POLIO GLOBAL ERADICATION INITIATIVE

Annual Report 2010

World Health Organization

ROTARY INTERNATIONAL

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Photo front cover : Free from polio, a healthy Nepalese boy plays with a bicycle. Nepal's close ties with India have led to several importations over the last five years. However the country reacted quickly to the most recent importation, and has not seen any wild polio virus since August 2010. Chris Wolff, WHO.

Photo back cover : In response to an importation of wild poliovirus which led to hundreds of cases of paralysis, a child in Tajikistan is vaccinated against polio. Sodiqov, UNICEF.

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EVERY LAST CHILD

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A child in West Bengal, India, wears a mask given to him after he was vaccinated against polio. The masks are donated by Rotary International. Rod Curtis, UNICEF India.

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1 | Executive summary

Global polio eradication efforts in 2010 were rewarded with four substantive results: a 95% reduction in the number of children paralysed by polio in Nigeria, a 94% reduction in polio-paralysed children in India, a 92% decline in polio cases due to type 3 wild polio-virus (WPV3) globally, and the interruption of imported wild polioviruses in all countries re-infected in 2009. Taken together, these results suggest that full application of the tools and tactics in the Global Polio Eradication Initiative (GPEI) *Strategic Plan 2010-2012* can lead to a world where 'every last child' is protected from polio.

This report summarizes polio eradication activities in 2010, the first year of implementation of the *Strategic Plan 2010-2012*, and measures progress against milestones established in that document. Mandated by the World Health Assembly (WHA), the GPEI developed the plan to stop polio in all of the areas where the virus still circulated by the end of 2012.

At the beginning of 2010, key parts of the four endemic countries were still detecting both of the surviving types of wild poliovirus, polioviruses were re-established in four previously polio-free countries in central and southern Africa, and outbreaks were stalking west Africa and the Horn of Africa.

In 2010, progress hinged on committed governments. India and Nigeria, for example, mobilized all levels of government and traditional and religious leaders to oversee and support eradication activities, while devoting significant domestic resources to the effort. The very low levels of poliovirus transmission in these countries, and of WPV3 globally, was also a testament to the impact of the new bivalent oral polio vaccine (bOPV) and to new approaches in vaccine delivery. The steep decline in the number of WPV3 cases worldwide in 2010 was perhaps the most significant impact of bOPV. There were 87 polio cases due to type 3 virus in 2010, compared with 1122 cases in 2009 – the lowest recorded number of WPV3 cases in the history of the GPEI. Although bOPV was expected to reduce WPV3 cases while maintaining pressure on WPV1 transmission, its impact exceeded expectations. The introduction of bOPV and new delivery tactics played a leading role in halving the total number of districts infected with any wild poliovirus worldwide: from 481 districts in 2009, to 241 during the same period in 2010.

In the *Strategic Plan*, milestones were set out to measure progress against: 1) stopping outbreaks in newly-infected countries; 2) interrupting re-established poliovirus transmission; and, 3) reducing cases in endemic countries. To assess progress towards these milestones and guide corrective actions, the WHA mandated the establishment of an Independent Monitoring Board (IMB), which first met in December 2010.

Concrete progress towards two of three milestones

Important and concrete advances have been made towards the first and third milestones of the *Strategic Plan*.

To reach the first milestone, countries faced with importations drew on a combination of approaches: coordinated and large-scale polio vaccination campaigns, independent monitoring of campaign coverage, rigorous surveillance and political weight. Importations from 2009 were stopped in all 15 countries by mid-2010; in 2010, new importations with onset in 2010 were stopped within six months in 11 countries.

No account of 2010 is complete, however, without the sobering reminder of the devastation that polio can cause even in places where it has been long forgotten: hundreds of people were paralyzed after wild poliovirus was imported into Tajikistan in February 2010, and an importation into the Republic of the Congo in September turned even more deadly. The response to these outbreaks reaffirmed two key lessons for polio eradication: speed is of the essence and, when necessary, older children and adults must be vaccinated.

CORNELIA WALTHER, UNICEF

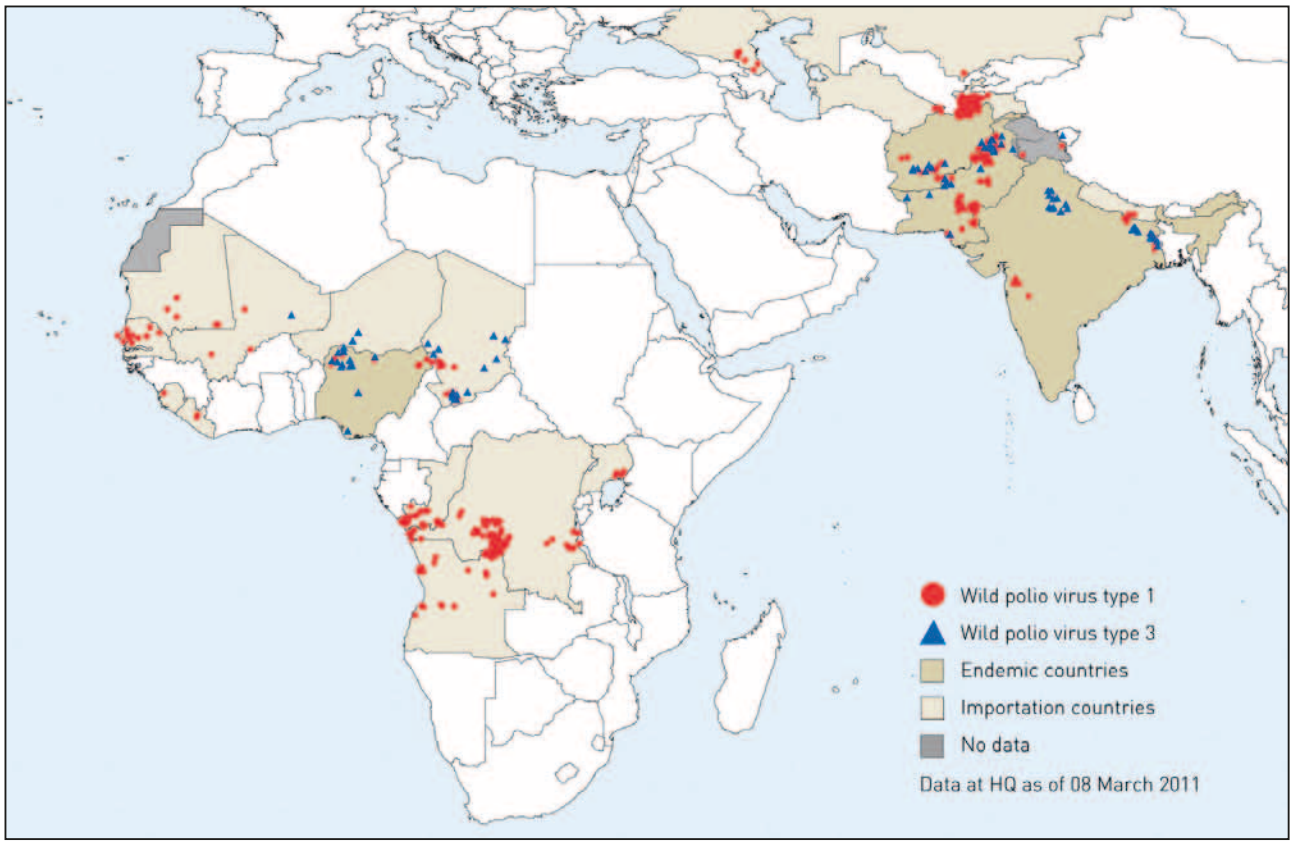
Jalalabad, Afghanistan, 2010: During a round of national immunization days, a girl waits with her mother and younger sister at a health centre until it is her turn to be immunized.

With respect to the third milestone, for endemic countries, the front-runners in 2010 were India and Nigeria with 94% and 95% reductions in cases respectively. These declines have particularly far-reaching implications for global efforts against polio, as all importations of wild poliovirus into polio-free areas in recent years have been related to viruses of Nigerian or Indian origin. On the fringes of this striking progress, risks still remain. In India, wild poliovirus was detected in early 2011 in West Bengal state, and the country remains in emergency mop-up mode. Polio also persists in the north-eastern and north-western corners of Nigeria, and there are warning signs that surveillance still suffers substantial gaps. The situation in Nigeria is further complicated by ongoing transmission of the vaccine-derived poliovirus that has lingered in the north of the country for over four years.

Despite the prevailing insecurity, Afghanistan also saw a 34% decrease in overall case numbers in 2010 compared to 2009, and as of April 2011 had detected no WPV3 for a full 12 months. As importantly, Afghanistan successfully prevented new outbreaks following importations from neighbouring Pakistan.

As polio eradication efforts gained ground in these three endemic countries, the virus tightened its grip over Pakistan. The rise of polio cases in Pakistan (of 62% over 2009) tempered the optimism elsewhere. In 2010, Pakistan had more cases of polio than the other three endemic countries combined. Arguably, it had far worse luck as well. Devastating floods washed through the country, damaging 600,000 homes, spoiling thousands of hectares of arable land and changing the lives of 18 million people. Hand-in-hand with this disaster, key polio-affected parts of Pakistan – notably the Federally Administered Tribal Agencies – continued to be plagued by conflict and insecurity, and as many as a quarter of a million children in those areas remained unvaccinated. Even in parts of Pakistan which were fully accessible, children continued to be missed during vaccination – and consequently paralysed by polio. Alarmed by the state of affairs, in October 2010 the President directed the rapid establishment of a National Emergency Action Plan to get polio eradication efforts back on track and launched it himself in January 2011.

Global WPV cases 2010



Second milestone goes off track

Under the second milestone, for re-established transmission countries, the situation is more alarming, with three of the four countries having missed this end-2010 milestone. Most signs pointed to the interruption of the re-established poliovirus in southern Sudan. In contrast, in Angola, Chad and the Democratic Republic of the Congo, re-established poliovirus transmission continued throughout 2010. The latter was plagued by new importations in its southern provinces and the capital city, while re-established poliovirus transmission continued in the east.

In the first half of 2010, substantial gaps in campaign quality in Angola allowed polio to spread both within the country and beyond, to the Democratic Republic of the Congo and the Republic of the Congo. In response, Angola launched a national Emergency Plan in June 2010, a key element of which was the full engagement of provincial Governors and municipal administrators. As a result of increased international technical support, key areas of the country saw an improvement in surveillance. High level advocacy in early 2011 paved the way for the President to consider polio a national priority; a sign of this focus was the commitment of significant domestic funding for the operational costs of polio campaigns.

