EPI and VPD Surveillance Review and Post-Introduction Evaluation of Hib (Pentavalent) Vaccine

Report of the Mission
Bangladesh, 15-25 March 2012

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Acronyms

ADB	Asian Development Bank
AEFI	adverse event following immunization
AES	acute encephalitic syndrome
AMES	acute meningo-encephalitic syndrome
AFP	acute flaccid paralysis
BCG	Bacille Calmette-Guérin
CCC	Chittagong City Corporation
CSF	cerbral spinal fluid
DCC	Dhaka City Corporation
DFID	Department for International Development
DIMO	District Immunization Medical Officer
DSFP	disease surveillance focal person
DTP	Diphtheria-tetanus-pertussis
ELISA	enzyme-linked immunosorbent assay
EPI	expanded programme on immunization
ERC	expert review committee
EVM	effective vaccine management
Hib	Haemophylus Influenza Type b
HSO	hospital surveillance officer
IEC	information, education and communication
ITAG	Immunization Technical Advisory Group
IPH	Institute of Public Health
IEDCR	Institute of Epidemiology, Disease Control & Research
JE	Japanese Encephalitis
JRF	joint reporting form
KCC	Khulna City Corporation
LSO	local surveillance officer
MCH	Maternal and Child Health
MCH&IO	Maternal and Child Health and Immunization Officer
MCV	measles containing vaccine

MLM	mid-level manager
MNT	maternal neonatal tetanus
MR	measles-rubella
NCCPE	National Certification Committee on Polio Eradication
NCIP	National Committee for Immunization Practice
NPEV	non-polio enterovirus
NP&ML	National Polio and Measles Laboratory
OPV	oral polio vaccine
PCV	Pneumococcal conjugate vaccine
PIE	Post-introduction evaluation
RCC	Rajshahi City Corporation
SCC	Sylhet City Corporation
SEARO	Regional Office for South-East Asia
SIDA	Swedish International Development Coodination Agency
SMO	surveillance medical officer
SSFP	Smiling Sun Franchise Programme
TB	Tuberculosis
TT	tetanus toxoid
UH&FPO	upazila health & family planning officer
UNFPA	United Nations Popullation Fund
UNICEF	United Nations Children's Fund
VPD	vaccine preventable disease
UPHCP	urban primary health care project
USAID	United States Agency for International Development
VVM	vaccine vial monitor
WHO	World Health Organziation

Executive summary and recommendations

A team comprising national and international experts reviewed the expanded programme on immunization (EPI), vaccine-preventable disease (VPD) surveillance system and conducted a post-introduction evaluation (PIE) of Hib (pentavalent) vaccine in Bangladesh from 14-26 March 2012. The general objectives of the review were to determine the status of immunization service delivery, review capacity of the surveillance system, including laboratory support and respond to vaccine-preventable diseases (VPD), assess implementation of Hib (pentavalent) vaccine introduction in Bangladesh and its strengths and identify areas for improvement.

Bangladesh has remained polio-free after a successful containment of importation of wild polio virus since November 2006, but there is always the risk of importation of polio virus from neighbouring countries. Significant progress has been made towards achieving certification standard AFP surveillance and documentation. Bangladesh made significant progress towards measles control by conducting measles catch-up campaigns in 2005-2006 and measles follow-up campaign in 2010 and also introduced measles case-based surveillance. Bangladesh introduced Hib (pentavalent) vaccine in 2009 and plans to introduce measles-rubella (MR) vaccine in 2012 and pneumococcal vaccine in 2013 in to the national programme on immunization (EPI). The last surveillance review in April 2004 mainly focused on AFP surveillance and an integrated, comprehensive review of the entire EPI and VPD surveillance and post-introduction evaluation (PIE) of new vaccine was not conducted in Bangladesh.

The current review focused on immunization coverage and sustainability of the surveillance network supported by development partners in order to verify Bangladesh's polio-free status and to identify strengths and gaps of EPI and vaccine-preventable disease (VPD) surveillance.

The review incorporated post-introduction evaluation (PIE) of Hib (pentavalent) vaccine with the objective of assessing the programmatic impact of the introduction as well as assessing the capacity of the country for future introduction of more new vaccines.

The methodology and tools for the EPI and VPD surveillance review were adapted from *The Common Assessment Tool for Immunization Services*[1] and the post-introduction evaluation (PIE) tool was adapted from the new vacine PIE[2] tool published by WHO Headquarters.

The team found that the rural health system has a good infrastructure with the health assistant (HA) and family welfare assistant (FWA) as the main asset for service delivery in rural areas and vaccinator from non governmental organizations (NGOs) in

[1] WHO: Immunization, Vaccine and Biologicals (2002). *The Common Assessment Tool for Immunization Services*, Geneva: WHO.
[2] WHO: Immunization, Vaccine and Biologicals (2010). *New Vaccine Post- Introduction Evaluation Tool*, Geneva: WHO.

urban areas; and EPI programme has very high coverage, adequate surveillance and good integration with the general health system.

The National Programme on Immunization (EPI), under the Directorate-General of Health Services of the Ministry of Health and Family Welfare, Government of Bangladesh developed and disseminated national guidelines for immunization service delivery and national guidelines for vaccine-preventable diseases surveillance which were available at all levels of the health system.

Introduction of Hib (pentavalent) vaccine into the national programme was smooth and well accepted by service providers, communities and media; and there was clear understanding about phasing out from DPT to Hib (pentavalent) at all levels and maintaining the cold chain and logistics was well planned after proper assessment and there was no major safety concern after introduction of pentavalent vaccine.

In reading the executive summary and recommendations, it is important to remember that the report findings vary from one district to another. However, the team observed that the main challenges facing the immunization programme were: (i) increasing and sustaining immunization coverage in urban areas; (ii) determining correct denominators; (iii) filling vacant positions of field workers and supervisors and (iv) providing appropriate in-service training for all EPI staff including mid-level managers. The main challenges facing the surveillance programme were designating disease control medical officers in all districts and upazilas to work along with SMOs and MCH&I officers. These gaps have led to difficulties in service delivery, monitoring and surveillance activities. The following are the key findings and recommendations of the review team:

Findings

Immunization service delivery findings: rural areas

- The immunization system is functioning well in rural areas. Penta 3 and most of the other antigens coverage was over 90% in most upazilas.
- The immunization service delivery in rural areas is managed by the government under the Ministry of Health and Family Welfare. The department of health and department of family planning have assigned staff from district to field level and are providing adequate funding and logistic support.
- Health assistants (HA), family welfare assistants (FWA), porters, medical technologist –EPI are the driving forces for EPI service delivery infrastructure.
- Field workers and volunteers are active in villages to register mothers and children; and to inform their communities about the appropriate date for immunization.
- Micro-plans are prepared on the basis of the reach every district (RED) strategy and submitted to the district and higher levels annually.

- Immunization sessions are held regularly with maintaining cold chain properly and reports are sent to upazilas daily through tally forms.
- Storage capacity for currently used vaccines and for introduction of MR, PCV and MCV2 is adequate once ongoing expansion is completed by March 2013; however rota vaccine introduction and Hepatitis B birth dose itroduction needs expansion.
- Good injection safety, correct injection techniques, correct use of auto disable syringes and proper filling of safety boxes were observed. However, disposal of safety boxes was not correct in some institutions.
- Vacant positions of field level workers and supervisors; frequent turnover of mid-level managers; and inadequate and non-systematic supervision exist.
- Many field workers and supervisors are not formally trained including mid-level managers and newly-appointed doctors.
- Bangladesh endorsed the Regional Committee resolution on "2012: year of intensification of routine immunization in SEAR" and has prepared a proposal for intensification of routine immunization (RI) in selected low-performing districts and city corporations.

Immunization service delivery findings: urban areas

- In urban areas immunization services are managed by city corporations and municipalities under the Ministry of Local Government and services are delivered by NGOs supported by national and international development partners. Vaccines and logistics are provided by national EPI.
- The immunization system is functioning; coverage evaluation survey data supports reported coverage in most places.
- Coverage is comparatively low in some urban areas. The number of children vaccinated in the previous year has considered as the denominator without considering the actual number of children living in the area has resulted the higher immunization coverage than the actual.
- Migrant populations in some urban areas are not reached adequately.
- In some urban areas, satellite/outreach centres are not representative to cover all geographical areas in a ward. Rather than conducting immunization sessions in all communities, sessions are conducted 3-4 times in the same location. The target for a session in some of these areas is very few.
- Since low denominator figure is taken as the target, it has resulted in plotted coverage in monitoring charts in some NGO clinics, higher than the actual coverage.

- In some urban areas, parents are unaware of date and place of immunization sessions and in some areas, health personnel and volunteers are not capable of mobilizing parents to bring children to satellite centres.
- Shortage of staff in NGO health teams, both at vaccinator and supervisory levels, exists in some urban areas, particularly in Dhaka City Corporation. The high turnover rate of NGO health workers also leads to inadequate provision of routine services.
- Supervision is inadequate in urban areas.

VPDs and AEFI surveillance findings

- Surveillance system for vaccine-preventable diseases is in place and functioning at all levels with defined norms and standards. Bangladesh has maintained global AFP surveillance certification standards since 2001.
- Lab surveillance is well linked to field surveillance. A national WHO accredited laboratory for polio, measles and JE is located at the Institute of Public Health.
- Measles case-based surveillance has been established at health facilities and measles outbreak identification, investigation and data collection rigorously completed at communities. However, at some places, forms are not completely filled, reflecting lack of adequate supervision.
- Surveillance data are not optimally used in some areas to improve routine immunization activities to ensure that all pockets are covered.
- Bangladesh eliminated maternal and neonatal tetanus according to the validation conducted in 2008.
- AEFI surveillance guideline has been updated, staff trained and capacity built up at all levels, but many zero-district reports suggest all AEFI cases may not have been reported. Some of the investigations are inconclusive and causality assessment has not been done.

Surveillance and immunization service delivery network findings

- Government officers responsible for surveillance are available, but their contribution varies among districts, city corporations and upazilas.
- WHO SMO network: Currently, 24 SMOs cover all 64 districts and seven city corporations and play a key role in AFP, measles and other VPD surveillance and case investigation, and are involved in supporting SIAs, routine immunization and micro-planning.
- GAVI-supported DIMO network: 32 DIMOs provided support in all districts till February 2012.
- GAVI HSS planned to support 13 low-performing districts by assigning MCH and immunization officers whose ToRs will include surveillance activities.

National coordination and advisory bodies findings

- Bangladesh has a very good functional inter-agency coordination committee (ICC) to take decisions on policy-related issues and different sub-committees to work on programme and finance-related issues.
- The National Committee for Immunization Practices (NCIP) makes recommendation on technical issues on vaccine introduction, vaccine trial, changes of the current vaccination schedule and suggests research/trial on new vaccine etc.
- The national steering committee for polio eradication and measles control is the highest body to take decisions at the national level on polio eradication and measles control programme.
- The national certification committee for polio eradication prepares annual update for certification of poliomyelitis and report to Regional Certification Committee on Poliomyelitis Eradication.
- The National Expert Review Committee for AFP reviews and classifies AFP cases.
- The lab containment task force committee monitors lab containment, guides preparation of inventory and issues and ensures containment of polio viruses.
- The expert review committee for AEFI is supporting the government on AEFI issues. EPI is supported by the national coordination bodies.
- The review team observed that some of the terms of reference of various committees are overlapping. This may delay the process of decision – making.

Hib (Pentavalent vaccine) Introduction findings

- Introduction was smooth, well accepted by service providers and communities.
- Maintenance of cold chain and logistics was well planned.
- Training of health workers completed before introduction; provided an opportunity to improve the staff skills in all aspects of EPI.
- No major safety concerns.
- Bangladesh has a system and infrastructure to introduce new vaccines.

Recommendations

Immunization service delivery recommendations

- Vacant field worker and supervisory positions in rural and urban areas should be filled by the government, city corporations and NGOs.

- Provide appropriate in-service training for all EPI staff including mid-level managers. Particular emphasis should be given to micro-planning in urban areas.
- Ensure correct target infant population (denominator) in the urban areas
  - Close monitoring to ensure appropriate micro-planning with optimum utilization of antenatal registers, regular updating of family registers compiled by family planning department and updating immunization registers.
  - Department of health working together with city corporation authorities to implement well-functioning immunization system in rural areas as well as in urban areas.
  - Development partners to support NGOs by regularly monitoring performance from immunization service delivery to coverage.
  - Explore ways to communicate with parents of missed children about the importance of immunization and where to obtain services.
- Implement on time the plans for cold chain expansion to accommodate introductions of new vaccines.

VPDs and AEFI surveillance recommendations

- Continue maintenance of high quality AFP surveillance through continuous monitoring of silent upazilas, urban zones and reporting units.
- Use measles outbreak investigation data to develop a brief report that includes immunization response to the outbreak.
- Strengthen neonatal tetanus surveillance through more emphasis on active surveillance and community surveillance in areas where neonatal tetanus cases are reported.
- Strengthen investigation of reported AEFI cases and explore non-reporting of expected number of AEFI.

Surveillance and immunization service delivery network recommendation

- Explore creating designated disease control medical officer posts in all districts and upazilas to work along with SMOs and MCH&I officers.
  - Initial priority could be given for appointing district-level officers responsible for disease control.
  - Explore utilizing national resources to appoint disease control medical officers.
  - Development partners to explore providing additional support for capacity building and logistics support to facilitate the disease control officers.

- Until the disease control officers are posted, the existing SMO network needs to be supported and MCH&I officers provided necessary logistic support to perform their duties.

National coordination and advisory bodies recommendation

- Review terms of reference (TOR) and composition of all national advisory bodies to ensure clear responsibilities and reporting to the senior management of the Ministry of Health.

Hib (Pentavalent vaccine) Introduction recommendation

- Cold space, vaccine and logistic requirement to be assessed and implementation plan to be developed and followed before introduction of new vaccine.

1. Background

Bangladesh lies within the broad delta formed by the rivers Ganges and Brahmaputra with an area of approximately 147 570 square km bordered by the Bay of Bengal on the south, by India on the west, northwest, and east and by Myanmar on the southeast. Administratively, the country is divided into seven divisions and 64 districts. Each district consists of a number of upazilas, which are formed by a number of unions. The total population reported for 2011 was 150 461 611 with 39 279 048 live births (WHO Annual Report Form based on 2001 census). Around 40% of the population is below 15 years (58 345 587). About 3.7 million children are under 1 year (i.e., 2.5% of population), 19.1 million are under 5 years (12.9% of total population) and 36.6 million women of childbearing age (24.7% of total population). Population density varies significantly with central Dhaka being the most densely populated and hilly Bandarban being the least densely populated. Approximately, 75% of the population lives in rural areas. The majority of the population is Muslim (about 90%) with Hindus accounting for about 9% and the remaining are Buddhist and Christian.

Expanded programme on immunization

The expanded programme on Immunization (EPI) was launched on April 7, 1979 (World Health Day) with the conventional vaccines- BCG, DPT, OPV, measles and TT. As vaccination centres were few and were located mainly in healthcare facilities in urban areas, the EPI coverage was less than 2% in 1984. In 1985, the Government of Bangladesh committed to the Global Universal Child Immunization Initiative (UCI), and began a phase-wise process of intensification of EPI from 1985-1990. During this period, EPI was intensified throughout 476 upazilas, 92 major municipalities and six city corporations. EPI was made available to all target groups (infants and pregnant mothers) by 1990. EPI intensification consisted of establishing a cold chain system from national to district and upazila levels, improving capacity to maintain cold chain down to the vaccination points in both rural and urban areas; procuring and managing logistics needs for about 134000 EPI outreach sites; and providing basic EPI training for mid-level managers, supervisors and field workers in public and private sectors. TT5 dose schedule for women of child bearing age was endorsed in 1993, National Immunization Days (NIDs) were initiated in 1995, Hepatitis B (HepB) was incorporated in 2003, AD syringes were introduced in 2004 and Hib (Haemophylus Influenza type b) vaccine was included in the immunization programme as pentavalent formulation (DPT + HepB +Hib) in 2009. According to the current immunization schedule all children should be immunized during their first year of life with BCG at birth, OPV, DPT-Hepatitis B–Hib combination vaccine with OPV at 6, 10 and 14 weeks and measles vaccine at nine months. See Table 1 for the current immunization schedule.

Table 1: ***Immunization schedule 2011***

Vaccine	Age of Administration
BCG	At birth
DTPHibHepB	6 weeks, 10 weeks, 14 weeks
OPV	6 weeks, 10 weeks, 14 weeks, 38 weeks
Measles	38 weeks
TT	+15 Years (WCBA 15-49 Yrs), + 1 month, + 6 months, + 1 year, + 1 year
Vitamin A	38 weeks

Source: WHO/UNICEF JRF, 2011

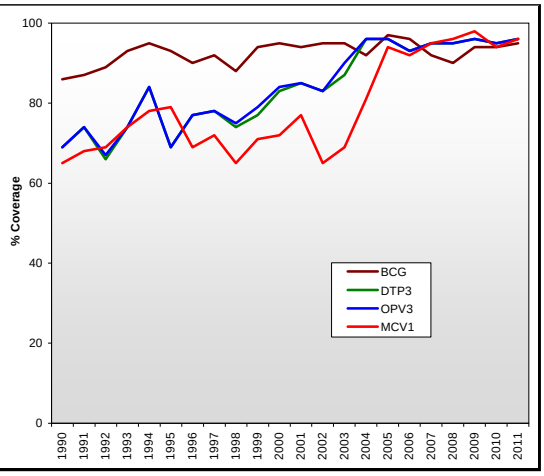
The immunization programme with the support of development partners has taken a number of measures to improve utilization of EPI services and coverage and injection safety by following the Reach Every District (RED) strategy and the LAUNCH (Large Number of Un-immunized Children) Programme. The key interventions and achievements include:

- Development of detailed sub-district-level annual micro-plan and conducting district-level quarterly review of micro-planning to identify key interventions to increase vaccination coverage.
- Training for supervisors and field workers, and mid-level managers to improve service quality.
- Communication and social mobilization - advocacy meetings with the local leaders and development printing and disseminating communication materials for strengthening social mobilization.
- Linkage with local NGOs and other service providers to address the pockets of uncovered areas, to involve volunteers for the vacant posts of service providers, and to provide extra porters for vaccine transportation to hard-to-reach areas.
- Monthly EPI review sessions were conducted by upazila, city corporation, municipality and district managers to identify problems and solutions at the local level.
- Expansion of cold chain capacity at all levels.
- Annual immunization coverage evaluation surveys to monitor division/ district/ city corporation level gender disaggregated immunization coverage, dropout rates and staff performance.

Table 2 shows the percentage of immunization coverage from 1990 to 2011 estimated by WHO/UNICEF. Nationally,>80% coverage of all antigens has been achieved since 2004.

Table 2: ***Percentage of national immunization coverage, 1990-2011***

Year	BCG	DTP3	OPV3	MCV1
1990	86	69	69	65
1991	87	74	74	68
1992	89	66	67	69
1993	93	74	74	74
1994	95	84	84	78
1995	93	69	69	79
1996	90	77	77	69
1997	92	78	78	72
1998	88	74	75	65
1999	94	77	79	71
2000	95	83	84	72
2001	94	85	85	77
2002	95	83	83	65
2003	95	87	90	69
2004	92	96	96	81
2005	97	96	96	94
2006	96	93	93	92
2007	92	95	95	95
2008	90	95	95	96
2009	94	96	96	98
2010	94	95	95	94
2011	95	96	96	96



Source: WHO/UNICEF Estimate, 2012

In 1995, Bangladesh conducted its first National Immunization Day (NID) as a commitment for global polio eradication and 21 NIDs have been conducted till February 2012.

