

Expanded Programme on Immunization (EPI) and Vaccine Preventable Disease (VPD) Surveillance Review

Nepal, 15-27 April 2010



**World Health
Organization**

Regional Office for South-East Asia

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Acronyms

AEFI	Adverse Event Following Immunization
AES	Acute Encephalitis Syndrome
AFP	Acute Flaccid Paralysis
FCHV	Female Community Health Volunteer
BCG	Bacille Calmette-Guérin
CDR	Central Development Region
CHD	Child Health Division
CIF	Case Investigation Form
DHO	District Health Office
DoHS	Department of Health Services
DPHO	District Public Health Office
EDCD	Epidemiology and Disease Control Division
EDR	Eastern Development Region
EPI	Expanded Programme on Immunization
ERC	Expert Review Committee
EWARS	Early Warning and Reporting System
FWDR	Far-Western Development Region
Hib	Haemophilus Influenzae Type B
HMIS	Health Management Information System
HQ	Headquarters
IPD	Immunization Preventable Diseases Unit
ITAG	Immunization Technical Advisory Group
JE	Japanese Encephalitis

NCC	National Certification Committee
NCCPE	National Commission for Certification of Polio Eradication
NID	National Immunization Day
NPHL	National Public Health Laboratory
NNT	Neonatal Tetanus
MCHW	Maternal and Child Health Worker
MoH&P	Ministry of Health and Population
MWDR	Mid-Western Development Region
OPV3	Oral Polio Vaccine 3 rd dose
SEARO	South-East Asia Regional Office
SIA	Supplemental Immunization Activity
SMO	Surveillance Medical Officer
TT	Tetanus Toxoid
TO	Technical Officer
UNICEF	United Nations Children's Fund
VDC	Village Development Committee
VPD	Vaccine Preventable Disease
VHW	Village Health Worker
WHO	World Health Organization
WDR	Western Development Region

Executive summary and recommendations

A team comprising national and international experts reviewed the Expanded Programme on Immunization (EPI) and vaccine preventable disease (VPD) surveillance systems in Nepal from the 14-28 April 2010. The general objectives of the review were to determine the status of the programme, quantify achievements in vaccine preventable disease control and explore ways to improve implementation. With the recent importation of wild poliovirus from India, the review teams focused on acute flaccid paralysis (AFP) surveillance indicators and oral polio vaccine coverage. The methodology for the review was adapted from *The Common Assessment Tool for Immunization Services*¹.

The team found that the health system has a good infrastructure with maternal and child health workers, village health workers (VHWs) and female community health volunteers (FCHVs) as the main asset for service delivery. The Ministry of Health & Population (MoH&P) developed and disseminated national standards for immunization delivery and VPD surveillance, which are available at all levels of the health system.

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 and surveillance programme were supervision and training, often related to high staff turnover and vacant positions. These gaps have led to difficulties in the implementation of immunization delivery, monitoring and surveillance activities. The following are the key findings and recommendations:

¹ WHO: Immunization, Vaccine and Biologicals (2002). *The Common Assessment Tool for Immunization Services*, Geneva: WHO.

Findings

VPD surveillance findings:

- surveillance system for vaccine preventable diseases is in place at all levels and functioning
- norms and standards are defined and available at all levels
- in addition to AFP surveillance, case-based surveillance for measles (fever/rash-illness), neonatal tetanus, Japanese encephalitis (JE) and acute encephalitic syndrome (AES) is being systematically scaled-up
- outbreak response is adequate with systems in place and rapid response teams formed at the national, regional and district level
- AFP surveillance reporting is too limited with an under-reporting of AFP cases
- AFP surveillance reporting sites are not sufficiently prioritized according to population density, geography and patient flow
- inadequate and irregular supervision of VPD surveillance from government health staff
- limited capacity for analysis and interpretation of data especially at the district level for action
- insufficient government involvement in AFP surveillance (all AFP cases are verified by SMO and AES surveillance and suspected measles outbreak investigation are mainly done by the government).

Immunization delivery findings:

- systems are in place and able to provide coverage >80% for most antigens
- main assets of service delivery infrastructure are the maternal and child health workers, village health workers and female community health volunteers
- an Adverse Event Following Immunization (AEFI) system is in place that reports primarily serious cases
- municipality immunization services are weak
- insufficient coordination between districts and municipalities for targeting high-risk groups

- inadequate and irregular supervision from government health staff at all levels
- high staff turnover at the district level, frequent vacant positions (vaccinators)
- variable involvement of the private sector in vaccine delivery and reporting
- lack of standardization of waste management, safety boxes not always used properly
- cold chain system intact; however, there were concerns with back-up power in some areas
- expired vaccine found in some districts
- high-risk migrant groups in urban slums and brick factories are not adequately targeted for both immunization and surveillance activities.

Recommendations

VPD surveillance recommendations:

- ensure syndromic approach to AFP surveillance reporting
- review and prioritize reporting sites
 - list reporting sites and review at regular intervals
 - include private sector practitioners and traditional healers
 - ensure reporting network captures health seeking behaviour of high-risk groups (migrants)
- provide refresher training on AFP surveillance, supplemental immunization activity (SIA) micro-planning, monitoring and evaluation
- improve active case finding through regular visits (active case search) to reporting units
- improve documentation by maintaining all original case investigation forms (CIFs) even of non-AFP cases
- analyze VPD surveillance indicators at the district level on a monthly basis with surveillance medical officers.

Immunization delivery recommendations:

- engage the private sector in delivery of immunization and reporting
- provide refresher training on sharps/waste management and universal precautions
- review cold chain infrastructure and capacity throughout the health care system and develop a cold chain replacement plan
- provide refresher training on EPI, routine immunization micro-planning, infant tracking, monitoring and evaluation.