At the invitation of the governments of Angola and of the Democratic Republic of the Congo, the chief executives of the polio eradication partners travelled to those countries to discuss with the respective Heads of State support in implementing corrective action plans.

In March 2010, the president of Chad announced he was declaring "war on polio." However, vaccination coverage of children improved only gradually, and transmission of the re-established WPV3 continued in the east of the country. New fronts opened up in this battle when WPV1 – imported from Nigeria in September – exploited the previous reliance on type 3 monovalent oral polio vaccine and rapidly sparked a new outbreak.

WPV cases 2009 vs 2010

Wild poliovirus type 1 cases*	WPV1-2009	WPV1-2010
Pakistan	61	120
Afghanistan	16	17
India	80	18
Nigeria	75	8
Re-established countries	74	144
Re-infected countries***	176	896

Wild poliovirus type 3 cases	WPV3-2009	WPV3-2010
Pakistan	28	24
Afghanistan	22	8
India	661	24
Nigeria	313	13
Re-established countries	67	15
Re-infected countries	31	3

Innovations

The significant advances against polio in 2010 in most endemic and outbreak-affected countries were facilitated by a series of innovations in programme planning and monitoring. District-specific planning made for better vaccination campaigns. Systematic tracking of the actions of sub-national leaders provided better accountability at the operational level. Other innovations applied more widely in 2010 were the Short-Interval Additional Dose (SIAD) strategy and targeted plans to reach mobile and transit populations. To provide a clearer picture of campaign quality, standard independent monitoring indicators were introduced in every country; where necessary, the picture was sharpened by the use of Lot Quality Assurance Sampling (LQAS) and serologic surveys. The sensitivity of disease surveillance was strengthened in 2010 by expanding environmental surveillance and introducing rapid field reviews.

Looking ahead

Meeting all of the *Strategic Plan* milestones will require the systematic and effective employment of these innovations in all infected districts and rapid adjustments in programme implementation when the IMB flags areas which have missed – or are at risk of missing – a milestone. In 2011, the priorities are threefold. In the countries that are on track to meet their milestones, the strategies must be sustained, to stop all transmission. Those countries which are at risk will aim to institutionalize best practices as they implement new emergency plans. Finally, continued innovation and research will guide next steps and prepare the ground for the post-eradication era.

COUNTRY CLASSIFICATION	WPV1		WPV3	
	2009*	2010	2009	2010
Endemic				
Afghanistan	16	17	22	8
India	80	18	661	24
Nigeria	75	8	313	13
Pakistan	61	120	28	24
Total	**232**	**163**	**1,024**	**69**
Re-established transmission				
Angola	29	33		
Chad		11	64	15
DRCongo		100	3	
Sudan	45			
Total	**74**	**144**	**67**	**15**
Outbreak				
Benin	20			
Burkina Faso	15			
Burundi	2			
Cameroon			3	
Congo**		382		
Côte d'Ivoire	26			
Guniea	42			
Kazakhstan		1		
Kenya	19			
Liberia	11	2		
Mali	2	3		1
Mauritania	13	5		
Nepal		6		
Niger	1		14	2
Russian Federation		14		
Senegal		18		
Sierra Leone	11	1		
Tajikistan		458		
Togo	6			
Turkmenistan		3		
Uganda	8	4		
Total	**176**	**896**	**31**	**3**
Global total	**482**	**1,203**	**1,122**	**87**

Data in WHO as of 11 May 2011.

* *Includes one type1/type3 mixture each in Afghanistan, India and Pakistan.*

***317 cases with inadequate specimens associated with the WPV1 outbreak have been exceptionally classified as confirmed polio based on their temporal and geographical association with virologically confirmed WPV1 cases and their classification by the National Polio Expert Committee as polio-compatible.*

In 2010, the financial benefits of eradication were calculated to be at least US$ 40-50 billion over the next 25 years, mostly in low-income countries; this figure does not include the considerable benefits that have already accrued in high-income countries, the additional benefits of having distributed Vitamin A and other interventions during polio campaigns and broader health system benefits of strengthened capacity.

The GPEI's estimated budget for 2011-2012 is US$ 1.87 billion; at the end of March 2011, US$ 665 million was still needed. The inspiring decline of polio in India and Nigeria catalysed emergency outreach by both Rotary International and the Bill & Melinda Gates Foundation to call on other donors and motivated the United Kingdom to double its funding to the GPEI for 2011-2012, contingent on other donors matching it five to one.

The lessons from Afghanistan, India, Nigeria and the countries which stopped new outbreaks in 2010 will be applied in 2011 to the remaining challenges in these areas as well as in Angola, Chad, the Democratic Republic of the Congo and Pakistan. At the end of the first year of implementation of the *Strategic Plan 2010-2012*, the world has in hand the tools and tactics needed to finish the job of polio eradication; it is now an issue of simply ensuring that these tools and tactics are systematically applied everywhere.

2 | Key Events 2010

January

10 India uses bivalent oral polio vaccine (bOPV) for the first time. Nigeria becomes the first African country to use the new vaccine during the 30 January Immunization Plus Days.

February

23 Iconic landmarks around the world are lit up with the slogan 'End Polio Now' in honour of Rotary International's 105th anniversary, as is Eilean Donan castle in Scotland.

MIKE PHIMISTER, ROTARY INTERNATIONAL

March

06 Across west and central Africa, leaders launch synchronized, multi-country polio vaccination campaigns.

April

23 Response activities begin for the Central Asian outbreak, the first in the World Health Organization's European Region since it was declared polio-free in 2002, with emergency grants from Rotary International, the United Nation's Central Emergency Response Fund and Japan. Imported from India, the virus demonstrates once again the vulnerability of polio-free areas until eradication is complete.

May

01 Players of the Afghan and Indian cricket teams exchange 'Bowl Out Polio' bats. Their high-profile game is viewed by thousands of cricket fans, helping to raise awareness of the polio eradication cause.

PRASHANT PANJIAR, BILL & MELINDA GATES FOUNDATION

11-14 Visiting Bihar, India, Bill Gates is struck by the quality and reach of India's polio programme; he crosses the Kosi River to see this for himself. Mr Gates also visits Kano, Nigeria in June, as part of his ongoing support to polio-affected countries: "All Nigerians should be proud of Nigeria's recent progress against polio," he says.

June

18 The *Strategic Plan 2010-2012* is officially launched in Geneva, Switzerland, a month after its endorsement by the World Health Assembly. The Ministers of Health of Nigeria, Angola and Senegal, among a number of other senior health ministry officials, existing and potential funders, vaccine manufacturers and key partner organizations speak at the event co-hosted by WHO Director-General Margaret Chan and UNICEF Executive Director Anthony Lake.

CORNELIA WALTHER, UNICEF

21 The 'Kick Polio out of Africa' football arrives in Montreal, Canada, at Rotary International's Convention. The ball has traversed 22 polio-affected African countries, where it was signed by 22 dignitaries in an example of African unity in the fight against polio – among them, religious and traditional leaders of northern Nigeria.

CHRISTINE McNAB

August

04 Polio eradication staff and resources are mobilized to help in the response to the devastating floods in Pakistan.

22 Osman Hussein Ibrahim, District Polio Officer, is killed by a stray bullet while on duty in Mogadishu, Somalia. The tragedy serves as a stark reminder of the dangers faced by front-line health workers.

24 Russian President Dmitry Medvedev and Bono, the lead singer of rock band U2, discuss polio eradication. Bono says that polio is a "low hanging fruit", as it is "nearly eradicated".

October

12 The Angolan Minister of Health, Dr José Van-Dúnem, along with the Governor and Vice-Governor of Luanda province, join vaccinators during a nationwide polio campaign.

24 In celebration of 'World Polio Day' Rotarians around the world work in creative ways to raise funds for polio eradication. Among other events, 4.6 million purple crocus bulbs – the colour that is used to mark the fingers of vaccinated children – are sold and planted in Great Britain and Ireland, to bloom the following spring.

28 WHO Director-General and Regional Director of the Eastern Mediterranean Region launch National Immunization Days in tribal areas of Pakistan, together with the Chief Minister of Khyber Pakhtunkhwa Province of Pakistan.

WHO PAKISTAN

November

11 An outbreak of imported poliovirus in the Republic of the Congo claims the lives of older children and adults and sends a chilling reminder of the deadly power of polio.

December

16 In a rigorous evaluation of the benefits and costs of eradicating polio, a study published in *Vaccine* finds that the programme could provide net benefits of at least US$40-50 billion by 2035, mostly in low-income countries, if transmission of wild polioviruses is interrupted within the next five years.

21-22 The Polio Independent Monitoring Board meets for the first time.

JOSÉ CAETANO, WHO ANGOLA

3 | Strategic Plan 2010-2012

"This new plan will strike at the final reservoirs of polio and consign this terrible virus to history."

Bill Gates, co-chair of the Bill and Melinda Gates Foundation, addressing the United States Congress in March 2010.

The world made rapid progress towards polio eradication soon after the Global Polio Eradication Initiative (GPEI) was launched in 1988. Case numbers began to plummet, three Regions of the World Health Organization were certified polio-free, transmission of one of the three serotypes of wild poliovirus was successfully interrupted worldwide – and by early in the new millennium, incidence of the disease had declined by a staggering 99%. The world expected that polio would soon be a disease of the past.

ROD CURTIS, WHO

The launch of the GPEI Strategic Plan 2010-2012 *at WHO in Geneva, Switzerland in June 2010.*

By 2005, the fight against polio had reached a stalemate. Endemic polio clung on stubbornly in limited areas of four countries: India (Uttar Pradesh and Bihar), Nigeria (northern states), Pakistan (parts of Sindh, Balochistan and North West Frontier Province and Federally Administered Tribal Areas), and Afghanistan (Southern Region). With most of the world polio-free, international spread of the virus from endemic areas led to recurrent outbreaks in polio-free countries. Despite the development of new tools in 2005 intended to dry up these remaining reservoirs – notably monovalent oral polio vaccines (mOPVs) – it became clear that the tactics which had eradicated polio from 99% of the world would not work in the remaining one per cent. That is why in 2008, the World Health Assembly (WHA) called for the development of new strategic approaches to finish the job once and for all. In 2008 and 2009, a number of key activities were tested and evaluated. The outcomes would ultimately help inform the new *GPEI Strategic Plan 2010-2012*.