Surveillance of acute flaccid paralysis (AFP), integrated with neonatal tetanus (NT) and measles, started in 1996 in collaboration with WHO. Later Adverse Event Following Immunization (AEFI) surveillance incorporated in the surveillance network. VPDs are reported weekly from Upazila Health Complex/static health facilities to Civil Surgeons/Chief Health Officers who after compilation send to the EPI HQ on weekly basis. Currently 767 health facilities are on this surveillance network, among these passive reporting sites, 140 sites are on weekly active surveillance for AFP, neonatal tetanus and measles conducted by SMOs/ local surveillance officers. AEFI surveillance is incorporated into EPI and reported from 869 reporting sites. Table 3 shows the vaccine-preventable diseases detected in Bangladesh from 2002 to 2011.

Table 3: ***Vaccine-preventable diseases, Bangladesh, 2002-2011***

Year	Polio	Diphtheria	Pertussis	Total Tetanus	Neonatal Tetanus (% of all Tetanus)	Measles	Rubella	Mumps	Japanese Encephalitis
2002	0	73	587	1,036	336 (32%)	3,484	-	ND	-
2003	0	78	332	715	390 (55%)	4,067	-	ND	-
2004	0	117	140	1,897	748 (39%)	9,743	347	ND	-
2005	0	125	125	1,388	341 (25%)	25,935	9,229	ND	-
2006	18	35	46	1,235	257 (21%)	6,192	3,418	ND	-
2007	0	86	87	1,034	206 (20%)	2,924	13,226	ND	204
2008	0	43	33	943	152 (16%)	2,660	5,526	ND	702
2009	0	23	16	791	121 (15%)	718	13,076	ND	15
2010	0	27	17	710	117 (16%)	788	12,963	ND	15
2011	0	11	44	644	98 (15%)	5,625	5,631	ND	103

Source: WHO/UNICEF JRF ND=No data

Bangladesh has maintained global AFP surveillance certification standards since 2001 at the national level (non-polio AFP rate of two and adequate stool collection rate of 80%). The last case of indigenous wild poliovirus was detected on August 2000 and later imported wild polio case was detected in 2006. Since November 2006 the country has remained polio-free.

The country has a sensitive surveillance system. Table 4 shows the AFP surveillance indicators from 2002-2011.

Table 4: ***AFP surveillance performance indicators, 2002-2011***

Indicator	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AFP cases	1,365	1,128	1,301	1,458	1,619	1,844	1,790	1,502	1,537	1610
Wild polio	0	0	0	0	18	0	0	0	0	0
Compatibles	0	0	2	0	2	0	0	0	0	0
AFP rate	2.70	2.03	2.31	2.66	2.91	3.25	3.1	2.61	2.63	2.72
Non-polio AFP rate[1]	2.70	2.03	2.31	2.66	2.87	3.25	3.1	2.61	2.63	2.72
Adequate stool collection rate[2]	89%	89%	90%	92%	93%	92%	92%	94%	95%	95%
Total stool samples collected	2,666	2,200	2,523	2,846	3,185	3,611	4,276	3,403	3,412	3,578
% NPEV	28.0	23.0	20.0	20.0	14.8	15.0	23.1	19.4	19.4	18.0
% Timeliness of primary result reported[3]	100	99	100	100	98	100	95	97	98	93

[1] Number of discarded AFP cases per 100,000 children under 15 years of age. Source: VPD surveillance bulletin, SEARO
[2] Percent with 2 specimens, 24 hours apart and within 14 days of paralysis onset.
[3] 2002 to 2007 result reported within 28 days and 2008 onwards result reported within 14 days of sample received at laboratory.

Bangladesh has made significant progress in its measles control programme. Measles surveillance is fully integrated with AFP and other VPDs. Case-based surveillance of measles started from all passive reporting sites in 2008.

Neonatal tetanus surveillance is also integrated with AFP and other VPD surveillance. The country has a successful MNT elimination programme which was validated in 2008. The number of childbearing age women to be vaccinated during case response immunization (CRI) has been increased from 20 to all childbearing age women of the sub-block of index case.

Acute meningo-encephalitis syndrome (AMES) surveillance was started only at three medical college hospitals (Rajshahi, Khulna and Chittagong) in 2008. The list of AMES surveillance sites was revised in 2011 when Chittagong Medical College Hospital was excluded and Rangpur Medical College Hospital was included in the AMES surveillance system.

The national guidelines for AFP and VPDs surveillance were first developed in 1997 and revised in 2002 and 2008. The AEFI surveillance guidelines were developed in 2005 and revised in 2009. The measles outbreak investigation guidelines were developed in 2002. The definition of measles outbreak has been revised from time to time in relation to the epidemiology of the disease.

The first, second and third joint national/international reviews of AFP surveillance were conducted in March 1997, July 2001 and April 2004 respectively. Division-wise internal reviews had also been conducted from time-to-time by WHO, UNICEF and the government.

2. Purpose and methodology of the review

2.1 Context

Justification

Bangladesh conducted the last joint national/international AFP surveillance review in 2004 and has remained polio-free after a successful containment of importation of wild poliovirus since November 2006. The country completed measles catch-up campaigns in 2005-2006 and a follow-up campaign in 2010 and introduced Hib (pentavalent) vaccine in its national EPI in 2009. Bangladesh has planned to introduce measles-rubella (MR) vaccine in 2012 and pneumococcal vaccine in 2013. The penta 3 coverage at national level has reached above 90% and MCV1 coverage is above 85%. However, there are a few districts that are performing below the level of national coverage. A post-introduction evaluation (PIE) of Hib (pentavalent) vaccine was necessary to assess any programmatic adjustments for the current vaccines and vaccines to be introduced in the near future.

As significant progress towards polio eradication has been made in the Region, efforts towards ensuring that all Member States are achieving the surveillance standards and documentation is essential. A joint national/international review was conducted to verify Bangladesh's polio-free status and to identify strengths and gaps in disease surveillance.

WHO-SEARO has been assisting Member States in strengthening VPD surveillance. As an integral part of this process, countries are encouraged to conduct periodic internal reviews of VPD surveillance which are complemented by joint national/international surveillance reviews. Bangladesh borders India, Myanmar and Nepal. As there is significant population movement across these borders, there is always the risk of importation of poliovirus from neighbouring countries. Since the last surveillance review in April 2004 mainly focused on AFP surveillance, an integrated, comprehensive review of the entire EPI and VPD surveillance was required for fine-tuning the national immunization programme.

2.2 Objectives of the review

Specific objectives of the review

1. To assess the strengths and weaknesses of immunization service delivery at all levels of the healthcare delivery system.
2. To analyze managerial and administrative capacity for immunization at the national and sub-national levels.
3. To assess the impact of Hib (pentavalent) introduction on routine immunization.
4. To assess the strengths and weaknesses of current vaccine distribution mechanisms and cold chain management.
5. To assess the status of injection safety and waste management for sharps.
6. Tor eview priority setting for immunization programme sustainability.
7. To review the capacity of the national surveillance system including laboratory support as applicable to detect and respond to vaccine-preventable diseases (VPD) in a timely manner.
8. To document the capacity for surveillance and management of AEFI.
9. To assess training needs for immunization managers, surveillance staff and basic health workers (vaccinators) at all levels.
10. To review the role of the private sector and nongovernmental organizations as providers of routine immunization services.
11. To assess communication strategies, including advocacy, partnership, social mobilization and their implementation.
12. To review the activities of the national committees involved in polio eradication (NCPPE, ERC, laboratory containment, AEFI, NCIP).
13. To review the roles and responsibilities of immunization programme stakeholders.
14. To review the roles and responsibilities of the surveillance medical officer network, district immunization medical officer network and district maternal and child health/ immunization officer network.

2.3 Methodology of the review

The review was conducted at the national, district and upazila (sub-district) levels. The team included participants from GoB, UNICEF, CDC, BRAC and WHO. Nine teams were formed (Two teams, each for Dhaka and Chittagong divisions and one team each for the rest of the five divisions.).

The review was divided into five components

(1) Briefing meeting (one-day) was held at EPI Bhaban, Mohakhali, Dhaka in the presence of national, international and development partners.

(2) Field work (six days) where each team evaluated two to four districts.

The teams reviewed available information and data on the EPI programme at the national, district/city corporation, upazila/zone, health facilities and other reporting units and immunization clinics. The team members interviewed key government officials and individuals involved in the EPI and VPD surveillance programme: civil surgeon (CS), upazila health and family planning officers (UH&FPO), hospital surveillance officers (HSO), local surveillance officers (LSO), superintendent EPI, medical technologist EPI, resident medical officers (RMO) and surveillance medical officers (SMO) of WHO.

At each level, the review activities included interviewing immunization and surveillance staff, and records, observation of immunization sessions, verification of AFP cases and measles outbreaks. The team used structured data collection tools for (i) assessment of surveillance at CS/UH&FPO offices (ii) assessment of surveillance at health facilities and for (iii) Post-Introduction evaluation of Hib (pentavalent).

(3) National level assessment included reviewing of functions of the National Committee for Immunization Practice (NCIP), the National Certification Committee on Polio Eradication (NCCPE), the National Expert Review Committee, and the national polio and measles laboratory.

(4) Preparation for debriefing ($1^{1/2}$) was held at Dhaka where the individual team reports were reviewed and consolidated.

(5) Final debriefing to the Senior Secretary, Ministry of Health and Family Welfare and other government officials, WHO, UNICEF and other immunization partners.

Selection of districts and areas

On the basis of surveillance performance indicators and routine immunization coverage data, 2-4 districts and city corporations were assigned for each review team consisting of high, moderate and low-performing districts. The geographic locations of the areas visited by the review teams are at see Figure 1 and the list of team members at Annex 1.

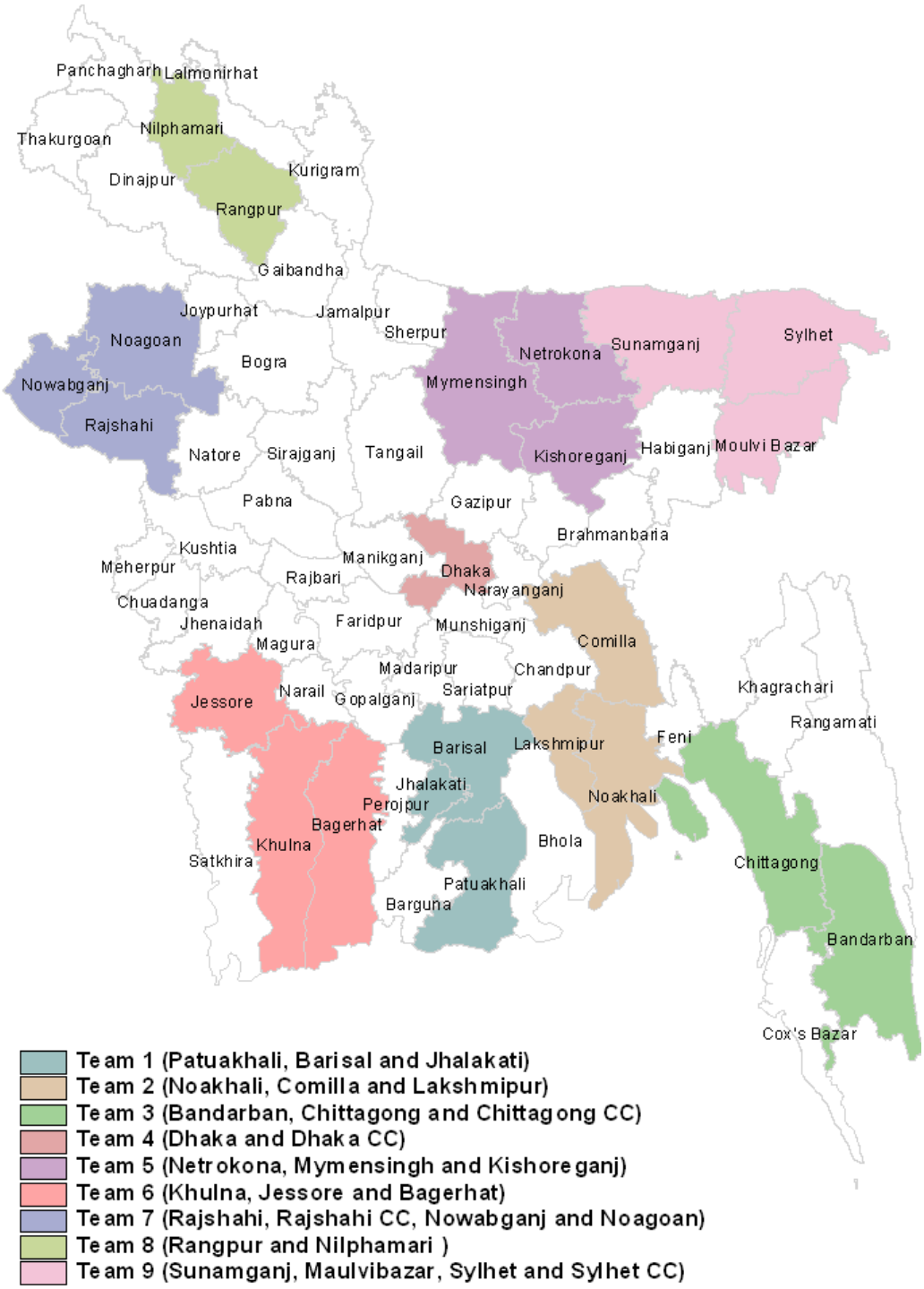
Nine teams reviewed 27 districts/city corporations, 56 upazilas/zones, 51 surveillance sites, 53 unions/wards and 63 immunization centres/outreach centres.

Limitation of the review

The review team acknowledges some limitations in the review process:

- Shortage of time (national holiday-one day in between) limited the number of districts and upazilas reviewed.
- Language barrier existed, but national team members contributed significantly in overcoming this obstacle.
- PIE questionnaires were lengthy and took long to complete.

Figure 1: Geographic location of the areas visited by the review team



3. Findings and recommendations

3.1 Immunization service delivery

EPI services in rural areas

The immunization service delivery in rural areas is managed by the government under the Ministry of Health and Family Welfare (MOHFW). The Department of Health and Department of Family Planning have assigned staff from district to field level and are providing adequate funding and logistic support.

The service delivery mechanism for providing EPI services in rural areas is based on their administrative areas. Administratively, Bangladesh has 64 districts, 482 upazilas, 4 498 unions, 13 494 wards, and 108 000 sub-blocks within the wards. Each district has on an average seven upazilas, each upazila has on an average 6-10 unions, each union consists of three wards (W-1, W-2 and W-3) and each ward consists of eight sub-blocks. Each sub-block has an EPI outreach/vaccination sites where routine EPI services are provided monthly for catchments of approximately 1000 population. Each week vaccination services are provided in two outreach/vaccination sites to cover eight sites of a ward in a month.

Vaccination at rural level is provided primarily by the health assistants (HA) from the health wing of MOHFW usually assisted by family welfare assistant (FWA), an employee of the family planning wing of MOHFW. An assistant health inspector (AHI) from the health wing and a family planning inspector (FPI) from the family planning wing of MOHFW work as union level supervisors. There is a category called porter who delivers vaccines from the upazila health complex (UHC) to vaccination sites/vaccine distribution points where field workers collect vaccines. The medical technologist –EPI at UHCs is the key person in providing technical support to the field-level workers.

The review team observed that HA, FWA, porters, MT-EPI are the driving forces of the EPI service delivery infrastructure in rural areas.

Field workers and volunteers are active in villages in informing communities about the date for immunization of children, knowledgeable about their target population and tasks, track mothers from the antenatal period, monitor deliveries and register mothers and children.

Micro-plans

Micro-plans are prepared on the basis of the Reach Every District (RED) strategy, updated annually at ward and upazila levels and submitted to district and higher levels for allocation of funding, vaccine and logistic requirements for supportive supervision.

Registration, recording and reporting

A strong system is available to register all women of childbearing age (CBAW) and newborn children; and to document and report detailed information on vaccination status of children and women. A register is maintained by health assistants to list a newborn child in his/her assigned wards, sub-block-wise. The information on vaccination status of children is regularly entered in the register. This serves as the basis for targeting, tracking and follow-up of children for complementary vaccination. It is also very useful in maintaining effective interpersonal communication (IPC) between health workers and parents.

There is another register maintained by the health assistants to list all women of childbearing age in his/her assigned wards by sub-block and to record TT vaccination information on five dose TT schedule. This provides the basis for targeting pregnant women for TT vaccination and for monitoring the outcome of the pregnancy.

Two separate tally sheets are maintained for reporting daily vaccination from routine vaccination sessions for children and women of childbearing age. These daily vaccination reports are the basis for preparing monthly reports for each reporting site.

Two separate registers are maintained for monthly reporting of vaccination – one for children and another one for - women.

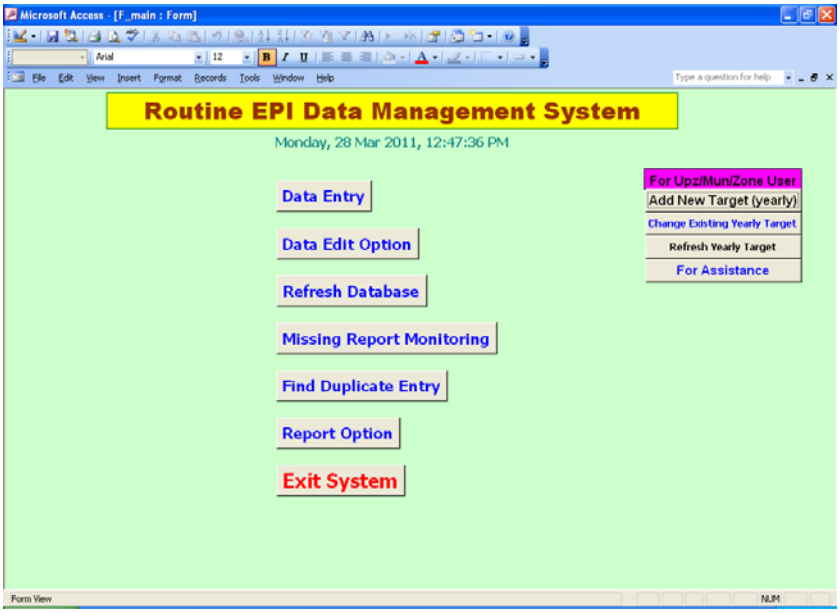
The system of registration of newborn children and women from house-to-house visit, use of detailed tally sheets for recording daily vaccinations and a monthly report of vaccinations are the components of a well-functioning immunization service delivery system.

Reports are sent from immunization sessions to upazilas on a daily basis through a tally form. A monthly report is prepared and sent to upazilas on a monthly basis, which is turn, sends a monthly report to the district. At the district level, an electronic version of the report is prepared and sent to the national level (Figure 2) along with a hard copy. A computer-software is used at all districts to prepare reports for the national level.

Immunization sessions

Immunization sessions are held regularly according to the micro-plans prepared as per national guidelines. Adequate vaccines, injection equipment and other logistics are provided, cold chain is maintained according to national guidelines, and integrated maternal and child health services are provided in the immunization sessions.

Figure 2: *Snap shot of computerized report*



EPI Services in the urban areas

In urban areas, immunization services are managed by city corporations and municipalities under the Ministry of Local Government, and delivered by local governments and NGOs supported by national and international development partners. Vaccines and logistics are provided by the national EPI. Immunization sites are established based mainly on the population size of wards. The EPI services in the city corporations are mostly provided by NGOs 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 led by the Asian Development Bank (ADB) that also includes DFID, SIDA and UNFPI. A majority of the vaccinators who are attached to the urban vaccination clinics are contract workers funded by NGOs.

In some urban areas, the number of children vaccinated in the previous year is considered as the denominator without considering the actual number of children living in the area. In these areas, the percentage of infants in the total population is much less that the national percentage of infants. This has resulted in reporting higher immunization coverage than the actual coverage. In these areas, information in ANC registers was incomplete, as this information is not linked to the information in the Immunization Register.

Migrant populations in some urban areas are not reached adequately and there is no proper system of documentation and registration of migrant population.

In some urban areas, satellite/outreach centres are not representative to cover all geographical areas in a ward. Rather than conducting immunization sessions in all communities, sessions are conducted 3-4 times in the same location. The number of women and children to be vaccinated in an EPI session in some of those areas is very few.