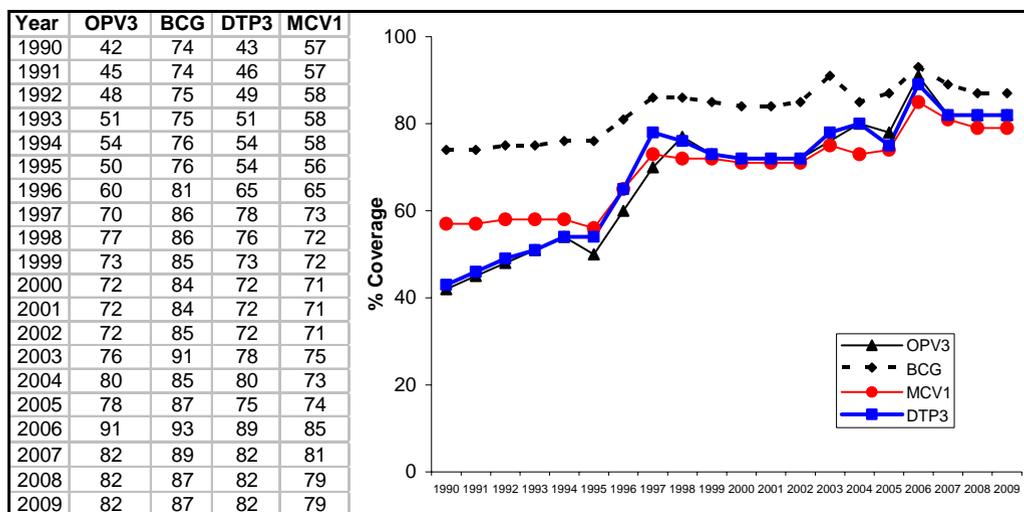
1. Background

Nepal is a land-locked country with an area of approximately 147,181 square kilometres. From east to west, the approximate length of the country is 885 kilometres and varies between 145 to 241 kilometres from north to south. The country borders the two most populous countries of the world, India in the east, south, and west; and, China to the north.

The country is divided into three geographic regions: the mountain zone (16 districts) makes up the northern part of the country; the hill zone (39 districts) parallels the mountain zone through the central part of the country from east to west; and the Terai zone (20 districts) which is in the lower elevation of the country and borders India. These three zones cover 35%, 42% and 23% of the total land area but 7%, 44% and 49% of the population, respectively. The Terai, or the plains part of the country, borders the Indian states of Uttar Pradesh, Bihar, Uttarakhand and West Bengal. Administratively, the country is divided into five development regions and 75 administrative districts. Districts are further divided into smaller units called Village Development Committees (VDC) and municipalities. In 2009, the total population of Nepal was estimated at 27 million with the under 15 year-old age group accounting for approximately 40% (11 million).

The Expanded Programme on Immunization (EPI) in Nepal began in 1979 in three districts covering the six “traditional” EPI targeted diseases. Figure 1 shows the routine immunization coverage estimates from 1990 to 2009. In 1996, Nepal conducted its first National Immunization Days (NID) as a commitment for polio eradication. Since July 1998, AFP surveillance has been a collaborative activity between the Ministry of Health & Population and WHO. Nepal made remarkable progress in both surveillance and supplementary immunization activities, which have been the hallmarks of the polio eradication strategy.

Figure 1: *Estimated routine immunization coverage, Nepal 1990-2009*



Source: WHO/UNICEF Joint Reporting Form

Two previous joint national/international AFP surveillance reviews were conducted in Nepal. The first review was conducted in April 2001, which reviewed AFP surveillance performance in all five regions. The second review was held in March/April 2006. In 2003 and 2007, informal reviews of the AFP surveillance system were conducted to specifically look at the Surveillance Medical Officer (SMO) network.

2. Purpose and methodology of the review

2.1 Context

Justification

Nepal has many remote and hard-to-access areas, so analysis of sub-national data is critical to identify poor performing and high-risk areas. Nepal shares a border with the two polio endemic states of India and with the ease of international travel and an open border, there is a constant risk of importation of wild poliovirus.

The surveillance system is functioning at a level to quickly detect and respond to importations, which is critical in order to initiate an appropriate response and prevent low-grade circulation. There are also important

lessons to be shared from Nepal's successful experiences in preventing the re-establishment of polio after importation. The last imported polio case from India was in February 2010. Polio importations reinforce the need for regular surveillance reviews. The basis of regional certification of polio-free status is high quality AFP surveillance. WHO-SEARO has been assisting Member States in strengthening AFP surveillance. As an integral component of this process, countries are encouraged to conduct internal surveillance reviews, which should be complemented by periodic joint national/international surveillance reviews.

Since the last surveillance review in March/April 2006, which focused on AFP surveillance, Nepal completed a measles immunization follow-up campaign in 2008 and initiated measles case-based surveillance. Maternal and neonatal tetanus elimination was validated in 2005 and has been maintained since then. However, an integrated, comprehensive review of the entire EPI and VDP surveillance programme has not been conducted in Nepal.

2.2 Objectives

Specific objectives of the review

- assess strengths and weaknesses of immunization service delivery at all levels of the health care delivery system
- analyze managerial and administrative capacity for immunization at the national and sub-national levels
- assess strengths and weaknesses of current vaccine distribution mechanisms and cold chain management
- assess injection safety and waste management for sharps
- review priority setting for immunization programme sustainability
- review the capacity of the national surveillance system including laboratory support as applicable to detect and respond to vaccine preventable diseases (VPDs) in a timely manner
- document the capacity for surveillance and management of adverse events following immunization (AEFI)

- assess training needs for immunization managers, surveillance staff and basic health workers (vaccinators) at all levels
- review the role of the private sector and civil society organizations, as providers of routine immunization services
- assess communication strategies, including advocacy, partnership, social mobilization and their implementation
- follow-up on the recommendations made in the national/international AFP surveillance review in 2006, ITAG meeting and EPI managers' meeting
- review the activities of the national committees involved in polio eradication: National Certification Committee (NCC), Expert Review Committee (ERC), and Laboratory Containment.