A major independent evaluation examined the precise reasons why polio persisted in these key areas, and what additional tools or approaches might be necessary to secure success. What clearly transpired is that a 'one size fits all' approach could not work, as the barriers to success in each of these areas were unique. New approaches and products – ranging from a new bivalent OPV (bOPV – containing type 1 and 3 serotypes) to district-specific planning – were introduced and evaluated.

All of these new approaches and tools were institutionalized in the *Strategic Plan 2010-2012*, endorsed by the World Health Assembly in May 2010. The plan was then officially launched at a major GPEI stakeholder conference on 18 June 2010, co-hosted by World Health Organization (WHO) Director-General Margaret Chan and then-new United Nations Children's Fund (UNICEF) Executive Director Anthony Lake.

Less than 12 months into the new *Strategic Plan*, the world began to see unprecedented results in areas that were long resistant to eradication strategies: most notably in the key reservoir areas of India and Nigeria and in outbreak settings in polio-free countries. The results demonstrated that the new approaches work, but only if they are fully implemented.

Innovations in action

A range of tactical and product innovations underpin the GPEI *Strategic Plan 2010-2012*, to tackle the remaining barriers to polio eradication in the remaining endemic areas, facilitate swifter and more thorough outbreak response, and limit renewed international spread of polio. These approaches are regularly assessed and refined.

Bivalent OPV is the 'game-changer'

Evaluated and developed in record time, the new bivalent OPV simultaneously targets both remaining wild poliovirus serotypes (WPV1 and WPV3) in a single dose. Clinical and field trials in 2010 confirmed this vaccine's superior efficacy over the traditionally-used trivalent OPV, while offering similar protection to its respective monovalent OPV counterparts.

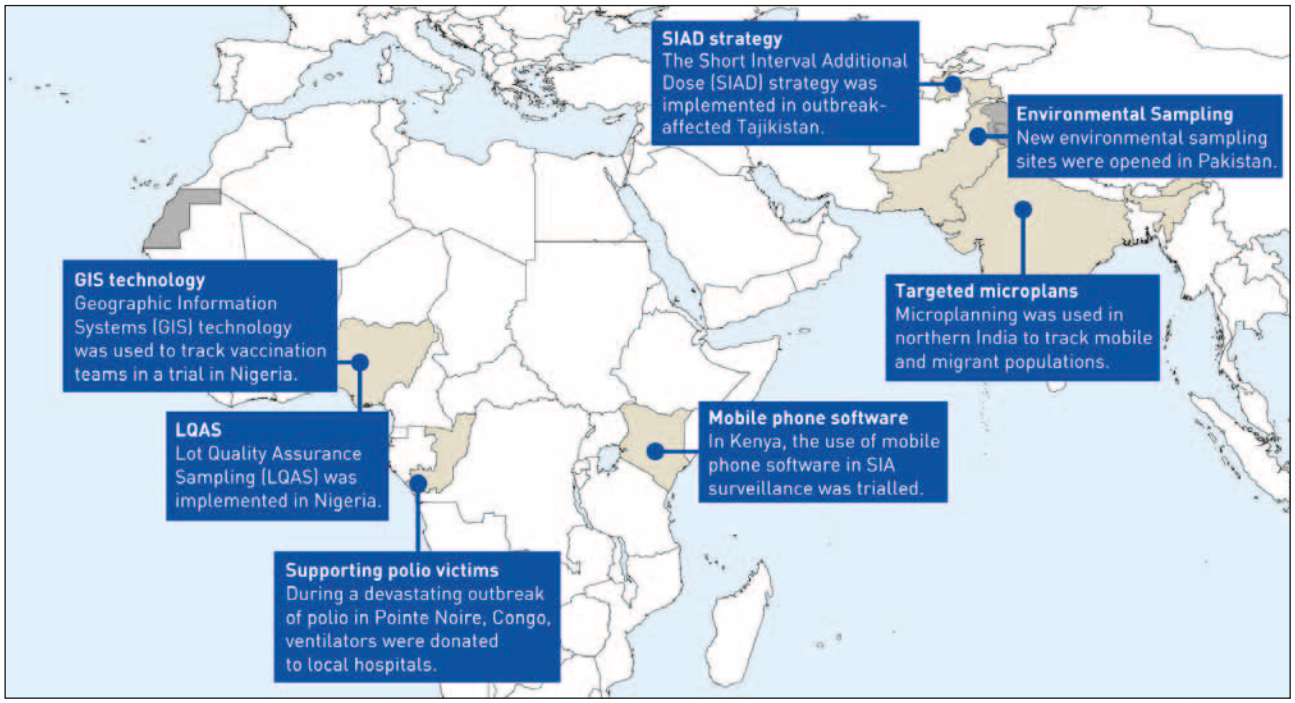
The availability of this new vaccine has changed the game, simplifying the logistics of running supplementary immunization activities (SIAs). Since its first use in December 2009 (in Afghanistan), use of bOPV was ramped up in 2010, reaching 179 million children in 17 countries. Any vaccine only works if it reaches children: the widespread use of bOPV was coupled with improved SIA operations in 2010, reducing global levels of WPV3 transmission to their lowest ever and significantly reducing WPV1 in key endemic areas at the same time.

Targeted operational microplans reach more children, no matter where they are

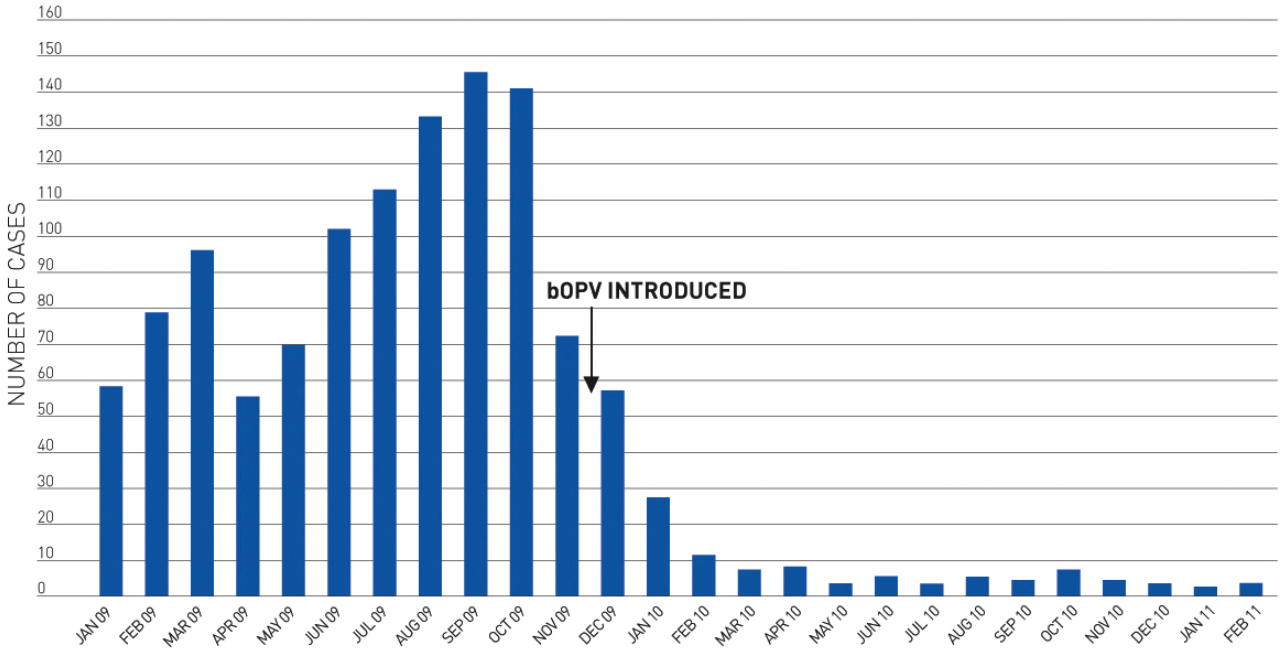
Poliovirus transmission now persists in only a handful of areas, surviving among the most vulnerable and often displaced populations. To reach the most marginalized groups of children, polio eradication efforts must zero in on the last virus strains in the most targeted manner possible.

This means identifying where the virus persists, both geographically, and socio-demographically, and then figuring out the best way to reach these groups given the unique factors at play in each place and each population. In some instances, this will mean focusing on identified highest-risk districts and using local, existing health and civil infrastructures to reach out to children (for example, in southern Afghanistan). In others, it means putting in place special strategies to vaccinate children among mobile and migrant population groups (such as in northern India).

New strategies in 2010



The effect of bivalent oral polio vaccine on WPV3



SIADs rapidly build immunity in conflict and outbreak settings

Children living in conflict-affected areas, or in areas which have been polio-free for a long time, are often particularly vulnerable to polio infection. In the former, vaccination may be difficult due to access; in the latter, vaccination may not perceived as a priority because no polio cases have occurred in some time. A consequent build-up of susceptible groups – those who are un- or under-immunized – creates a fertile environment for poliovirus if it is present or introduced.

The Short Interval Additional Dose (SIAD) strategy was developed to more rapidly build population immunity levels in such settings. The SIAD strategy exploits the availability of monovalent OPVs to shorten the interval traditionally needed before administering subsequent doses. Trivalent OPV doses have to be administered at intervals of four to six weeks, due to interference between different poliovirus types contained in trivalent OPV, especially type 2. With monovalent OPVs, the issue of interference in subsequent dose administration has been removed (as only one poliovirus strain is contained in such vaccines), and subsequent doses can be administered at a shortened interval of one week.

This approach, first evaluated in Somalia in 2007, was an integral part of the response to the explosive outbreaks in 2010 in Tajikistan and the Republic of the Congo. It continues to be used to raise immunity levels in the persistent-transmission security-compromised districts of southern Afghanistan, and is planned for use in several difficult settings, including the Federally Administered Tribal Areas in Pakistan.

LQAS and enhanced independent monitoring evaluate impact

How many children are reached, and in which areas? Large-scale SIAs are a proven approach to stopping polio, but only if they are implemented at the highest level of quality. Any missed children allow the poliovirus a breathing space to survive and circulate.

In 2010, enhanced independent monitoring, coupled with Lot Quality Assurance Sampling (LQAS), aimed to provide a clearer picture of the impact of SIAs. New protocols and criteria were created to guide a real-time independent monitoring network, validated as necessary by LQAS (a standard quality assurance system whereby classified areas of interest, corresponding to 'lots', are sampled to determine 'acceptable' or 'unacceptable' levels of vaccine coverage). By rapidly identifying any areas with sub-optimal performance, mid-course corrections can be implemented and areas with deficits re-covered by secondary immunization teams, even during the same SIA.

