



APPLICATION FOR COUNTRY PROPOSAL: PHASE 2

Government of the People's Republic of Bangladesh

For Support to:

New and Under-Used Vaccine

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GAVI Secretariat; c/o UNICEF, Palais des Nations, 1211 Geneva 10, Switzerland.

All documents and attachments must be in English or French.

Please direct any enquiries to:

Dr Ivone Rizzo irizzo@gavialliance.org or representatives of a GAVI Alliance partner agency.

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*** Annex 1 is attached in excel spreadsheet format – please update and complete the tables*

1. Executive Summary

Immunization is one of the greatest success stories in Bangladesh in public health intervention. It is estimated that the program is saving 200,000 deaths annually. Immunization alone contributes to prevent 15-20% child mortality. The program also aims at women of child bearing age and pregnant women for TT vaccination.

National EPI started the immunization program targeting six vaccine preventable diseases. Later on with GAVI support Hepatitis-B vaccine and AD syringe was introduced in the routine immunization program. According to the progress report Government of Bangladesh will start financing for Hep-B vaccine from 2008. After ending the injection safety support Government of Bangladesh is procuring injection safety supplies from a local syringe manufacturing company from 2007. It shows that Government of Bangladesh introduced new vaccine and AD syringe through GAVI support but for the sustenance, Government of Bangladesh already started to procure AD syringes by their own and will share the cost of Hep-B vaccine from the next year.

For reducing the child mortality and morbidity Government of Bangladesh is conducting the study of different disease burden through national and international expertise. Due to it's high cost Government of Bangladesh was not able to introduce Hib vaccine in the immunization program although Hib disease burden assessment conducted by professional bodies from Dhaka Shishu Hospital and ICDDR'B.

After came to know about the GAVI support for Hib vaccine the Government of Bangladesh organized a consultative workshop with the participation of high officials from the MOH&FW, some renowned paediatricians, representatives from CDC Atlanta, WHO-Geneva, John Hopkins University, Dhaka University, Bangabandhu Shekh Muzib Medical University (BSMMU), World Bank, WHO-SEARO, UNICEF and national EPI. The objective of the workshop was to analyze the disease burden and to formulate the strategy for introduction of Hib vaccine in the routine immunization program. It was agreed that Government of Bangladesh will introduce Hib vaccine according to GAVI policy and guideline which was later confirmed by the minister in one of the side meeting with the GAVI personnel from Geneva during the 24th Health Minister's Meeting at Dhaka, Bangladesh.

National EPI had decided to develop a five year plan but for getting the GAVI II support the comprehensive Multi-Year Plan (cMYP) for EPI has been prepared following GAVI guidelines. The cMYP has been prepared for three years (2008-2010) and in consistence with WHO/UNICEF joint reporting forms and annual progress reports. The major features of the cMYP are summarized below.

Government of Bangladesh will introduce Hib vaccine in the routine immunization program under GAVI support preferably pentavalent single dose vial (liquid form) from 2008. National EPI has the experience of HepB vaccine introduction and for Hib introduction their will be no major concern.

Government has decided the introduction of Td vaccine to school going children from 2008. Children received three doses of DTP will get third dose of TT at class-I (6 years of age), TT-4 at class-II (7 years of age) and TT-5 at class-III (8 years of age). There will be one pilot in 2007 to finalize the operational strategy of Td introduction at school. The existing five dose TT schedule will be continued but all the TT will be replaced by Td from 2008.

As per EPI CES 2006, the valid coverage for Measles is 78 % and as a continuation of the Measles Catch up campaign, government has decided to conduct Measles Follow up

campaign in 2009 and Measles second dose will be introduced in 2010 subject to increase Measles coverage by 90 %.

Currently national EPI is procuring all injection safety supplies (AD syringe, reconstitution syringe and safety box) for all routine EPI vaccines through its own fund. In 2006 Government spent around 90% of total routine EPI vaccine cost from the pool fund and rest 10% by the bilateral fund. In the next three years there will be no significant funding gap even after Hib introduction because at that time Government need not to pay for DTP vaccine and the shared contribution for Hep-B vaccine. As a country co-financing policy (20 cent per dose) Government has to pay an around of USD 3 million for Hib vaccine and currently Government is spending around 6 million USD for DTP vaccine. But still then national EPI reviewed the costing and took necessary arrangements for revision of the Annual Operational Plan (AOP).

GAVI/WHO designed the Data Quality Audit (DQA) to improve the quality of country's information system for immunization data. The DQAs were undertaken in 2002 and 2003 and these qualitatively confirmed existing findings about the country's routine vaccination program. After introduction of Hepatitis-B vaccine and based on the recommendation of DQA the national EPI reviewed and revised the record keeping and reporting forms.

The cMYP follows a frame work to plan activities to achieve the immunization goals as contained in the national health policy in order to ensure that all children and mothers of Bangladesh benefit equitably from this intervention. The cMYP sets out the medium term (2008-2010) strategic plan of immunization services of Bangladesh, the related objectives, indicators, milestones, key activities and the associated costing and funding plan. The cMYP will be reviewed every year to accommodate practical and realistic recommendations including newer vaccines. The Government of Bangladesh if provided with GAVI phase-II support will ensure the effective utilization of that support in accordance with the guidelines and policy developed by GAVI.

2. Signatures of the Government and National Coordinating Body

The Government of the People's Republic of Bangladesh commits itself to developing national immunization services on a sustainable basis in accordance with the Comprehensive Multi-Year Plan for Immunization (cMYP) or updated Multi-Year Plan presented with this document.

The table below shows the immunization targets outlined in the cMYP or updated Multi-Year Plan, the Government commitment to establish a partnership and participate with the GAVI Alliance in financing the plan for introduction of new vaccines, and the funds required from the GAVI Alliance.¹

2.1a: Targets and budget for the introduction of 1st vaccine presentation: Hib (liquid form) immunization using pentavalent 1 dose vial (DPT + Hepatitis-B + Hib)

Total requirements			Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
National target for children to be immunized		#	3,803,293	3,957,368	4,030,578	4,106,333
Total number of vaccine doses required*		#		15,582,137	12,696,321	12,934,949
Total number of AD syringes required		#		16,637,270	13,421,825	13,674,089
Total number of reconstitution syringes required		#		0	0	0
Total number of safety boxes required		#		184,674	148,982	151,782
Total budget	Price per vaccine dose *	\$		3.20	2.90	2.65
	Total funding required	\$		14,344,855	12,000,186	12,225,731
Country co-financing	Co-financing per dose	\$		0.20	0.20	0.20
	Total country payment	\$		3,116,427	2,539,264	2,586,990
GAVI Alliance support requested	GAVI payment per dose	\$		3.00	2.70	2.45
	Total GAVI payment	\$		11,228,428	9,460,922	9,638,741

* Including buffer stock

2.1b: Targets and budget for the introduction of 2nd vaccine presentation: Hib (lyophilized form) immunization using pentavalent 2 dose vial (DPT + Hepatitis-B + Hib)

Total requirements			Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
National target for children to be immunized		#	3,803,293	3,957,368	4,030,578	4,106,333
Total number of vaccine doses required		#		13,178,035	13,421,825	13,674,089
Total number of AD syringes required		#		16,834,940	13,421,825	13,674,089
Total number of reconstitution syringes required		#		9,142,262	7,449,113	7,589,119
Total number of safety boxes required		#		288,347	231,667	236,022
Total budget	Price per vaccine dose *	\$		3.20	2.90	2.65
	Total funding required	\$		15,639,435	13,056,736	13,302,138
Country co-financing	Co-financing per dose	\$		0.20	0.20	0.20
	Total country payment	\$		3,294,509	2,684,365	2,734,818
GAVI Alliance support requested	GAVI payment per dose	\$		3.00	2.70	2.45
	Total GAVI payment	\$		12,344,926	10,372,371	10,567,320

* Including air freight and injection devices

¹ Please complete all tables for the years that match the cMYP or updated Multi-Year Plan. This could be more or less than 5 years.

Following the regulations of the internal budgeting and financing cycles the Government will normally release its portion of the funds in the month of September 2007. Payment of the procurement of the first year of co-financed support will be around January 2008.

The Government agrees to use UNICEF Supply Division (Copenhagen) as its procurement agency for the purchase of the supply detailed in this application. If this is not possible, the Government agrees to comply with the GAVI Alliance requirements, and has included details of the proposed mechanism in Section 6, with details of the relevant National Regulatory Authority procedures.

Districts' performance on immunization will be reviewed annually through a transparent monitoring system. The Government requests that the Alliance and its partners contribute financial and technical assistance to support immunization of children as outlined in this application.

Minister of Health (or senior official):

Minister of Finance (or senior official):

Signature:

Signature:

Title: Secretary, Ministry of Health and Family Welfare

Title: Joint Secretary, Ministry of Finance

Date:

Date:

National Coordinating Body: Inter-Agency Coordinating Committee for Immunization:

We, the members of the ICC met on the 18 February 2007 to review this proposal. At that meeting we endorsed this proposal on the basis of the supporting documentation which is attached.