The review team aimed to answer the following questions:

- Is there capacity for timely and adequate response to VPD outbreaks?
- Does the system for the delivery of immunization work?
- Does the system for the surveillance of VPD work?
- Is AFP and measles surveillance integrated with other VPD surveillance?
- Can the laboratory network support VPD surveillance?

2.3 Methodology of the review

The review was conducted at national and district levels. Twelve teams were formed (one central team and 11 field teams) to review available information and data on the EPI programme at the national, district, sub-district, health centre, and other reporting unit levels for 24 districts (one-third of the country). Team members also interviewed key government officials and individuals involved in EPI programme, VPD surveillance, and polio eradication to include: surveillance medical officers (SMO), health-centre staff, beneficiaries, parents, community leaders, measles laboratory staff, ERC and NCC members, polio partners and WHO-Nepal staff.

The review was divided into five components:

- orientation (one day) was held in Kathmandu where the teams were briefed on the Nepal health system, EPI and VPD programmes and the assessment tools
- field level activity (five days) where each team evaluated two to five districts
- national level activity where the national level, the eradication committees, and the network laboratories were reviewed
- debriefing session (two days) was held in Kathmandu where the teams reviewed and consolidated their findings
- final debriefing was held in Kathmandu with government officials, WHO, UNICEF and other health partners.

At each level the review activities included: interview of surveillance staff, review of hospital records and observation of immunization sessions. Using structured data collection tools developed for each level, the following technical areas were assessed:

- immunization service delivery
- injection safety and waste management
- vaccine management (supply and cold chain)
- vaccine-preventable disease surveillance (focusing on AFP and measles) including AEFI surveillance
- human resource/training capacity
- advocacy and communication.

One team focused specifically on the laboratory component of the VPD surveillance and looked at laboratory capacity and proficiency, global accreditation, logistics and linkages between the laboratory and surveillance programmes.

In addition to the information collected during the review, the following information was also considered: immunization and VPD guidelines, recommendations from the 2006 surveillance review, line listing, aggregated surveillance data, and demographic data. The review team tried to ensure that the areas covered were representative of the different regions in Nepal.

Limitations of the review

The review team acknowledges some limitations in the review process:

- time and logistics limited the number of regions and districts reviewed
- a significant language barrier existed, but the national team members contributed significantly in overcoming this obstacle.

3. Findings and recommendations

3.1 VPD Surveillance

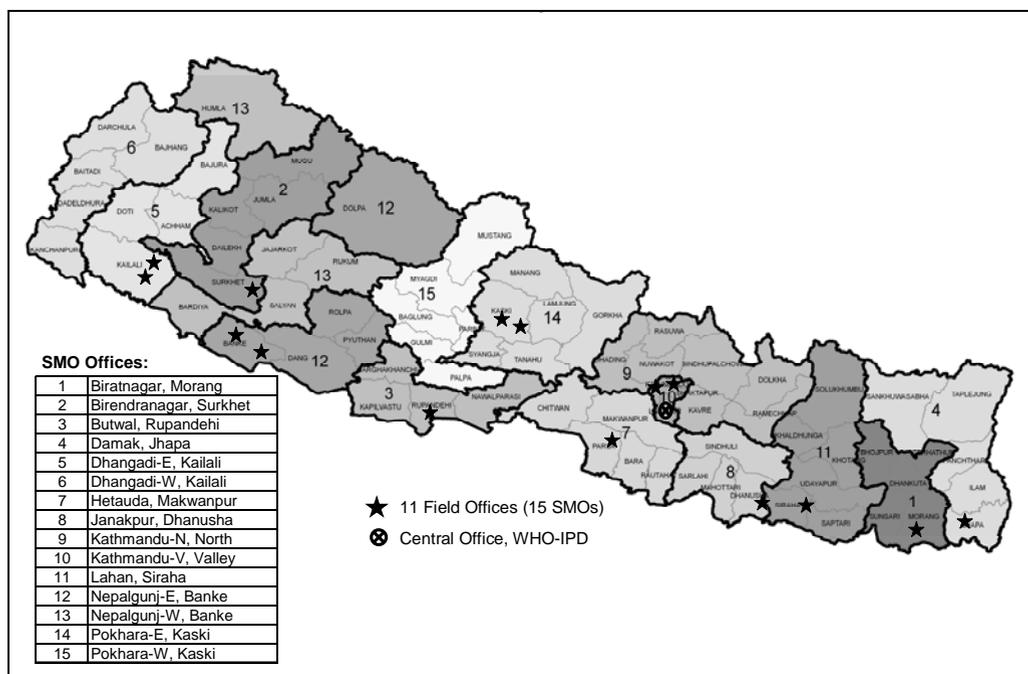
Surveillance for vaccine preventable diseases is conducted by three reporting systems: Immunization Preventable Diseases Unit (WHO-IPD), Health Management Information System (HMIS) and Early Warning and Reporting System (EWARS). The information is transmitted from the district to the regional and then to the national level. WHO-IPD Surveillance Medical Officers (SMOs) in conjunction with District Health Officers conduct AFP and polio cases investigations. The Child Health Division (CHD) EPI chief has overall responsibility for coordinating the investigation of all AFP cases and suspected or confirmed cases of polio. IPD carries out activities in close collaboration with CHD, the Epidemiology and Disease Control Division (EDCD), the National Public Health Laboratory (NPHL) and Logistics Management Division (LMD) at the central level and with the Regional Health Directorate at the regional level under the Ministry of Health and Population (MoHP).

