577,154	48,577,154	48,577,154	**242,885,768**
Per-diems for outreach vaccinators/mobile teams							
Per-diems for supervision and monitoring	214,650	215,550	215,550	215,550	215,550	215,550	**1,077,750**
Transportation	**165,644**	**483,977**	**776,686**	**801,006**	**637,729**	**650,484**	**3,349,883**
Fixed Site Strategy (Incl. Vaccine Distribution)	165,644	483,977	776,686	801,006	637,729	650,484	**3,349,883**
Outreach strategy							
Mobile strategy							
Maintenance and overhead	**1,442,781**	**1,946,471**	**2,621,293**	**2,965,441**	**1,822,221**	**1,995,173**	**11,350,600**
Cold chain maintenance and overhead	1,347,636	1,851,326	2,526,148	2,870,296	1,727,076	1,900,028	**10,874,875**
Maintenance of other capital equipment							
Building Overheads (Electricity, Water…)	95,145	95,145	95,145	95,145	95,145	95,145	**475,725**
Short-term training	239,707	513,842	354,245	429,342	361,968	264,000	**1,923,398**
IEC/Social Mobilization	225,786	115,466	390,500	314,085	259,085	384,085	**1,463,221**
Disease Surveillance	2,571,637	6,598,380	2,817,631	3,046,817	2,878,922	3,156,237	**18,497,987**
Program management	2,942,070	9,928,647	10,086,212	5,012,919	9,711,470	9,939,090	**44,678,337**
Other routine recurrent costs							
Subtotal	150,255,020	139,759,573	150,414,547	144,027,370	147,916,171	148,897,480	**731,015,142**
Routine capital costs							
Vehicles (100% EPI)		876,107	797,313	62,535			**1,735,954**
Cold chain equipment		6,677,066	8,178,620	2,625,990	1,182,313	1,000,336	**19,664,324**

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Cost category		Future Resource Requirements					
	2016	2018	2019	2020	2021	2022	Total 2018-2022
Other capital equipment							
Buildings Construction (100% EPI)							
Subtotal		7,553,172	8,975,933	2,688,525	1,182,313	1,000,336	**21,400,278**
Supplemental immunization activities (SIAs)							
MR follow-up campaign (children from 9 months to 5 years)		24,704,682				26,073,567	**50,778,249**
Vaccines & injection supplies		16,077,066				16,967,895	**33,044,961**
Operational costs		8,627,616				9,105,672	**17,733,288**
Vaccines & injection supplies							
Operational costs							
Subtotal		24,704,682				26,073,567	**50,778,249**
Shared Health Systems Costs (EPI Portion)							
Shared Personnel Costs	92,913,130	92,913,130	92,913,130	92,913,130	92,913,130	92,913,130	**464,565,652**
Shared Transport Costs – Vehicles, Fuel and Maintenance	182,160	185,803	189,519	193,310	197,176	201,119	**966,927**
Shared buildings - construction							
Shared Buildings – Overhead							
Subtotal	93,095,290	93,098,934	93,102,650	93,106,440	93,110,306	93,114,250	**465,532,579**
Grand Total	**243,350,310**	**265,116,361**	**252,493,130**	**239,822,335**	**242,208,790**	**269,085,633**	**1,268,726,249**
Routine Immunization	243,350,310	240,411,679	252,493,130	239,822,335	242,208,790	243,012,065	**1,217,947,999**
Supplemental immunization activities (campaigns)		24,704,682				26,073,567	**50,778,249**

Figure 124: Macroeconomic and sustainability indicators

	2016	2018	2019	2020	2021	2022
Macroeconomic projections						
Population	149,772,364	164,739,525	167,062,353	169,451,344	171,908,389	174,401,060
GDP ($)	203,540,642,676	253,740,733,283	273,941,251,277	295,808,277,452	319,483,795,812	345,054,224,532
Per capita GDP ($)	1,359	1,540	1,640	1,746	1,858	1,979
Total Health Expenditures (THE $)	4,612,988,811	5,073,977,379	5,145,520,460	5,219,101,402	5,294,778,373	5,371,552,659
Total Health Expenditures (THE) per capita	31	31	31	31	31	31
Government Health Expenditures (GHE $)	1,287,023,878	1,415,639,689	1,435,600,208	1,456,129,291	1,477,243,166	1,498,663,192
Government Health Expenditure per capita ($)	9	9	9	9	9	9
Resource requirements for immunization						
Routine and SIAS (Campaigns) includesvaccines and operational costs)	243,350,310	327,759,416	316,039,354	304,303,680	306,469,594	334,531,206
Routine only (includes vaccines and operational costs)	243,350,310	303,054,734	316,039,354	304,303,680	306,469,594	308,457,639
Per DTP3 immunized child	85	97	100	95	95	95
Per capita						
Routine and SIAS (Campaigns) includesvaccines and operational costs)	1.62	1.99	1.89	1.80	1.78	1.92
Routine only (includes vaccines and operational costs)	1.62	1.84	1.89	1.80	1.78	1.77
% Government Health Expenditures						
Routine and SIAS (Campaigns) includesvaccines and operational costs)	18.91%	23.15%	22.01%	20.90%	20.75%	22.32%
Routine only (includes vaccines and operational costs)	18.91%	21.41%	22.01%	20.90%	20.75%	20.58%
% Of Total Health Expenditures (THE)						
Routine and SIAS (Campaigns) includesvaccines and operational costs)	5.28%	6.46%	6.14%	5.83%	5.79%	6.23%
Routine only (includes vaccines and operational costs)	5.28%	5.97%	6.14%	5.83%	5.79%	5.74%
% GDP						
Routine and SIAS (Campaigns) includesvaccines and operational costs)	0.12%	0.13%	0.12%	0.10%	0.10%	0.10%
Routine only (includes vaccines and operational costs)	0.12%	0.12%	0.12%	0.10%	0.10%	0.09%
Funding gap						
Funding gap (with secured funds only)		38,777,064	13,897,336	10,489,581	14,379,385	40,790,087
% of the future resource requirements for immunization		12%	4%	3%	5%	12%
% Government Health Expenditures		2.74%	0.97%	0.72%	0.97%	2.72%
% Of Total Health Expenditures (THE)		0.76%	0.27%	0.20%	0.27%	0.76%
% GDP		0.02%	0.01%	0.00%	0.00%	0.01%
Funding gap (with secured & probable funds)		0	0	0	0	0
% of the future resource requirements for immunization		0%	0%	0%	0%	0%
% Government Health Expenditures		0.00%	0.00%	0.00%	0.00%	0.00%
% Of Total Health Expenditures (THE)		0.00%	0.00%	0.00%	0.00%	0.00%
% GDP		0.00%	0.00%	0.00%	0.00%	0.00%