Environmental surveillance, serosurveys and mathematical modelling shadow and predict poliovirus' movements

With polio transmission increasingly beaten back to isolated areas or among marginalized communities, the search for the virus takes on new urgency, to find out where it may be hiding, where it might go next, and which populations are most at risk. The active disease surveillance for acute flaccid paralysis (AFP) cases is the main search engine for polio cases. To complement this surveillance, the use of supplementary tools was stepped up in 2010, particularly in areas where programmatic and epidemiological data did not align.

Environmental surveillance, expanded in 2010 to high-transit urban areas in key zones in India and Pakistan, provided additional data on the extent of virus transmission. At the same time, serologic surveys more accurately determined population immunity, identifying gaps which must be filled. Finally, mathematical modelling of high-risk areas helped to predict which polio-free areas, or marginalized groups, are most at risk for re-infection and outbreaks.

These innovations enable a more thorough risk assessment and therefore the targeted allocation of resources to areas which most urgently need them.

Everyday technology used in new ways to reach more children with polio vaccine

The ubiquity of mobile technology was harnessed in 2010 to monitor the quality of SIAs. Real-time data collection and analysis were conducted by independent monitors through mobile phones and EpiSurveyor software to help monitor the quality of SIAs. Data is sent in real-time to a remote server, where it can be viewed and downloaded from any computer with internet access. Evaluated during SIAs in Kenya, this technology could further enhance the scaled-up independent monitoring and LQAS efforts. A second trial is ongoing in Pakistan; pending the outcomes, this approach could be institutionalized in 2011.

In Nigeria, in November 2010, a pilot study was carried out to determine the feasibility of using Geographic Information Systems (GIS) to support both implementation and monitoring of SIAs. GIS is a tool that captures, stores, analyses and presents data linked to location. In Nigeria, it helped track and map the movements of vaccination teams in relation to prepared microplans. Analysis of the real-time data allowed for the immediate identification of missed areas, which were subsequently re-visited by the teams. Following further assessment, the use of this methodology may be expanded in 2011.

Polio survivors not left stranded by eradication efforts

The year 2010 marked the year that the arguments for 'control' of polio versus 'eradication' were put to rest, as explosive outbreaks in Tajikistan and the Republic of the Congo drove home the urgent need to completely eradicate this virus or risk massive outbreaks with regular occurrence in even the most unexpected places in the future.

The outbreaks in Tajikistan and the Republic of the Congo were particularly deadly, with a case fatality rate of more than 30% in the latter. While eradication is the ultimate protection from polio, manifestly much more needs to be done to support surviving polio victims.

Due to the sudden increase in number and severity of paralytic cases overwhelming national capacities in the central Asian and Congo outbreaks, WHO professionals in disability and rehabilitation and NGOs worked as part of the response to the polio outbreak to assess national capacity for acute respiratory support and rehabilitation and establish rehabilitation programmes for the large number of victims. In the Republic of the Congo, a special team of the Global Initiative of Emergency and Essential Surgical Care of WHO was dispatched in November to help support a humanitarian response to the outbreak, with a clear mandate to reduce the associated mortality. Special units were set up to provide ventilation care to critically ill patients with respiratory failure. Such collaboration will facilitate standard operating procedures for a response to acute polio outbreaks and guidelines on improving access to rehabilitation services for polio survivors.

4 | Stopping poliovirus transmission

Overview of poliovirus epidemiology in 2010

Wild poliovirus (WPV) was detected in 20 countries in 2010. In the four countries where transmission of indigenous WPV has never been interrupted, three recorded a decline in cases (Afghanistan, India and Nigeria); one (Pakistan) recorded an increase.

Of the four countries considered to be in the category of re-established WPV transmission, one (Sudan) recorded no cases and appeared to have interrupted transmission, while the remaining three countries (Angola, Chad and the Democratic Republic of the Congo) continued to detect cases related to re-established virus through end-2010. Of note, the latter two also had new importations.

Cases following importation were detected in 2010 in 13 countries: Chad and the Democratic Republic of the Congo and 11 others[1].

Circulating vaccine-derived poliovirus (cVDPV[2]) was detected in eight countries: type 2 in Afghanistan, Chad, the Democratic Republic of the Congo, India, Niger, Nigeria and Somalia, and type 3 in Ethiopia.

1 *Congo, Kazakhstan, Liberia, Mali, Nepal, Niger, Russian Federation, Senegal, Tajikistan, Turkmenistan, Uganda.*

2 *Vaccine-derived polioviruses are rare strains of poliovirus that have genetically mutated from the strain contained in the oral polio vaccine. Very rarely, if a population is seriously under-immunized, there are enough susceptible children for the excreted vaccine-derived polioviruses to begin circulating in the community and become 'circulating vaccine-derived polioviruses' (cVDPV).*

A Tajikistani child is vaccinated against polio following a large polio outbreak. Alexander Sodiqov, UNICEF Tajikistan.

4.1 *Strategic Plan* milestone 1 : Cessation of outbreaks

MILESTONE	MEASUREMENT	BASELINE	STATUS[3]	COMMENTS
By mid-2010: Cessation of all polio outbreaks with onset in 2009	Number of countries[4] with onset of outbreak in 2009 that report a genetically-related WPV after June 2010	15 countries with WPV importation in 2009	0 countries reporting WPV after 30 Jun 2010	Countries with outbreak in 2009 reporting genetically-related WPV in 2010: Mauritania: latest case 28 Apr 2010 Mali: latest case 30 Mar 2010 Sierra Leone: latest case 28 Feb 2010
Ongoing: Cessation of new outbreaks within six months of confirmation of index case	Number of countries[5] with a new WPV importation (genetically-unrelated to previous circulation) persisting >6 months from confirmation of index case	11 countries with WPV importation in 2010 2 countries with WPV importation in 2011[6] (Gabon, Niger)	0 country with WPV importation persisting >6 months	Countries with outbreak in 2010-11 reporting WPV in last 6 months (latest case): Republic of Congo: 22 Jan 11 Niger: 19 Jan 11 Gabon: 15 Jan 11 Uganda : 15 Nov 10 Russian Federation: 25 Sep 10

GPEI MAJOR PROCESS INDICATOR 2010	MEASUREMENT	BASELINE	FINAL STATUS OF ACHIEVEMENT	COMMENTS
By end-2010 100% of WPV importations and cVDPVs in previously polio-free areas responded to per international outbreak response guidelines.	% of WPV and cVDPV outbreaks responded to as per international outbreak response guidelines.	**2009** WPV : 87%, 13/15 importation countries responded to as per international guidelines. Median response time was 27 days, range 9-43 days.	**2010** WPV : 82%, 9/11 importation countries responded as per international guidelines. Median response time was 14 days, range 2-33 days.	**Countries not meeting outbreak response criteria in 2010** Russia: data not available on timing of mop-up activities. Kazakhstan : Only 2 SIAs cconducted following the WPV1 case.
		2009 cVDPV: NA. Data not systematactically collected.	**2010** cVDPV : 0% previously polio-free countries with cVDPV.	
International assessment conducted in 75% of countries with importation events persisting for >6 months.	International assessment conducted in 75% of countries with importation events persisting for >6 months.	International assessment conducted in 75% of countries with importation.	Not applicable.	All outbreaks have been controlled within 6 months.

3 *Calculated from data reported to WHO/HQ as of 30 March 2011.*
4 *Excluding endemic and re-established transmission countries (analysed separately).*
5 *Excluding endemic and re-established transmission countries (analysed separately).*
6 *Niger reported a WPV3 with onset 19 Jan 2011 that is pending sequencing results.*
7 *WPV reported in Uganda in 2010 is linked to WVP from Kenya in 2009 and not related to previous Uganda circulation confirming the continuation of the 2009 Kenya/Uganda outbreak.*

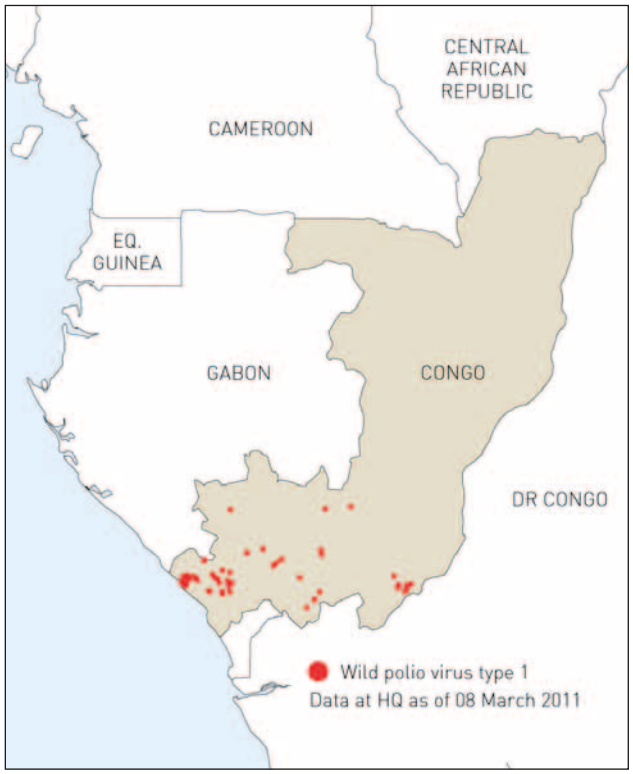
Outbreaks of wild poliovirus

Republic of the Congo

On 2 November 2010, after ten polio-free years, the Republic of the Congo confirmed the first case in a massive polio outbreak. The imported poliovirus – of Angolan origin – spread rapidly and with deadly results, ultimately afflicting 446 people[8] and killing 203 of them. Young adults made up 70% of the fatalities. The outbreak was centred in the districts of Pointe Noire and Kouilou, an area which is near the oil-rich Angolan province of Cabinda and a major national economic centre for Congo.

The speed and viciousness of the epidemic took the world by surprise. Polio transmission had been stopped after 2000, surveillance indicators were of acceptable standard, the country had been conducting regular SIAs (supplementary immunization activities), and routine immunization was reported at around 90%.

Congo WPV cases 2010



What was behind this outbreak? The area was close to borders with two countries experiencing intense polio outbreaks (Angola and the Democratic Republic of the Congo) and yet is relatively isolated due to poor transport links. The cases occurred almost entirely in poor, densely populated neighbourhoods without access to clean water and sanitation. Few adults would have been fully vaccinated as children; until about 10 years ago, the country was in conflict and health services unreliable.