The Health Management Information System (HMIS) collects surveillance data from all 75 districts on a monthly basis. The system provides data for assessing disease distribution, morbidity, and mortality. Health staff in institutions record reportable communicable disease cases in their area and send the information to the District Health Offices on a monthly basis. The data are compiled manually and sent to the Department of Health Services (DoHS), HMIS Division. This system suffers from weak supervision, monitoring, and training. Case definitions are not strictly followed; so, the quality of the data is questionable. The system is not timely or sensitive enough to detect sporadic cases or outbreaks for programmes with elimination or eradication goals.

The Early Warning and Reporting System (EWARS) is under the EDCD and collaborates with the Vector Borne Research and Training Centre (VBDRTC). It was started as a hospital-based, sentinel system in 1997. Now, it is based in 44 hospitals, primarily in the Terai zone of Nepal, and monitors priority diseases: three vector-borne diseases (kala-azar, malaria, dengue) and three epidemic-prone diseases/syndromes (severe acute respiratory illness, acute gastroenteritis, and cholera) and three vaccine preventable diseases (AFP, measles, and neonatal tetanus). The sentinel hospitals send weekly reports (and immediate reports in case of an outbreak) to the VBDRTC where reports are consolidated, forwarded to EDCD and published in the weekly EWARS bulletin. Like HMIS, there is limited supervision and monitoring with questionable timeliness and completeness of reporting.

The IPD surveillance network consists of Surveillance Medical Officers (SMOs) that cover the entire country. See Figure 2 for map of WHO-supported SMO network in Nepal. With the exception of the Far-Western Development Region (FWDR) that has two SMOs, there are three SMOs assigned to each of the five regions and one SMO that covers the three districts of Kathmandu valley. Each SMO covers three (Kathmandu valley) to seven (FWDR) districts and conducts case investigations, monitors and supervises AFP, NNT, measles, and AES/JE surveillance in addition to supporting routine and supplementary immunization activities as required. There is one District Health Office (DHO) or District Public Health Office (DPHO) in each of Nepal's 75 districts. Each district is composed of village development committees (VDCs) and municipalities. Health care facilities include hospitals, primary health centres, health posts, sub-health posts and vaccination outreach sites. At the community level, the Village Health Workers (VHWs), Maternal and Child Health Workers (MCHWs) and Female Community Health Volunteers (FCHVs) are key components of the health service delivery infrastructure in Nepal. These individuals are often the first contact a child has with the health care system.

Figure 2: WHO-supported SMO network with IPD Field Officers in Nepal, 2010



VPD surveillance

AFP surveillance

AFP surveillance is given considerable priority at the regional, district, health centre and health post levels. The WHO-supported AFP surveillance network established in June 1998 has been the hallmark of vaccine preventable disease surveillance in the country. Systems are in place for reporting laboratory results and linking information with surveillance data. The management of the programme is well understood at all levels. However, the review team found a few areas worth additional consideration: AFP surveillance indicators and AFP surveillance guidelines.

AFP surveillance indicators

Table 1 shows the AFP surveillance indicators from 1997 to 2009. Nationally, Nepal has met the minimum AFP surveillance indicators for non-polio AFP and adequate stool rates since 2001. Effective from 2005,

the expected non-polio AFP rate was increased to 2/100,000 persons <15 years of age. Figures 3 and 4 give a graphic representation of the AFP surveillance indicators for 2009 and 2010 by district. Despite Nepal meeting the targets nationally, at the sub-national level there are districts that are silent or are not meeting the minimum standard for the non-polio AFP rate indicator or the adequate stool collection rate indicator.

Table 1: AFP surveillance indicators, Nepal 2001-2009

Indicator	2001	2002	2003	2004	2005	2006	2007	2008	2009 ¹
AFP Cases	186	197	192	214	230	364	343	425	452
Wild Polio	0	0	0	0	4	5	5	6	0
Compatibles	0	1	1	0	2	1	0	0	0
AFP Rate	1.95	2.01	1.91	2.16	2.31	3.57	3.29	3.99	4.15
Non-Polio AFP Rate ²	1.95	2	1.9	2.16	2.25	3.5	3.24	3.93	4.14
Adequate Stool Collection Rate ³	83%	87%	86%	84%	84%	86%	83%	87%	87%
Total Stool Samples Tested	367	387	374	414	443	720	658	782	833
% NPEV	27.0	33.0	20.0	29.0	20.0	23.0	20.1	18.3	17.6
% Reported Within 28 Days	99.0	98.0	100.0	99.0	100.0	98.0	100.0	100.0	100.0

¹ For 2009 data, See the IVD VPD Weekly Bulletin. Data as of 21 Jun 2010

² Number of discarded AFP cases per 100,000 children under 15 years of age.

³ Percent with 2 specimens 24 hours apart and within 14 days of paralysis onset.