➤ The endorsed minutes of this meeting are attached as DOCUMENT NUMBER:

Name/Title	Agency/Organisation	Signature
	Ministry of Health & Family Welfare	
	Ministry of Finance	
	Ministry of Local Government , Rural Development and Cooperatives	
	Ministry of Forestry and Environment	
	Ministry of Education	
	BRAC	
	DFID	
	ICDDR,B	
	CIDA	
	Government of Japan	

	World Bank	
	Rotary International	
	UNICEF	
	USAID	
	WHO	

In case the GAVI Secretariat has queries on this submission, please contact:

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The GAVI Secretariat is unable to return documents and attachments. Unless otherwise specified by the country, documents may be shared with the GAVI Alliance partners and collaborators.

The Inter-Agency Coordinating Committee for Immunization

Agencies and partners (including development partners, NGOs and Research Institutions) that are supporting immunization services are co-ordinated and organised through an inter-agency coordinating mechanism (ICC).

The ICC are responsible for coordinating and guiding the use of the GAVI Alliance New and Under-Used Vaccine support, as well as all other immunization activities in the country. Please provide information about the ICC in your country in the spaces below.

Profile of the ICC

Name of the ICC: Inter Agency Coordination Committee

Date of constitution of the current ICC: 1985

Organisational structure (e.g., sub-committee, stand-alone):

Technical Sub Committee, Recruitment Sub Committee, Financial Management Sub Committee, procurement Sub Committee

Frequency of meetings: 4 times a year

Major functions and responsibilities of the ICC:

The function of the ICC is to strengthen immunization program of Bangladesh through

coordination among all parents to achieve the national immunization goal

The major functions of the ICC are:

1. To help in developing a national policy framework for EPI
2. To promote common agreement on program objectives and strategies
3. To identify program needs and explore technical assistance to address those issues
4. To help in identifying and obtaining national and international resources for the program
5. To assist in utilizing the resources effectively and efficiently
6. To advocate and promote EPI priorities among other programs
7. To ensure sustainable development of the national immunization program

Three major strategies to enhance the ICC's role and functions in the next 12 months:

1. Monitor the implementation of planned activities for 2007
2. Provide support and monitor the GAVI supported activities through regular visit in the field
3. ICC meeting should be held in pre-fixed dates -4 times a year quarterly

The role of ICC is to monitor the activities of different sub-committees. ICC has to take decisions for all EPI related activities which includes finalization of the date for SIAs, all policy related issues, introduction of new vaccine, approval of GAVI budget and monitor the fund utilization. The ICC also review all documents like as progress report, WHO-UNICEF joint report, cMYP, application for GAVI II support and provide feed back. The introduction of Hib vaccine was also discussed in the ICC meetings for Government concurrence and also to review the application.

3. Immunization Program Data

Please complete the tables below, using data from available sources. Please identify the source of the data, and the date. Where possible use the most recent data, and attach the source document.

- Please refer to the Comprehensive Multi-Year Plan for Immunization (or equivalent plan), and attach a complete copy (with an executive summary) as DOCUMENT NUMBER One (1)
- Please refer to the two most recent annual WHO/UNICEF Joint Reporting Forms on Vaccine Preventable Diseases and attach them as DOCUMENT NUMBERS Two (2) WHO/UNICEF Joint Reporting Form for 2005, Three (3) WHO/UNICEF Joint Reporting Form for 2006
- Please refer to Health Sector Strategy documents, budgetary documents, and other reports, surveys etc, as appropriate.
Four (4) Revised PIP-NIPHP, Five (5) APR Report

Table 3.1: Basic facts for the year 2006 (most recent; specify dates of data provided and source)

	Figure	Date	Source
Total population	141,553,741	2006	Bangladesh Bureau of Statistics
Infant mortality rate (per 1000)	56/1000	2006	UNICEF : State of World's Children 2006
Surviving Infants*	3,798,525	2006	UNICEF : State of World's Children 2006
GNI per capita (US\$)	470	2006	UNICEF : State of World's Children 2006
Percentage of GDP allocated to Health	0.57 %	2006	HNPSP
Percentage of Government expenditure on Health	6.6 %	2006	HNPSP

* Surviving infants = Infants surviving the first 12 months of life

Please provide some additional information on the planning and budgeting context in your country:

Please indicate the name and date of the relevant planning document for health

1. Health, Nutrition and Population Sector Program (HNPSP) 2006-2010
2. Essential Service Delivery Annual Operation Plan

Is the cMYP (or updated Multi Year Plan) aligned with this document (timing, content etc.)

The cMYP for 2008-2010 is considered for preparing the application for GAVI phase-II Support

Please indicate the national planning budgeting cycle for health

The financial year of Bangladesh is from July-June. In every financial year there is an allocation for respective sector in the national budget prepared by the Government of Bangladesh. After getting the allocation the Ministry of Health and Family Welfare (MOH&FW) prepare its budget break up as per HNPSP. The budget break down does not require approval from the Ministry of Finance. Immunization is one of the components of the Essential Service Delivery (ESD). During revision and review of Annual Operational Plan (AOP), the immunization part is also reviewed for any change, if required. The present revised PIP is for the period of 2006-2010 which is approved in ECNEC.

Please indicate the national planning cycle for immunization

Immunization is one of the programs of Child Health and Limited Curative Care, which is a

part of Essential Service Delivery (ESD). In every year National EPI prepare a detailed budget based on the planned activities for that specific year. These activities and budget allocation is then reflected in the Annual Operational Plan (AOP) with a total budget of Directorate General of Health Services (DGHS). This AOP could be changed as per program requirements.

Table 3.2: Current Vaccination Schedule: Traditional, New Vaccines and Vitamin A Supplement (refer to cMYP pages or updated Multi-Year Plan)

Vaccine <i>(do not use trade name)</i>	Ages of administration <i>(by routine immunization services)</i>	Indicate by an "x" if given in:		Comments
		Entire country	Only part of the country	
BCG	At birth	X		
DPT	6 weeks, 10 weeks and 14 weeks	X		
Hep-B	6 weeks, 10 weeks and 14 weeks	X		
OPV	6 weeks, 10 weeks and 14 weeks and 38 weeks	X		
Measles	38 weeks	X		
TT	15 years or first contact, + M1, +M6, +Y1 and +Y1	X		
Vitamin A	38 weeks (100,000 IU)	X		
Vitamin A	1-5 years (half- yearly)-200,000 IU	X		
Vitamin A	Post- partum (200,000 IU)	X		

Table 3.3: Trends of routine immunization coverage and disease burden (as per last two annual WHO/UNICEF Joint Reporting Form on Vaccine Preventable Diseases)

Trends of immunization coverage (in percentage)						Vaccine preventable disease burden		
Vaccine		Reported		Survey		Disease	Number of reported cases	
		2005	2006	2005	2006		2005	2006
BCG		91	90	96	98	Tuberculosis*		
DTP	DTP1	96	95	95	97	Diphtheria	125	34
	DTP3	96	93	87	84	Pertussis	125	46
Polio 3		96	93	88	92	Polio	00	17
Measles (first dose)		94	92	81	84	Measles	25,934	6,180
TT2+ (Pregnant women)		48	59	91	94	Neonatal Tetanus **	341	256
Hib3		NA	NA	NA	NA	Hib ***	NA	NA
Yellow Fever		NA	NA	NA	NA	Yellow fever	NA	NA
HepB3		84	94	NA	NA	Hepatitis B sero-prevalence*	NA	NA
Vit A supplement	Mothers (<6 weeks post-delivery)	ND	42	ND	29			
	Infants (>6 months)	87	86	68	73			

If available ** If 'total' tetanus data only is available, please give it and note that this is the case *** Note: JRF asks for Hib meningitis

If survey data is included in the table above, please indicate the years the surveys were conducted, the full title and if available, and the age groups the data refers to:

Survey were conducted in 2005 and 2006

Title of the survey: EPI Coverage Evaluation Survey

Age group: For routine immunization (children 1-2 years), for PAB of children (children less than 1 year) for TT vaccination (women 15-49 years)

Table 3.4: Baseline and annual targets

Number	Baseline and targets			
	Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)

Births	4,135,453	4,210,773	4,288,671	4,369,276	
Infants' deaths	268,804	273,700	278,764	284,003	
Surviving infants	3,866,649	3,937,073	4,009,907	4,085,273	
Pregnant women	5,043,231	5,135,089	5,230,088	5,328,376	
Target population vaccinated with BCG	4,094,098	4,168,665	4,245,784	4,325,583	
BCG coverage*	99 %	99 %	99 %	99 %	
Target population vaccinated with OPV3	3,486,352	3,634,318	3,701,552	3,854,925	
OPV3 coverage**	88 %	90 %	90 %	92 %	
Target population vaccinated with DTP3***	3,486,352	3,634,318	3,701,552	3,854,925	
DTP3 coverage**	88 %	90 %	90 %	92 %	
Target population vaccinated with DTP1***	3,803,293	3,957,368	4,030,578	4,106,333	
Wastage ² rate in base-year and planned thereafter (from vaccine wastage study-2005)	44	40	36	32	
Target population vaccinated with 3 rd dose of Hepatitis-B	3,486,352	3,634,318	3,701,552	3,854,925	
Hepatitis-B Coverage**	88 %	90 %	90 %	92 %	
Target population vaccinated with 1 st dose of Hib	3,803,293	3,957,368	4,030,578	4,106,333	
Wastage ¹ rate in base-year and planned thereafter (from vaccine wastage study-2005)	10	10	8	6	
Target population vaccinated with 1 st dose of Measles	3,170,652	3,307,141	3,448,520	3,676,746	
Target population vaccinated with 2 nd dose of Measles	NA	NA	NA	NA	
Measles coverage**	82 %	84 %	86 %	90 %	
Pregnant women vaccinated with TT+	4,639,777	4,826,984	5,020,884	5,115,241	
TT+ coverage****	92 %	94 %	96 %	96 %	
Vit A supplement	Mothers (<6 weeks from delivery)	3,486,352	3,634,318	3,701,552	3,854,925
	Infants (>6 months)	3,170,652	3,307,141	3,448,520	3,676,746
Annual DTP Drop out rate [(DTP1-DTP3)/DTP1] x 100	8	8	8	6	
Annual Measles Drop out rate (for countries applying for YF)	NA	NA	NA	NA	