The Ministry of Health of Congo responded with four rounds of polio SIAs for all age groups in the entire country. The first round began on 12 November, 10 days after confirmation of the first case. The peak of the outbreak was around the middle of November, and by the middle of December, after the second round, there were only sporadic cases. The most recent case had onset of paralysis on 22 January 2011; the outbreak had been controlled in only 83 days, before it could spread to the rest of the country. In the first quarter of 2011, a single related case was reported in Gabon.

Once the outbreak investigations were complete, the response was effective, led by the Ministry of Health in partnership with the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the US Centers for Disease Control and Prevention (CDC), Rotary International, the Bill & Melinda Gates Foundation and Médecins Sans Frontières. The response shows that existing strategies for polio outbreaks work very well when adapted to country needs and put into action as a matter of urgency by a committed government, supported by national and international partners.

Congo
382 cases: all WPV1
3 NIDs
13 infected districts out of 27

8 *Only 65 cases were virologically confirmed as WPV1 because polio was not expected in adults, and specimens were only taken in about 20% of cases; 66% of patients died within 24 hours of admission. However, the national expert review committee made the decision to classify 317 cases as polio based upon their compatibility on clinical grounds, leading to the total of 382 people affected by this outbreak.*

ASSELIN, UNICEF

Unusually, most of those struck with polio during the Congo outbreak are young adults, not children under five. "When I got here I could still move my arms" says Tony Boussana, 24.

Uganda, Kenya and Horn of Africa

Down from a total of 27 cases of type 1 wild poliovirus (WPV1) reported from Kenya and Uganda in 2009, the 2010 tally for the Horn of Africa was four cases – all WPV1 – from eastern Uganda. By the end of the first quarter of 2011, Somalia had clocked four years without reporting any WPV.

This decline of WPV transmission belies significant gaps in surveillance indicators at sub-national level, both in Uganda and Kenya. Indeed it is this sub-optimal surveillance performance along the Uganda-Kenya border that led to 18 months of undetected WPV circulation between 2009 and 2010. The 2010 National Expert Committee review in Kenya classified nine AFP cases as clinically polio compatible. Two of these occurred in the outbreak area and had onset of paralysis in March and September. Hence based on the current evidence, continuing WPV transmission can not be ruled out.

Uganda WPV cases 2010

BEN NKOWANE, WHO

A Somali girl shows her marked finger tips. Vaccination teams mark children's fingertips after they have been vaccinated against polio during SIAs.

Both Uganda and Kenya have undertaken political subdivision of administrative areas with attendant blurring of geographical catchment responsibilities at sub-national levels. In addition, the area along the border of the two countries experiences significant insecurity, making vaccination and surveillance activities and supervision very difficult. The lesson from Uganda is that countries which have high risk areas, borders with recently infected areas and mobile and hard-to-reach populations should remain particularly vigilant, with active surveillance in addition to efforts to boost population immunity even in the absence of polio-specific SIAs.

Following the detection of the WPV1 in eastern Uganda, three rounds of response SIAs were conducted in November and December 2010 and January 2011, covering a contiguous area in Uganda and in Kenya along the common border. Coverage as verified by independent monitoring from finger marking showed sub-optimal but improving performance: in Kenya, the percentage of children found unvaccinated dropped from 23% to 14%. In Uganda, independent monitoring results showed similar improvement, with a decrease in missed children from 11% to 6%. Detailed WPV transmission risk analyses were conducted in February 2011 in both countries and based on the outcome, surveillance revitalisation plans were developed with improved supervision and training, and deployment of national and international Stop Transmission of Polio (STOP) teams, with focus on the difficult-to-reach areas. Opportunities for improving OPV coverage through Child Health Days were also identified using extra government and UNICEF resources.

Somalia has achieved and maintained AFP surveillance key indicators above certification standards for the past four years. No wild poliovirus case has been detected in Somalia since March 2007 and all efforts (including Child Health Days and negotiation of days of tranquillity) are ongoing to maintain this polio-free status despite the insecurity and continuing political instability. The immunity profile of the population is closely monitored, and in order to maintain and improve the population immunity, two rounds of National Immunization Days (NIDs) and two rounds of Child Health Days are conducted annually.

The main concern for Somalia in 2011 are South and Central Zones of the country which account for 70% of the population, where insecurity has severely constrained vaccination activities. In late 2010, local authorities allowed access to two zones (Bay and Bakool) and 210,000 additional children were vaccinated. Efforts and negotiations with local authorities continue to improve access to these areas.

Uganda, Kenya and Horn of Africa

Ethiopia: 0 cases, 2 SNIDs, 1 CHD
Kenya: 0 cases, 1 SNIDs, 1 Mop-up
Somalia: 0 cases, 1 NIDs, 4 SNIDs, 4 CHDs
Uganda: 4 cases: all WPV1, 2 SNIDs, 1 mop-ups, 2 infected districts out of 80

West Africa

The west African outbreak has been brought under control, with cases reported in just seven out of the 24 previously-infected countries in 2010. The first year of the GPEI *Strategic Plan 2010-2012* has resulted in a marked improvement in SIA quality, and throughout 2010, a series of multi-country campaigns, supported by the highest levels of government, took place across west and central Africa.

The confirmation of cases in Liberia, after almost six months of being reportedly 'polio-free', underlined the necessity for disease surveillance to be improved (and sustained), and high-quality immunization campaigns to be conducted, complemented by improvements in routine immunization levels. These most recent Liberian cases threatened the attainment of the first milestone of the *Strategic Plan* (cessation of all polio outbreaks with onset in 2009), but the country managed to put an end to transmission just within the accepted six-month period.

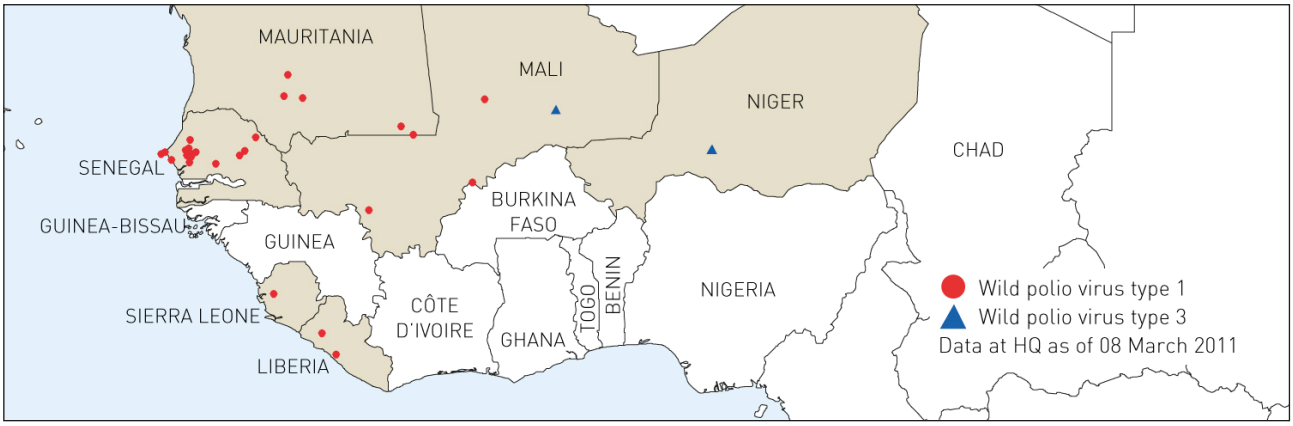
The multi-country outbreak that infected 24 countries across sub-Saharan Africa from 2008-10 has been significantly curbed, if not stopped, with only six countries[9] reporting cases in 2010. Of those, Sierra Leone has not recorded a case since February 2010; Senegal and Mauritania have not recorded any cases since April 2010; and Niger's cases have been single-case importations related to Nigeria. This once-extensive outbreak has been limited in the last half of 2010, due to a series of synchronized, multi-country campaigns across west and central Africa which has raised immunity to wild poliovirus as a block. In March and April 2010, 19 countries joined together to immunize up to 85 million children under five years of age in one week. In October, 15 countries repeated the exercise, with the presidents of Liberia, Mali, Sierra Leone and Guinea, the Prime Minister of Mauritania, and the Ministers of Health of Senegal and Côte d'Ivoire personally launching the campaigns. More than 400,000 volunteers and health workers took part in the campaigns, which could only take place thanks to the rapid release of emergency funds by the Bill & Melinda Gates Foundation and Rotary International.

While a previous round of campaigns in 2009 had not reached enough children to stop the outbreak in all countries, new approaches in 2010 saw a significant increase in vaccination coverage. These approaches included standardized independent monitoring to determine whether children had been reached, better training for vaccinators, the redeployment of experienced staff to manage the pre-campaign micro-plan process, and the use of the new Short Interval Additional Dose (SIAD) strategy to rapidly raise immunity in the persistent transmission areas of Liberia

West Africa

Liberia: 2 cases: both WPV1, 7 NIDs, 2 infected districts out of 15
Mali: 4 cases: 3 WPV1, 1 WPV3, 3 NIDs, 2 SNIDs and 4 mop ups, 4 infected districts out of 59
Mauritania: 5 cases: all WPV1, 7 NIDs, 1 mop up, 4 infected districts out of 53
Niger: 2 cases: both WPV3, 2 NIDs, 1 SNID, 1 mop up, 1 infected district out of 42
Senegal: 18 cases: all WPV1, 6 NIDs, 1 mop up, 11 infected districts out of 65
Sierra Leone: 1 case: WPV1, 6 NIDs, 1 infected districts out of 13

West Africa WPV cases 2010



9 *Senegal, Niger, Sierra Leone, Mali, Mauritania, and Liberia*

and Mali. In areas where independent monitoring of the March synchronized activity showed significant numbers of children missed, there was an increased focus on the engagement of all tiers of government to actively support the immunization activities by launching and taking part in campaigns, participating in the creation of comprehensive area-specific plans and holding better-trained health workers accountable for the quality of immunization. These factors resulted in immediate improvements in the April rounds; e.g., in Senegal, the number of missed children from one campaign to the next fell from 12% to 7%.

Successful strategies from the *Strategic Plan 2010-2012* will continue to be implemented in 2011, with a special focus on improving surveillance, the quality of immunization campaigns and routine immunization levels. A thorough review of surveillance in west Africa is planned, concentrating on known areas with sub-optimal surveillance and with a particular focus on mobile, migrant, and underserved populations who may sustain transmission undetected for long periods and move the virus long distances. Furthermore, the progress against polio in Nigeria will only assist polio eradication activities in west Africa, as Nigeria has served as a major reservoir for WPV1 and WPV3 circulation in west and central Africa since 2003.