Figure 3: AFP surveillance indicators, Nepal 2009

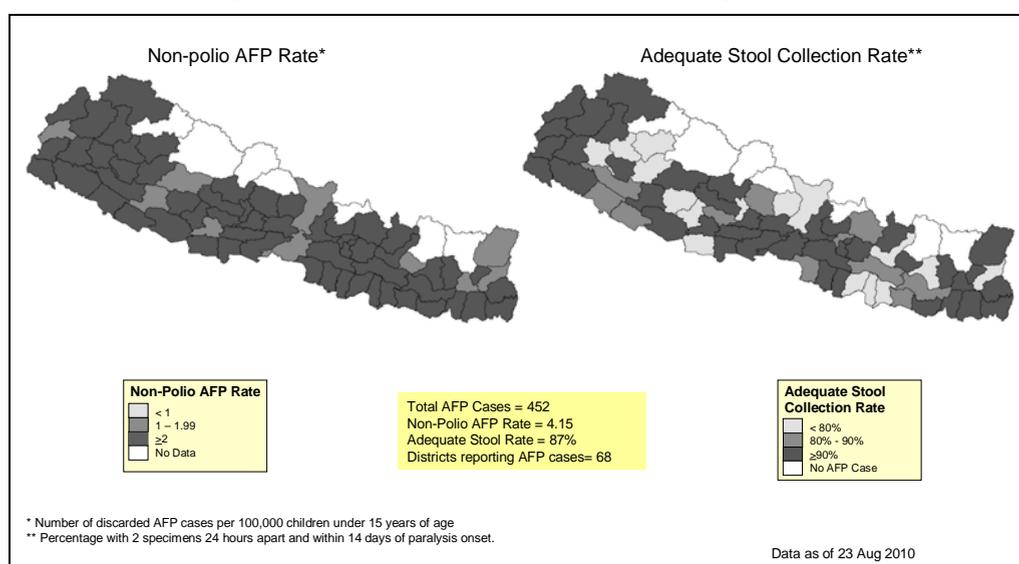
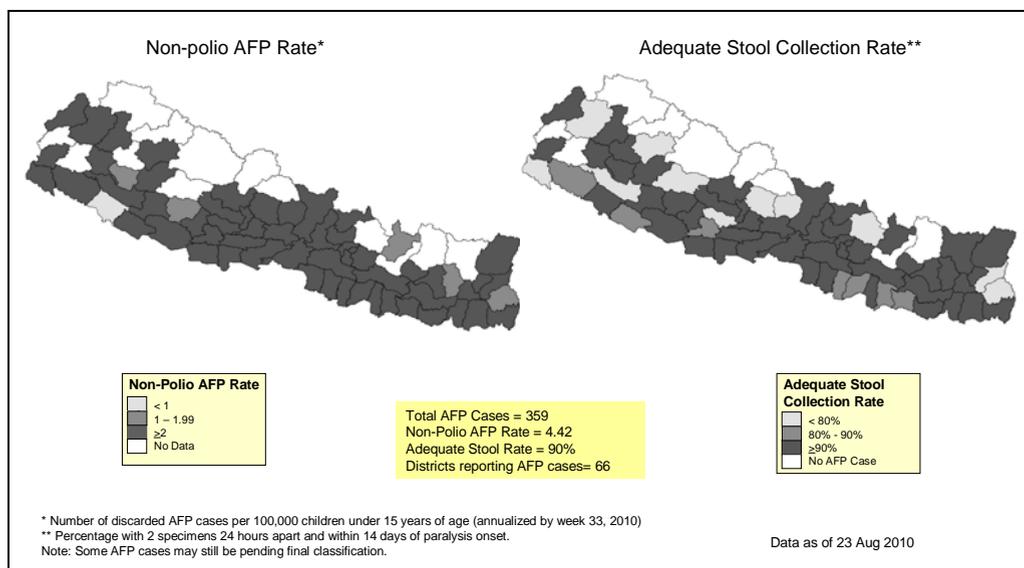


Figure 4: **AFP surveillance indicators, Nepal 2010**



Surveillance sites

SMOs make regular visits to designated surveillance sites, but can also visit more frequently based on caseload. Often the SMO will receive a telephone call to visit an AFP case (or fever/rash case). Clinicians and health staff were found to be familiar with the reporting requirements. The SMOs were found to have an outstanding relationship with hospital and health centre staff. Stool samples are collected in health facilities and using reverse cold chain they are sent to the National Institute of Health Laboratory in Bangkok, Thailand. The yellow boxes used for the transportation of stool samples were labelled and appeared adequate. All health facilities had polio eradication posters displayed with the name and telephone number of the SMO. The health staff interviewed at all levels knew the SMO covering their area. There were too few reporting sites outside of the government system, e.g. private practitioners and/or traditional healers.

AFP surveillance guidelines

Case investigation activities are clearly outlined in the *Standard Procedures for Surveillance Medical Officers* handbook (2010). As part of the central level visit, the AFP surveillance guidelines were reviewed. The guideline has an extensive section on AFP differential diagnosis. The team thought that

this approach might be limiting the reporting of AFP cases; and, therefore a more syndromic approach could increase the sensitivity of the surveillance system and greatly increase the expected AFP rate. While Nepal is achieving an adequate non-polio AFP rate nationally, the system may not be sensitive enough in all areas.

Managerial aspects of AFP surveillance

Staffing and training

The level of knowledge of staff at all levels was good. However, high staff turnover showed the need for regular refresher and induction trainings to guarantee a high quality, functioning system.

Monitoring and supervision

The team observed that the main challenges facing the immunization and surveillance programme were supervision and training, often related to high staff turnover and vacant positions. Despite these difficulties supervision for the AFP surveillance system was the most consistent and was supported by regular visits by the surveillance medical officers.

Data for action

There is limited capacity to analyze and interpret data at the district and sub-district levels by District Health Officers.

Measles surveillance

Nepal has made significant progress with measles control, through measles campaigns and routine immunization coverage. Case-based measles surveillance has been integrated into the AFP surveillance activities; and SMOs include surveillance for measles-like illness in their active surveillance visits and measles is also reported through the zero reporting system. Usually, rash and fever cases are reported and investigated by district or hospital staff, and the SMO assists with outbreak investigation. However, at one referral hospital the SMO was regularly called to conduct a case investigation of each measles-like case, 90% of which were found on laboratory testing to be due to rubella, not measles.