* Number of infants vaccinated out of total births

** Number of infants vaccinated out of surviving infants

*** Indicate total number of children vaccinated with either DTP alone or combined

**** Number of pregnant women vaccinated with TT+ out of total pregnant women

Table 3.5a: Summary of current and future immunization budget (or refer to cMYP pages or updated Multi-Year Plan)

Cost category	Estimated costs per annum in US\$ (,000)			
	Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)

² The formula to calculate a vaccine wastage rate (in percentage): $[(A - B) / A] \times 100$. Whereby: A = the number of doses distributed for use according to the supply records with correction for stock balance at the end of the supply period; B = the number of vaccinations with the same vaccine in the same period. For new vaccines check **table α** after Table 7.1.

Routine Recurrent Cost				
Vaccines (BCG, DPT, OPV, Measles and TT)	15,530,155	16,140,004	16,526,244	16,959,002
Traditional vaccine (Hepatitis-B)		2,592,868	3,169,002	3,766,657
New and underused vaccines- Pentavalent (Hib+Hep-B+DPT)- 1 dose vial		3,116,427	2,539,264	2,586,990
Injection supplies (BCG+ DPT+ Measles+ TT)	2,552,287	2,647,004	2,722,271	2,789,475
Personnel	3,852,608	3,929,660	4,008,253	4,085,819
Salaries of full-time NIP health workers (immunization specific)	3,308,855	3,375,032	3,442,532	3,509,150
Per-diems for outreach vaccinators / mobile teams	543,753	554,628	565,721	576,669
Transportation	1,414,324	1,483,870	1,556,894	1,633,568
Maintenance and overheads	258,793	261,348	263,969	266,546
Training	472,909	482,367	492,014	501,535
Social mobilisation and IEC	312,120	53,060	54,122	55,184
Disease surveillance	2,474,653	2,578,923	2,689,167	2,795,428
Program management	112,560	114,811	117,107	119,373
Other	1,193,473	1,217,342	1,241,689	1,265,717
Subtotal Recurrent Costs	32,026,490	38,547,344	39,388,249	40,911,113
Routine Capital Costs				
Vehicles	412,115	291,722	306,308	316,263
Cold chain equipment	362,770	392,918	426,016	447,317
Other capital equipment	158,760	163,800	168,840	173,880
Subtotal Capital Costs	933,645	848,440	901,164	937,460
Campaigns				
Polio	24,000,000	12,000,000	12,000,000	12,000,000
Measles				10,000,000
Yellow Fever				
MNT campaigns				
Other campaigns				
Subtotal Campaign Costs	24,000,000	12,000,000	12,000,000	22,000,000
GRAND TOTAL	56,960,135	51,395,784	52,289,413	63,848,573

Please list in the tables below the funding sources for each type of cost category (if known). Please try and indicate which immunization program costs are covered from the Government budget, and which costs are covered by development partners (or the GAVI Alliance), and name the partners.

Table 3.6: Summary of current and future financing and sources of funds (or refer to cMYP or updated Multi-Year Plan)

Cost category	Funding source	Estimated financing per annum in US\$ (,000)			
		Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
Routine Recurrent Cost					
1. Vaccines (BCG, DPT, OPV, Measles and TT)	1. IDA Pool fund, GoB through RPA & UNICEF	15,530,155	16,140,004	16,526,244	16,959,002

2. Traditional vaccine (Hepatitis-B)	2. GoB & GAVI	GAVI	2,592,868	3,169,002	3,766,657
3. New and underused vaccines-Pentavalent (Hib+Hep-B+DPT)- 1 dose vial	3. GoB and GAVI		3,116,427	2,539,264	2,586,990
4. Injection supplies (BCG+ DPT+ Measles+ TT)	4. GoB	2,552,287	2,647,004	2,722,271	2,789,475
5. Personnel	5. GoB	3,852,608	3,929,660	4,008,253	4,085,819
6. Salaries of full-time NIP health workers (immunization specific)	6. GoB	3,308,855	3,375,032	3,442,532	3,509,150
7. Per-diems for outreach vaccinators / mobile teams	7. GoB and GAVI	543,753	554,628	565,721	576,669
8. Transportation	8. GoB and GAVI	1,414,324	1,483,870	1,556,894	1,633,568
9. Maintenance and overheads	9. GoB and pool fund	258,793	261,348	263,969	266,546
10. Training	10. GoB , GAVI, WHO, UNICEF	472,909	482,367	492,014	501,535
11. Social mobilisation and IEC	11. GoB, GAVI, WHO, UNICEF	312,120	53,060	54,122	55,184
12. Disease surveillance	12. GoB, WHO, pool fund	2,474,653	2,578,923	2,689,167	2,795,428
13. Program management	13. GoB	112,560	114,811	117,107	119,373
14. Other	14. GoB and GAVI	1,193,473	1,217,342	1,241,689	1,265,717
Routine Capital Costs					
1. Vehicles	1. GoB, GAVI	412,115	291,722	306,308	316,263
2. Cold chain equipment	2. GoB & UNICEF	362,770	392,918	426,016	447,317
3. Other Capital equipment	3. GoB	158,760	163,800	168,840	173,880
Campaigns					
1. Polio	1. GoB-IDA, WHO, UNICEF, Pool	24,000,000	12,000,000	12,000,000	12,000,000
2. Measles	2. GoB, WHO, UNICEF				10,000,000
3. Yellow Fever	3. NA				
4. MNT campaigns	4. NA				
5. Other campaigns	5. IDA Pool Fund				
GRAND TOTAL		56,960,135	51,395,784	52,289,413	63,848,573

4. New and Under-Used Vaccines (NVS)

Please give a summary of those aspects of the comprehensive multi-year immunization plan that refer to the introduction of new and under-used vaccines (refer to the cMYP or Multi-Year Plan). Please outline the key points that informed the decision-making process (data considered etc.)

Introduction of new and under utilized vaccine in the routine EPI program is one of the major objective of the national health program. In the national plan for EPI 2001-2005 it was

clearly mentioned that new and underutilized vaccines will be introduced in the routine EPI based on disease burden and availability of resources. Accordingly with the help of GAVI support Government of Bangladesh introduced Hepatitis-B vaccine.

For introduction of Hib vaccine a consultative workshop was held in June 2006 on Hib disease burden and prevention in Bangladesh. The objectives of the workshop were to receive a global update on Hib diseases burden and vision for prevention; to review the available evidence of Hib diseases burden and impact of Hib vaccine in Bangladesh; to determine programmatic and technical implications of Hib vaccine introduction in Bangladesh; to analyze costing of Hib vaccine introduction and its possible financing mechanism through GAVI phase II support and to inform policy makers with accurate data and cost-benefit analysis for deciding on possible introduction of Hib vaccine in Bangladesh.

Officials from MOH&FW, DGHS, EPI HQ, Paediatricians, WHO, UNICEF, WB and other development partners were present in the workshop. P. Zuber of WHO-Geneva, Ms. R. Hajjeh from Johns Hopkins University of USA and Dr. C. Burgess of WHO-SEARO were also present. The decision which came out from this workshop is to introduce Hib vaccine in the routine immunization program to reduce the disease burden.

Current Hib vaccine is safe and highly effective – 90-99% of children develop antibodies after three doses. It prevents meningitis, pneumonia, epiglottitis, and other serious infections caused by the Hib bacterium. In the United States, Hib cases declined 99% from 1986 to 1995 in children under five, as a result of the use of Hib vaccine.

WHO recommends that Hib vaccine now be included in routine infant immunization programmes for all children, as appropriate to national capacities and priorities.

Please describe (or refer to the relevant section of the cMYP or Multi-Year Plan) how your country intends to move towards financial sustainability for the chosen new vaccines, how the co-financing payments will be met, and any other issues regarding financial sustainability that were considered

The Government of Bangladesh procuring the routine EPI vaccines through pool fund and IDA credit. From 2007-08 Government is planning to gradually include the vaccine cost in the revenue budget. Accordingly national EPI planned to incorporate the cost of BCG in the new PIP and the AOP will be revised accordingly. By this time Government already started procuring injection safety supplies from a local syringe manufacturing company. Government also increased the budget allocation for different SIAs and from 16th NID Government is planning to provide the total amount from the pool fund. For better utilization of pool fund Government already made some MOU with partners for implementation of different health programs.