Since a low denominator is taken as the target, this has resulted in the plotted coverage in monitoring charts in some NGO clinics showing a higher figure than the actual coverage.

In some urban areas, parents were unaware of the date and place of immunization sessions and no attempts were made to reach the missing children.

Vaccine storage, cold chain and logistics

There is adequate capacity for storage of currently used vaccines at district and upazila levels. The cold chain is well maintained. Plans for cold chain expansion are being implemented for MR, PCV and MCV2 at national level. District and sub-district level capacity is adequate to introduce these vaccines. However, introduction of Rota vaccine and Hepatitis B birth dose needs expansion of the cold chain at all levels. EPI staff is trained on correctly forecasting requirements and no shortage of vaccine and logistics were reported. However, there is no regular cold chain engineer to provide technical support at the national level.

Injection safety and waste management

Good injection safety with correct injection techniques by vaccinators was observed throughout the country. Auto-disable syringes were correctly used and safety boxes properly filled and taken back from immunization sessions to the collection centres. However, in some institutions safety boxes were not correctly disposed of as per the national guidelines.

Human resources

Even after the recent recruitment of staff, there are vacant positions of field-level workers and supervisors in rural areas, which is an issue for upazila and district managers.

Shortage of staff in NGO health teams, both at the vaccinator and supervisory levels exists in some urban areas, particularly in Dhaka city corporation.

The turnover rate among NGO health workers is also very high in urban areas, leading to inadequate provision of routine services. In some areas, health personnel and volunteers were not attentive in following up the children who had missed immunization or in looking for additional children.

Many field workers and supervisors are not formally trained and not capable of mobilizing parents to bring children to satellite centres/ EPI centres. Mid level managers

including newly appointed doctors are not formally trained on immunization. There is no regular system to train MLM soon after taking over the new post.

Supervision

Supervision is inadequate in urban areas and not systematic in rural areas. Frequent turnover of mid-level managers is a factor for inadequate supervision throughout the country.

Immunization coverage

It appeared that the immunization system is in place and functioning well in rural areas. Penta 3 coverage was more than 90% in most of the upazilas. Similar coverage was observed for most of the antigens in the rural areas. This observation was based on the coverage of the communities visited, coverage of immunization sites visited and completeness of data in recording and reporting forms and compatibility of data from immunization centres to upazilas and to districts.

However, coverage was comparatively low in some of the urban areas (~75% Penta 3), including Dhaka city corporation. Coverage evaluation survey data is compatible with reported coverage in most places.

Intensification of routine immunization

Bangladesh endorsed the "Delhi Call for Action for Intensification of Routine Immunization" and the Regional Committee resolution on "2012 year of intensification of routine immunization" in SEAR. EPI, together with development partners have prepared a proposal for intensification of routine immunization in 32 selected low-performing districts and four city corporations. The plan is yet to be finalized and implemented in the chosen districts.

Recommendations for improving immunization service delivery

1. Filling Vacant field worker and supervisory positions in rural and urban areas should be filled by government, city corporations and NGOs.
2. Provided Appropriate in-service training for all EPI staff including mid-level managers should be. Particular emphasis should be given for micro-planning in urban areas.
3. Ensured correct target infant population (denominator) in the urban areas
    - Close monitoring to ensure appropriate micro-planning with optimum utilization of antenatal registers, regular updating of family registers compiled by family planning department and updating immunization registers.

- Department of health working together with city corporation authorities to implement well functioning immunization system in rural areas also in urban areas.
- Development partners to support NGOs by regularly monitoring performances from immunization service delivery to coverage.
- Explore ways to communicate to parents of missed children about the importance of immunization and where to obtain services.

4. Plans for cold chain expansion should be implemented to accommodate introductions of new vaccine in a timely manner.

3.2 VPDs and AEFI surveillance

The review team observed that the surveillance system for vaccine-preventable diseases is in place and functioning at all levels with defined norms and standards. The surveillance network is composed of and includes government and private health facilities, traditional healers, faith healers, herbalists etc and is sensitized to reporting VPDs.

AFP surveillance

Bangladesh has maintained global AFP surveillance certification standards since 2001 at the national level (non-polio AFP rate of 2 and adequate stool collection rate of 80%). At sub-national level, all 64 districts and six out of seven city corporations achieved non-polio AFP target of more than 2.00 and 63 out of 64 districts achieved adequate stool collection target of more than 80% in 2011.

The review teams observed that reporting forms are completed at all levels. Surveillance medical officers (SMO) conduct active surveillance. Supervision for surveillance activities appears to be good in most reporting centres visited and AFP surveillance is well established. There is evidence of regular monitoring of specific performance indicators, immediate case investigation, weekly zero reporting, and active surveillance. Public health staff appears motivated, well trained, and aware about AFP notification and investigation procedures at all levels.

Laboratory surveillance is well linked to 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.

The finding of the review was that the surveillance system is dependant on SMOs 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 (LSO) and guided by Disease Surveillance Focal Persons (DSFP). At present, however, the structure is not fully functional and its utilization is not fully explored.

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. In 2011, a total of 2981 suspected measles cases were reported from health facilities on a routine basis of which 2683 (90%) cases were tested for serology. From serology of routine reported cases 1444/2683 (53.8%) were measles and 267/2683 (9.9%) were rubella. A total of 333 suspected measles outbreaks were detected and investigated in 2011 and identified 11863 suspected measles cases. After laboratory results the outbreak was classified as (i) lab confirmed measles outbreak – 91 (number of cases 2802), (ii) lab confirmed rubella outbreak – 89 (number of cases 4744) and (iii) lab confirmed mixed outbreak – 48 (number of cases 1572).

The review team observed that in most of the places visited, health personnel are aware about the measles case definitions and recording and reporting forms for measles case-detailed based surveillance and outbreak investigation forms are filled appropriately. Samples are collected for serology and sent to the national laboratory. However, at some places, forms are not completely filled, showing lack of adequate supervision. Surveillance data are not optimally used in some areas to improve routine immunization activities to ensure that all pockets are covered.

Neonatal tetanus surveillance

Active surveillance for neonatal tetanus is also carried out by SMOs/LSOs. The country has a successful MNT elimination programme. According to the validation conducted in 2008, maternal and neonatal tetanus has been eliminated. The area of case response immunization (CRI) has been increased from 20 cases to all CBAW of sub-blocks of index case. TT2 + vaccination coverage is still very low nationally. Neonatal tetanus surveillance needs to be strengthened to identify pockets of low coverage to sustain the elimination status.

Acute meningo encephalitis syndrome (AMES) surveillance

Only three medical colleges hospitals (Rajshahi, Khulna and Chittagong) were in the list of AMES surveillance from 2008 which was revised in 2011 when Chittagong was discontinued and Rangpur included in the AMES surveillance system.

AEFI surveillance

The AEFI surveillance guideline has been updated, staff trained and capacity building is being done at all levels. A total of 869 units send weekly AEFI surveillance reports. In 2011, 1 134 AEFI cases were hospitalized AEFI; cases including mild cases were reported by the AEFI surveillance system. Of these, 34 cases were hospitalized and 41 cases were investigated. However, many zero district reports are suggesting that all AEFI cases may

not have been reported. Some of the investigations were inconclusive and causality assessment was not done.

National Laboratory for Polio and Measles:

National laboratory for polio, measles and JE is functioning well and has passed annual accreditation by WHO.

Recommendation for improving VPDs and AEFI Surveillance:

1. Maintenance of high quality AFP surveillance should be continue through regular monitoring of salient upazilas, urban zones and reporting units.
2. Measles outbreak investigation data should be used to develop a brief report that includes immunization response to the outbreak.
3. Neonatal tetanus surveillance should be strengthen through more emphasis on active surveillance and community surveillance in areas where neonatal tetanus cases are reported.
4. Investigation of reported AEFI cases should be strengthened and non-reporting of expected number of AEFI explored.

3.3 Surveillance medical officers network

Surveillance medical officers of WHO have been providing support to the Government of Bangladesh for polio eradication initiatives since 1999. After cessation of immunization and other child health (IOCH) activities of USAID, WHO supported urban areas and recruited 42 SMOs to intensify surveillance, SIAs and routine immunization activities.

The government recruited district immunization and medical officers (DIMO) from GAVI ISS fund initially for the low-performing 25 districts in 2002, and later increased it to 32 to provide routine immunization services covering all districts. DIMOs' positions had been abolished in February 2012 following discontinuation of funding support. The government is in the process of recruiting 13 maternal and child health and immunization officers (MCH and IO) for selected low-performing districts through GAVI HSS support. The terms of reference of MCH and IO include surveillance activities.

Several SMO positions remained vacant for a long time. Presently, only 24 SMOs are operational, which would be reduced to 22 soon. One SMO is covering more than one district mainly to monitor and supervise surveillance activities. SMOs are also fully involved in SIAs and, to some extent, in routine immunization. They provide technical support to districts in planning and implementation, including preparation of micro-plans and data quality self assessment (DQSA).

BOX SMO Network

- WHO SMO network: Currently, 24 SMOs cover all 64 districts and seven city corporations and play a key role in AFP and measles and other VPD surveillance and case investigation. They are also involved in supporting SIAs, routine immunization, micro-planning and DQSA.
- DIMO network: 32 DIMOs provided support in all districts till February 2012.
- GAVI HSS planned to support 13 low-performing districts by assigning MCH and immunization officers whose ToRs will include surveillance activities.
- Government officers responsible for surveillance at district and upazila levels are available but their contribution varies among districts, city corporations and upazilas.
- City corporation and district managers valued the contribution of SMOs and have requested for their continuation.
- Development partners supporting SMO network feel that this role should be transferred to government with adequate support to perform functions.

Recommendations for improving surveillance and immunization service delivery network

1. Creation of designated disease control medical officer posts in all districts and upazilas to work with SMOs and MCH&I officers should be explored.
   - Initial priority should be given for appointing district-level officers responsible for disease control.
   - National resources should be utilized whenever possible to appoint disease control medical officers.
   - Development partners should provide additional support for capacity building and logistics support to facilitate the disease control officers.
2. Until the disease control officers are posted, the existing SMO network needs to be supported and MCH&I officers provided necessary logistic support to perform their duties.

3.4 National coordination and advisory bodies

In order to provide technical guidance to MOH&FW, several national-level coordination and advisory bodies are supporting the immunization programme. Two committees- the Inter-Agency Coordination Committee (ICC) and the National Committee for Immunization Practices (NCIP) are functioning for overall EPI programme support and five committees are functioning on specific areas of EPI. The main responsibilities of the committees are:

- **Inter-Agency Coordination Committee**: takes decisions on policy, programme and finance-related issues and endorses the Annual Progress Report and proposals for new and underutilized vaccine of GAVI. The committee is chaired by Secretary, MOH&FW. This Committee is supported by a Technical Sub-Committee (TSC).

- **National Committee on Immunization Practice**: assesses the feasibility of introduction of new and underused vaccines. The committee is chaired by Senior Secretary, MOH&FW. The Committee has a scientific and technical sub-committee to give recommendations based on an analysis of global and regional practices and country needs. This Committee recently recommended pneumococcal vaccine, rota vaccine, birth dose of hepatitis B vaccine, second dose of measles vaccine, Td vaccine and measles and rubella vaccine to be incorporated into the routine expanded programme on immunization.

- **National steering committee for polio eradication and measles control** (NSC-PE&MC) is the highest body to take decisions at the national level for events on polio eradication and measles control and is chaired by the Minister of Health.

- **The national certification committee for polio eradication (NCCPE)** prepares an annual update for certification of poliomyelitis, prepares a report to SEARCCPE, and assesses the status and risk of importation of polio into the country. NCCPE recommends conducting annual NIDs until this Region is polio free. This committee is chaired by national Professor M R Khan.

- **The national expert review committee** (ERC) reviews and classifies AFP cases regularly and monitors the certification process. This committee is chaired by a senior professor of paediatrics and is supported by professors of paediatric neurology, virology, epidemiology and representatives from the national polio lab, national EPI and IVD-WHO.

- **The national task force (NTF) for lab containment**: prepares a national plan for laboratory containment of wild poliovirus, prepares national inventory and submits documents to the NCCPE. This committee is also chaired by Secretary, MOH&FW and supported by the technical sub-committee on laboratory containment of wild poliovirus chaired by Director (hospital & clinic), DGHS.

- **National AEFI expert review committee**: assesses and classifies serious AEFI reported to the surveillance programme and plays a critical role in carrying out causality assessments and advising EPI and the National Regulatory Authority at times of crisis. This committee is chaired by Programme Manager- EPI and Surveillance, DGHS.

The review team met with the chairpersons of NCCPE, ERC, and the national AEFI ERC and reviewed the current status and future plans.

- NCCPE is preparing a response to the issues raised at the 2nd SEARCCPE held at Bangkok in January 2012.

- Preparing final report of 2011.
- Reviewing line listing of AFP cases reported in 2011.
- Verifying final diagnoses of AFP cases.
- Reviewing criteria used by ERC for arriving at final diagnoses.
- Exploring reasons of non-reporting of "0" compatible cases.
- Documentation of lab containment and updating inventory of laboratories

- National AEFI Committee meetings are held but are not adequate and regular. A causality assessment was held in 2010, but that was not followed up.
- Stressed the need for strengthening surveillance and continuation of the support of WHO surveillance network until the Region is declared "polio free".

The review team observed that some of the Terms of references of various committees are overlapping. This may delay the process of decision making.

Recommendation for improving national advisory bodies

1. The terms of reference (TOR) and composition of all national advisory bodies should be reviewed to ensure clear responsibilities and reporting to the senior management of the ministry of health.

3.5 Hib (pentavalent vaccine) post-introduction evaluation

Bangladesh introduced Haemophilus influenza type b (Hib) vaccine into the national EPI programme in the form of pentavalent vaccine (DTP, Hep-B and Hib) with GAVI co-financing support in 2009 in a phased manner. The programme was launched in January 2009 at Khulna division and extended to all divisions by July 2009. Before introduction, the following activities were undertaken by the EPI programme:

- Training materials were developed and provided training to SMOs and DIMOs on cold chain assessment, status of vaccine and cold chain equipment.
- National-level and district/city corporation-level training of trainers (TOT) was conducted.
- Training was organized at upazila/municipality and zone levels.
- Distribution of vaccine and logistics at District/CC/Upazila/Municipality level were ensured
- Communication material.was developed and printed
- Advocacy and planning meetings on introduction of Hib vaccine were organized at district/CC/ upazila/municipality and zone levels.
- Hib vaccine was introduced at local levels.

A post-introduction evaluation (PIE) is recommended by WHO for all countries that have introduced new vaccine, ideally within 6-12 months of introduction. The objective of the current evaluation was to assess the programmatic impact of the introduction on the immunization programme. Although it is three years after introduction, PIE was still considered useful and effective as Bangladesh is planning to introduce more new vaccines into the national immunization programme and the findings would be useful for other SEAR countries who have not yet introduced pentavalent vaccine.

The questionnaires developed for PIE in Bangladesh were based on the New Vaccine Post-Introduction Evaluation (PIE) Tool published by WHO. Three types of questionnaires were developed, one for EPI office/civil surgeon's office, one for UHC and the third for parents.

The following are the key PIE findings:

- *Planning and Introduction:* Introduction was smooth and well accepted by service providers and the community. Clear understanding during switch from DPT to Hib at all levels and smooth phase-out of DPT.
- *Training:* Training of trainers (TOT) was provided by national staff at district/city corporation level. The training was cascade type- district-level trainers provided training of trainers to the upazila and municipality level trainers who in turn,provided training to doctors, nurses and health workers. Trainers followed standard training modules and the training provided an opportunity to improve the skills of staff in all aspects of EPI.
- *Vaccine coverage*: The immunization data base was updated to include information on pentavalent vaccine. The coverage of pentavalent was higher than DTP and the drop-out rate of pentavalent was lower than DTP.
- *Cold-chain management:* Maintenance of cold chain and logistics was well planned after proper assessment. No problem was observed after introduction of pentavalent vaccine.
- *Vaccine management, transport and logistics:* Updated immunization policy guidelines including pentavalent vaccine were followed for vaccine management and transport. Shifting policy from DTP to pentavalent was well executed.
- *Waste management and injection safety:* There were no changes in the waste-disposal system and injection safety guidelines, and no major safety concerns.
- *Vaccine wastage:* The pentavalent vaccine wastage rate was almost "zero" compared to 20% -50% DPT wastage rate.
- *Monitoring and supervision*: Supervisory visits were made and feedbacks were provided through oral discussions and through filling up of supervisory checklists.

- *Adverse events following immunization (AEFI):* Written protocol for monitoring and reporting AEFI for all vaccines is available including crisis plan to manage AEFI. Change of protocol for pentavalent vaccine introduction was not needed. AEFIs reported through AEFI surveillance network were all of a minor nature.

- *Advocacy and communication:* Official launching ceremonies were held during the introduction. The media used were television, radio, newspapers, advocacy meetings at different levels and interpersonal communication by field workers.

- *Sustainability:* The government has a budget line for vaccine purchase and has financed traditional vaccines. Cost of pentavelent vaccine was co-financed by the government. Operational delivery cost was also borne by the government.

- *Impact assessment:* No data available on impact assessment plan.

- *General impressions:*
  - Pentavalent vaccine introduction was well accepted by healthcare workers, professional societies, communities/public, government, medias and other service providers.
  - Introduction of pentavalent vaccine has some financial implications on cold chain, vaccine transport, communication materials/media development and printing and training, these are covered by the government.
  - The introduction of pentavalent vaccine had improved the EPI programme, as frequency of doses was reduced- single dose, and fewer AEFI.
  - The introduction process was very smooth – no problem encountered.

- *Observation of vaccine storage area at national/district-levels:*
  - No remarkable negative observation from any observer- Temperature of refrigerator maintained between $+2^0$ to $+8^0$C and recorded twice daily including weekends, no vaccine with expiry date or at VVM stage 3 or 4. Injection equipment was stored in good condition. Space between the vaccine boxes/trays to allow air circulation was not always adequate.

In conclusion, the review team observed that pentavalent vaccine introduction was well accepted by the service providers and the community in Bangladesh has a system and infrastructure to incorporate new vaccines. This experience would provide confidence in introducing other new vaccines in future. A descriptive analysis of the results from the Hib (pentavalent) vaccine post-introduction evaluation tool is available in Annexes 2 and 3.

Recommendation for introducing new vaccines

1. Cold space, vaccines and logistic requirements should be assessed and implementation plan developed and followed before introduction of new vaccines.