Acute encephalitis syndrome (AES) surveillance

Japanese encephalitis is seasonal in Nepal and active surveillance for acute encephalitis syndrome (AES) is defined by fever and an altered state of consciousness, which includes meningitis, cerebral malaria and all forms of encephalitis. AES surveillance was integrated with AFP surveillance in 2004 and has been extended to 126 reporting sites. Government staff complete case investigation forms and SMOs help to collate line lists and facilitate the transportation of specimens (blood/CSF) using the AFP reverse cold chain.

Neonatal tetanus surveillance

Active surveillance for neonatal tetanus is also carried out by SMOs. The country has a successful MNT elimination programme, which was validated in 2005. School-based immunization with TT vaccine has been implemented in 12 districts as one strategy to maintain TT coverage. Since 2009, all suspected cases are reported through the HMIS and clinically confirmed or discarded by the SMOs.

Suggestions for improving AFP surveillance and other VPD surveillance

- ensure syndromic approach to AFP surveillance reporting:
 - consider revising the AFP surveillance section of the VPD surveillance manual to further emphasize syndromic AFP case identification
- review and prioritize reporting sites for VPD surveillance :
 - list reporting sites and review at regular intervals
 - include more private sector practitioners, traditional healers and informers
 - continue to ensure the reporting network collects health seeking behaviour of all AFP cases especially in high-risk groups (migrants) through the CIF as revised in 2010
- provide refresher training on VPD surveillance, AFP surveillance, SIA micro-planning, monitoring and evaluation
- improve active case finding for all VPDs and especially AFP through regular visits (active case search) to priority sites

- improve documentation by maintaining all original CIFs even of non-AFP cases
- analyze indicators at the district level on at least a monthly basis with surveillance medical officers

3.2 Immunization system

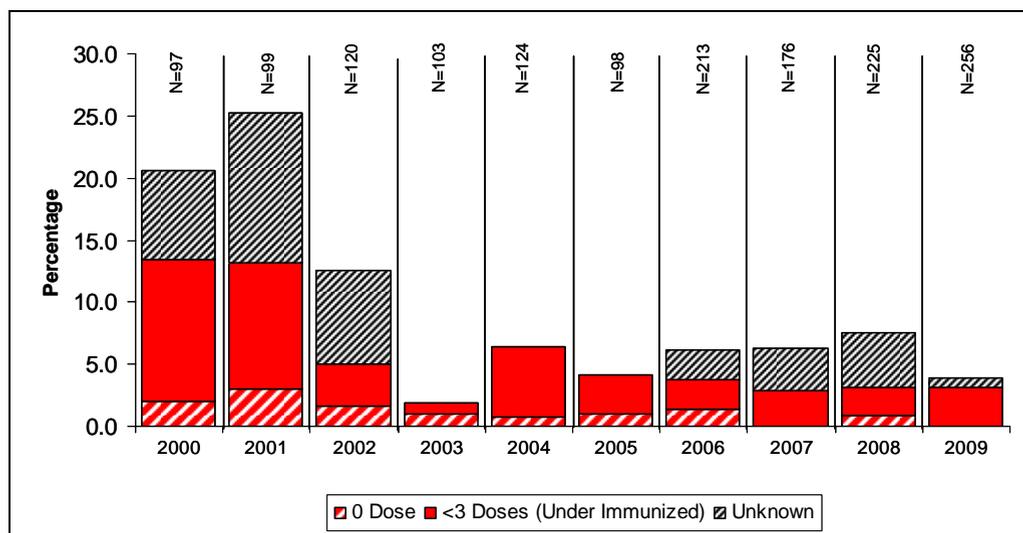
Nepal started the Expanded Programme on Immunization (EPI) in 1979 in three districts and extended it throughout the country by 1988. It is a priority programme of the Government of Nepal. The national immunization programme provides a birth dose of BCG; DPT-hepatitis B-Hib combination vaccine with oral polio vaccine at 6, 10 and 14 weeks; and, measles vaccine at nine months. Japanese encephalitis vaccine is being phased-in high-risk districts of the country for children 12-23 months of age. Pentavalent vaccine containing DPT, hepatitis B and Haemophilus influenzae type B antigens was introduced in 2009. Additional vaccinations include TT for pregnant women. Table 3 shows the routine immunization coverage for the last five years, which has been relatively consistent. Besides the officially reported coverage and WHO/UNICEF estimates, looking at the OPV3 immunization status of the non-polio AFP cases is another method for assessing the performance of the routine immunization delivery system. Figure 5 graphically displays the immunization status of the non-polio AFP cases for the last ten years and shows that only a small percentage of children in this sample are underimmunized.

Table 3: Routine immunization coverage, Nepal, 2005-2009

Antigen	2005		2006		2007		2008		2009	
	Country Official	WHO UNICEF (estimate)								
BCG	87	87	93	93	89	89	87	87	94	87
MCV1	74	74	85	85	81	81	79	79	90	79
DTP3	75	75	89	89	82	82	82	82	89	82
OPV3	78	78	91	91	82	82	82	82	93	82

Source: WHO/UNICEF Estimates and Country Official Estimates (WHO/UNICEF JRF)

Figure 5: **Percent under-immunized non-polio AFP cases six months to 5 years, Nepal, 2000-2009**



*Source: SEARO Weekly AFP data as of 21 June 2010

Immunization service delivery

The health system in Nepal consists of district hospitals, zonal hospitals, referral hospitals, nursing homes, private hospitals, primary health care centres, health posts and sub-health posts.