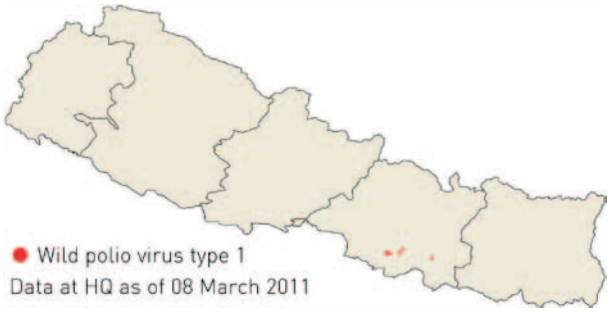
NEHEMIE MBAKULIYEMO, WHO AFRICAN REGION

A Malian girl who was paralysed by polio in 2010.

Nepal

Nepal's close community and trade ties with India have led to repeated WPV importations over the last five years. In 2010, WPV was imported twice into the Terai districts of Nepal, which border the polio-endemic Indian state of Bihar. The first re-introduction occurred in January in Mahottari district and did not result in detection of further cases. The second occurred in May in Rautahat district, leading to a local outbreak of five cases and spreading back across the Indo-Nepal border to cause an additional three cases in Bihar. The Government of Nepal called for emergency measures and conducted nine SIAs in 2010, including two NIDs. A joint national/international surveillance review for vaccine-preventable diseases was conducted, focusing on the performance and sensitivity of the AFP surveillance system, location of mobile populations from India and OPV coverage in routine and SIA activities. Special attention was given to the Terai area. The country recorded no cases after August.

Nepal WPV cases 2010



Nepal
6 cases: all WPV1
2 NIDs
8 SNIDs
2 infected districts out of 75

Tajikistan and central Asia

Until it is completely eradicated, polio remains a threat everywhere: there is no more poignant reminder of this message than the child who developed polio paralysis on 1 February 2010 in Tajikistan. The WHO European Region, certified polio-free since 2002, became the first such region to be re-infected. Of Indian origin, the poliovirus sparked a large outbreak that subsequently spread to Turkmenistan, Kazakhstan and the Russian Federation. The risk of such an outbreak had been flagged by the European Regional Certification Commission in its 2009 assessment due to the low vaccination rates in the countries of Central Asia – making them a potentially fertile ground for such importations.

Tajikistan and central Asia
Kazakhstan: 1 case: WPV1, 1 NIDs, 2 SNIDs, 1 infected district out of 201
Kyrgyzstan: 0 cases, 2 NIDs, 1 CHDs
Russian Federation: 14 cases: all WPV1, 4 SNIDs, 2 Mop-ups, 7 infected districts out of 83
Tajikistan: 458 cases: all WPV1, 6 NIDs, 1 Mop-up, 35 infected districts out of 65
Turkmenistan: 3 cases: all WPV1, 3 NIDs, 2 infected districts out of 61
Uzbekistan: 0 cases, 4 NIDs, 1 SNIDs

The region mounted a massive response to the outbreak, with large-scale immunization campaigns to swiftly boost immunity, in some cases extending the age of the target population up to 15 years, and even older in some areas. In Tajikistan – the epicentre of the outbreak with 458 people paralysed – no cases have been reported since 4 July 2010. However, the risk of further international spread remained high early in 2011, especially in the Russian Federation (where a child was paralysed by polio as recently as 25 September 2010).

In most countries affected by this outbreak, the immunization response was rapid, often using the Short Interval Additional Dose (SIAD) approach which delivers doses of vaccine in quick succession. Independent monitoring of the campaigns reported very high coverage (>95%) and the rapid decline in cases following the campaigns confirmed that when properly implemented, the internationally agreed outbreak response guidelines can indeed rapidly interrupt transmission. The bitter lesson learned was that until the last poliovirus has been eradicated, every country is at risk. An effective surveillance infrastructure as well as high immunization coverage are the essential defensive tools of any country.

Tajikistan and central Asia WPV cases 2010

Outbreaks of vaccine-derived poliovirus

During 2010, cVDPV was detected in eight countries: in six, there were outbreaks of newly emergent or previously circulating VDPV[10]; in two (Chad and Niger), cVDPV was imported from a nearby outbreak (Nigeria). All outbreaks were cVDPV2, except for Ethiopia, which experienced a cVDPV3 outbreak. Two rounds of SIAs with tOPV were held in response in Ethiopia; the most recent case occurred in November 2010, in an area covered two weeks earlier during a rolling nationwide measles catch-up campaign to which OPV had been added. Somalia reported one cVDPV type 2 in 2010, a continuation of cVDPVs that emerged in 2009. The outbreak is in southern Somalia, where efforts are ongoing to improve access to children (as noted in the section on WPV transmission).

Details of cVDPV in endemic and re-established transmission countries are in the relevant country section of this report.

10 Afghanistan, the Democratic Republic of the Congo, Ethiopia, India, Nigeria and Somalia.

Little Georgina Lusia de Deus Nzongo is carried by her brother after being paralyzed by polio. Leonie Marinovich, UNICEF Angola.

4.2 *Strategic Plan* milestone 2: Cessation of all re-established poliovirus transmission

MILESTONE	MEASUREMENT	BASELINE	STATUS[11]	COMMENTS
By end-2010: Cessation of all 're-established' poliovirus transmission	Number of countries with 're-established' WPV transmission reporting genetically related WPV after 31 December 2010	4 countries with 're-established' poliovirus	2 countries with continued re-established WPV in 2011 (Angola, Chad) 1 country at high risk of continued re-established WPV (DRC)	Angola: 4 Feb 2011 case is related to re-established WPV Chad: 30 Jan 2011 case is related to re-established WPV DRC: Re-established WPV1 detected as recently as 22 Nov 10 in Katanga along with 2 WPV1 from December (also in Katanga) pending sequencing

GPEI MAJOR PROCESS INDICATOR - 2010	OUTCOME	FINAL STATUS OF ACHIEVEMENT
Angola		
<10% missed children in all districts of Luanda, Benguela, and Kwanza Sul during each SIA	5 of 22 districts with data achieved (no data available for 8 districts within the 3 specified provinces)	Not achieved
Chad		
<10% missed children in greater N'Djamena and in the sountern and eastern WPV transmission zones during each SIA in the second half of 2010	0 of 3 zones achieved	Not achieved
Democratic Republic of Congo		
>80% adequate specimens in all provinces	2 of 11 provinces achieved	Not achieved
AFP rate >2 in all provinces	11 of 11 provinces achieved	Achieved
<10% missed children in each SIA in Orientale, North & South Kivu	0 of 3 provinces achieved	Not achieved
(Southern) Sudan		
>80% adequate specimen rates in all states	10 of 10 states achieved	Achieved
Non-polio AFP rate >2 in all states	10 of 10 states achieved	Achieved
<10% missed children in each state during each SIA	2 of 10 states achieved	Not achieved

11 Calculated from data reported to WHO/HQ as of 30 March 2011.

Sudan

Sudan is the only one of the four countries where poliovirus had re-established transmission which did not report a case of polio in 2010. The re-established wild poliovirus type 1 (WPV1) in southern Sudan has not been detected since 27 June 2009. In northern Sudan, surveillance activities were heightened in the states bordering Chad and southern Sudan. All states met international standards of acute flaccid paralysis (AFP) surveillance during the year. Routine immunization rates were high (91% in 2009).

However, the March 2010 Technical Advisory Group for the Horn of Africa cautioned that inconsistency of surveillance quality at sub-state level meant that the risks of failing to detect and interrupt WPV transmission were considered moderate in Sudan. During the year, the northern part of the country carried out three supplementary immunization activities (SIAs) and administered oral polio vaccine at one round of Child Health Days.

CHRIS OFFER, ROTARY INTERNATIONAL

A healthy child in Rumbek, southern Sudan.

Sudan
0 cases
1 NIDs
5 SNIDs
1 CHDs

In southern Sudan, severely affected by the 2008-2009 outbreak of wild poliovirus, several strategies were implemented. Field teams were brought up to strength with national and international staff in critical areas. International Stop Transmission of Polio (STOP) team members were deployed throughout the year to all states and high-risk areas. This cadre trained and supervised district surveillance focal persons, updated campaign guidelines, and worked with local partners to implement eradication activities and support accelerated Expanded Programme on Immunization (EPI) campaigns. Four SIAs were carried out in southern Sudan throughout 2010.

Caution remains on the programme for Sudan, not least following the detection of wild polio virus cases in Uganda in late 2010, early 2011 detection of cases in neighbouring Chad and the isolation of a wild poliovirus from the sewage in Egypt in March 2011 – closely linked to the 2009 WPV1 outbreak.

Angola

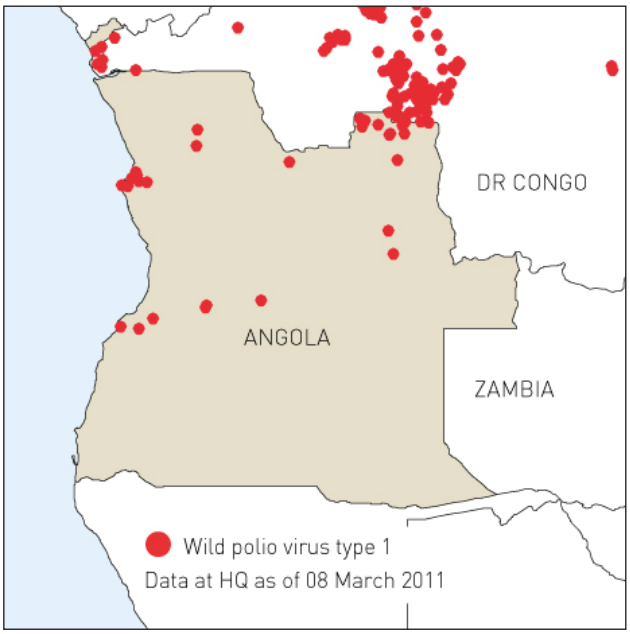
In Angola, a weak health system, low routine immunization coverage and insufficient capacity to fully implement international polio outbreak response guidelines has led to re-established transmission of WPV1 since 2007.

Until late 2009, WPV1 transmission was primarily restricted to the Luanda-Benguela corridor along the Atlantic coast. However, in 2010, due to significant operational gaps (with a national average of upwards of 17% of children regularly missed during SIAs), the outbreak spread to seven previously polio-free provinces of Angola in 2010 and internationally into the Democratic Republic of the Congo and the Republic of the Congo. Genetic sequencing of a 7 January 2011 WPV1 in Kuando Kubango confirmed it to be a continuation of Angola's re-established WPV1, meaning that the country had not met the end-2010 milestone of the *GPEI Strategic Plan 2010-2012*.