Please list the vaccines to be introduced with support from the GAVI Alliance (and presentation):

Government of Bangladesh is willing to introduce Hib vaccine in pentavalent form in 1-dose vial (liquid) in routine EPI program (to reduce number of injection to infants) and to reduce the vaccine wastage.

Assessment of burden of relevant diseases (if available):

Disease	Title of the assessment	Date	Results

If new or under-used vaccines have been already introduced, please give details of the lessons learnt about storage capacity, protection from accidental freezing, staff training, cold chain, logistics, drop out rate, wastage rate etc., and the action points to address them in the new plan:

Lessons Learned	Action Points
1. More space required for storage of new Vaccines along with the maintenance of cold chain	Both storage capacity and cold chain facilities need further increase for proper storage and ensure the optimum cold chain system.
2. Training for the personnel at every levels for proper implementation	Nation wide comprehensive training need to be conducted for Hib introduction
3. Accidental freezing was observed of freeze sensitive vaccine and diluents	Manual was developed on Cold Chain and EPI store management, and training imparted to personnel related with vaccine and cold chain management (EPI Supervisors and Medical Technologists)
4. Vaccine wastage rate was also a concern	<ul style="list-style-type: none"> ➤ A study on vaccine wastage rate was carried out in 2005 followed by sentinel monitoring system to reduce the vaccine wastage ➤ Instead of 8 sites, 4-site strategy is piloting to reduce vaccine wastage

First Preference Vaccine

- Please complete Table A.1 in Annex 1 (an excel spreadsheet), for the first vaccine required.

To fill out Table A.1, please update the figures in Table β and Table μ in Annex 1 with the most recent UNICEF Supply Division Prices and Charges on the UNICEF website.

Please refer to www.unicef.org/supply for the most recent GAVI Alliance Vaccine Product Selection Menu, and review the GAVI Alliance NVS Support Country Guidelines to identify the appropriate country category, and the minimum country co-financing level for each vaccine in each group.

Please indicate in the table below the required number of vaccine doses, the vaccine presentation, the associated injection safety material required and safety boxes for the first vaccine required as per the calculation made in Annex 1.

		Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
National target for children to be immunized	#		3,957,368	4,030,578	4,106,333
Total number of vaccine doses required	#		15,582,137	12,696,321	12,934,949
Total number of AD syringes required	#		16,637,270	13,421,825	13,674,089
Total number of reconstitution syringes required	#				
Total number of safety boxes required	#		184,674	148,982	151,782

Please indicate in the table below the price per dose, the total funds required to meet the estimated demand, the country co-financing contribution, and the funds required from the GAVI Alliance according to the calculations made in the Annex 1 spreadsheet.

		Base year (2007)	Year 1 (2008)	Year 2 (2009)	Year 3 (2010)
Total budget	Price per dose *	\$	3.20	2.90	2.65
	Total funds required	\$	14,344,855	12,000,186	12,225,731
Country co-financing	Co-financing per dose	\$	0.20	0.20	0.20
	Total country payment	\$	3,116,427	2,539,264	2,586,990
GAVI co-financing	GAVI payment per dose	\$	3.00	2.70	2.45
	Total GAVI payment	\$	11,228,428	9,460,922	9,638,741

* Total price per dose includes vaccine cost, plus freight, supplies, insurance, visa costs etc

Second Preference Vaccine

Currently Government of Bangladesh has no plan to introduce any other new or underutilized vaccine except Hib vaccine.

Procurement and Management of New and Under-Used Vaccines

- a) Please show how the support will operate and be managed including procurement of vaccines (GAVI expects that most countries will procure vaccine and injection supplies through UNICEF):

Although under GAVI phase-1 support Government procured Hepatitis-B vaccine and injection safety supplies through UNICEF but under GAVI Phase-II support the

Government of Bangladesh is interested to get the support for injection safety supplies (AD syringe, reconstitution syringe and safety box) in cash. One local manufacturer already started to produce AD syringe and Safety boxes. Government of Bangladesh already procured injection safety supplies (AD syringe, reconstitution syringe and safety box) from this company.

b) If an alternative mechanism for procurement and delivery of supply (financed by the country or the GAVI Alliance) is required, please document:

- That the functions of the National Regulatory Authority comply with WHO requirements for procurement of vaccines and injection devices of assured quality
- That the delivery in country of the procured supply is in compliance with the co-financing plan
- That acceptable procurement principles and processes are applied

The Government of Bangladesh is willing to get the Hib vaccine in kind through the procurement mechanism that exists with UNICEF for Hepatitis-B vaccine. For injection safety support (AD syringe, reconstitution syringe and safety box) Government of Bangladesh is interested to get this support in cash so that AD, reconstitution syringes and safety boxes can be procured from the local manufacturers. The standard of local manufacturing company for injection safety supply (AD syringe, reconstitution syringe and safety box) is complied in accordance with the guideline and standard of the National Regulatory Authority (NRA) that complies WHO protocol also. The local company is a joint venture with Star Syringe Manufacturing Company, UK. The co-financing will be paid in the Bank account as per instructed by GAVI.

c) Please describe the introduction of the vaccines (refer to cMYP or updated Multi Year Plan)

Under GAVI support Government of Bangladesh introduced Hepatitis-B vaccine in a phased manner which started from 2003 and completed in 2005. For Hib vaccine introduction, Government of Bangladesh also planned the similar strategy which will start from 2008. In the first phase one District and one City Corporation will be selected. The introduction in the first phase will start from January 2008 for three months. After getting the award the national EPI will start the training in the first phase areas. There will be no injection safety training as the field workers already trained on use of AD syringe. The training will be only vaccine presentation. There will be one national TOT who will train the District and Upazila Managers. The Upazila Managers will train the field workers. The national and District trainers will monitor the Upazila training. From the second quarter of 2008 the whole country will be covered.

- d) Please indicate how funds should be transferred to the country by the GAVI Alliance (if applicable)

According to the requirement of GAVI Board, Government of Bangladesh opened a foreign currency bank account in a nationalized bank to operate the GAVI support (first phase) which includes ISS and reward money. The same account will be used for operating GAVI Phase-II support. The fund will be managed under the guidance of ICC.

- e) Please indicate how the co-financing amounts will be paid (and who is responsible for this)

The Government of Bangladesh is willing to get the Hib vaccine in kind through the procurement mechanism that exists with UNICEF for Hepatitis-B vaccine. For injection safety support (AD syringe, reconstitution syringe and safety box) Government of Bangladesh is interested to get this support in cash so that AD, reconstitution syringes and safety boxes can be procured from the local manufacturers. The standard of local manufacturing company for injection safety supply (AD syringe, reconstitution syringe and safety box) is complied in accordance with the guideline and standard of the National Regulatory Authority (NRA) that complies WHO protocol also. The local company is a joint venture with Star Syringe Manufacturing Company, UK. The co-financing will be paid in the Bank account as per instructed by GAVI.

- f) Please outline how coverage of the new vaccine will be monitored and reported

The monitoring of Hib vaccine coverage will be incorporated in the existing reporting system for routine EPI. It should be mentioned here that national EPI already established the computerized EPI data management system for routine EPI. The software will be updated for inclusion of Hib coverage.

If you are approved for new vaccines support, you will be entitled to receive a lump-sum of US\$ 100,000 to facilitate the introduction of each new vaccine. If you wish to receive these funds, please *submit the attached "Banking Form" (in Annex 2) along with this proposal, if you have not yet already done so for other types of support from the GAVI Alliance.*

5. Additional Comments and Recommendations from the Inter-Agency Coordinating Committee for Immunization (ICC) and other Health Sector Development Partners

The Inter-Agency Coordination Committee for Immunization (ICC) recognizes the support of GAVI for providing their technical and financial assistance in strengthening the overall routine immunization program.

With the support from GAVI the Government of Bangladesh introduced Hepatitis-B vaccine in the routine immunization program. Training for all field workers on Hepatitis-B vaccine introduction was also done all over the country with the financial support from GAVI. Government of Bangladesh already planned for inclusion of Hepatitis-B vaccine cost in the national budget in a phased manner.

To get the injection safety support GAVI provided their technical assistance for developing the national policy on injection safety through which the national EPI incorporated the use of AD syringe for all vaccines in the routine EPI. With the technical assistance of WHO the Government of Bangladesh explored the possibility of local production of AD syringe and ultimately one local company started production of AD syringes.

The assistance that GAVI provided for conducting the Data Quality Audit (DQA) is worth mentioning through which the national EPI reviewed and revised all record keeping and reporting forms and also strengthened the quality reporting system.

The ICC believes that with the assistance from GAVI the Government of Bangladesh will be able to introduce Hib vaccine from the year 2008 in routine EPI. The ICC also believes that GAVI will consider the pentavalent two doses vial to reduce the number of injections and ultimately strengthen the injection safety. At the same time GAVI will provide the injection safety support in cash so that the Government of Bangladesh can patronize the local AD syringe manufacturing company for sustainable development of injection safety at all level as per national policy.