Annex 1

Deployment of review teams and areas visited

Name of External participants	Designation	Name of GoB Participants	Name of Development partners	Division
Dr Ujjawal Sinha, WHO-India	Sub-Regional Team Lead, Bihar	Dr Md Kamrul Islam, DPM-EPI HQ		Barisal
Dr Adwoa Bentsi-Enchill, WHO-HQ	Medical Officer-Implementation Research	Dr Md Shariful Islam, DPM-EPI HQ	Dr Hasanuzzaman, NC-RED, WHO-IVD	Chittagong
Dr Gangaram Choudhary, WHO-Nepal	Surveillance Coordinator, Programme for Immunization Preventable Diseases	Dr Md Younus, DPM-Training, IMCI, EPI Bhaban, Dhaka		Chittagong
Dr Tika Ram Sedai and Dr Nihal Abeysinghe, WHO-SEARO	Technical Officer-Data Management Regional Adviser-Vaccine Preventable Disease	Dr SAJM Musa, LD-MNC&AH Dr Tajul Islam A Bari, PM-EPI & Surveillance	Dr Jayantha Liyanage MO- EPI, WHO	Dhaka
Dr Christopher Gregory, CDC-Atlanta	Medical Epidemiologist	Dr Mosleh Uddin Ahmed, Prof. Community Medicine	Dr Jucy Merina Adhikari, Immunization Specialist, UNICEF	Dhaka
Dr Deepak Kumar, WHO-India	Deputy National Surveillance Team Lead, Delhi	Dr Ashek Ahmed Shahid Reza, DPM-EPI HQ		Khulna
Dr Michael Friedman, CDC-Atlanta	Medical Epidemiologist	Ms Kohinoor Begum, Training Officer, EPI HQ	Dr Selina Ahmed, NPO-VSQ, WHO-IVD	Rajshahi
Dr Ashutosh Agarwal, WHO-India	Officer on Special Duty, UP	Dr Shamsuzzaman, DPM-EPI HQ	Dr Abbas, BRAC, Dhaka	Rangpur
Dr Yin Yin Aung, UNICEF-ROSA Dr Mainul Hasan, WHO-SEARO	Regional Immunization Specialist Medical Officer-Surveillance	Dr Md Rashidul Alam, Medical Officer, EPI HQ		Sylhet

Annex 2

Hib (Pentavalent) Vaccine Post- Introduction Evaluation Result: Bangladesh

Frequency Tables for EPI Office (National)/civil surgeon's office (district) level result (please refer to annex 3 for the exact question)

District

District	Frequency	Percent	Cum Percent
Bagerhat	1	10.0%	10.0%
Barisal	1	10.0%	20.0%
Netrokona	1	10.0%	30.0%
Jhalokathi	1	10.0%	40.0%
Khulna	1	10.0%	50.0%
Maulabi Bazar	1	10.0%	60.0%
Mymensingh	1	10.0%	70.0%
Patuakhali	1	10.0%	80.0%
Rangpur	1	10.0%	90.0%
Sunamgong	1	10.0%	100.0%
Total	10	100.0%	100.0%

G1_ Date of obligatory Pentavalent Vaccination was started at national/ divisional/ district level

G1	Frequency	Percent	Cum Percent
July, 2009	3	30.0%	30.0%
June, 2009	7	70.0%	100.0%
Total	10	100.0%	100.0%

G2_ Was the Pentavalent vaccine introduced nationwide or was it a phased introduction?

G2_VacIntro	Frequency	Percent	Cum Percent
National	8	80.0%	80.0%
Phased introduction	2	20.0%	100.0%
Total	10	100.0%	100.0%

G3_ What is the population of children less than 1 year of age in this country/ division/ district?

G3_U1Pop	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
5517	1	10.0%	40.0%
27812	1	10.0%	50.0%
45314	1	10.0%	60.0%
53059	1	10.0%	70.0%
60059	1	10.0%	80.0%
74674	1	10.0%	90.0%
135889	1	10.0%	100.0%
Total	10	100.0%	100.0%

N4_ What factors influenced the decision for introduction of the Pentavalent vaccine

N4_IntroDecision	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
MOH's decision	1	10.0%	40.0%
National decision	1	10.0%	50.0%
Strong political will	5	50.0%	100.0%
Total	10	100.0%	100.0%

N5_ Was the national immunization advisory committee supportive of the decision to introduce the Pentavalent vaccine?

Support	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Don't Know	3	30.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

N6_ What is the current national immunization schedule?

N6_CurImmSch	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

N7_ Was the immunization schedule changed when the Pentavalent vaccine was introduced?

N7_ImmSchChanged	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
No	6	60.0%	100.0%
Total	10	100.0%	100.0%

N8_ What is the schedule for the Pentavalent Vaccine?

N8_PentaSchedule	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
6 M; 10 M; 14 M	1	10.0%	50.0%
6 W; 10 W; 14 W	5	50.0%	100.0%
Total	10	100.0%	100.0%

G9_ Could you please tell what disease(s) does Pentavalent Vaccine prevent?

G9_PentaPrevent	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
DPT, HepB and Hib	4	40.0%	50.0%
Hib	2	20.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

G10_ Do you have a National/ divisional/ district Pentavalent Vaccine introduction plan or timeline for introduction activities?

G10_PlanTimeline	Frequency	Percent	Cum Percent
No, They have started on June 2009	1	10.0%	10.0%
Yes, district plan/timeline	6	60.0%	70.0%
Yes, National plan/timeline	3	30.0%	100.0%
Total	10	100.0%	100.0%

N11_ Did you receive support or use guidelines to develop your introduction plan/timeline?

N11_Support	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Yes	6	60.0%	100.0%
Total	10	100.0%	100.0%

G12_ Target audience for the training

G12_TrainingAudience	Frequency	Percent	Cum Percent
Doctors, Nurses, Health-care workers	9	90.0%	90.0%
Nurses, Health-care workers	1	10.0%	100.0%
Total	10	100.0%	100.0%

G12_ Type of training

G12_TrainingType	Frequency	Percent	Cum Percent
All at a time	1	10.0%	10.0%
Cascade	8	80.0%	90.0%
Region-by-region	1	10.0%	100.0%
Total	10	100.0%	100.0%

G12_ Was training conducted before vaccine introduction?

G12_TrainingBeforeIntro	Frequency	Percent	Cum Percent
Yes	10	100.0%	100.0%
Total	10	100.0%	100.0%

G12_ If yes, how long before

G12_ifYesHowLongBefore	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
1 month	2	20.0%	50.0%
1 week	3	30.0%	80.0%
2009	2	20.0%	100.0%
Total	10	100.0%	100.0%

G12_ Was training conducted after vaccine introduction?

G12_TrainingAfterIntro	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
No	7	70.0%	100.0%
Total	10	100.0%	100.0%

G12_ If yes, how long after

G12_ifYesHowLongAfter	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

G12_ How long was the training?

G12_TrainingDays	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
1 day	2	20.0%	40.0%
1 month	1	10.0%	50.0%
2 days	1	10.0%	60.0%
3 days	3	30.0%	90.0%
5 days	1	10.0%	100.0%
Total	10	100.0%	100.0%

G12_ Who conducted the training?

G12_WhoConducted	Frequency	Percent	Cum Percent
CS, DCS MOCS	2	20.0%	20.0%
CS, DCS, MOCS	5	50.0%	70.0%
CS, DCS, MOCS, SMO, DIMO	2	20.0%	90.0%
District	1	10.0%	100.0%
Total	10	100.0%	100.0%

G13_ How were the trainings financed?

G13_TrainingFinanced	Frequency	Percent	Cum Percent
EPI	5	50.0%	50.0%
GAVI	2	20.0%	70.0%
GoB GAVI	1	10.0%	80.0%
UNICEF	2	20.0%	100.0%
Total	10	100.0%	100.0%

G14_ What specific training was given on the administration of the Pentavalent vaccine?

G14_SpecificTraining	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
EPI	1	10.0%	20.0%
Injection technique	1	10.0%	30.0%
Injection technique, vaccine storage	1	10.0%	40.0%
Penta demonstration	1	10.0%	50.0%
Practice demonstration	1	10.0%	60.0%
Technique, procedure	1	10.0%	70.0%
Theory and technical	1	10.0%	80.0%
Yes	2	20.0%	100.0%
Total	10	100.0%	100.0%

G15_ Do you think there are ways in which the training could be improved?

G15_TrainingImproved	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Don't Know	2	20.0%	30.0%
No	1	10.0%	40.0%
Yes	6	60.0%	100.0%
Total	10	100.0%	100.0%

G16_ What educational and reference materials were provided to participants at the time of training? Ask for samples.

G16_EduMaterial	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Brochures	1	10.0%	20.0%
Brochures, hand book	1	10.0%	30.0%
EPI guide book	1	10.0%	40.0%
Module supplied	1	10.0%	50.0%
New Guideline	2	20.0%	70.0%
Training manual	1	10.0%	80.0%
Yes	2	20.0%	100.0%
Total	10	100.0%	100.0%

G17_ Was the immunization database updated to accommodate information on the Pentavalent vaccine?

G17_DatabaseUpdated	Frequency	Percent	Cum Percent
Don't Know	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G18_ What formula do you use to calculate vaccine coverage? Include the source of the numerator (doses administered) and denominator (target population).

G18_Formula	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

G19_ What was DTP1 vaccine coverage in children of 1 year of age in the year before the Pentavalent vaccine introduction?

G19_DPT1_Cov_Yr	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

G19__ What was DTP3 vaccine coverage in children of 1 year of age in the year before the Pentavalent vaccine introduction?

G19_DPT3_Cov_Yr	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

G20_ What is the coverage of the first dose of the Pentavalent vaccine for the most recent administrative period?

G20_FirstDose	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
19	1	10.0%	30.0%
20	1	10.0%	40.0%
95	1	10.0%	50.0%
97	1	10.0%	60.0%
98	2	20.0%	80.0%
99	1	10.0%	90.0%
100	1	10.0%	100.0%
Total	10	100.0%	100.0%

G20_ What is the coverage of the second dose of the Pentavalent vaccine for the most recent administrative period?

G20_SecondDose	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
17	1	10.0%	30.0%
20	1	10.0%	40.0%
93	1	10.0%	50.0%
96	1	10.0%	60.0%
97	2	20.0%	80.0%
99	2	20.0%	100.0%
Total	10	100.0%	100.0%

G20_ What is the coverage of the last dose of the Pentavalent vaccine for the most recent administrative period?

G20_LastDose	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
15	1	10.0%	30.0%
19	1	10.0%	40.0%
93	1	10.0%	50.0%
95	1	10.0%	60.0%
96	2	20.0%	80.0%
98	1	10.0%	90.0%
99	1	10.0%	100.0%
Total	10	100.0%	100.0%

G21_ Is coverage of the Pentavalent vaccine higher or lower than DTP?

G21_Coverage	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
Higher	5	50.0%	80.0%
Same	2	20.0%	100.0%
Total	10	100.0%	100.0%

G22_ Is the drop-out rate for the Pentavalent vaccine higher or lower than the DTP drop-out rate?

G22_Dropout	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
Higher	1	10.0%	30.0%
Lower	4	40.0%	70.0%
Very minimum	1	10.0%	80.0%
Yes	2	20.0%	100.0%
Total	10	100.0%	100.0%

G23_ Is there a cumulative immunization coverage chart on the wall? Do you know how to interpret the data to increase coverage?

G23_Chart	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
Yes	8	80.0%	100.0%
Total	10	100.0%	100.0%

G24 In the last year, what proportion of divisions/ districts/health facilities sent all monthly immunization summary forms on time

G24_Time	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
100	6	60.0%	100.0%
Total	10	100.0%	100.0%

G24_ In the last year, what proportion of divisions/ districts/health facilities sent all monthly immunization summary forms completed

G24_Complete	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
100	7	70.0%	100.0%
Total	10	100.0%	100.0%

G25_ Discuss any changes you had to make in the cold chain before introduction of the Pentavalent vaccine.

G25_ChangeColdChain	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
ILR and cold chain	4	40.0%	80.0%
More space	1	10.0%	90.0%
No	1	10.0%	100.0%
Total	10	100.0%	100.0%

G26_ Were any problems with the cold chain identified after the introduction of the Pentavalent vaccine? If yes, what were the problems and how have the problems been addressed?

G26_Problem	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Inadequate space	1	10.0%	20.0%
No problems	8	80.0%	100.0%
Total	10	100.0%	100.0%

G27_ Do you use freeze watch monitors during vaccine transportation?

G27_UseFreeze	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	5	50.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

G28_ Do you have immunization policy guidelines for vaccine management? If yes, have they been updated to include Pentavalent vaccine?

G28_PolicyGuidelines	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G29_ How do you forecast vaccine requirements?

G29_Forecast	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
3 months stock + buffer	1	10.0%	60.0%
3M supply x 1.3 - present stock	1	10.0%	70.0%
Every 3 month	1	10.0%	80.0%
Target x3/12+Buffer stock	1	10.0%	90.0%
Target/12+Buffer stock	1	10.0%	100.0%
Total	10	100.0%	100.0%

G30_ Did the estimated needs change with introduction of the Pentavalent vaccine?

G30_EstimateChange	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	5	50.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

G31_ How are vaccines ordered?

G31_VaccineOrder	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Every 3 month	3	30.0%	80.0%
Quarterly	2	20.0%	100.0%
Total	10	100.0%	100.0%

G32_ Please describe how vaccines are transported to the divisions/districts/health facilities.

G32_VacTransport	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Cold box	6	60.0%	70.0%
Truck/Van	1	10.0%	80.0%
Vehicle from national level	2	20.0%	100.0%
Total	10	100.0%	100.0%

G33_ How often do you send out vaccine shipments and supplies from your level to the next level?

G33_VacShipment	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Monthly	8	80.0%	90.0%
Vehicle with cold box to Upazila	1	10.0%	100.0%
Total	10	100.0%	100.0%

G34_ Did the frequency of deliveries change with introduction of the Pentavalent vaccine? If yes, by how much?

G34_FreqChange	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	7	70.0%	80.0%
Yes	2	20.0%	100.0%
Total	10	100.0%	100.0%

G35_ Please describe how the transportation of vaccines to outreach sites has changed with the introduction of the Pentavalent vaccine.

G35_VacTranpChanged	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
No change	3	30.0%	70.0%
Not needed	1	10.0%	80.0%
Vaccine carrier with icepack (4) by porter	2	20.0%	100.0%
Total	10	100.0%	100.0%

G36_ What effect did the Pentavalent vaccine have on dry storage space requirements?

G36_Effect	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Need more space	3	30.0%	40.0%
No effect	3	30.0%	70.0%
None	3	30.0%	100.0%
Total	10	100.0%	100.0%

G37_ What were the costs associated with increased transport or cold chain requirements?

G37_Cost	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Extra cold boxes	1	10.0%	50.0%
Extra cold-chain space	2	20.0%	70.0%
Extra petrol	1	10.0%	80.0%
Extra trucks/car rental or purchase, extra cold-chain space	2	20.0%	100.0%
Total	10	100.0%	100.0%

G38_ Who paid for these extra costs?

G38_CostPaid	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
Government EPI	6	60.0%	90.0%
National EPI	1	10.0%	100.0%
Total	10	100.0%	100.0%

G39_ What policy was established for the remaining quantities of DTP after introduction of Pentavalent vaccine?

G39_PolicyDTP	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
1st dose to newborn only	2	20.0%	80.0%
1st dose to newborn only till all DPT (2 & 3)	1	10.0%	90.0%
Used before Penta introduction	1	10.0%	100.0%
Total	10	100.0%	100.0%

G40_ Did you have a gap between using up DTP vaccine stock and receiving Pentavalent vaccine? If yes, for how long?

G40_Gap	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
2-3 months all DPT exhausted	1	10.0%	50.0%
3M - 4M	1	10.0%	60.0%
No	4	40.0%	100.0%
Total	10	100.0%	100.0%

G41_ Did you run out of any vaccines, including the Pentavalent vaccine**,** or vaccine supplies in the past six months?

G41_StockOut	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	9	90.0%	100.0%
Total	10	100.0%	100.0%

G42_ Have you had any vaccine expirations in the last six months? If yes, what did you do with the expired stock?

G42_VacExpire	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	9	90.0%	100.0%
Total	10	100.0%	100.0%

N43_ Have you had any vaccine with the vaccine vial monitor (VVM) in stage III or IV in the last six months? If yes, what did you do with these vaccines?

N43_VVM	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	7	70.0%	90.0%
Yes	1	10.0%	100.0%
Total	10	100.0%	100.0%

N44_ Are vaccine orders/deliveries tied to injection supplies (i.e. bundling)?

N44_InjSuply	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
No	2	20.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

G45_ Describe the waste disposal policy/plan at each level.

G45_WasteDisposal	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Incineration/pit burn	1	10.0%	50.0%
Not at district level	2	20.0%	70.0%
Not seen	1	10.0%	80.0%
Pit burning	2	20.0%	100.0%
Total	10	100.0%	100.0%

G46_ Does each level generally follow these guidelines?

G46_FollowGuideline	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Don't know	2	20.0%	60.0%
No	1	10.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

G47_ Did you have to make changes to your guidance for your waste disposal system for introduction of the Pentavalent vaccine? If yes explain.

G47_ChangeWasteDisp	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
No	6	60.0%	100.0%
Total	10	100.0%	100.0%

G48_ Did you have to make changes to your guidelines regarding injection safety for introduction of the Pentavalent vaccine? If yes, explain.

G48_ChangeInjectSafety	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
No	3	30.0%	70.0%
No change	3	30.0%	100.0%
Total	10	100.0%	100.0%

G49_ What formula is used to calculate vaccine wastage and what is the source of the data.

G49_formulaVaccWaste	Frequency	Percent	Cum Percent
Missing	9	90.0%	90.0%
Vaccine wastage not calculated	1	10.0%	100.0%
Total	10	100.0%	100.0%

G50_ What is the vaccine wastage rate of the Pentavalent vaccine?

G50_PentaWastage	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
0	2	20.0%	40.0%
0.0011	1	10.0%	50.0%
0.01	2	20.0%	70.0%
0.0158	1	10.0%	80.0%
0.0351	1	10.0%	90.0%
0.96	1	10.0%	100.0%
Total	10	100.0%	100.0%

G51_ What was the DTP wastage rate?

G51_DTPWastage	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
20-25%	1	10.0%	50.0%
20-30%	1	10.0%	60.0%
30%	1	10.0%	70.0%
30-40%	1	10.0%	80.0%
38%	1	10.0%	90.0%
58.23%	1	10.0%	100.0%
Total	10	100.0%	100.0%

G52_ Has the Pentavalent vaccine wastage rate changed when compared to DTP wastage rate (last admin period)?

G52_WastageChanged	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	1	10.0%	30.0%
Reduced	3	30.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

G53_ Did you change anything about the way you administer vaccines, to reduce wastage of the Pentavalent vaccine?

G53_WastageReduce	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
No	3	30.0%	90.0%
Yes	1	10.0%	100.0%
Total	10	100.0%	100.0%

G54_ How often are supervisory visits made to the divisional level?

G54_Divisional	Frequency	Percent	Cum Percent
Missing	7	70.0%	70.0%
3M	1	10.0%	80.0%
Few times	1	10.0%	90.0%
Line director	1	10.0%	100.0%
Total	10	100.0%	100.0%

G54_ How often are supervisory visits made to the district level?

G54_District	Frequency	Percent	Cum Percent
Missing	7	70.0%	70.0%
3M	1	10.0%	80.0%
Monthly	2	20.0%	100.0%
Total	10	100.0%	100.0%

G54_ How often are supervisory visits made to the health-facility level?

G54_HealthFacility	Frequency	Percent	Cum Percent
Missing	7	70.0%	70.0%
2/Month	1	10.0%	80.0%
Monthly	2	20.0%	100.0%
Total	10	100.0%	100.0%

G55_ Have you or a member of your staff or a partner organization made supervisory visits, to the districts/health facilities since Pentavalent vaccine introduction?

G55_SupVisit	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	2	20.0%	30.0%
Yes	7	70.0%	100.0%
Total	10	100.0%	100.0%

G55_ Have you or a member of your staff or a partner organization made supervisory visits, to the districts/health facilities since Pentavalent vaccine introduction? If yes, how often?

G55_IfYesHowOften	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
2 to 3 months	1	10.0%	60.0%
Bi-weekly	1	10.0%	70.0%
Monthly	1	10.0%	80.0%
Weekly	2	20.0%	100.0%
Total	10	100.0%	100.0%

G56_ How do supervisors give feedback to sites visited?

G56_Feeback	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Oral	4	40.0%	50.0%
Written and Oral	5	50.0%	100.0%
Total	10	100.0%	100.0%

G57_ What are the main issues that came up at the last two supervisory visits? Are they specifically related to introduction of the Pentavalent vaccine? How have they been resolved?

G57_Issues	Frequency	Percent	Cum Percent
Missing	7	70.0%	70.0%
AEFI	1	10.0%	80.0%
Less MO, less staff	1	10.0%	90.0%
More space, more cleanness, more arrangement of equipments	1	10.0%	100.0%
Total	10	100.0%	100.0%

G58_ Are follow-up visits conducted at sites with inadequate performance and continuing problems?