The review team observed that overall it appears that the immunization system is able to provide coverage greater than 80% for all antigens. The health staff were committed to the immunization programmes with the community level health worker providing regular and sustainable outreach to communities.

The involvement of the private sector varies from district to district. In some places they were fully involved by receiving vaccines and reporting coverage data to the national level; and in other places, they were completely separate from the government system. The review team observed that the immunization service delivery in municipalities was weak. As a result, there was insufficient coordination between districts and municipalities resulting in inadequate targeting of high-risk groups. The review team observed that children in high-risk populations posed a major risk to transporting and/or sustaining vaccine preventable disease outbreaks.

These high-risk groups consist of people living and working in urban slums, brick factories and areas bordering the Indian states of Bihar and Uttar Pradesh. The children from these high-risk groups were not adequately targeted for both immunization and surveillance activities.

Suggestions for improving immunization delivery

- engage the private sector in delivery of immunization and reporting
- provide refresher training on sharps/waste management and universal precautions
- review cold chain infrastructure and capacity throughout the health care system and develop a cold chain replacement plan (in process)
- provide refresher training on EPI, routine immunization micro-planning, infant tracking, monitoring and evaluation
- ensure that high-risk populations (e.g., urban slums, migrant groups and border areas with India) are targeted for enumeration and immunization activities.

Adverse event following immunization (AEFI)

The AEFI system is in place: definition, reporting mechanisms and validation is standardized and documented. The review team observed that a system for reporting serious cases is in place with an AEFI committee at the central level meeting to review serious cases for causality assessment. Minor cases do not always get reported in a systematic way through the system.

Suggestion for improving adverse events following immunizations (AEFI)

- conduct refresher training in AEFI management and reporting for staff at the regional, district and health centre level.

Vaccine supply and cold chain management

The review team observed stock-outs of different vaccines at the district and regional levels, in some areas. It was unclear whether the issue was a lack of supply from the manufacturer or an under estimate of vaccine needs at the regional or district level. The methods to calculate wastage rate and vaccine consumption was not always well understood at field level. In terms of the cold chain, some norms and standards exist at central level for human resources and cold chain material (number and specification); however these minimum standards have yet to be met in the field. The review team observed variability in the quality of cold chain and appropriate equipment for storing vaccines (commercial refrigerators) in addition to concerns with back-up power in some districts.

Suggestions for improving vaccine supply and cold chain management

- conduct refresher training in cold chain procedures, and vaccine inventory management
- advocate at regional and district level to ensure that minimum standards for cold chain logistics and management are implemented
- review and conduct refresher training on the methods for calculating the vaccine requirements at the district level.

3.3 Expert Review Committee (ERC) and National Certification Committee (NCC)

As part of the review of the central level, the review team met with the Expert Review Committee (ERC) and the National Certification Committee (NCC). The ERC meets on a regular basis to classify AFP cases. The technical composition of the committee was appropriate and included paediatricians and neurologists. The NCC is providing SEARO with annual updates on certification and is actively participating in regional meetings as required.

Suggestion for improving the ERC and NCC

- review membership of these two bodies regularly (annually) to ensure continued transparency and independence.

3.4 Coordination and support

WHO-Nepal

The recommendations for the WHO-Nepal country office focus on increasing supervision and training. The review team felt that the country team has a lot to contribute to these two areas and specific recommendations are intended to maximize supervision and training opportunities. The SMO network in Nepal is a key component for high quality AFP surveillance. WHO and the Nepal MoH&P have made a substantial investment in maintaining and expanding the network. While the SMO network was initially designated to support only AFP surveillance, their terms of reference have gradually expanded to include a more active role in supporting polio, measles and JE supplemental immunization activities (SIAs) and surveillance for other VPDs. The review team observed that the workload of the SMOs was focused on measles and JE surveillance activities. With many competing activities, there was concern that in this critical time of polio eradication that AFP surveillance was not prioritized sufficiently.

Suggestions for improving coordination and support from WHO-Nepal

- review workload of the SMOs with regards to covering AFP, measles, JE and other VPD surveillance
- re-prioritize the SMO network to focus on AFP surveillance and polio SIAs particularly in the Kathmandu valley and Terai districts until India is polio free
- SEARO should facilitate regular cross-border meetings between the government of Nepal and the government of India to review progress and coordinate AFP surveillance and polio supplemental immunization activities.