6. Documents Required

Document	DOCUMENT NUMBER	Duration *
Comprehensive Multi-Year Plan (cMYP) or updated Multi-Year Plan	1 (one)	2008-2010
WHO / UNICEF Joint Reporting Form (last two)	2 (two) and 3 (three)	2005 and 2006
Plan for introduction of New Vaccine (if not already included in the cMYP or updated Multi-Year Plan)	Included in the cMYP	2008-2010
Endorsed minutes of the ICC meeting discussing the requested GAVI Alliance New and Under-Used Vaccine (NVS) support	4 (four)	February 2007

		(25 th meeting)
Endorsed minutes of the National Coordinating Body meeting where the GAVI Alliance NVS proposal was endorsed	5 (five)	June 2006
Minutes of the three most recent ICC meetings	6 (six), 7 (seven), 8 (eight)	(22 nd , 23 rd and 24 th)
ICC work-plan for the forthcoming 12 months		

** Please indicate the duration of the plan / assessment / document where appropriate*

REPLY TO CONDITIONS AFTER THE SUBMISSION OF THE ABOVE PROPOSAL

OCTOBER 2007

GOVERNMENT RESPONSE TO GAVI QUERY

1. Assessment of Cold Chain

1.1. Storage and transportation of vaccine

(a) Central level

In the national immunization program all vaccines are kept in the cold room except OPV which kept at freezer room at the central level. During transportation chilled water pack is used for cold sensitive vaccines. These are DTP, Hepatitis-B and TT. For OPV, Measles and BCG frozen ice pack is used for transportation. At central level the diluents are kept at ambient temperature and as well as during transportation.

(b) District level

At District level all vaccines are kept in the Ice Lining Refrigerator (ILR) except OPV which kept at deep freeze. During transportation to Upazila chilled water pack is used for cold sensitive vaccines. These are DTP, Hepatitis-B and TT. For OPV, Measles and BCG frozen ice pack is used for transportation. If only one cold box is needed then chilled water pack is used for all vaccines. At District level the diluents are kept at ambient temperature and as well as during transportation.

(c) Upazila level

At Upazila level all vaccines are kept in the Ice Lining Refrigerator (ILR). During transportation at outreach sites conditioned ice pack is used in the vaccine carrier. The diluent is also kept in the ILR on the day before sending to outreach site.

1.2. Available storage capacity

The storage capacity of national EPI was considerably increased due to preparation to measles catch-up campaign in 2005 and 2006 where more than 35 million children were immunized.

Storage volume for routine vaccine in Upazila (one month stock) and in district (three month stock) was assessed using WHO volume calculator 2004 edition. Target children under one year of age, WCBA, coverage of all routine antigens and reported wastage rates for all antigens was also considered in this calculation. Based on the assessment a total of 119 ILR (TCW1152) have been supplied to 59 District stores and 133 ILR (TCW1152), 11 fast freezers (TFW800) and 95 gas refrigerator (GR265) have been supplied to 166 Upazila stores to meet up their cold storage capacity. A total of 43 freezers and refrigerators (six FCW300, eight

TCW1152, and twenty eight GR265) were kept reserve in central EPI store for any emergency demand. Vaccine carriers were also procured as per need.

Recently the cold storage capacity at national level has been increased to 623 m³ from 283 m³. Out of this 623 m³, 482 m³ is for freezer and 141 m³ is for cold room. The storage capacity at central level was calculated with the vaccine volume calculator and attached here with.

Based on the above supply of cold chain equipment and increase of cold storage capacity at national level it is apprehended that there is sufficient storage capacity at Central, District, City Corporation and Upazila level and there will be no shortage after introduction of Hib vaccine (Penta, liquid and single dose). National EPI also have a plan to procure additional ILR if necessary.

2. Financial Analysis

EPI is one of the successful programs in the health sector of Bangladesh and the Government of Bangladesh is very much aware for strengthening and as well as to sustain of this program. The commitment of the Government towards the children of Bangladesh is very clear and is reflected in the Health, Nutrition and Population Sectoral Program (HNPS). The FSP is a continuous process and the Government of Bangladesh is working together with relevant line ministries and the donors through the ICC for securing vaccine costs of the national immunization program on a regular basis. The IDA credit and pool fund will be used for procuring the vaccines.

3. Use of 3 million USD

Before introduction of Hib vaccine national EPI planned to update all record keeping and reporting forms/books and print those forms/books for countrywide use. The existing record keeping and reporting forms/books will be replaced with the new ones. The saved money will be used for printing of new forms and an amount of USD 300,000 will be required for this purpose.

To aware the mass people and to motivate them, different communication materials will be printed/developed at the time of Hib introduction. These communication materials will include message on injection safety and AEFI surveillance. Besides the printing materials Radio/TV spot will also be prepared to create awareness through mass media. An amount of around 500,000 USD will be required for this activity.

National EPI has a plan to procure/replace cold chain equipment for District, City Corporation, Upazila and Municipalities. This includes ILR, deep freezer, cold box, vaccine carrier, voltage stabilizer etc. An amount of 1,000,000 USD will be required for procuring the cold chain equipments and the accessories for District and Upazila stores.

From 2007 national EPI is procuring the injection safety supplies (AD syringe, safety box, mixing syringe etc.) using the Government budget. The balance amount of the saved

money (approximately USD 1.2 million) will be used for continuing the procurement of injection safety supplies in future.

4. Outstanding Hepatitis-B vaccine

Government of Bangladesh approved for Hep-B vaccine from GAVI for 5 years. Government of Bangladesh spreading the unused portion of Hepatitis-B vaccine through the year 2012 due to phased introduction. If Government of Bangladesh gets Hib vaccine from 2008 then there might be no require of Hep-B vaccine from 2008. If the balance amount of Hep-B vaccine at the time of introduction covers the 2nd and 3rd dose of Hep-B vaccine those who already received 1st or 2nd dose of Hep-B then there will be no need of Hep-B vaccine.

Government of Bangladesh will introduce Hib vaccine in the routine EPI program in phased manner. At the time of introduction only the first dose of Hib vaccine will be given to less than one year children. Children who received any dose of DTP and Hepatitis-B will complete the series with mono. At the time of introduction of Hib vaccine Hepatitis-B and DTP mono will be calculated for those children who received either first or second dose of mono and these vaccines will kept separately for those children.

The planning of Hib introduction will be made in such a way so that there will be minimum wastage of outstanding Hep-B vaccine.

5. Addressing High Wastage of Vaccine

Expanded Program on Immunization launched in Bangladesh in the year 1975 on the eve of World Health Day. At the beginning of EPI vaccination was confined among the major hospitals and clinics. From the result of the CES it was revealed that the operational strategy was not adequate to achieve the immunization goal. For why intensification was planned in the year 1985 and full intensification was completed by 1989. In the intensified strategy one outreach session was planned for around 1,000 populations.

In Bangladesh the lowest administrative unit is a ward, which has a population of around 8,000 to 10,000. Based on the population each and every rural ward has been divided into 8 sub blocks and each sub block has an outreach session, which operates once in a month. In Bangladesh the total number of rural ward is 13,500 and based on the above operational strategy the total number of outreach site in rural areas are $13,500 \times 8 = 108,000$. Besides the outreach sessions, fixed sessions are also held in all the Upazila Health Complexes (fixed site), which operates for 2 to 6 days vaccination per week.

In the urban settings there is no common operational strategy like as rural areas. The Districts hospitals, Medical College Hospitals and other specialized hospitals are located in the urban areas and these fixed sites conduct EPI session almost everyday. Besides that, based on program need outreach sessions are also planned for the urban areas which also operates 1-4 sessions per month. Based on these above calculation the total number of sessions per month is around 134,684.

Considering this operational strategy at least one vial of each type of vaccine will be required per session whatever may be the number of children to be vaccinated and the calculation for the vaccines were made based on number of sessions rather than the number of children. For example, in a ward 4 vials of Measles will be required to vaccinate 30 children in a single session. But if these 30 children were provided vaccination from 8 different sites then 8 vials of Measles will be required.

Government of Bangladesh requested the introduction of Hib vaccine in the form of pentavalent single dose vial, liquid form. In that case the wastage will be not more than 10%.

Currently EPI is following eight-site strategy i.e. in one ward eight sessions are conducted per month for a total population of around 8000. For each session it is required to send at least one vial for each vaccine although the wastage is high. If the number of sessions per ward is reduced then the target per session will be more and thereby the vaccine wastage would be reduced. For that reason National EPI has started piloting of four site strategy in six Upazila from January 2007.

A retrospective vaccine wastage study was undertaken in Bangladesh in 2005. From that study it was revealed that the wastage for BCG was 84%, for DPT 45%, for Measles 69% and for TT 35%. Reasons for such high vaccine wastage were not identified during the study. For that with the assistance of WHO national EPI is doing sentinel monitoring of vaccine wastage in 80 Upazila. The objective of this study is to find out the reasons for high wastage and how to address those issues those issues for reducing vaccine wastage. The experiences then will be applied to the other areas.