In June 2010, the Ministry of Health with partner support implemented a major review of SIA strategies and developed an emergency plan to interrupt polio transmission. In 2011, a new Expanded Programme on Immunization (EPI) plan was formulated, incorporating the polio eradication objective, and a target was set for interrupting polio transmission by end-June 2011. Recognizing that many of the operational challenges lay beyond the authorities of the health sector, in a major shift the plan focuses on a municipal- and community-based approach to immunization. Planning and implementation of SIAs now falls under the responsibility of the provincial and municipal administrations, with the health sector providing the necessary technical support, and the President will hold the governors accountable for results. Early results in 2011 show improvement in quality of SIAs in most provinces, particularly in Luanda, where the percentage of missed children decreased for the first time in the last five years to 10% in October 2010 and to 7% in February 2011 campaigns nationwide.

Angola
33 cases: all due to its re-established WPV1 transmission
4 NIDs
1 SNIDs
5 Mop-ups
19 infected districts out of 164

Angola WPV cases 2010



The Minister of Health personally presented the major elements of the new EPI plan to the newly-established Independent Monitoring Board (IMB) at the group's inaugural meeting on 21-22 December 2010, in Geneva, Switzerland. The President of Angola announced his intention to personally oversee the plan's implementation throughout 2011 and secure the full engagement of provincial governors. At his invitation, senior leadership from the United Nations Children's Fund (UNICEF), the World Health Organization (WHO) and the Bill & Melinda Gates Foundation flew to Luanda to discuss necessary support from international polio eradication partners. As a clear sign of renewed commitment, the Government of Angola has announced its intention to cover operational costs for the polio eradication activities in the 2011 plan.

With the leadership of provincial and municipal administrative leaders and the technical support of the health sector and partners, the aim is to address the operational challenges affecting SIAs, by consistently institutionalizing 'best practice' approaches in all areas. Such approaches include: the development and regular updating of neighbourhood specific microplans; systematic accountability of local administration; funding of operational costs from local budget; intensified independent monitoring (with identified underperforming areas immediately re-covered); area-specific social mobilization; and, enhancing surveillance for acute flaccid paralysis (AFP) to ensure rapid detection of any residual transmission and enable a rapid mop-up response. Full application of these practices is essential to stop polio transmission in Angola.

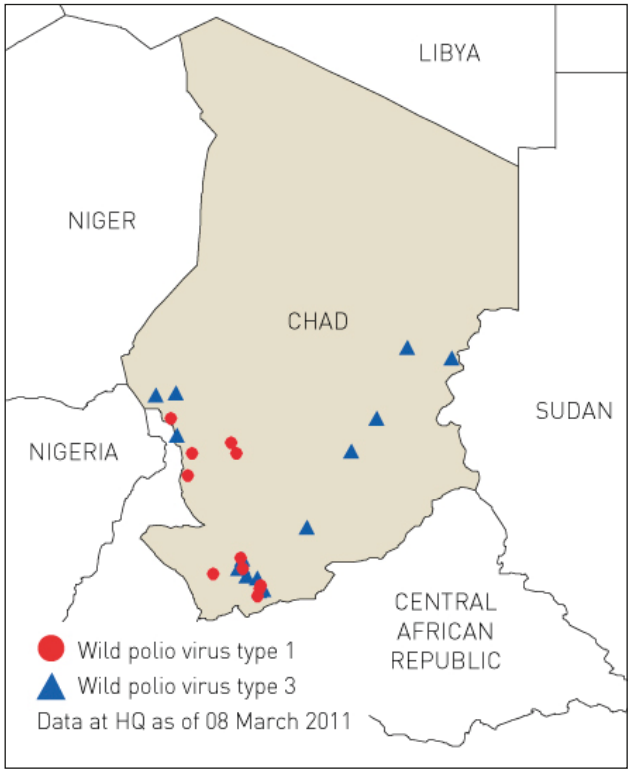
Chad

Chad has been affected by re-established WPV3 transmission since November 2007, with periodic onward spread into Sudan and other parts of the Horn of Africa. At the beginning of 2010, Chad was considered to be one of the greatest threats to polio eradication in Africa. Despite polio eradication activities, Chad missed the end-2010 milestone to stop transmission.

In March 2010, following a long-term advocacy effort, notably by Rotary International, President Idriss Deby Itno declared 'war on polio' as he launched the National Immunization Days (NIDs) by immunizing a child in the presence of the country's senior political figures and media. The visit of the UNICEF Regional Director to accompany Hollywood star and UNICEF Ambassador Mia Farrow provided the setting for President Itno to call on all levels and sectors of the country's government to oversee improvements in the quality of campaigns. All 22 provincial governors, along with traditional and religious leaders, high-level military officials, and civil society representatives from across the country held a meeting shortly afterwards to review and revise polio eradication efforts in the country and to reaffirm their commitment to polio eradication by signing the *N'Djamena Declaration for Polio Eradication in Chad*. The President's engagement also assured an increase in domestic financial contributions towards immunization efforts. For his personal engagement, Rotary International awarded the President with the prestigious 'Polio Eradication Champion' Award, in August.

Chad
26 cases: 14 cases due to its re-established WPV3 transmission; 11 cases due to new WPV1 spread and 1 case due to new WPV3 spread, both from Nigeria
6 NIDs
12 SNIDs
14 infected districts out of 61

Chad WPV cases 2010



This renewed commitment has led to some operational improvements in certain areas, but significant challenges continue to plague both SIA quality and surveillance. The fragility of the progress was underscored when Chad became re-infected by WPV1 from neighbouring Nigeria, and this virus regained a foothold in the west of the country in the second half of the year. At the same time, the re-established WPV3 transmission continued in the east of the country. Of particular concern: one of the latest WPV3s (from December) is genetically linked to virus last detected in the country in May 2009, indicating missed transmission for a period of 18 months. Another indication of the poor immunity in Chad is the detection of circulating vaccine-derived poliovirus type 2 (cVDPV), imported from neighbouring Borno, Nigeria, in December 2010.

At the start of 2011 the Government of Chad began developing an operational plan to address the situation. Under this plan, technical support will be allocated to priority areas, based on ongoing epidemiological and programmatic risk assessment, as a series of large-scale SIAs will be implemented. Special outreach strategies are being developed

JEAN-MARC GIBOUX

A vaccination team visits a refugee camp in Ouaddai state, eastern Chad.

to reach high-risk populations. The focus is on increasing population immunity levels in the east of the country, including by scaling up human and technical resources, to minimise the risk of further spread of virus into Sudan. Sub-national surveillance sensitivity will be monitored on a quarterly basis, with field-level visits conducted as necessary to areas identified as having deficits. In addition to scaling up technical support to strengthen surveillance in identified sub-performing areas, the logistical aspects of specimen transfer in a timely and adequate manner (from the field to laboratory) will be reviewed and improved as necessary.

Efforts to increase accountability at the implementation level are central to the plan. District heads will be personally charged with overseeing implementation reviews following each SIA and providing summaries with clear outcomes and recommendations to provincial governors, whose offices will oversee direct oversight of implementation of the plan. At the national level, monthly implementation reports will be prepared by the Ministry of Health and shared with the office of the Prime Minister.

At the end of 2010, Chad remained a major risk to polio eradication in Africa. Implementation of the new plan – and verification of that implementation – is essential to concrete progress.

Democratic Republic of the Congo

The Democratic Republic of the Congo (DR Congo) is affected by three separate polio events – two outbreaks following new importations and the re-established transmission of poliovirus – and the country saw a tragic spike in polio in 2010, with 100[12] confirmed cases.

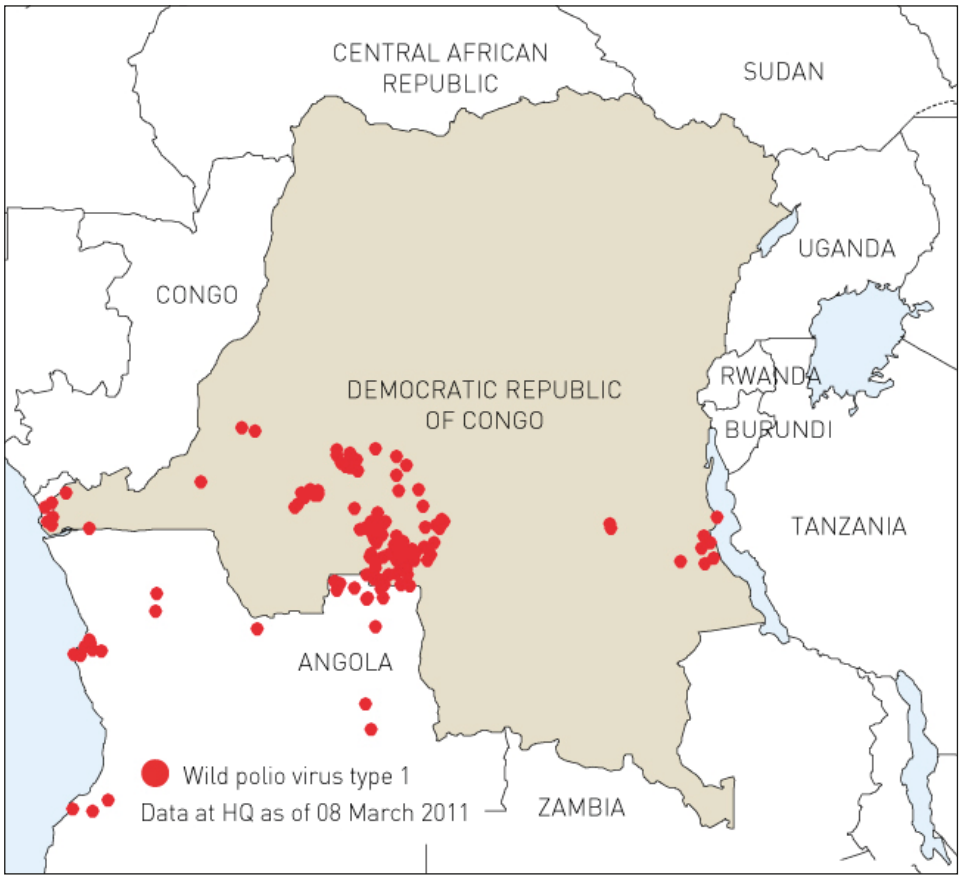
WPV1 transmission is re-established in Katanga, in the east of the country, since 2007. Although there have been no cases in that outbreak after December 2010, it is too early to rule out continued transmission. The country remains at risk for missing its end-2010 milestone.