G58_FupVisit	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	2	20.0%	40.0%
Yes	6	60.0%	100.0%
Total	10	100.0%	100.0%

G59_ Have you received a supervisory visit? If yes, when and by whom?

G59_SupervisoryVisit	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	1	10.0%	30.0%
Yes	7	70.0%	100.0%
Total	10	100.0%	100.0%

G60_ Do you have a system and written protocol for monitoring and reporting AEFIs for all vaccines? Please describe the procedure.

G60_MonitoringAEFI	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
Yes	8	80.0%	100.0%
Total	10	100.0%	100.0%

G61_ Do you have a crisis plan in place to manage AEFIs? Please describe.

G61_CrisisPlan	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
Yes	8	80.0%	100.0%
Total	10	100.0%	100.0%

G62 Did you make any changes to the AEFI protocol specifically for the Pentavalent vaccine?

G62_ChangeProtocal	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
No	7	70.0%	100.0%
Total	10	100.0%	100.0%

G63_ Have you had any reported AEFIs for the Pentavalent vaccine or another vaccine since the Pentavalent vaccine was introduced?

G63_AEFIReported	Frequency	Percent	Cum Percent
Missing	4	40.0%	40.0%
Yes	3	30.0%	70.0%
Yes, 1	1	10.0%	80.0%
Yes, 2	1	10.0%	90.0%
Yes, 20	1	10.0%	100.0%
Total	10	100.0%	100.0%

G64_ Did you have an official launch ceremony at the time of the Pentavalent vaccine introduction?

G64_OfficialLunch	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	1	10.0%	20.0%
Yes	8	80.0%	100.0%
Total	10	100.0%	100.0%

G65_ Did you use any media outlets to promote the Pentavalent vaccine and inform/educate the community about the vaccine?

Missing	1	10.0%	10.0%
Advocacy meeting	2	20.0%	30.0%
Community groups	1	10.0%	40.0%
Government officials	1	10.0%	50.0%
Newspaper	1	10.0%	60.0%
No	1	10.0%	70.0%
Radio	1	10.0%	80.0%
Television	2	20.0%	100.0%
Total	10	100.0%	100.0%

G66_ Did you prepare or distribute any health education material for the community on the Pentavalent vaccine? If yes, what were they? Who were the target audiences? When and how were they distributed?

G66_HEMaterial	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
Banner	2	20.0%	50.0%
Brochures	3	30.0%	80.0%
Flyers	2	20.0%	100.0%
Total	10	100.0%	100.0%

G67_ Did you prepare or distribute any health education material for the community on the Pentavalent vaccine? If yes, what were they? Who were the target audiences? When and how were they distributed?

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G67_Budget	Frequency	Percent	Cum Percent
Missing	7	70.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

G68_ How are traditional EPI vaccines financed?

G68_VacFinanced	Frequency	Percent	Cum Percent
Missing	8	80.0%	80.0%
Govt/GAVI	2	20.0%	100.0%
Total	10	100.0%	100.0%

G69_ How is the Pentavalent vaccine paid for?

G69_PentaPaid	Frequency	Percent	Cum Percent
Missing	8	80.0%	80.0%
Govt/GAVI	2	20.0%	100.0%
Total	10	100.0%	100.0%

G70_ How are the operational delivery costs of Pentavalent vaccine paid for?

G70_DeliveryCost	Frequency	Percent	Cum Percent
Missing	8	80.0%	80.0%
Govt/GAVI	2	20.0%	100.0%
Total	10	100.0%	100.0%

G71_ Do you plan to introduce any more Pentavalent vaccines in the future? If yes, which one(s) and when?

Missing	8	80.0%	80.0%
Not applicable	1	10.0%	90.0%
Not yet	1	10.0%	100.0%
Total	10	100.0%	100.0%

G72_ Are you conducting, or do you plan to conduct, a vaccine impact assessment, i.e. a study to determine if the Pentavalent vaccine is reducing disease burden?

G72_Study	Frequency	Percent	Cum Percent
Missing	8	80.0%	80.0%
Don't Know	1	10.0%	90.0%
No	1	10.0%	100.0%
Total	10	100.0%	100.0%

G73_ How well was the Pentavalent vaccine accepted by Health-care workers?

G73_HCW	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G73_ How well was the Pentavalent vaccine accepted by Health-care workers?

G73_Societies	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G73_ How well was the Pentavalent vaccine accepted by community/public?

G73_Community	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G73_ How well was the Pentavalent vaccine accepted by Government?

G73_Govt	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G73_ How well was the Pentavalent vaccine accepted Media?

G73_Media	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Yes	9	90.0%	100.0%
Total	10	100.0%	100.0%

G74_ Were there financial implications in introducing the Pentavalent vaccine for cold chain?

G74_ColdChain	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
No	3	30.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

G74_ Were there financial implications in introducing the Pentavalent vaccine for vaccine transport?

G74_VacTrans	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	4	40.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

G74_ Were there financial implications in introducing the Pentavalent vaccine for wastage?

G74_Wastage	Frequency	Percent	Cum Percent
Missing	2	20.0%	20.0%
No	4	40.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

G74_ Were there financial implications in introducing the Pentavalent vaccine Communication materials/media ?

G74_ComMaterial	Frequency	Percent	Cum Percent
Missing	3	30.0%	30.0%
No	5	50.0%	80.0%
Yes	2	20.0%	100.0%
Total	10	100.0%	100.0%

G74 Were there financial implications in introducing the Pentavalent vaccine for training?

G74_Training	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
No	1	10.0%	20.0%
Yes	8	80.0%	100.0%
Total	10	100.0%	100.0%

G74_ Were there financial implications in introducing the Pentavalent vaccine for other?

G74_Other	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
No	2	20.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

G75_ What effect has the introduction of the Pentavalent vaccine had on your EPI programme?

G75_Effect	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Improved the EPI Programme	9	90.0%	100.0%
Total	10	100.0%	100.0%

G76_ In your opinion, was the introduction of the Pentavalent vaccine a smooth process or problematic? Please explain.

G76_Process	Frequency	Percent	Cum Percent
Missing	1	10.0%	10.0%
Very smooth - no problem	9	90.0%	100.0%
Total	10	100.0%	100.0%

G77_ Many other countries will be introducing this and other Pentavalent vaccines soon. What have you learned from this experience, and what advice do you have for other countries to ensure a smooth introduction?

G77_Advice	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

N78_ Are all freezers and refrigerators clean and functioning properly?

N78_Freezer	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

N79_ Are there thermometers outside the freezers and refrigerators?

N79_ThermoOutside	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
No	1	10.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

N80_ Are there thermometers inside the freezers and refrigerators?

N80_ThermoInside	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

N81_ Is the temperature inside the refrigerators currently between +2° and +8° C?

N81_Temp	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

N82_ Is there a log of freezer and refrigerator temperatures?

N82_Log	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes	5	50.0%	100.0%
Total	10	100.0%	100.0%

N82_ If yes, has temperature consistently been between +2° and +8°C for refrigerators in the last two months?

N82_LastTwoMon	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

N83_ How often are temperatures recorded?

N83_Record	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
Twice daily	4	40.0%	100.0%
Total	10	100.0%	100.0%

N84_ Are temperatures monitored and recorded on weekends and holidays?

N84_Weekend	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
No	1	10.0%	70.0%
Yes	3	30.0%	100.0%
Total	10	100.0%	100.0%

N85_ Are all vaccines arranged as "First expiry, First out"?

N85_FEFO	Frequency	Percent	Cum Percent
Missing	6	60.0%	60.0%
Yes	4	40.0%	100.0%
Total	10	100.0%	100.0%

N86_ Did you observe any expired vaccines?

N86_VacExpire	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
No	5	50.0%	100.0%
Total	10	100.0%	100.0%

N87_ Did the VVMs that you observed indicate that vaccine is usable, i.e. Stage 1 or 2

N87_VacUsable	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Yes, all vaccines usable	5	50.0%	100.0%
Total	10	100.0%	100.0%

N88_ Are vaccines with VVM in Stage 2 arranged so that they are used first?

N88_VacUse	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
Not applicable	4	40.0%	90.0%
Yes	1	10.0%	100.0%
Total	10	100.0%	100.0%

N89_ Are there spaces between the vaccine boxes/trays to allow air circulation

N89_Space	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
No	3	30.0%	80.0%
Not applicable	1	10.0%	90.0%
Yes	1	10.0%	100.0%
Total	10	100.0%	100.0%

N90_ Is injection equipment stored in good condition?

N90_InjEquip	Frequency	Percent	Cum Percent
Missing	5	50.0%	50.0%
No adequate space	1	10.0%	60.0%
Yes	3	30.0%	90.0%
Yes all	1	10.0%	100.0%
Total	10	100.0%	100.0%

Comments

Comments	Frequency	Percent	Cum Percent
Missing	10	100.0%	100.0%
Total	10	100.0%	100.0%

Frequency Tables for Health Facility (Upazila Health Complex) level result (please refer to annex 3 for the exact questions)

District/HF

District/HF	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Bagerhat	2	12.5%	25.0%
Bandanban	1	6.3%	31.3%
Barisal	4	25.0%	56.3%
Chittagong	1	6.3%	62.5%
Mymensingh	1	6.3%	68.8%
Khulna	1	6.3%	75.0%
Netrokona	1	6.3%	81.3%
Nilphamari	1	6.3%	87.5%
Patuakhali	1	6.3%	93.8%
Rangpur	1	6.3%	100.0%
Total	16	100.0%	100.0%

H1_ Were you (interviewee) working at this health facility at the time of the pentavalent vaccine introduction?

H1_Working	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
No	3	18.8%	25.0%
Yes	12	75.0%	100.0%
Total	16	100.0%	100.0%

H2_ When was the pentavalent vaccine first administered at this health facility?

H2_DateVacIntro	Frequency	Percent	Cum Percent
July, 2009	8	50.0%	50.0%
June, 2009	7	43.8%	93.8%
Sept, 2009	1	6.3%	100.0%
Total	16	100.0%	100.0%

H3_ How many people from this health-facility were trained for the pentavalent vaccine introduction?

H3_NumTrained	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
12	1	6.3%	37.5%
45	1	6.3%	43.8%
52	1	6.3%	50.0%
60	1	6.3%	56.3%
65	2	12.5%	68.8%
67	1	6.3%	75.0%
114	1	6.3%	81.3%
115	1	6.3%	87.5%
150	1	6.3%	93.8%
170	1	6.3%	100.0%
Total	16	100.0%	100.0%

H3_ Who from this health-facility were trained for the pentavalent vaccine introduction?

H3_WhoTrained	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
DCS, MO	3	18.8%	31.3%
DGHS	1	6.3%	37.5%
District level/ UH&PO	1	6.3%	43.8%
Focal person	1	6.3%	50.0%
HA, FWA, AHH, HI, SI, MT-EPI	4	25.0%	75.0%
MO	2	12.5%	87.5%
U H&FO, MO, MT-EPI, HI, SI	2	12.5%	100.0%
Total	16	100.0%	100.0%

H3_ How many of them are still working at this health-facility?

H3_NumWorking	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
0	1	6.3%	37.5%
1	3	18.8%	56.3%
40	1	6.3%	62.5%
52	1	6.3%	68.8%
56	1	6.3%	75.0%
60	1	6.3%	81.3%
67	1	6.3%	87.5%
107	1	6.3%	93.8%
170	1	6.3%	100.0%
Total	16	100.0%	100.0%

H3_ How long was the training for health facility staff?

H3_TrainingDays	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
1 day	4	25.0%	62.5%
2 days	3	18.8%	81.3%
3 days	3	18.8%	100.0%
Total	16	100.0%	100.0%

H3_ What were the key topics covered in the training?

H3_Topics	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
According to EPI guideline	1	6.3%	18.8%
Advantage of Penta	1	6.3%	25.0%
Doses requirement, AEFI	1	6.3%	31.3%
New vaccine, cold chain, AEFI	2	12.5%	43.8%
Penta vaccine components, AEFI	1	6.3%	50.0%
Penta vaccine components, cold chain, AEFI	1	6.3%	56.3%
Penta vaccine components, injection techniques, AD syringes	1	6.3%	62.5%
Penta vaccine introduction	1	6.3%	68.8%
Penta, AEFI	1	6.3%	75.0%
Penta, cold chain	1	6.3%	81.3%
Routine EPI	1	6.3%	87.5%
Single shot for 5 vaccines; Schedule	1	6.3%	93.8%
Use, route, AEFI	1	6.3%	100.0%
Total	16	100.0%	100.0%

H3_ Were there any opportunities to practice the new skills to administer the Pentavalent vaccine correctly?

H3_Skill	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	4	25.0%	43.8%
Not much changes	1	6.3%	50.0%
Yes	8	50.0%	100.0%
Total	16	100.0%	100.0%

H3_ Did the person from this health facility trained train others in the health facility?

H3_TrainedOther	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Don't know	1	6.3%	25.0%
No	2	12.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H3_ Was training conducted before vaccine introduction?

H3_TrainingBeforeVaccine	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H3_ If yes, how long before

H3_IfYesHowLongBefore	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
1 month	4	25.0%	68.8%
1 week	5	31.3%	100.0%
Total	16	100.0%	100.0%

H3_ Was training conducted after vaccine introduction?

H3_TrainingAfterVaccine	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
No	11	68.8%	100.0%
Total	16	100.0%	100.0%

H3_ If yes, how long after?

H3_IfYesHowLongAfter	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H3_ Who conducted the training for health-facility?

H3_WhoConducted	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
EPI	1	6.3%	31.3%
MO	1	6.3%	37.5%
SMO, MO-CS, DIMO	1	6.3%	43.8%
UH&FO	1	6.3%	50.0%
UH&FO, MO	7	43.8%	93.8%
UH&FO, MT-EPI	1	6.3%	100.0%
Total	16	100.0%	100.0%

H4_ Do you think there are any ways in which the training could be improved?

H4_TrainingImprove	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	3	18.8%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H5_ Are pentavalent vaccine introduction guidelines or educational and reference materials from the training available?

H5_Materials	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Don't know	1	6.3%	25.0%
No	4	25.0%	50.0%
Yes	8	50.0%	100.0%
Total	16	100.0%	100.0%

H6_ Overall, were you satisfied with the training provided?

H6_Satisfied	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
No	2	12.5%	18.8%
Yes	13	81.3%	100.0%
Total	16	100.0%	100.0%

H7_ What is the size of the target population for infant immunizations in this health facility?

H7_TargetPop	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
740	1	6.3%	18.8%
1320	1	6.3%	25.0%
1530	1	6.3%	31.3%
1644	1	6.3%	37.5%
2485	1	6.3%	43.8%
2876	1	6.3%	50.0%
5012	1	6.3%	56.3%
6684	1	6.3%	62.5%
7452	1	6.3%	68.8%
9174	1	6.3%	75.0%
9177	1	6.3%	81.3%
10260	1	6.3%	87.5%
10526	1	6.3%	93.8%
12236	1	6.3%	100.0%
Total	16	100.0%	100.0%

H8_ What formula do you use to calculate vaccine coverage? Include the source of the numerator (doses administered) and denominator (target population).

H8_Formula	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H9_ What was DTP1 vaccine coverage in the year before the pentavalent vaccine introduction?

H9_DPT1_Cov_Yr	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H9_ What was DTP3 vaccine coverage in the year before the pentavalent vaccine introduction?

H9_DPT3_Cov_Yr	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H10_ What is the coverage of the first dose of the pentavalent vaccine for the most recent administrative period?

H10_FirstDose	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
18	1	6.3%	25.0%
91	1	6.3%	31.3%
92	1	6.3%	37.5%
97	2	12.5%	50.0%
98	1	6.3%	56.3%
99	2	12.5%	68.8%
101	1	6.3%	75.0%
103	2	12.5%	87.5%
105	2	12.5%	100.0%
Total	16	100.0%	100.0%

H10_ What is the coverage of the second dose of the pentavalent vaccine for the most recent administrative period?

H10_SecondDose	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
22	1	6.3%	25.0%
88	1	6.3%	31.3%
91	1	6.3%	37.5%
92	1	6.3%	43.8%
96	1	6.3%	50.0%
97	1	6.3%	56.3%
99	3	18.8%	75.0%
102	3	18.8%	93.8%
104	1	6.3%	100.0%
Total	16	100.0%	100.0%

H10_ What is the coverage of the third dose of the pentavalent vaccine for the most recent administrative period?

H10_ThirdDose	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
20	1	6.3%	25.0%
85	1	6.3%	31.3%
90	1	6.3%	37.5%
93	1	6.3%	43.8%
95	1	6.3%	50.0%
96	1	6.3%	56.3%
99	4	25.0%	81.3%
102	2	12.5%	93.8%
104	1	6.3%	100.0%
Total	16	100.0%	100.0%

H11_ Is coverage of the Pentavalent vaccine higher or lower than DTP?

H11_Coverage	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
Higher	8	50.0%	81.3%
Same	2	12.5%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H12_ Is the drop-out rate for the Pentavalent vaccine higher or lower than the DTP drop out rate?

H12_Dropout	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
Lower	6	37.5%	87.5%
No	2	12.5%	100.0%
Total	16	100.0%	100.0%

H13_ How often do you report immunization data to the higher level?

H13_Report	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Monthly	14	87.5%	100.0%
Total	16	100.0%	100.0%

H14_ Have immunization registries/child health cards, etc. been updated to include the pentavalent vaccine?

H14_Registry	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
All updated	14	87.5%	93.8%
Vaccine registry/logbook	1	6.3%	100.0%
Total	16	100.0%	100.0%

H15_ How many days a week does your site perform outreach immunization sessions, i.e. immunization sessions not conducted at the health facility?

H15_Times	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
0	1	6.3%	50.0%
1	1	6.3%	56.3%
2	2	12.5%	68.8%
4	3	18.8%	87.5%
5	1	6.3%	93.8%
6	1	6.3%	100.0%
Total	16	100.0%	100.0%

H16_ How is outreach data collected?

H16_OutreachData	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Every evening	1	6.3%	18.8%
Field health worker	2	12.5%	31.3%
HA porter	2	12.5%	43.8%
Porter	2	12.5%	56.3%
Tally sheets	4	25.0%	81.3%
Vaccinator	3	18.8%	100.0%
Total	16	100.0%	100.0%

H17_ What changes, if any, did you have to make to outreach sessions when you introduced the pentavalent vaccine?

H17_ChangeOutreach	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
More vaccine carriers required	1	6.3%	18.8%
More vaccine carriers required, increased number of outreach sessions	1	6.3%	25.0%
No changes required	12	75.0%	100.0%
Total	16	100.0%	100.0%

H18_ How are vaccines stored at your health facility?

H18_VacStored	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Cold storage box	5	31.3%	37.5%
Refrigerator	10	62.5%	100.0%
Total	16	100.0%	100.0%

H19_ What cold chain equipment is utilized during outreach services?

H19_EquipOutreach	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Vaccine carrier	15	93.8%	100.0%
Total	16	100.0%	100.0%

H20_ The last time there was an interruption in your power supply, what did you do?

H20_PowerCut	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Cold box	3	18.8%	31.3%
Generator	3	18.8%	50.0%
No	3	18.8%	68.8%
No problem	1	6.3%	75.0%
Not such	4	25.0%	100.0%
Total	16	100.0%	100.0%

H21_ Discuss any changes you had to make in the cold chain before introduction of the pentavalent vaccine

H21_ChangesColdChain	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
Added one ILR	1	6.3%	31.3%
More cold box, ILR	6	37.5%	68.8%
No	5	31.3%	100.0%
Total	16	100.0%	100.0%

H22_ Were there any problems with the cold chain recognized after the introduction of the pentavalent vaccine? If yes, what were the problems and have the problems been addressed? If they have been addressed, how were they addressed?

H22_ProblemColdChain	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Inadequate space	3	18.8%	25.0%
No problems	12	75.0%	100.0%
Total	16	100.0%	100.0%

H23_ Do you have immunization policy guidelines for vaccine management?

H23_VMPolicy	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Yes	15	93.8%	100.0%
Total	16	100.0%	100.0%

H23_ If yes, have they been updated to include the pentavalent vaccine?