Besides this Government of Bangladesh has a plan to review the vaccine vial presentation. Currently the vials are of 10 doses. It is planned to be piloted with lesser doses vial in selected Upazila to find out the wastage. If the wastage found less then GoB will go for lesser doses vial for BCG, Measles and TT/Td.

6. Utilization of Non-vaccine Fund

Prior to introduction of Hib vaccine Government of Bangladesh has a plan to train all Manager, supervisor and field workers who are involved with the immunization program. It will take around one month to complete the training. In the first week the TOT will be organized where the SMOs, DIMOs and EPI Supervisor from the District will participate. Medical Officers from national EPI and WHO experts will facilitate the TOT.

In the second week the SMOs, DIMOs, and District trainers will organize training for Upazila personnel at their respective District. There will be four persons from each Upazila who will receive the training at District level. They are UH&FPO, UFPO, Medical Technologist-EPI and the Sanitary Inspector (in charge).

In the third and fourth week the Upazila trainers will in turn train the supervisors and field workers of their respective Upazila. The Upazila training will be supervised by National, Divisional and District level health personnel. Besides that the WHO and UNICEF staffs at national and field level will supervise the training.

For completing the training on the introduction of new vaccine, different training materials need to be developed and printed. These materials/guide books will be distributed to all the participants.

The table of budget break-up for non-vaccine fund is attached herewith.

REPLY TO CONDITIONS AFTER THE SUBMISSION OF THE ABOVE REPLIES

MARCH 2008

Response by Ministry of Health and Family Welfare, Bangladesh, clarifying the issues raised by the GAVI Board based on IRC recommendations by letter dated 04 December 2007, in respect to Bangladesh's proposal to GAVI for support for introduction Hib vaccine as the pentavalent (DPT-HepB-Hib) preparation in National Expanded Program on Immunization.

Background

Bangladesh submitted its application for GAVI support for introduction of Hib vaccine as the pentavalent (DPT-HepB-Hib) vaccine into its national immunization program on 20 April 2007. Following the review of Bangladesh's proposal by the GAVI Independent Review Committee (IRC) in June 2007, the Government of Bangladesh was informed by letter dated 25 June 2007 to the Minister of Health and Family Welfare of the decision of "conditional approval". In order to qualify for final approval five conditions were required to be fulfilled as conveyed through GAVI decision letter.

Bangladesh government submitted their response to the GAVI secretariat clarifying the issues raised for the September 2007 round of GAVI's IRC review of applications. Clarifications submitted for three responses were accepted by the GAVI and further clarifications were requested from Bangladesh government for two of the conditions, which are as follows.

1. Assess Cold Chain capacity to store requested vaccines, and describe plan for the provision of additional capacity if needed.

2. Conduct a thorough financial analysis and provide more detailed strategies for financial sustainability, with measurable indicators and targets, specific activities necessary to achieve these targets (timeline and responsible agencies to be shown) and budgetary implications.

Clarifications

7. Cold Chain Capacity

(b) Central level

In the national immunization program all vaccines are stored in the cold room except OPV which is kept at freezer room at the central level. During transportation to the district chilled water pack is used for freeze-sensitive vaccines (DTP, Hepatitis-B and TT). For OPV, Measles and BCG frozen ice pack is used for transportation. At central level the diluents are kept at ambient temperature as well as during transportation to the district level.

(d) District level

At District level all vaccines are stored in the Ice Lined Refrigerator (ILR) except OPV which is stored in freezer. During transportation to Upazila, conditioned ice pack is used for freeze-sensitive vaccines (DTP, Hepatitis-B and TT) and frozen ice pack is used for OPV, Measles and BCG vaccines. If only one cold box is needed to transport all vaccines then conditioned ice pack is used. At District level the diluents are kept at ambient temperature as well as during transportation to the Upazila.

(e) Upazila level

At Upazila level all vaccines are stored in the Ice Lined Refrigerator (ILR). During transportation to the outreach sites conditioned ice pack is used in the vaccine carrier. The diluents are also kept in the ILR on the previous day before sending to the outreach site.

1.1 Available cold storage capacity at national level

The storage capacity was considerably increased at all level during preparation for measles catch-up campaign in 2005 and 2006 where more than 35 million children were vaccinated.

Currently there are 12 cold rooms and 5 freezer rooms at the central EPI store. In May 2007, 8 cold rooms and 3 freezer rooms were installed keeping in mind for introduction of new vaccine (Hib). The storage capacity of 12 cold rooms is 482 m³ and 5 freezer rooms is 141 m³. The total usable capacity for cold room is around 160 m³ or 160,667 liter and for freezer room is around 47 m³ or 47,000 liter considering usable space as one third of the total available space.

Table 1: Available cold room capacity at national level

Equipment	Name of Company	Location	Capacity in liters
WIC-1 (New)	Huure	EPI HQ	40,000
WIC-2 (New)	Huure	EPI HQ	30,000
WIC-3 (New)	Huure	EPI HQ	40,000
WIC-4 (New)	Huure	EPI HQ	30,000
WIC-5 (New)	Huure	EPI HQ	40,000
WIC-6 (New)	Huure	EPI HQ	40,000
WIC-7 (New)	Huure	EPI HQ	30,000
WIC-8 (New)	Huure	EPI HQ	30,000
WIC-9 (Old)	Huure	EPI HQ	8,000
WIC-10 (Old)	Muller	EPI HQ	9,000
WIC-11 (Old)	Korea	Cold Chain Bhaban	45,000
WIC-12 (Old)	Huure	TEMO-2, Mohakhali	140,000
Total			482,000

1.2. Calculation of cold room capacity at national level for introduction of pentavalent liquid vaccine

The estimations are based on the national EPI plans and using WHO vaccine volume calculators. Pentavalent vaccine, Measles, Tetanus Toxoid and BCG vaccines are included in the calculations for 3 years (2008-2010). Target children under one year of age, women of child bearing age (WCBA), coverage, wastage rates, buffer stock etc. were also taken into account for this calculation. The results of estimations are summarized in the table below.

Table 2: Storage capacity (cold room) at national level for option-1 (pentavalent liquid single dose preparation)

			2008	2009	2010
A	Annual volume requirement, including liquid single dose pentavalent vaccine (m ³)	Sum-product of total vaccine doses multiplied by unit packed volume of the vaccine	548.14	558.28	568.78
B	Available volume capacity of cold room (m ³)	#	160.67	160.67	160.67
C	Estimated minimum number of shipments per year required for the existing cold room capacity	A/B	3.41	3.47	3.54
D	Number of consignments/shipments per year	Based on national vaccine shipment plan	4	4	4
E	Gap (if any)	[(A/D)-B]	No Gap or shortage		
F	Estimated cost for expansion	USD	0	0	0

Table 3: Storage capacity (cold room) at national level for option-2 (pentavalent lyophilized two dose preparation)

			2008	2009	2010
A	Annual volume requirement, including lyophilized two dose pentavalent vaccine (m ³)	Sum-product of total vaccine doses multiplied by unit packed volume of the vaccine	499.32	508.56	518.12
B	Available volume capacity of cold room (m ³)	#	160.67	160.67	160.67
C	Estimated minimum number of shipments per year required for the existing cold room capacity	A/B	3.11	3.17	3.22
D	Number of consignments/shipments per year	Based on national vaccine shipment plan	4	4	4
E	Gap (if any)	[(A/D)-B]	No Gap or shortage		
F	Estimated cost for expansion	USD	0	0	0

Table 2 and table 3 shows that national level has enough space (160.67m³) to store country's 3 months required vaccines (Penta + measles + BCG + TT). This means 4 shipments will be required per year. Therefore Bangladesh does not have a shortage or gap of cold room capacity at national level in accommodating Hib vaccine as pentavalent either in liquid single dose or lyophilized two dose preparation.

Table 4: Available freezer room capacity at national level (-15°C to -25°C)

Equipment	Name of Company	Location	Capacity in liters
WIF-1 (New)	Huure	EPI HQ	20,000
WIF-2 (New)	Huure	EPI HQ	20,000
WIF-3 (New)	Huure	EPI HQ	20,000
WIF-4 (Old)	Huure	TEMO-2, Mohakhali	45,000
WIF-5 (Old)	Korea	Cold Chain Bhaban	36,000
Total			141,000

Table 5: Freezer room capacity (-15°C to -25°C) at National level for accommodating three months' supply of OPV.

	2008	2009	2010
Net volume requirement, for storage of 3 month stock of OPV (m ³)	23.00	23.42	23.86
Available net storage capacity (m ³) at freezer room	47.00	47.00	47.00

Table 4 and table 5 shows that national level has enough space (47.00 m³) to store country's 3 months required Polio vaccine including buffer stock and preparation of ice pack.

1.3. Calculation of cold storage capacity at District level for introduction of pentavalent liquid vaccine

Storage volume for routine vaccine at District level was assessed using WHO vaccine volume calculator. Vaccine supply is scheduled on quarterly basis from National to District level. So the total space at District level would be the same as national level for one quarter. Target children under one year of age, women of child bearing age (WCBA), coverage, wastage rates, buffer stock etc. were also taken into account for this calculation.