Annex 1

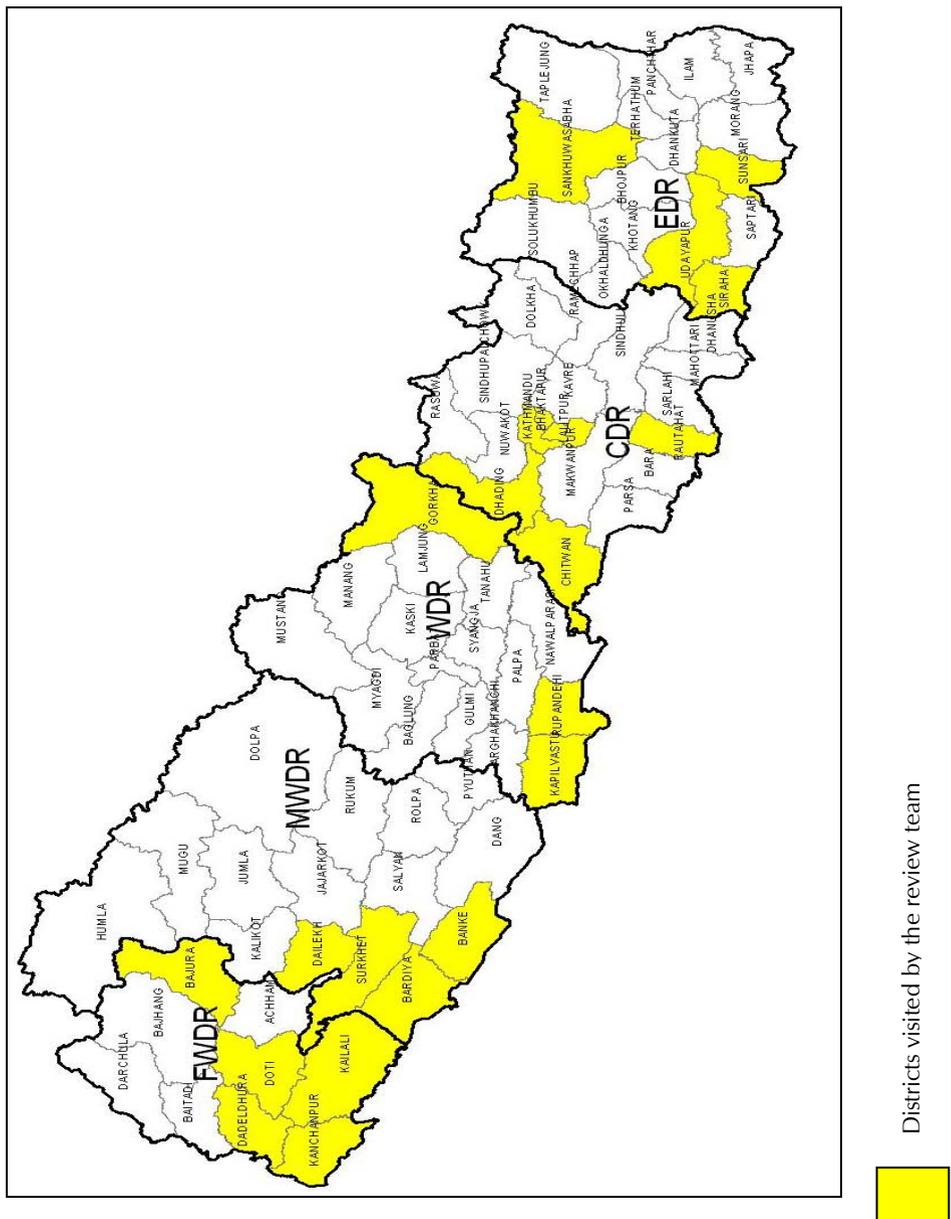
Deployment of review teams and areas visited

Table 5: Joint review team

International Team Member	Designation	National Team Member	Region
Dr Thukten Chopel	General Deputy Medical Officer, MoH Bhutan	Dr. Sudhir Khanal, Program specialist, UNICEF	Sankhuwasabha & Sunsari
Dr. Shalva Bratchuli	STOP Officer, CDC-Atlanta	Dr Jagat Narayan Giri, Coordinator, IPD	Siraha & Udayapur
Dr Mandeep Rathee	Sub-Regional Team Leader Patna, NPSP/WHO-India	Dr Ganga Ram Choudary, Surveillance Coordinator, IPD	Dhanusha & Mahottari
Dr Hemant Shukla	Regional Team Leader Bihar, NPSP/WHO-India	Dr DB Shah, NCC member	Chitwan & Rautahat
Dr Patrick O'Connor	RA-Polio & VPD Surveillance, IVD/WHO-SEARO	Dr W William Schluter, MO-EPI, Dr R P Bichha, Director, CHD	Kathmandu, Lalitpur & Bhaktapur
Dr Rudi Tangerman	MO, SAM, WHO-HQ		
Dr Hardeep Singh Sandhu	Medical Epidemiologist, CDC-Atlanta	Mr K B Chand, Immunization Incharge, CHD	Gorkha & Dhading
Dr Sunil Bahl	MO-Polio, IVD/WHO-SEARO	Dr Murari Man Shrestha, JE/MR coordinator, IPD	Rupendehi & Kapilvastu

International Team Member	Designation	National Team Member	Region
Dr Bhupendra Tripathi	Sub-Regional Team Leader Lucknow, NPSP/WHO-India	SMOs	Banke & Bardiya
Dr Ahmed Darwish	Polio Chief, WHO-Pakistan	Mrs Karma Tshering, TO, IPD	Surkhet & Dailekh
Dr Madhava Ram Balakrishnan	MO-Surveillance, IVD/WHO-SEARO	Dr Hemang Dixit, NCC chairperson	Kailali & Kanchanpur
Dr Ziaur Mohamad Rahman	Coordinator-Chittagong Division, IVD/WHO-Bangladesh	Dr.Mahendra Singh Thapa, Immunization Officer, IPD	Doti & Dadeldhura
Mr Eric Wiesen	Medical Epidemiologist, IVD/CDC-Atlanta	Dr Rajendra Bohara, NC, IPD	Bajura
Dr Nalini Ramamurty	Virologist, IVD/WHO-SEARO	Dr Geeta Shakya, Director, NPHL	Lab review in Kathmandu Visit To BPKIHS, Dharan
Dr Arun Thapa	Coordinator, IVD/WHO-SEARO	N/A	Kathmandu for supervisory visit
Mr Chris Maher	Coordinator, SAM, WHO-HQ	N/A	Kathmandu for supervisory visit

Figure 6: Districts visited by the joint national and international review team, Nepal, April 2010



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 programme strengths and limitations. Additionally, WHO encourages countries to identify strategies to harness strengths and utilize the available resources to improve the quality of surveillance and immunization. In April 2010, national and international experts reviewed the Expanded Programme on Immunization (EPI) of Nepal and also the surveillance system that was in place for detecting vaccine preventable diseases.

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 Nepal 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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