H23_IfYesUpdated	Frequency	Percent	Cum Percent
Missing	15	93.8%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H24_ How do you forecast vaccine requirements?

H24_VacForcast	Frequency	Percent	Cum Percent
Missing	12	75.0%	75.0%
Monthly report compiled & buffer	1	6.3%	81.3%
Monthly report, buffer+target	1	6.3%	87.5%
Target x 1.05 (WF)+buffer	1	6.3%	93.8%
Target/buffer & stock analysis	1	6.3%	100.0%
Total	16	100.0%	100.0%

H25_ How did estimated requirements change following introduction of the pentavalent vaccine?

H25_ChangEstimate	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
Don't know	2	12.5%	37.5%
No	5	31.3%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H26_ Who ordered for vaccine delivery to the health facility.

H26_Order	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
MT EPI	6	37.5%	68.8%
UH&FO	3	18.8%	87.5%
UH&FPO	2	12.5%	100.0%
Total	16	100.0%	100.0%

H26_ How often vaccines are delivered to the health facility.

H26_Delivery	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Monthly	12	75.0%	93.8%
Need basis	1	6.3%	100.0%
Total	16	100.0%	100.0%

H27_ What did you do with remaining quantities of DTP after introduction of the Pentavalent vaccine?

H27_DTPStock	Frequency	Percent	Cum Percent
Missing	9	56.3%	56.3%
None	1	6.3%	62.5%
Penta only for 1st dose	4	25.0%	87.5%
Return EPI HQ	2	12.5%	100.0%
Total	16	100.0%	100.0%

H28_ Did you have a gap between using up DTP vaccine and receiving the Pentavalent vaccine? If yes, for how long?

H28_Gap	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
3M - 4M	2	12.5%	62.5%
No	5	31.3%	93.8%
they use concurrent	1	6.3%	100.0%
Total	16	100.0%	100.0%

H29_ Have you had any vaccine expirations in the last six months?

H29_VacExpire	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
No	15	93.8%	100.0%
Total	16	100.0%	100.0%

H29_ If yes, what action has been taken?

H29_Action	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H30_ Have you had any vaccine with VVM in Stage III or IV in the last six months? If yes, what did you do with these vaccines?

H30_VVM	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	14	87.5%	100.0%
Total	16	100.0%	100.0%

H31_ Did you run out of any vaccines, including the pentavalent vaccine or vaccines supplies in the past six months?

H31_VacShortage	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
No	15	93.8%	100.0%
Total	16	100.0%	100.0%

H32_ Are vaccine orders/deliveries tied to injection supplies (i.e. bundling)?

H32_Injection	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	7	43.8%	62.5%
Yes	6	37.5%	100.0%
Total	16	100.0%	100.0%

H32_ Are vaccine orders/deliveries tied to injection supplies (i.e. bundling)?

H32_Stock	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
No	4	25.0%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H33_ Did you have to make any changes to your waste-disposal system for introduction of the pentavalent vaccine? If yes, explain.

H33_ChangeWasteDisposal	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	10	62.5%	75.0%
Yes	4	25.0%	100.0%
Total	16	100.0%	100.0%

H34_ Have you experienced any problems with your waste-disposal system?

H34_ProblemWaste	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	8	50.0%	62.5%
Yes	2	12.5%	75.0%
Yes, more space	1	6.3%	81.3%
Yes, more vial buried & pitted	1	6.3%	87.5%
Yes, need incineration	2	12.5%	100.0%
Total	16	100.0%	100.0%

H35_ What formula is used to calculate vaccine wastage and what is the source of the data

H35_FormulaWaste	Frequency	Percent	Cum Percent
Missing	15	93.8%	93.8%
Target X no. of dose X 1.05	1	6.3%	100.0%
Total	16	100.0%	100.0%

H36_ What is the vaccine wastage rate of the pentavalent vaccine?

H36_WastageRate	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
0	9	56.3%	62.5%
0.0034	1	6.3%	68.8%
0.0048	1	6.3%	75.0%
0.01	1	6.3%	81.3%
0.02	1	6.3%	87.5%
0.09	2	12.5%	100.0%
Total	16	100.0%	100.0%

H37_ What was the DTP wastage rate?

H37_DTPWastage	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
20-30%	1	6.3%	37.5%
30%	1	6.3%	43.8%
37%	1	6.3%	50.0%
39%	1	6.3%	56.3%
40%	1	6.3%	62.5%
48%	1	6.3%	68.8%
52%	1	6.3%	75.0%
58%	1	6.3%	81.3%
72.50%	1	6.3%	87.5%
Don't know	2	12.5%	100.0%
Total	16	100.0%	100.0%

H38_ Has the Pentavalent vaccine wastage rate changed when compared to DTP wastage rate (last admin period)?

H38_WastageChange	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
Reduced	6	37.5%	87.5%
Yes	2	12.5%	100.0%
Total	16	100.0%	100.0%

H39_ Did you change anything about the way you administer vaccines, to reduce wastage of the pentavalent vaccine?

H39_ChangetoReduce	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
No	8	50.0%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H40_ How many times in the past six months have you received a supervisory visit from district or divisional level or from a partner agency? Was the visit documented?

H40_SupVisit	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
1	2	12.5%	18.8%
2	1	6.3%	25.0%
3	1	6.3%	31.3%
4	4	25.0%	56.3%
6	1	6.3%	62.5%
8	1	6.3%	68.8%
10	1	6.3%	75.0%
11	1	6.3%	81.3%
12	1	6.3%	87.5%
13	1	6.3%	93.8%
15	1	6.3%	100.0%
Total	16	100.0%	100.0%

H41_ If yes, who visited, and what were the problems identified?

H41_WhoVisited	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
CS	1	6.3%	31.3%
CS, Director	2	12.5%	43.8%
Director health	1	6.3%	50.0%
Epi supt	1	6.3%	56.3%
Incharge	1	6.3%	62.5%
MT EPI	1	6.3%	68.8%
National EPI	1	6.3%	75.0%
SMO	2	12.5%	87.5%
SMO, DIMO, MOCS	1	6.3%	93.8%
SMO, EPI, CS	1	6.3%	100.0%
Total	16	100.0%	100.0%

H42_ Do you have a system and written protocol for monitoring and reporting AEFIs for all vaccines? Please describe the procedure.

H42_AEFI	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Yes	15	93.8%	100.0%
Total	16	100.0%	100.0%

H43_ Did you make any changes to the AEFI protocol specifically for the pentavalent vaccine?

H43_ChangeProtocal	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	13	81.3%	100.0%
Total	16	100.0%	100.0%

H44_ Have you had any reported AEFIs for the pentavalent vaccine or another vaccine since the pentavalent vaccine was introduced?

H44_AEFIReport	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	3	18.8%	31.3%
Yes	2	12.5%	43.8%
Yes, 1	2	12.5%	56.3%
Yes, 2	2	12.5%	68.8%
Yes, 3	5	31.3%	100.0%
Total	16	100.0%	100.0%

H45_ Did you have an official launch ceremony at this health facility at the time of the pentavalent vaccine introduction?

H45_LunchPenta	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	7	43.8%	56.3%
Yes	7	43.8%	100.0%
Total	16	100.0%	100.0%

H46_ Did this health facility provide any health education messages or materials to the community about the pentavalent vaccine at the time of introduction?

H46_HEMaterials	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Banners	2	12.5%	18.8%
Brochures	4	25.0%	43.8%
Brochures, banners	1	6.3%	50.0%
None provided	3	18.8%	68.8%
None provided, health education sessions	1	6.3%	75.0%
Posters, brochures	1	6.3%	81.3%
Posters, brochures, health education sessions	2	12.5%	93.8%
Posters, brochures, public message	1	6.3%	100.0%
Total	16	100.0%	100.0%

H47_ Did you experience any resistance from the community regarding the pentavalent vaccine?

H47_Resistance	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	13	81.3%	100.0%
Total	16	100.0%	100.0%

H48_ Do you remember any media focus (e.g. on radio, television or newspapers) on the pentavalent vaccine?

H48_MediaFocus	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	9	56.3%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H49_ What is the immunization schedule for the pentavalent vaccine

H49_Schedule	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
6m, 10m, 14m	1	6.3%	43.8%
6w, 10w, 14w	9	56.3%	100.0%
Total	16	100.0%	100.0%

H50_ Are there infants who should not receive the vaccine?

H50_Infants	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
2	1	6.3%	56.3%
Don't know	1	6.3%	62.5%
No	6	37.5%	100.0%
Total	16	100.0%	100.0%

H51_ Please explain the correct way to administer the Pentavalent vaccine

H51_Administer	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
IM	2	12.5%	62.5%
No	1	6.3%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H52_ Have you or other staff experienced any problems with administering Pentavalent vaccine?

H52_Problem	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
HA	1	6.3%	43.8%
No	9	56.3%	100.0%
Total	16	100.0%	100.0%

H53_ What antigens are included in Pentavalent vaccine?

H53_Antigens	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
DPT, HepB, Hib	8	50.0%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H54_ What disease(s) does the pentavalent vaccine prevent?.

H54_Prevent	Frequency	Percent	Cum Percent
Missing	9	56.3%	56.3%
DPT, HepB, Hib	5	31.3%	87.5%
Hib	1	6.3%	93.8%
Pneumonia	1	6.3%	100.0%
Total	16	100.0%	100.0%

H55_ What information do you provide to parents before and after vaccination with the pentavalent vaccine?

H55_Information	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
Two or more mentioned	1	6.3%	37.5%
Yes all	10	62.5%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for cold chain involved in introduction of the pentavalent vaccine?

H56_ColdChain	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
No	8	50.0%	75.0%
Yes	4	25.0%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for vaccine transport involved in introduction of the pentavalent vaccine?

H56_VacTrans	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	9	56.3%	75.0%
Yes	4	25.0%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for wastage involved in introduction of the pentavalent vaccine?

H56_Wastage	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
No	7	43.8%	75.0%
Yes	4	25.0%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for communication material/media involved in introduction of the pentavalent vaccine?

H56_ComMaterial	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
No	11	68.8%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for training involved in introduction of the pentavalent vaccine?

H56_Training	Frequency	Percent	Cum Percent
Missing	5	31.3%	31.3%
No	2	12.5%	43.8%
Yes	9	56.3%	100.0%
Total	16	100.0%	100.0%

H56_ Were there any financial implications for other costs involved in introduction of the pentavalent vaccine?

H56_Other	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
No	8	50.0%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H57_ What effect has the introduction of the pentavalent vaccine had on your EPI programme?

H57_Effect	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Improved the EPI programme.	13	81.3%	100.0%
Total	16	100.0%	100.0%

H58_ In your opinion, was the introduction of the pentavalent vaccine a smooth process or problematic?

H58_Process	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Very smooth - no problem	13	81.3%	100.0%
Total	16	100.0%	100.0%

H59_ Many other countries will be introducing this and other Pentavalent vaccines soon. What have you learned from this experience and what advice do you have for other health facilities to ensure a smooth introduction

H59_Advice	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H60_ Are (all) vaccines reconstituted correctly

H60_Reconstituted	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
Yes	9	56.3%	100.0%
Total	16	100.0%	100.0%

H61_ Are vaccines stored/handled properly during the session, e.g. clean, organized, vaccine vials outside carrier are in foam pad?

H61_VacStored	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H62_ Are appropriate administration techniques observed (for Pentavalent intramuscular injection in the deltoid region of upper arm or the higher anterolateral area of the thigh)?

H62_Administration	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
Not observed	2	12.5%	50.0%
Yes	8	50.0%	100.0%
Total	16	100.0%	100.0%

H63_ Are AD syringes used?

H63_ADSyringes	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H64_ Are needles recapped (look in safety box for capped needles)?

H64_Recapped	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
No	9	56.3%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H65_ Are AD syringes disposed of in a safety box?

H65_Disposed	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H66_ the policy on use of the open multi-dose vial observed? Date opened marked on vial

H66_DateOpened	Frequency	Percent	Cum Percent
Missing	10	62.5%	62.5%
No	3	18.8%	81.3%
Yes	3	18.8%	100.0%
Total	16	100.0%	100.0%

H66_ Open vial discarded at end of immunization session

H66_VialDiscarded	Frequency	Percent	Cum Percent
Missing	11	68.8%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H66_ observation

H66_Observation	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H67_ Number of unsafe practices

H67_NumUnsafe	Frequency	Percent	Cum Percent
Missing	9	56.3%	56.3%
No	6	37.5%	93.8%
Not any	1	6.3%	100.0%
Total	16	100.0%	100.0%

H68_ Are all refrigerators clean and properly functioning?

H68_Refrigerator	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H69_ Is there a thermometer outside the refrigerator?

H69_ThermoOutside	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	3	18.8%	37.5%
Not working	1	6.3%	43.8%
Yes	9	56.3%	100.0%
Total	16	100.0%	100.0%

H70_ Is there a thermometer inside the refrigerator?

H70_ThermoInside	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H71_ Is the temperature inside the refrigerator currently between +2° and +8° C?

H71_Temp	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H72_ Is there a log of refrigerator temperatures?

H72_Log	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H73_ How often are temperatures recorded?

H73_TempRecord	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Daily	1	6.3%	18.8%
Twice daily	13	81.3%	100.0%
Total	16	100.0%	100.0%

H74_ Are temperatures monitored and recorded on weekends and holidays?

H74_Weekend	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

H75_ Are vaccines arranged as "First expiry, First out"?

H75_FEFO	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Not applicable	2	12.5%	25.0%
Yes	12	75.0%	100.0%
Total	16	100.0%	100.0%

H76_ Did you observe any expired vaccines

H76_VacExpire	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	12	75.0%	87.5%
Yes	2	12.5%	100.0%
Total	16	100.0%	100.0%

H76_ If yes, which vaccine and how many?

H76_IfYesVacNum	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

H77_ Did the VVMs that you observed indicate that vaccine is usable, i.e. Stage 1 or 2

H77_VVM	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Yes, all vaccines usable	14	87.5%	100.0%
Total	16	100.0%	100.0%

H78_ Are vaccines with VVM in Stage 2 arranged so that they are used first?

H78_VacVVM	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	3	18.8%	37.5%
Not applicable	6	37.5%	75.0%
Yes	3	18.8%	93.8%
Yes, OPV from last NID	1	6.3%	100.0%
Total	16	100.0%	100.0%

H79_ Are there spaces between the vaccine boxes/trays to allow air circulation?

H79_Space	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
No	5	31.3%	43.8%
Yes	9	56.3%	100.0%
Total	16	100.0%	100.0%

H80_ Are any posters or other literature about the Pentavalent vaccine noted in the health facility?

H80_Poster	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	12	75.0%	93.8%
Yes	1	6.3%	100.0%
Total	16	100.0%	100.0%

H81_ Is injection equipment stored in good condition with Adequate space

H81_AdqSpace	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	3	18.8%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H81_ Is injection equipment stored in good condition with clean and dry conditions

H81_Clean	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

H81__ Is injection equipment stored in good condition with well organized

H81_Organized	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
Yes	8	50.0%	100.0%
Total	16	100.0%	100.0%

H82_ How are used AD syringes being disposed of?

H82_Dispose	Frequency	Percent	Cum Percent
Missing	4	25.0%	25.0%
Safety box	12	75.0%	100.0%
Total	16	100.0%	100.0%

H83_ How are used safety boxes disposed of?

H83_SafetyBox	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
Incinerator	3	18.8%	37.5%
Pit-buried, above-ground area	1	6.3%	43.8%
Pit-burned	6	37.5%	81.3%
Pit-exposed, Pit-buried	2	12.5%	93.8%
Pit-exposed, Pit-buried, Above-ground area	1	6.3%	100.0%
Total	16	100.0%	100.0%

H84 Were discarded needles and syringes observed on the ground outside the facility?

H84_NeedlesObserved	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	8	50.0%	68.8%
Yes	5	31.3%	100.0%
Total	16	100.0%	100.0%

H85_ Is waste-disposal site closed off?

H85_WastSite	Frequency	Percent	Cum Percent
Missing	3	18.8%	18.8%
No	7	43.8%	62.5%
Yes	6	37.5%	100.0%
Total	16	100.0%	100.0%

H86_ Describe any other observation of the disposal site

H86_Observation	Frequency	Percent	Cum Percent
Missing	16	100.0%	100.0%
Total	16	100.0%	100.0%

Frequency Tables for Interview with Parents (please refer to annex 3 for the exact question)

District

District	Frequency	Percent	Cum Percent
Bandanban	1	6.3%	6.3%
Bardanban	1	6.3%	12.5%
Barisal	3	18.8%	31.3%
Chittagong	1	6.3%	37.5%
Hath hazari	2	12.5%	50.0%
Mymensingh	1	6.3%	56.3%
Netrokoma	1	6.3%	62.5%
Nilphamari	1	6.3%	68.8%
Patuakhali	2	12.5%	81.3%
Rangpur	1	6.3%	87.5%
Sunamgong	1	6.3%	93.8%
Team 3	1	6.3%	100.0%
Total	16	100.0%	100.0%

P1_ Do you have your child's Immunization card with you today?

P1_ImmCard	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
No	1	6.3%	12.5%
Yes	14	87.5%	100.0%
Total	16	100.0%	100.0%

P1_ What vaccine(s) did your child receive today?

P1_VacToday	Frequency	Percent	Cum Percent
Missing	2	12.5%	12.5%
Pentavalent	14	87.5%	100.0%
Total	16	100.0%	100.0%

P1_ Is the health card updated?

P1_CardUpdated	Frequency	Percent	Cum Percent
New health card - updated to include pentavalent vaccine	7	43.8%	43.8%
Old health card - with pentavalent vaccine written by hand	9	56.3%	100.0%
Total	16	100.0%	100.0%

P2_ What vaccine(s) did your child receive today?

P2_VacReceived	Frequency	Percent	Cum Percent
Answer correct	1	6.3%	6.3%
Does not know	5	31.3%	37.5%
Mentions general beneficial effects of vaccines	1	6.3%	43.8%
Partially correct	9	56.3%	100.0%
Total	16	100.0%	100.0%

P3_ Do you know about the pentavalent vaccine for infant

P3_KnowPenta	Frequency	Percent	Cum Percent
No	6	37.5%	37.5%
Yes	10	62.5%	100.0%
Total	16	100.0%	100.0%

P3_ If yes, which disease(s) do they prevent?

P3_IfYesPrevent	Frequency	Percent	Cum Percent
Missing	7	43.8%	43.8%
Answer correct	3	18.8%	62.5%
Answer incorrect	1	6.3%	68.8%
Does not know	5	31.3%	100.0%
Total	16	100.0%	100.0%

P4_ How did you receive the message about the pentavalent vaccine?

P4_MessaPe	Frequency	Percent	Cum Percent
Missing	8	50.0%	50.0%
Health worker	6	37.5%	87.5%
Health worker, TV	1	6.3%	93.8%
Neighbor	1	6.3%	100.0%
Total	16	100.0%	100.0%

P5_ Do you know when to bring your child for his/her next vaccination?

P5_NextVaccination	Frequency	Percent	Cum Percent
Missing	1	6.3%	6.3%
Yes - answer correct	14	87.5%	93.8%
Yes - answer incorrect	1	6.3%	100.0%
Total	16	100.0%	100.0%

P6_ Do you know what reaction your child may get following his/her vaccination today?

P6_Reaction	Frequency	Percent	Cum Percent
Missing	6	37.5%	37.5%
No	1	6.3%	43.8%
Yes - answer correct	9	56.3%	100.0%
Total	16	100.0%	100.0%

P7_ Other comments or observations.