At District level all vaccines are stored in Ice Lined Refrigerator (ILR) except OPV which is stored in freezer. Most of the ILR at District level are TCW 1152 type which can be converted into freezer in case of need. The net vaccine storage capacity of one ILR is considered around 169 liter (0.17 m³) and for one freezer (model-MK 300) around 264 liter (0.26 m³) for calculation.

A total number of 782 refrigerators and 163 freezers are in use in all 64 districts. In addition to this there are 163 refrigerators and 44 freezers in stock at different level for future use (need based).

Table 6: Cold storage capacity (+2°C to +8°C) at District level for accommodating three month's supply of vaccines (Including buffer).

	2008	2009	2010
Net volume requirement, for storage of 3 month stock of vaccines including liquid single dose pentavalent vaccine (m ³)	137.04	139.57	142.19
Net volume requirement, for storage of 3 month stock of vaccines including lyophilized two dose pentavalent vaccine (m ³)	124.83	127.14	129.53
Available net storage capacity (m ³) at district level	159.71	159.71	159.71

In Table-6 it is shown that whatever the formulation of pentavalent vaccine (liquid single dose / lyophilized two doses) the district level capacity is more than adequate to store three months supply of vaccines. Therefore Bangladesh does not have a shortage or gap of storage capacity in accommodating Hib vaccine as pentavalent vaccine either as liquid single dose or lyophilized two dose preparation at District level.

Table 7: Cold storage capacity (-15°C to -25°C) at District level for accommodating three month's supply of OPV (Including buffer).

	2008	2009	2010
Net volume requirement, for storage of 3 month stock of OPV (m ³)	23.00	23.42	23.86
Available net storage capacity (m ³) at district level	54.65	54.65	54.65

In Table-7 it is shown that for OPV the district level capacity is more than adequate to store 3 months supply. The remaining space after storing OPV is used for preparation of ice packs.

1.4. Calculation of cold storage capacity at Upazila/City Corporation/Municipality level for introduction of pentavalent liquid vaccine

At Upazila/City Corporation/Municipality level all vaccines are stored in Ice Lined Refrigerator (ILR). Upazila receives monthly supply from the District. So the space required for storage of vaccine at Upazila level will be one third capacity of District.

Table 8: Cold Storage capacity (+2°C to +8°C) at Upazila/City Corporation/Municipality level for accommodating one month's supply of vaccines (Including buffer).

	2008	2009	2010
Net volume requirement, for storage of 1 month stock of vaccines including liquid single dose pentavalent vaccine (m ³)	45.68	46.52	47.40
Net volume requirement, for storage of 1 month stock of vaccines including lyophilized two dose pentavalent vaccine (m ³)	41.61	42.38	43.18
Available net storage capacity of vaccines (m ³) at Upazila level in 1162 ILR	196.38	196.38	196.38

In the Table-8 it is shown that whatever the formulation of pentavalent vaccine (liquid single dose / lyophilized two doses) the Upazila/City Corporation/Municipality level capacity is more than adequate to store one month supply of vaccines. Therefore Bangladesh does not have a shortage or gap of storage capacity in accommodating Hib vaccine as pentavalent vaccine either in liquid single dose or lyophilized two dose preparation at Upazila/City Corporation/Municipality level.

A total number of 1108 freezers (total net available space is 292.51 m³) are available in all 471 Upazilas, 6 City Corporations and 92 Municipalities. The number of freezers at Upazila/City Corporation/Municipality level is considerably high for preparing large number of ice packs during supplementary immunization activities including NIDs.

It should be noted here that there is no shortage of vaccine carrier at any level. Further, the successful completion of Measles campaign in 2005-2006 which delivered over 35 million doses of vaccines without any problem in cold chain capacity or cold chain maintenance provides very good evidence for adequacy and appropriate management of the Bangladesh EPI cold chain system.

Based on the above assessment of storage capacity of vaccines at National, District, Upazila, City Corporation and Municipality level it is revealed that there is sufficient storage capacity at all level and there will be no shortage after introduction of Hib vaccine either in liquid single dose or lyophilized two dose forms of the pentavalent vaccine.

2. Financial sustainability

2.1 Fund allocation for Health, Nutrition and Population Sector Program.

The program of the Bangladesh Ministry of Health and Family Welfare is called the Health, Nutrition and Population Sector Program (HNPS). Under this program the work areas are divided to 38 operational plan. The EPI program is a component of the Essential Services Delivery (ESD) Operational Plan (OP) of Program Implementation Plan (PIP). The Revised Program Implementation Plan (RPIP) of HNPS program presented in Annex1.

With reference to the basic characteristics of a SWAp, the partnership between GOB and Development Partners is built on the following general guiding principles:

- a) MOHFW leads the implementation of the HNPS and the design and management of DP support, including technical assistance.
- b) The Development Partners provide sector-wide support to the priorities defined by the MOHFW in the HNP Strategic Investment Plan - SIP (July 2003 - June 2010) and detailed in the respective Programme Implementation Plans .
- c) Development Partners that are pooling resources provide sector-wide support by making contributions to a FOREX Account held by GOB at the Central Bank.

Together with GOB's contributions, those funds are made available to the implementing agencies or spending units through GOB's budgetary channels.

- d) Development Partners that are not pooling resources provide support or parallel financing for specific projects or budget lines in the OP and budget. The contributions of Non-Pooled DPs may be financial, but may also include the provision of technical assistance and in-kind contributions.
- e) Mechanisms already exist or have been recently established to facilitate the exchange of information and the policy dialogue between GOB and the DPs ("the HNP Forum"), and to coordinate and streamline actions and procedures amongst the DPs ("the HNP Consortium").

An amount of Tk. 83,341 million (USD 1389 million) of Development Partners (DPs) support is likely to be channelised to the HNPSP of MOHFW in 2005 – 2010.

2.2 Fund allocation for Essential Service Delivery (ESD).

Consistent with the HNPSP Conceptual Framework and the existing policy framework for HNPSP, the MOHFW has maintained its earlier prioritization of Essential Services Delivery (ESD) Package, which will continue to receive 60 percent of sectoral resource allocations. (Annex 1. pp.49) .

In a table 9 it is shown the revised allocation of the funds for the implementation of ESD package by years during 2008-2010. This table represents the summary of revised fund allocation in Operational plan for ESD program for 2008-2009 (p.84, Annex 2) and demonstrates the increase of the funds allocation for the almost all components of ESD including components of National EPI program. The maximum increase is for the 2008-2009 year and is due to the planned supplementary immunization activities for measles control and MNT elimination programs.

The allocation for Hep B vaccine is also kept "HepB vaccine introduction" for the co-financing of this vaccine procurement in line with continuation of GAVI phase 1 support. Vaccine procurement and operational cost for routine immunization are included in the component "Increase and Sustain Routine EPI". For this component the current commitment is for 13% increase for 2008-2009 and 5% increase for 2009-2010.

In tables 10a -10c it is shown the funds allocation for different sub-components including funds allocated for routine EPI vaccines procurement for "Increase and Sustain Routine EPI" component of ESD program.. The source of these tables is 2nd Revision of ESD Operational plan (pp,300 – 301)-Annex 3.

**Table 9: Allocation of funds for different components of Essential Service Delivery Program
(Annex 2.)**

Sub-Component	FY-2007-2008		FY-2008-2009		FY-2009-2010	
	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$
Support Services & Coordination	5,223.23	7,681,221	4,960.31	7,294,574	11,373.26	16,725,382
Reproductive Health Program	12,627.63	18,570,044	13,553.19	19,931,162	11,852.91	17,430,750
Child Health	33,508.84	49,277,706	43,540.27	64,029,809	36,827.22	54,157,676
Increase and sustain Routine EPI	14,692.56	21,606,706	16,685.37	24,537,309	17,646.56	25,950,824
Emergency preparedness for polio importation: National wide Mop-up Campaign	7,966.29	11,715,132	8,770.33	12,897,544	8,770.33	12,897,544
Elimination of neonatal tetanus (NT)	-	-	1,288.02	1,894,147	-	-
Measles catch-up campaign & Measles followup campaign	-	-	6,404.64	9,418,588	-	-
Introduction of Hepatitis B vaccine	7,687.96	11,305,824	7,371.99	10,841,162	7,480.70	11,001,029
Introduction of new and underused vaccines	20.00	29,412	30.00	44,118	30.00	44,118
Sub Total for Routine EPI	30,366.81	44,657,074	40,550.35	59,632,868	33,927.59	49,893,515
control of Acute Respiratory Infection (ARI)	253.60	372,941	101.79	149,691	78.01	114,721
Control of Diarrhoeal Diseases (CDD)	11.70	17,206	11.70	17,206	11.70	17,206
Integrated Management of Childhood Illness (IMCI)	2,337.22	3,437,088	2,517.40	3,702,059	2,559.70	3,764,265
School Health	539.51	793,397	359.03	527,985	250.00	367,647
Scout Health & Nutrition Club	-	-	-	-	-	-
Limited Curative Care	752.50	1,106,618	520.61	765,603	520.61	765,603
Urban Health Services	801.16	1,178,176	869.42	1,278,559	276.00	405,882
Wastage Management	870.14	1,279,618	963.68	1,417,176	985.07	1,448,632
Total Essential Service Delivery	53,783.50	79,093,382	64,407.48	94,716,882	61,835.07	90,933,926