P7_Comments	Frequency	Percent	Cum Percent
Missing	14	87.5%	87.5%
Parent is happy to have Penta	1	6.3%	93.8%
Penta is well accepted	1	6.3%	100.0%
Total	16	100.0%	100.0%

Annex 3

Pentavalent Vaccine Post-Introduction Evaluation (PIE) Tool-Bangladesh: Questionnaires

PIE questionnaire 1.1 EPI office (national)/civil surgeon's office (district)

PIE questionnaire 1.2 Upazila heath complex

PIE questionnaire 1.3 Interview with parents

PIE questionnaire 1.1 — EPI office (national)/civil surgeon's office (district)

Obligatory* Pentavalent *vaccination

Date of interview: _____ Name of interviewer: _____

This questionnaire was conducted at: (insert name of country, division or district)
☐ Nat level: _____
☐ District level: _____

Name(s) and title(s) of person(s) interviewed (please list all persons that you interviewed):
EPI manager/person responsible for vaccinations (or their deputy) should be interviewed
Name: _____ *Title:* _____

Name: _____ *Title:* _____

Name: _____ *Title:* _____

Contact details of most senior person:
Telephone: _____ *E-mail address:* _____

Pentavalent vaccine preparation: (e.g. fully liquid, liquid lyophilized, manufacturer)
_____

Pentavalent vaccine presentation: (e.g. prefilled syringe, 1-dose vial, 2-dose vial)
_____

Documents to request at beginning of interview:

Document / data	Document received	Document reported to exist but not available at time of interview	Document unavailable
Copy of Nat immunization schedule (Nat level only)			
Introduction plan for pentavalent vaccine			
Training materials/reference documents utilized at pentavalent vaccine training			
Vaccine management guidelines			
Media campaign/social mobilization/education materials (e.g. brochures, posters, pamphlets)			

Vaccine stock records			
Supervisor's book/site-visit reports (divisional and district level only)			
Injection safety/waste-management			
Policy document			
Wastage reports			
AEFI protocol/reporting form			
AEFI logbook/registry			
Nat coverage and drop-out rates (Nat level)			

Abbreviation	Background information	Nat/district questionnaire
GEN	1. Date of obligatory Pentavalent Vaccination was started at national/ divisional/ district level **Note:** *If interviewing division or district, put date for appropriate area.*	(DD/MM/YYYY) _____ / _____/ _____
GEN	2. Was the Pentavalent vaccine introduced nationwide or was it a phased introduction?	☐ National introduction (all divisions and districts at once) ☐ Phased introduction (explain) _____
GEN	3. What is the population of children less than 1 year of age in this country/ division/ district?	Number of children less than 1 year of age_____ Source/Year_____
NAT	4. What factors influenced the decision for introduction of the Pentavalent vaccine?	Check all that apply ☐ Strong political will ☐ Strong paediatric associations ☐ Introduction by neighbouring countries ☐ Disease burden data available nationally ☐ Visit by international adviser ☐ Other influences (specify)
NAT	5. Was the national immunization advisory committee supportive of the decision to introduce the Pentavalent vaccine?	☐ Yes ☐ No ☐ Don't know If no, what were their reasons: _____
NAT	6. What is the current national immunization schedule? **Note:** *Ask for a copy of the schedule for all EPI vaccines (National level only).*	Copy of schedule received ☐ Yes ☐ No

NAT	7. Was the immunization schedule changed when the Pentavalent vaccine was introduced? If yes, why?	☐ Yes ☐ No ☐ Don't know If yes, reason _____
NAT	8. What is the schedule for the Pentavalent Vaccine?	Insert age that dose is given Schedule: Dose 1 _____ Dose 2 _____ Dose 3 _____
GEN	9. Could you please tell what disease(s) does Pentavalent Vaccine prevent?	
	PRE-IMPLEMENTATION PLANNING AND VACCINE INTRODUCTION PROCESS	**National/district questionnaire**
GEN	10. Do you have a National/ divisional/ district Pentavalent Vaccine introduction plan or timeline for introduction activities? **Note:** *For example, if someone from the district only has a* National *plan, just check* National *plan. If they have a* National *and a district plan check both.*	☐ Yes, National plan/timeline ☐ Yes, district plan/timeline Interviewer, please ask for a copy at time of interview. Review later to ensure essential components are included. ☐ No. If no, why not? _____
NAT	Ask only if response to question 10 was "yes" 11. Did you receive support or use guidelines to develop your introduction plan/timeline?	☐ Yes. If yes, specify support? _____ ☐ No. If no, why not? _____ ☐ Don't know

	Training	National/district questionnaire
GEN	12. Describe the training organized for your employees for the Pentavalent Vaccine introduction, if any.	Target audience for the training ☐ Doctors ☐ Nurses ☐ Healthcare workers ☐ Other (specify) Type of training: ☐ Cascade ☐ Region-by-region ☐ Other (specify) Was training conducted before vaccine introduction ☐ Yes ☐ No If yes, how long before _____ Was training conducted after vaccine introduction ☐ Yes ☐ No If yes, how long after _____ ☐ How long was the training? _____ Who conducted the training at each level? District _____ Health facilities _____ Other comments on training _____
GEN	13. How were the trainings financed?	
GEN	14. What specific training was given on the administration of the Pentavalent vaccine?	
GEN	15. Do you think there are ways in which the training could be improved?	☐ Yes ☐ No ☐ Don't know If yes, please describe _____
GEN	16. What educational and reference materials were provided to participants at the time of training? Ask for samples.	

	Vaccine Coverage	National/district questionnaire
GEN	17. Was the immunization database updated to accommodate information on the Pentavalent vaccine?	☐ Yes ☐ No ☐ Don't know
GEN	18. What formula do you use to calculate vaccine coverage? Include the source of the numerator (doses administered) and denominator (target population).	Formula Numerator source _____ Denominator source_____ Correct formula used ☐ Yes ☐ No
GEN	19. What was DTP1 and DTP3 vaccine coverage in children of 1 year of age in the year before the Pentavalent vaccine introduction? **Note:** *Use year before Pentavalent vaccine introduction or closest administrative period.*	DTP1 coverage _____ year _____ DTP3 coverage _____ year _____
GEN	20. What is the coverage of the first and last dose of the Pentavalent vaccine for the most recent administrative period?	Pentavalent first dose coverage _____ Pentavalent second dose coverage _____ Pentavalent last dose coverage _____ *Specify the period;*
GEN	21. Is coverage of the Pentavalent vaccine higher or lower than DTP?	
GEN	22. Is the drop-out rate for the Pentavalent vaccine higher or lower than the DTP drop-out rate?	
GEN	23. Is there a cumulative immunization coverage chart on the wall? Do you know how to interpret the data to increase coverage?	
GEN	24. In the last year, what proportion of divisions/ districts/health facilities sent all monthly immunization summary forms completed and submitted on time?	Percentage of divisions/districts/health facilities submitting reports on time every month _____ Percentage of reports complete _____ (Of reports received, how many have all key information completed for every month)?

	Cold Chain Management	National/district questionnaire
GEN	25. Discuss any changes you had to make in the cold chain before introduction of the Pentavalent vaccine. **Note:** *Try to distinguish cold chain expansion/replacement of equipment that is part of normal cold-chain rehabilitation from changes made specifically to accommodate the Pentavalent vaccine.*	
GEN	26. Were any problems with the cold chain identified after the introduction of the Pentavalent vaccine? If yes, what were the problems and how have the problems been addressed?	☐ No problems ☐ Inadequate space ☐ Frozen vaccine ☐ Malfunctioning refrigerators ☐ Power supply/fuel shortage ☐ Other (specify)
GEN	27. Do you use freeze watch monitors during vaccine transportation?	☐ Yes ☐ No ☐ Don't know
	Vaccine Management, Transport & Logistics	**National/district questionnaire**
GEN	28. Do you have immunization policy guidelines for vaccine management? If yes, have they been updated to include Pentavalent vaccine? Please provide a copy at time of interview.	☐ Yes ☐ No
GEN	29. How do you forecast vaccine requirements?	
GEN	30. Did the estimated needs change with introduction of the Pentavalent vaccine?	☐ Yes ☐ No ☐ Don't know If yes, why? _____
GEN	31. How are vaccines ordered?	
GEN	32. Please describe how vaccines are transported to the divisions/districts/health facilities.	
GEN	33. How often do you send out vaccine shipments and supplies from your level to the next level?	

GEN	34. Did the frequency of deliveries change with introduction of the Pentavalent vaccine? If yes, by how much?	☐ Yes ☐ No ☐ Don't know If yes, Frequency of delivery before introduction _____ times/year Frequency of delivery after introduction _____ times/year Reason for change?
GEN	35. Please describe how the transportation of vaccines to outreach sites has changed with the introduction of the Pentavalent vaccine.	
GEN	36. What effect did the Pentavalent vaccine have on dry storage space requirements?	
GEN	37. What were the costs associated with increased transport or cold chain requirements?	Please state how many of the following were required: Extra trucks/cars rental or purchase _____ Extra logistic staff _____ Extra petrol _____ Extra cold chain space _____ Other costs (specify) _____
GEN	38. Who paid for these extra costs?	
GEN	39. What policy was established for the remaining quantities of DTP after introduction of Pentavalent vaccine?	
GEN	40. Did you have a gap between using up DTP vaccine stock and receiving Pentavalent vaccine? If yes, for how long?	
GEN	41. Did you run out of any vaccines, including the Pentavalent vaccine, or vaccine supplies in the past six months?	☐ Yes, vaccines (specify) _____ ☐ Yes, vaccine supplies (specify) _____ ☐ No If yes, how many weeks _____ If yes, reason for stock out _____

GEN	42. Have you had any vaccine expirations in the last six months? If yes, what did you do with the expired stock?	☐ Yes ☐ No If yes, action taken _____
NAT	43. Have you had any vaccine with the vaccine vial monitor (VVM) in stage III or IV in the last six months? If yes, what did you do with these vaccines?	☐ Yes ☐ No If yes, action taken _____
NAT	44. Are vaccine orders/deliveries tied to injection supplies (i.e. bundling)? **Note:** *Look at stock records to get this information.*	☐ Yes ☐ No Verified by checking stock records ☐ Yes ☐ No
	Waste Management & Injection Safety	**National/district questionnaire**
GEN	45. Describe the waste disposal policy/plan at each level.	
GEN	46. Does each level generally follow these guidelines?	☐ Yes ☐ No ☐ Don't know
GEN	47. Did you have to make changes to your guidance for your waste disposal system for introduction of the Pentavalent vaccine? If yes explain.	
GEN	48. Did you have to make changes to your guidelines regarding injection safety for introduction of the Pentavalent vaccine? If yes, explain.	
	Vaccine Wastage	**National/district questionnaire**
GEN	49. What formula is used to calculate vaccine wastage and what is the source of the data. Ask for wastage report.	☐ Vaccine wastage not calculated Formula: Data source, numerator _____ Data source, denominator _____ Source of data: ☐ Stock books ☐ Summary sheets ☐ Other

GEN	50. What is the vaccine wastage rate of the Pentavalent vaccine? **Note:** *If vaccine wastage rate is unknown for Pentavalent vaccine because PIE is done before administrative data are available, record anecdotal reports or attempt part-year calculation.*	Pentavalent vaccine wastage rate _____%
GEN	51. What was the DTP wastage rate?	
GEN	52. Has the Pentavalent vaccine wastage rate changed when compared to DTP wastage rate (last admin period)?	
GEN	53. Did you change anything about the way you administer vaccines, to reduce wastage of the Pentavalent vaccine?	
	Monitoring and Supervision	**National/district questionnaire**
GEN	54. How often are supervisory visits made to the divisional/district/health-facility level?	Divisional level _____ District level _____ Health-facility level _____
GEN	55. Have you or a member of your staff or a partner organization made supervisory visits, to the districts/health facilities since Pentavalent vaccine introduction? If so, how often and by whom?	☐ Yes ☐ No If yes, how often _____ By whom _____ If no, why not? _____
GEN	56. How do supervisors give feedback to sites visited?	☐ Written ☐ Supervisory logbook ☐ Supervisory checklist ☐ Send site visit report ☐ Other (specify) _____ ☐ Oral ☐ Discussion with staff ☐ Other (specify) _____

GEN	57. What are the main issues that came up at the last two supervisory visits? Are they specifically related to introduction of the Pentavalent vaccine? How have they been resolved?	a. b. c.
GEN	58. Are follow-up visits conducted at sites with inadequate performance and continuing problems?	☐ Yes ☐ No
GEN	59. Have you received a supervisory visit? If yes, when and by whom?	☐ Yes ☐ No When _____ By whom _____ Ask to see a copy of the visit report.
	Adverse Events Following Immunization (AEFI)	**National/divisional/district questionnaire**
GEN	60. Do you have a system and written protocol for monitoring and reporting AEFIs for all vaccines? Please describe the procedure. Ask for a copy of the AEFI protocol and reporting form.	☐ Yes ☐ No If no, why not _____
GEN	61. Do you have a crisis plan in place to manage AEFIs? Please describe.	
GEN	62. Did you make any changes to the AEFI protocol specifically for the Pentavalent vaccine?	
GEN	63. Have you had any reported AEFIs for the Pentavalent vaccine or another vaccine since the Pentavalent vaccine was introduced? **Note:** *Verify using AEFI logbook/registry if available.*	☐ Yes ☐ No ☐ Don't know If yes, How many for the Pentavalent vaccine _____ How many for a traditional vaccine (specify) _____ What were the AEFIs_____ How were they handled? _____

	Advocacy & Communication	**National/divisional / district questionnaire**
GEN	64. Did you have an official launch ceremony at the time of the Pentavalent vaccine introduction? **Note:** *If yes, what did it involve, was it successful, did it get much media coverage, how long before the introduction of the* Pentavalent vaccine *did it take place?*	☐ Yes ☐ No ☐ Don't know If yes, describe _____ If no, why not? _____
GEN	65. Did you use any media outlets to promote the Pentavalent vaccine and inform/educate the community about the vaccine? **Note:** *Please ask for copies of any materials*.	Check all that apply: ☐ Radio ☐ Television ☐ Community groups ☐ Town crier ☐ Celebrity ☐ Government officials ☐ Other (specify) Main messages _____
GEN	66. Did you prepare or distribute any health education material for the community on the Pentavalent vaccine? If yes, what were they? Who were the target audiences? When and how were they distributed? **Note:** *Please ask for copies of any materials*.	**Check all that apply:** ☐ Posters ☐ Brochures ☐ Flyers ☐ Clothing (t-shirts, hats etc.) ☐ Other (specify) Target audiences _____ Main messages _____
	Sustainability	**National/divisional/ district questionnaire**
NAT	67. Is there a budget line for vaccine purchase in the Nat budget?	
NAT	68. How are traditional EPI vaccines financed? **Note:** *List all sources that pay for the vaccine*.	

NAT	69. How is the Pentavalent vaccine paid for? **Note:** *List all sources that pay for the vaccine.*	
NAT	70. How are the operational delivery costs of Pentavalent vaccine paid for? **Note:** *List all sources that pay for the vaccine.*	
NAT	71. Do you plan to introduce any more Pentavalent vaccines in the future? If yes, which one(s) and when? **Note:** *If they say no, this is an opportunity to mention Pentavalent vaccines, such as pneumococcal vaccine, rotavirus vaccine, which are available*	
	Impact Assessment	**National/divisional questionnaire**
NAT	72. Are you conducting, or do you plan to conduct, a vaccine impact assessment, i.e. a study to determine if the Pentavalent vaccine is reducing disease burden?	☐ Yes ☐ No ☐ Don't know If yes, give details _____ If no, why not? _____
	General Impressions	**National/divisional/district questionnaire**
GEN	73. How well was the Pentavalent vaccine accepted? If there were any problems, please comment for each group. **Note:** *Was it considered to be a safe and effective, and needed vaccine?*	Pentavalent vaccine well accepted Healthcare workers ☐Y ☐ N Professional societies ☐Y ☐ N Community/public ☐Y ☐ N Government ☐Y ☐ N Media ☐Y ☐ N On what is your answer based? _____ Discuss any problems _____

GEN	74. Were there financial implications in introducing the Pentavalent vaccine for each of the following areas?	Ask about the financial implications of each of the following: Cold chain ☐Y ☐ N If yes, specify:_____ Vaccine transport ☐Y ☐ N If yes, specify:_____ Wastage ☐Y ☐ N If yes, specify:_____ Communication materials/media ☐Y ☐ N If yes, specify:_____ Training ☐Y ☐ N If yes, specify:_____ Other costs? ☐Y ☐ N If yes, specify:_____
GEN	75. What effect has the introduction of the Pentavalent vaccine had on your EPI programme?	Please check one that best describes the introduction: ☐ Improved the EPI programme. Please explain _____ ☐ Made the EPI programme worse. Please explain _____ ☐ No effect. Please explain _____
GEN	76. In your opinion, was the introduction of the Pentavalent vaccine a smooth process or problematic? Please explain.	Please check one that best describes the introduction: ☐ Very smooth. No problems ☐ Smooth, minor problems. Please explain _____ ☐ Somewhat smooth, some major problems. Please explain _____ ☐ Not smooth at all, some major problems. Please explain _____
GEN	77. Many other countries will be introducing this and other Pentavalent vaccines soon. What have you learned from this experience, and what advice do you have for other countries to ensure a smooth introduction?	

	Observation of Vaccine Storage Area at the National/ Divisional/ District Levels	National/divisional/district questionnaire
NAT	78. Are all freezers and refrigerators clean and functioning properly?	☐ Y ☐ N
NAT	79. Are there thermometers outside the freezers and refrigerators?	☐ Y ☐ N ☐ Some
NAT	80. Are there thermometers inside the freezers and refrigerators?	☐ Y ☐ N ☐ Some
NAT	81. Is the temperature inside the refrigerators currently between +2° and +8° C?	☐ Y ☐ N ☐ Some
NAT	82. Is there a log of freezer and refrigerator temperatures?	☐ Y ☐ N ☐ Some If yes, has temperature consistently been between +2° and +8°C for refrigerators in the last two months? ☐ Y ☐ N ☐ Some
NAT	83. How often are temperatures recorded?	☐ Twice daily ☐ Daily ☐ No records ☐ Other (specify) _____
NAT	84. Are temperatures monitored and recorded on weekends and holidays? **Note:** *Check specifically for holidays in _____(insert date of most recent holiday).*	☐ Y ☐ N ☐ Sometimes
NAT	85. Are all vaccines arranged as "First expiry, First out"?	☐ Y ☐ N If no, why not? _____ ☐ Not applicable. Why? _____
NAT	86. Did you observe any expired vaccines?	☐ Y ☐ N If yes, which vaccine, and how many? _____
NAT	For vaccines with a VVM 87. Did the VVMs that you observed indicate that vaccine is usable, i.e. Stage 1 or 2	☐ Yes, all vaccines usable ☐ No, some vaccines Stage 3 or 4 (unusable) Specify vaccine and proportion unusable _____

NAT	For vaccines with a VVM 88. Are vaccines with VVM in Stage 2 arranged so that they are used first?	☐ Y ☐ N ☐ Not applicable, no Stage 2
NAT	89. Are there spaces between the vaccine boxes/trays to allow air circulation?	☐ Y ☐ N
NAT	90. Is injection equipment stored in good condition?	Adequate space ☐ Y ☐ N Clean and dry conditions ☐ Y ☐ N Well organized (i.e. easily accessible) ☐ Y ☐ N ☐ Other observation (specify) _____
	Notes and Comments	
GEN	If you were unable to visit the cold store or dry store area, please mention reason. Record any interesting positive or negative anecdotes or comments by immunization staff.	