**Table 10a: Allocation of funds for “ Increase and Sustain Routine EPI program”
for 2007-2008. (Annex 3 p.300)**

Inputs	Proposed for (Year) 2007-2008					
	Total		GOB		Pooled fund and other donors	
	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$
A. REVENUE EXPENDITURE						
Supplies and Services	14,321.01	21,060,309	3,560.57	5,236,132	10,760.44	15,824,176
Vaccine as part of supplies and services	9,831.44	14,458,000	--	-	9,831.44	14,458,000
Repair and Maintenance	128.50	188,971	128.50	188,971	-	-
B. CAPITAL EXPENDITURE						
Acquisition of Assets	243.05	357,426	10.54	15,500	232.51	341,926
Grand Total = (A+B)	14,692.56	21,606,706	3,699.61	5,440,603	10,992.95	16,166,103

**Table 10b: Allocation of funds for “ Increase and Sustain Routine EPI program”
for 2008-2009. (Annex 3 p.300)**

Inputs	Proposed for (Year) 2008-2009					
	Total		GOB		Pooled fund and other donors	
	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$
A. REVENUE EXPENDITURE						
Supplies and Services	16,448.43	24,188,868	6,310.72	9,280,471	10,137.71	14,908,397
Vaccine as part of supplies and services	10,077.21	14,819,426	-	-	10,077.21	14,819,426
Repair and Maintenance	136.25	200,368	136.25	200,368	-	-
B. CAPITAL EXPENDITURE						
Acquisition of Assets	100.69	148,074	16.44	24,176	84.25	123,897
Grand Total = (A+B)	16,685.37	24,537,309	6,463.41	9,505,015	10,221.96	15,032,294

**Table 10c: Allocation of funds for “ Increase and Sustain Routine EPI program”
for 2009-2010. (Annex 3 p.301)**

Inputs	Proposed for (Year) 2009-2010					
	Total		GOB		Pooled fund and other donors	
	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$	X10 ⁵ BDT	US\$
A. REVENUE EXPENDITURE						
Supplies and Services	16,712.02	24,576,500	6,322.38	9,297,618	10,389.64	15,278,882
Vaccine as part of supplies and services	10,329.14	15,189,912	-	-	10,329.14	15,189,912
Repair and Maintenance	136.25	200,368	136.25	200,368	-	-
B. CAPITAL EXPENDITURE						
Acquisition of Assets	798.29	1,173,956	14.54	21,382	783.75	1,152,574
Grand Total = (A+B)	17,646.56	25,950,824	6,473.17	9,519,368	11,173.39	16,431,456

2.3 Fund allocation for Routine EPI Vaccines

Under vaccine sub expenditure area funds are allocated for procurement of all vaccines. Under procurement of vaccines (pages 191 – 202 of operational plan; Annex 4) allocation for individual vaccines is shown. Following tables 11a and 11b summarize funds allocated for vaccine procurement 2008 – 2010.

Table 11 a: Allocation of funds for Routine EPI vaccines procurement in Operational Plan for ESD program

Vaccine	Financial Year 2007-2008		Financial Year 2008-2009		Financial Year 2009-2010	
	BDT (lakh)	USD	BDT	USD	BDT	USD
BCG	958.52	1,409,588	982.48	1,444,823	1,007.04	1,480,941
OPV	393.99	579,397	403.44	593,294	413.93	608,721
TT	718.61	1,056,779	736.58	1,083,206	754.99	1,110,279
Measles	1,056.34	1,553,441	1,082.74	1,592,265	1,109.81	1,632,074
DPT	4,530.10	6,661,912	4,643.35	6,828,456	4,759.44	6,999,176
HepB	2,173.88	3,196,882	2,228.22	3,276,794	2,283.93	3,358,721
Total	9,831.44	14,457,99	10,077.21	14,818,838	10,329.14	15,189,912

Table 11b: Allocation of funds (USD) for procurement of DPT and HepB vaccines for Routine EPI

	Financial Year 2007-2008	Financial Year 2008-2009	Financial Year 2009-2010
Funds allocation in place for all Routine Vaccines procurement	14,458,000	14,819,426	15,189,911
Funds allocated for DPT and HepB vaccines (may be used for Pentavalent vaccine co-financing component)	9,858,794	10,105,250	10,357,897

Funds allocated for DPT vaccine and Hepatitis B vaccine will be available and will be used to finance Bangladesh governments co-financing component of the pentavalent vaccine. As soon as Bangladesh will be granted the approval for GAVI support to introduce Hib pentavalent vaccine, the current Operational Plan of ESD will be revised to incorporate co-financing cost for procurement of pentavalent Hib vaccine instead of the cost for procurement of DTP and HepB vaccines

2.4 Expected expenditure for procurement of Hib pentavalent vaccine for Routine EPI program.

In the following tables 7 and 8 it is shown what amount of total cost for Hib pentavalent vaccine is expected to be co-financed by Government of Bangladesh and what part is expected to be funded by GAVI phase 2 support. The calculations of Hib pentavalent vaccine co-financing amount and the support from GAVI were done as per GAVI phase 2 calculator for costing of new vaccines with consideration that 0.20 USD per dose will be co-financed by GoB.

Table 12: Target and total cost (USD) for procurement of pentavalent vaccine liquid single dose preparation .

Year	2008	2009	2010
National target for children to be immunized	3,957,368	4,030,578	4,106,333
Total funds needed	14,344,855	12,000,186	12,225,731
Co-financing by the Bangladesh Government	3,166,427	2,539,264	2,586,990
Contribution by the GAVI	11,178,428	9,460,922	9,638,741

Table 7 above shows the total and the co-financing component by Bangladesh government and GAVI in case of liquid single dose pentavalent vaccine. The starting year (2008) calculation includes a 25% buffer stock.

Table 13: Target and total cost of vaccine & supplies for pentavalent vaccine lyophilized two dose preparation

Year	2008	2009	2010
National target for children to be immunized	3,957,368	4,030,578	4,106,333
Total fund needed	15,639,435	13,056,736	13,302,138
Co-financing by the Bangladesh Government	3,294,509	2,684,365	2,734,818
Contribution by the GAVI	12,344,926	10,372,371	10,567,320

Table 8 above shows total and co-financing component by Bangladesh government and GAVI in case of lyophilized two doses pentavalent vaccine. The starting year (2008) calculation includes a 25% buffer stock.

2.5 Fund allocation and co-financing commitment for Hib vaccine introduction as pentavalent vaccine .

The above analysis shows the Bangladesh Government has financial commitment for EPI program and identified funds for procurement of current vaccines (BCG,OPV,DPT, HepB, TT and measles). The following table compares the fund allocation and commitments in view of Hib vaccine introduction as the pentavalent vaccine.

Table 9: Governments allocation available to purchase pentavalent vaccine (liquid single dose) and the co-financing component 2008-2010.

	2008 (Financial year 2007-8)	2009 (Financial year 2008-9)	2010 (Financial Year 2009-10)
Funds available in Operational plan for DPT and Hep B procurement which can be used for procurement of Hib pentavalent vaccine	9,858,794	10,105,250	10,357,897
Co-financing amount (USD) to be paid by Government for Hib pentavalent vaccine	3,166,427	2,539,264	2,586,990
Gap	No gap	No gap	No gap

Table 10: Governments allocation available to purchase pentavalent vaccine (Lyophilized two dose) and the co-financing component 2008-2010.

	2008 (Financial year 2007-8)	2009 (Financial year 2008-9)	2010 (Financial Year 2009-10)
Funds available in Operational plan for DPT and Hep B procurement which can be used for procurement of Hib pentavalent vaccine	9,858,794	10,105,250	10,357,897
Co-financing amount (USD) to be paid by Government for Hib pentavalent vaccine	3,294,509	2,684,365	2,734,818
Gap	No gap	No gap	No gap

From the above presented data it is clear that Government of Bangladesh will not have a gap in funds to co-finance the government's contribution for introduction of Hib vaccine as the pentavalent vaccine from 2008 unto 2010. In case of introduction of Hib pentavalent vaccine the funds required for procurement of DTP and HepB vaccine that have been already budgeted for 2008-2010 will be used for procurement of Hib pentavalent vaccine. After approval of GAVI 2 support for Hib pentavalent vaccine introduction, the relevant revisions will be incorporated into Revised Operational plan of ESD program to show procurement of Hib pentavalent vaccine and required fund instead the current plan for procurement of DTP and HepB vaccines. The revision of Operational plans of ESD is a continuous process and the Government of Bangladesh is working together with relevant line ministries and the donors through the ICC for securing vaccine costs of the national immunization program on a regular basis. The IDA credit and pool fund will be used for procuring the vaccines. Moreover GoB always revises the Annual Operational Plan (AOP) according to the need of the program.

The next costed Multi year Plan to finance Health program in Bangladesh will be developed in 2009 to cover years 2011 to 2018. In this next cMYP the funds for vaccine procurement also will be identified and the government will submit a fresh application to the GAVI for the continuation of the pentavalent vaccine from 2011.