PIE Questionnaire 1.2 — UPAZILA HEALTH COMPLEX

Date of interview: _____ Name of interviewer:_____

This questionnaire was conducted at
Division: _____
District: _____
Upazila health complex name: _____

Type of health facility (check one):
☐Health National/Clinic ☐Health Post/Outpost ☐ Other (specify)_____

Name(s) and title(s) of person(s) interviewed (please list all the persons that you interviewed): EPI senior nurse/Healthcare worker responsible for vaccinations (or their deputy) should be interviewed

*Name*_____ *Title* _____

*Name*_____ *Title* _____

*Name*_____ *Title* _____

Contact details of most senior person:
Telephone _____ *e-mail address* _____

Documents to request at beginning of interview: (check appropriate boxes)

Document / data	**Document received**	**Document reported to exist but not available at time of interview**	**Document unavailable**
Introduction plan for Pentavalent vaccine			
Training materials/reference documents utilized during Pentavalent vaccine training			
Vaccine management guidelines			
Media campaign/social mobilization/education materials (brochures, posters, pamphlets, etc.)			
Vaccine stock records			
Supervisor's book/site visit reports			
Injection safety/waste-management policy document			
Wastage reports			
AEFI protocol/reporting form			
AEFI logbook/registry			
Sample health card/immunization card			
Immunization logbooks, monitoring forms, tally sheets, vaccine registries			

Abbreviation	Pre-Implementatation Planning	Health-facility questionnaire
GEN	1. Were you (interviewee) working at this health facility at the time of the pentavalent vaccine introduction?	☐ Yes ☐ No **Interviewer:** If "No", try to get a staff member who was present when the Pentavalent vaccine was introduced to participate. If not, continue with the interview although it may not be possible to answer all questions.
GEN	2. When was the pentavalent vaccine first administered at this health facility?	(MM/YYYY) _____/ _____ ☐ Don't know
	Training	**Health-facility questionnaire**
GEN	3. Please describe health-facility staff training for the pentavalent vaccine introduction, if any.	How many people from this health facility were trained? _____ Who from this health facility was trained? _____ How many of them are still working at this health facility? ____ How long was the training for health facility staff? _____ What were the key topics covered in the training?_____ Were there any opportunities to practice the new skills to administer the Pentavalent vaccine correctly? _____ Did the person from this health facility? Who was trained, train others in the health facility? ☐ Yes ☐ No ☐ Don't know Was training conducted before vaccine introduction ☐ Yes ☐ No If yes, how long before? _____ Was training conducted after vaccine introduction ☐ Yes ☐ No If yes, how long after? _____ Who conducted the training for health-facility staff? _____ Other comments on training ____

GEN	4. Do you think there are any ways in which the training could be improved?	☐ Yes ☐ No. ☐ Don't know If yes, please describe _____
GEN	5. Are pentavalent vaccine introduction guidelines or educational and reference materials from the training available? Ask to see samples.	☐Yes ☐ No ☐ Don't know
GEN	6. Overall, were you satisfied with the training provided?	☐Yes ☐ No ☐ Not applicable
	Vaccine Coverage	**Health-facility questionnaire**
GEN	7. What is the size of the target population for infant immunizations in this health facility? What is the source of this figure?	Children 1 years of age:_____ Source of data _____
GEN	8. What formula do you use to calculate vaccine coverage? Include the source of the numerator (doses administered) and denominator (target population).	Formula Numerator source _____ Denominator source_____
GEN	9. What was DTP1 and DTP3 vaccine coverage in the year before the pentavalent vaccine introduction? **Note:** *use 2011/2010 data*.	DTP1 _____ year _____ DTP3 _____ year _____
GEN	What is the coverage of the first, second and third dose of the pentavalent vaccine for the most recent administrative period?	Pentavalent -1 coverage _____ Pentavalent -2 coverage _____ Pentavalent -3 coverage _____
GEN	10. Is coverage of the Pentavalent vaccine higher or lower than DTP?	
GEN	11. Is the drop-out rate for the Pentavalent vaccine higher or lower than the DTP drop out rate?	

GEN	12. How often do you report immunization data to the higher level? Ask to see a report.	
GEN	13. Have immunization registries/child health cards, etc. been updated to include the pentavalent vaccine?	Check box if updated ☐ Vaccine registry/logbook ☐ Health card ☐ Tally sheets/district reporting forms ☐ Vaccine stock forms ☐ Other (specify)
GEN	14. How many days a week does your site perform outreach immunization sessions, i.e. immunization sessions not conducted at the health facility?	☐ Outreach not performed _____ times per week
GEN	15. How is outreach data collected?	
GEN	16. What changes, if any, did you have to make to outreach sessions when you introduced the pentavalent vaccine**?**	☐ No changes required ☐ More vaccine carriers required ☐ Increased number of outreach sessions ☐ Other changes (specify)
	Cold Chain Management	**Health-facility questionnaire**
GEN	17. How are vaccines stored at your health facility?	Check all that apply ☐ Cold storage box ☐ Refrigerator ☐ Other (specify) _____
	18. What cold chain equipment is utilized during outreach services?	
GEN	19. The last time there was an interruption in your power supply, what did you do?	
GEN	20. Discuss any changes you had to make in the cold chain before introduction of the pentavalent vaccine. **Note:** *Try to distinguish cold chain expansion/replacement of equipment that is part of normal cold chain rehabilitation from changes specifically for the Pentavalent vaccine*.	

GEN	21. Were there any problems with the cold chain recognized after the introduction of the pentavalent vaccine? If yes, what were the problems and have the problems been addressed? If they have been addressed, how were they addressed?	☐ No problems ☐ Inadequate space ☐ Frozen vaccine ☐ Malfunctioning refrigerators ☐ Power supply ☐ Other (specify) How resolved? _____
	Vaccine Management, Transport & Logistics	**Health-facility questionnaire**
GEN	22. Do you have immunization policy guidelines for vaccine management? If yes, have they been updated to include the pentavalent vaccine? Please provide a copy at time of interview**.**	☐ Yes ☐ No
GEN	23. How do you forecast vaccine requirements?	
GEN	24. How did estimated requirements change following introduction of the pentavalent vaccine?	☐ Yes ☐ No ☐ Don't know If yes, why? _____
GEN	25. Please describe how vaccines are ordered and delivered to the health facility.	Who orders? _____ How often are vaccines delivered? _____ Any problems? _____
GEN	26. What did you do with remaining quantities of DTP after introduction of the Pentavalent vaccine?	
GEN	27. Did you have a gap between using up DTP vaccine and receiving the Pentavalent vaccine? If yes, for how long?	
GEN	28. Have you had any vaccine expirations in the last six months? If yes, what did you do with the expired stock?	☐ Yes ☐ No If yes, action taken_____

GEN	29. Have you had any vaccine with VVM in Stage III or IV in the last six months? If yes, what did you do with these vaccines?	☐ Yes ☐ No If yes, action taken _____
GEN	30. Did you run out of any vaccines, including the pentavalent vaccine or vaccines supplies in the past six months?	☐ Yes ☐ No ☐ Yes, vaccines (specify) ☐ Yes, vaccine supplies (specify) ☐ No If yes, how many weeks? _____ If yes, reason for stock out _____
GEN	31. Are vaccine orders/deliveries tied to injection supplies (i.e. bundling)? **Note:** *Look at stock records to get this information*.	☐ Yes ☐ No Verified by checking stock records ☐ Yes ☐ No
	Waste Management and Injection Safety	**Health-facility questionnaire**
GEN	32. Did you have to make any changes to your waste-disposal system for introduction of the pentavalent vaccine? If yes, explain.	☐ Yes ☐ No If yes, explain _____
GEN	33. Have you experienced any problems with your waste-disposal system? Observe site.	☐ Yes ☐ No If yes, explain _____

	Vaccine Wastage	**Health-facility questionnaire**
GEN	34. What formula is used to calculate vaccine wastage and what is the source of the data. Ask for wastage report.	☐ Vaccine wastage not calculated Formula: Data source, numerator _____ Data source, denominator _____ Is the formula provided correct? Yes ☐ No Source of data: ☐ Stock books ☐ Summary sheets ☐ Other

GEN	35. What is the vaccine wastage rate of the pentavalent vaccine? **Note:** *If vaccine wastage rate is unknown for Pentavalent vaccine because PIE is done before administrative data are available, record anecdotal reports or attempt part-year calculation.*	pentavalent vaccine wastage (this administrative period) _____%
GEN	36. What was the DTP wastage rate?	
GEN	37. Has the Pentavalent vaccine wastage rate changed when compared to DTP wastage rate (last admin period)?	
GEN	38. Did you change anything about the way you administer vaccines, to reduce wastage of the pentavalent vaccine?	
	Monitoring and Supervision	**Health-facility questionnaire**
GEN	39. How many times in the past six months have you received a supervisory visit from district or divisional level or from a partner agency? Was the visit documented? Ask to see the supervisory book, copy of last report.	Number of visits _____ Is there a written report of the visit? ☐Yes ☐ No
GEN	40. If yes, who visited, and what were the problems identified?	Who visited? _____ (job title) Problems identified _____
	Adverse Events Following Immunization (AEFI)	**Health-facility questionnaire**
GEN	41. Do you have a system and written protocol for monitoring and reporting AEFIs for all vaccines? Please describe the procedure. Ask for a copy of the AEFI protocol and reporting form.	☐Yes ☐ No If no, why not? _____
GEN	42. Did you make any changes to the AEFI protocol specifically for the pentavalent vaccine?	

GEN	43. Have you had any reported AEFIs for the pentavalent vaccine or another vaccine since the pentavalent vaccine was introduced? **Note:** *Verify using AEFI log book/registry, if one.*	☐ Yes ☐ No ☐ Don't know If yes: How many for pentavalent vaccine**?** _____ How many for a traditional vaccine? (specify) _____ What were the AEFIs? _____ How were they handled? _____
	Advocacy, Communication & Acceptance	**Health-facility questionnaire**
GEN	44. Did you have an official launch ceremony at this health facility at the time of the pentavalent vaccine introduction? **Note:** W*hat did it involve, was it successful, did it get much media coverage?*	☐ Yes ☐ No ☐ Don't know If yes, describe _____
GEN	45. Did this health facility provide any health education messages or materials to the community about the pentavalent vaccine at the time of introduction? Ask to see copies of materials.	Check all that apply ☐ None provided ☐ Posters ☐ Brochures ☐ Health education sessions ☐ Public meetings ☐ Other (specify)
GEN	46. Did you experience any resistance from the community regarding the pentavalent vaccine?	☐ Yes ☐ No ☐ Don't know
GEN	47. Do you remember any media focus (e.g. on radio, television or newspapers) on the pentavalent vaccine?	☐ Yes ☐ No If yes, describe _____
	Healthcare Worker Knowledge (ask Health Assistant-HA or Family Welfare Assistant-FWA, not head of health facility)	**Health-facility questionnaire**
GEN	48. What is the immunization schedule for the pentavalent vaccine?	
GEN	49. Are there infants who should not receive the vaccine?	
GEN	50. Please explain the correct way to administer the Pentavalent vaccine	

GEN	51. Have you or other staff experienced any problems with administering Pentavalent vaccine?	
GEN	52. What antigens are included in Pentavalent vaccine?	
GEN	53. What disease(s) does the pentavalent vaccine prevent?.	Interviewer: Write exact response given
GEN	54. What information do you provide to parents before and after vaccination with the pentavalent vaccine?	Check if mentioned — don't prompt but can tell afterwards ☐ Name of the vaccine ☐ Diseases it protects against ☐ Benefits to the child ☐ Vaccine schedule/when to return ☐ Normal side effects? ☐ What side effects should they return for ☐ Bring vaccination card ☐ Other health messages (specify) Two or more mentioned? ☐Yes ☐ No
	General Impressions	**Health-facility questionnaire**
GEN	55. Were there any financial implications for the health facility involved in introduction of the pentavalent vaccine?	Ask about the financial implications of each of the following: ☐ Don't know Cold chain ☐Y ☐ N If yes, specify_____ Vaccine transport ☐Y ☐ N If yes, specify_____ Wastage ☐Y ☐ N If yes, specify_____ Communication materials/media ☐Y ☐ N If yes, specify_____ Training ☐Y ☐ N If yes, specify_____ Other costs? ☐Y ☐ N If yes, specify_____

GEN	56. What effect has the introduction of the pentavalent vaccine had on your EPI programme?	Please check one that best describes the introduction: ☐ Improved the EPI programme. Please explain_____ ☐ Made the EPI programme worse. Please explain_____ ☐ No effect. Please explain_____
GEN	57. In your opinion, was the introduction of the pentavalent vaccine a smooth process or problematic? Please explain.	Please check one that best describes the introduction: ☐ Very smooth. No problems ☐ Generally smooth, minor problems. Please explain_____ ☐ Somewhat smooth, some major problems. Please explain _____ ☐ Not smooth. Major problems. Please explain _____
GEN	58. Many other countries will be introducing this and other Pentavalent vaccines soon. What have you learned from this experience and what advice do you have for other health facilities to ensure a smooth introduction?	
	Observations at Vaccination Session	**Health-facility questionnaire**
GEN	59. Are (all) vaccines reconstituted correctly (e.g. measles, BCG)?	☐ Y ☐ N ☐ Unknown (N = unsafe practice)
GEN	60. Are vaccines stored/handled properly during the session, e.g. clean, organized, vaccine vials outside carrier are in foam pad?	☐ Y ☐ N ☐ Unknown (N = unsafe practice)
GEN	61. Are appropriate administration techniques observed (for Pentavalent intramuscular injection in the deltoid region of upper arm or the higher anterolateral area of the thigh)?	☐ Y ☐ N ☐ Not observed (N = unsafe practice)

GEN	62. Are AD syringes used?	☐ Y ☐ N (N = unsafe practice)
GEN	63. Are needles recapped (look in safety box for capped needles)?	☐ Y ☐ N ☐ Unknown (Y = unsafe practice)
GEN	64. Are AD syringes disposed of in a safety box?	☐ Y ☐ N ☐ Unknown (N = unsafe practice)
GEN	65. Is the policy on use of the open multi-dose vial observed?	Date opened marked on vial ☐ Y ☐ N Open vial discarded at end of immunization session ☐ Y ☐ N ☐ Other observation (specify) _____ ☐ Unknown (N = unsafe practice)
GEN	66. **Summary:** How many unsafe practices, based on questions above, were observed?	Number of unsafe practices _____
	Observation of Vaccine Storage Area	**Health-facility questionnaire**
GEN	67. Are all refrigerators clean and properly functioning?	☐ Y ☐ N
GEN	68. Is there a thermometer outside the refrigerator?	☐ Y ☐ N
GEN	69. Is there a thermometer inside the refrigerator?	☐ Y ☐ N
GEN	70. Is the temperature inside the refrigerator currently between +2° and +8° C?	☐ Y ☐ N What is the temperature? _____
GEN	71. Is there a log of refrigerator temperatures?	☐ Y ☐ N
GEN	72. How often are temperatures recorded?	☐ Twice daily ☐ Daily ☐ No records ☐ Other (specify)
GEN	73. Are temperatures monitored and recorded on weekends and holidays? **Note:** *Check specifically for holidays in _____(insert date of most recent holiday).*	☐ Y ☐ N ☐ Sometimes
GEN	74. Are vaccines arranged as "First expiry, First out"?	☐ Y ☐ N If no, why not? _____ ☐ Not applicable. Why? _____
GEN	75. Did you observe any expired vaccines?	☐ Y ☐ N If yes, which vaccine and how many? _____

GEN	For vaccines with a VVM 76. Did the VVMs that you observed indicate that vaccine is usable, i.e. Stage 1 or 2	☐ Yes, all vaccines usable ☐ No, some vaccines Stage 3 or 4 (unusable) Specify vaccine and proportion unusable _____
GEN	For vaccines with a VVM 77. Are vaccines with VVM in Stage 2 arranged so that they are used first?	☐ Y ☐ N ☐ Not applicable, no Stage 2
GEN	78. Are there spaces between the vaccine boxes/trays to allow air circulation?	☐ Y ☐ N
	Health Communication	**Health-facility questionnaire**
GEN	79. Are any posters or other literature about the Pentavalent vaccine noted in the health facility?	☐ Y ☐ N
	Stock Room	**Health-facility questionnaire**
GEN	80. Is injection equipment stored in good condition	Adequate space ☐ Y ☐ N Clean and dry conditions ☐ Y ☐ N Well organized (i.e. easily accessible) ☐ Y ☐ N ☐ Other observation (specify) _____
	Waste Disposal	**Health-facility questionnaire**
GEN	81. How are used AD syringes being disposed of? (If not observed, ask how boxes are disposed).	☐ Safety box ☐ Open bucket ☐ Other ☐ Other observations
GEN	82. How are used safety boxes disposed of? (If not observed, ask how boxes are disposed). **Note:** *Specify whether box is emptied and reused or destroyed with contents inside.*	☐ Incinerator ☐ Pit-burned ☐ Pit-exposed ☐ Pit-buried ☐ Above-ground area ☐ Box reused ☐ Other observation
GEN	83. Were discarded needles and syringes observed on the ground outside the facility?	☐ Y ☐ N
GEN	84. Is waste-disposal site closed off?	☐ Y ☐ N
GEN	85. Describe any other observation of the disposal site.	
	Notes and Comments	
	If you were unable to visit the cold store or dry store area, please mention reason. Record any interesting positive or negative anecdotes or comments by health-care workers.	

PIE Questionnaire 1.3— Interview with parents

Date of interview: _____ Name of interviewer: _____

District: _____Health-facility where the parent was interviewed:
_____

Interview a parent who have just received the pentavalent vaccine for his/her child (can also talk to a group of parents waiting to be vaccinated to get their impressions)**.** Begin the interview by saying the following *"I would like to ask you a few questions about the vaccines you received today. The answers you give will help us learn more about how to introduce a Pentavalent vaccine."* (N.B. You may need someone conversant in the local language to ask the questions).

1. Do you have your child's Immunization card with you today? If yes: May I please see it?	Use health card to answer the following Health card present ☐ Yes ☐ No Vaccines received today ☐ pentavalent Is the health card updated? ☐ Old health card (not updated to include Pentavalent vaccine) ☐ Old health card (with Pentavalent vaccine written in by hand) ☐ New health card (updated to include Pentavalent vaccine)
2. What vaccine(s) did your child receive today?	Check one box ☐ Names all vaccines (answer correct) ☐ Names some vaccines (partially correct) ☐ Does not know ☐ Mentions specific health benefit of vaccine (e.g. for pentavalent vaccine says) ☐ Mentions general beneficial effects of vaccines, e.g. "I got vaccines to be healthy" ☐ Other (specify) _____
3. Do you know about the pentavalent vaccine for infant?	☐Yes ☐ No If yes, which disease(s) do they prevent? ☐ Does not know ☐ Answer correct ☐ Answer incorrect
4. If yes to question 3. How did you receive the message about the pentavalent vaccine? **Note:** *Radio, newspaper, television, health-care worker, friend, public meeting.*	

5. Do you know when to bring your child for his/her next vaccination? **Note:** *If answer is no or yes but incorrect, please advise the parent when next vaccination is due.*	☐ Yes (answer correct) ☐ Yes (answer incorrect) ☐ No
6. Do you know what reaction your child may get following his/her vaccination today? **Note:** *This question is trying to differentiate between baseline knowledge and knowledge received at current vaccination session.*	☐ Yes (answer correct) ☐ Yes (answer incorrect) ☐ No Interviewer: *If answer is no or yes but incorrect, please advise mother of potential injection side adverse experiences, e.g. mild redness, pain, mild swelling at injection site, mild fever.*
7. Other comments or observations. Record any interesting positive or negative anecdotes or comments by parents.	

WHO assists Member States of the South-East Asia Region to periodically review their surveillance systems and national immunization programmes. These reviews provide an insight into the strengths and limitations of the programme. Additionally, WHO encourages countries to identify strategies to harness strengths and utilize the available resources to improve the quality of surveillance and immunization. In March 2012, national and international experts reviewed the Expanded Programme on Immunization (EPI) and Vaccine Preventable Diseases (VPD) surveillance and conducted a post-introduction evaluation of Hib (Pentatvalent) vaccine in Bangladesh.

This report summarizes the progress made in vaccine preventable disease surveillance, immunization service delivery and coverage, injection safety, vaccine supply, cold chain management, and advocacy and communications. It also provides recommendations for the consideration of the Government of Bangladesh and development partners in their efforts to achieve the national goals for immunization.

World Health Organization
Regional Office for South-East Asia
World Health House
Indraprastha Estate
Mahatma Gandhi Marg,
New Delhi-110002, India

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