The acute outbreak in Kasai Occidentale, Bandundu and Kinshasa is the result of new international spread of polio from Angola in 2010. An outbreak in Bas-Congo is linked to the epidemic which struck the Republic of the Congo, also due to poliovirus related to Angola.

Although challenging terrain in some areas complicate the logistics of implementing supplementary immunization activities (SIAs), fundamental operational deficits continue to compromise the eradication effort, and approximately 10% of children remain un- or under-immunized. Due to subnational surveillance gaps, further undetected transmission is not improbable, particularly in the east. It is these fundamental deficits which have allowed three separate strains to affect the country, and which must be urgently addressed in 2011.

The government is implementing an emergency action plan in the first half of 2011 to urgently address this situation, which will be overseen by the highest levels of the government. President Joseph Kabila invited the Director-General of WHO, Dr Margaret Chan and the WHO Regional Director for Africa, Dr Luís Gomes Sambo to meet with him in Kinshasa in February 2011. Discussions centred on ways to best implement and monitor the country's emergency

Democratic Republic of the Congo WPV cases 2010



12 As of 4 May, 2011.

Democratic Republic of Congo
100 cases[12]: all WPV1
9 SNIDs
31 infected districts out of 508

response plans. At a meeting with donors, partners and government officials, President Kabila expressed his government's firm commitment to ending the current polio outbreak. This visit was followed by a meeting between UNICEF Executive Director Anthony Lake, the Prime Minister and the Minister of Health, to discuss support from polio partners to the government's efforts.

The priorities are to enhance surveillance sensitivity to determine where the virus is continuing to circulate, and to continue large-scale SIAs to boost population immunity and interrupt both the new importations and re-established virus. The emergency plan aims to provide a coherent, comprehensive national polio eradication plan identifying the distinct challenges posed by the three outbreaks and adopting distinct strategies to address each, including strong district-level plans, implementation and supervision by national and local authorities.

The three provinces of Bandundu, Kasai Occidental and Katanga are challenging terrain to run vaccination campaigns. A field assessment of the security situation in Katanga concluded that, while all areas reporting polio cases would be accessible to vaccination teams, caution would be needed due to the general risk of crime or looting when travelling by road. Authorities are also adjusting vaccination strategy in Kinshasa: because young adults have been struck down with the virus in some areas, vaccination campaigns have been expanded to cover the entire population (rather than just children under five years of age).

Full implementation of the emergency plan will stop polio in the Democratic Republic of the Congo. Until then, the country continues to face the risk of the spread of polio both within and beyond its borders.

HANS EVERTS, WHO

A healthy girl carries a pot of water on her head.

Rukhsar Khatoon sleeps in her mother's lap while in hospital for physiotherapy. Rukhsar was the only Indian child paralysed by polio in the first quarter of 2011. This is a reflection of the country's dedication to polio eradication throughout 2010. S.Bari, WHO.

4.3 *Strategic Plan* milestone 3: Cessation of all polio transmission in endemic countries

MILESTONE	MEASUREMENT	BASELINE	STATUS[13]	COMMENTS
By end 2011: Cessation of all polio transmission in at least 2/4 endemic countries	Number of WPV cases reported year to date 2009 and 2010.	WPV Jan-Dec 2009[11]: Afghanistan: 38 India: 741 Nigeria: 388 Pakistan: 89	% change 2009 to 2010: Afghanistan: -34% India: -94% Nigeria: -95% Pakistan: +62%	WPV Jan-Dec 2010[11]: Afghanistan: 25 India: 42 Nigeria: 21 Pakistan: 144

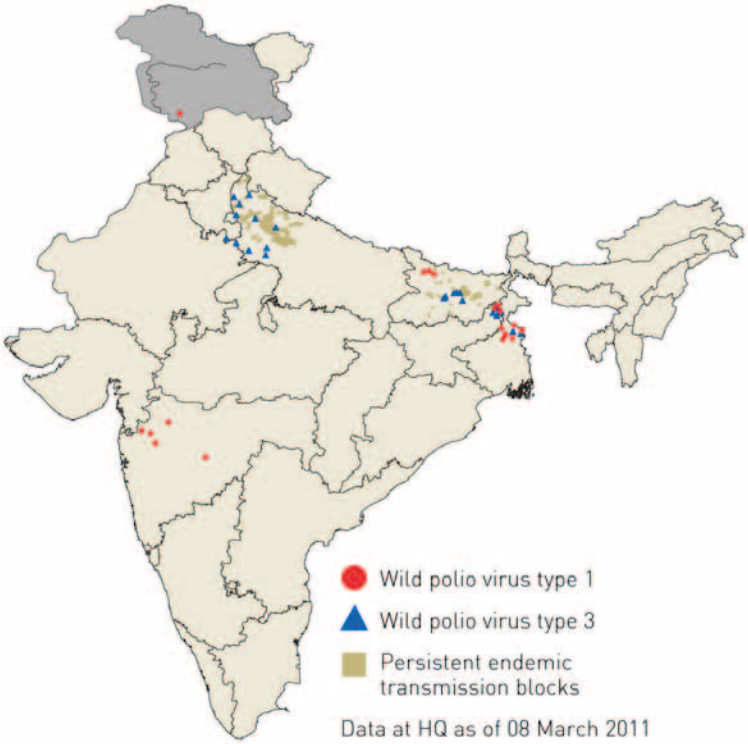
13 Calculated from data reported to WHO/HQ as of 30 March 2011.

GPEI MAJOR PROCESS INDICATOR - 2010	OUTCOME	FINAL STATUS OF ACHIEVEMENT
India		
>95% population immunity to type 1 polio in the persistent transmission areas of western Uttar Pradesh and central Bihar.	2 of 2 states achieved *Bihar at 98% and UP at 98% for type 1. As a baseline for the 2011 major process indicator the 2010 results for type 3 were Bihar at 78% and UP at 76%.*	Achieved
Nigeria		
<10% 0-dose children (per NPAFP data) in each of the 12 high-risk states (including the 8 persistent transmission states).	11 of 12 states achieved.	Not achieved
Afghanistan		
<10% missed children during at least 4 SIAs in each of the 13 conflict-affected districts with persistent transmission in the Southern region.	0 of 13 districts achieved.	Not achieved
Pakistan		
<15% missed children during at least 8 SIAs in every district of the Quetta area and the persistent transmission districts and agencies of NWFP and FATA.	4 of 7 districts achieved (with data from 9 rounds)	Not achieved
<10% missed children during at least 4 SIAs in every town of Karachi.	18 of 18 towns achieved.	Achieved

India

By the end of 2010, the impact of the new approaches outlined in the *GPEI Strategic Plan 2010-2012* was nowhere more evident than in India. The country saw a 94% decline in new cases in 2010 compared to 2009, with wild poliovirus type 1 (WPV1) and wild poliovirus type 3 (WPV3) dropping concurrently thanks to the large-scale administration of the new bivalent oral polio vaccine (bOPV). And despite the onset of the high season for polio transmission in the second half of the year, record-low levels of polio continued to be reported from the traditional endemic reservoir areas of Uttar Pradesh (no cases since 21 April 2010) and Bihar (no cases since 1 September 2010). However, confirmation of a WPV1 positive environmental sample in Mumbai in November 2010, as well as ongoing transmission of WPV1 in parts of West Bengal expose the very real remaining risks. Nevertheless, success in attaining a polio-free India has never looked more realistic.

India WPV cases 2010



India has perhaps the best-ever opportunity to stop polio transmission, grounded in strong epidemiological evidence and proven strategic approaches. At this juncture, complacency is the most acute risk. Evidence of ongoing low-level transmission underscores the very real danger this virus continues to pose to India's eradication effort. In key high-risk areas, notably in the re-infected state of West Bengal, serious vaccination coverage gaps remain, particularly among some under-served populations.

All levels of leadership, from government to religious leaders, from the Prime Minister to village heads, are engaged in oversight and support of immunization efforts, leading to levels of societal buy-in for supplementary immunization activities (SIAs) unmatched elsewhere.

Identification and immunization of mobile populations in polio-free areas featured as a major strategy for the India programme in 2010. Migrant group destinations – such as Delhi, Punjab, Mumbai, and West Bengal – have gone through a process of listing itinerant settlement areas and revising micro-plans to ensure OPV is delivered, even to people living with families in locations such as construction sites or brick kilns.

The migrant strategy is complemented by the introduction of focused, district-level plans, where the highest-risk blocks are singled out for intensive immunization campaigns, built on the foundations of increased technical staffing capacity.

The progress in India has underlined the impact of bivalent OPV in contexts where both WPV1 and WPV3 are circulating. Perhaps most importantly, this progress promises to have far-reaching implications. India and Nigeria have repeatedly been the two largest exporters of WPV in GPEI history. In 2010, poliovirus linked to India re-infected Nepal, Tajikistan, the Russian Federation, Kazakhstan

India
42 Cases: 18 WPV1, 24 WPV3
2 NIDs
14 SNIDs
5 Mop-ups
17 infected districts out of 627

ROD CURTIS, UNICEF INDIA

A child is vaccinated using oral polio vaccine in Kolkata.

and Turkmenistan. Further, the Angolan WPV1 virus that spread to infect the Democratic Republic of the Congo and the Republic of the Congo in 2010, is of Indian origin, and now stands as probably the greatest threat to polio eradication in Africa.

India faces the most critical six months in its effort to eradicate polio. High immunity profiles in the key reservoirs of Uttar Pradesh and Bihar have provided a clear epidemiological opportunity to eradicate polio by end-June 2011. Given the continuing risk posed to global eradication (all importations into polio-free areas in the recent past were from India and Nigeria), this becomes the GPEI's foremost priority.

The November 2010 India Expert Advisory Group on Polio Eradication (IEAG) recommended an aggressive mop-up strategy of conducting immediate, effective mop-ups around any reported cases. As part of this comprehensive response to transmission, mop-ups were conducted in December 2010 in New Delhi and Mumbai, following positive environmental surveillance sampling, as well as in the location of the genetic origin of the virus, central Bihar. This strategy will need to be sustained throughout 2011. It will be essential to incorporate mobile population strategies to track and reach small groups of migrant workers, nomads and slum dwellers who represented a disproportionately high number of cases in 2010: it is by reaching these unreached communities that India will stop polio.

HANS EVERTS, WHO

Children play beside the train tracks in Bihar, India.

Nigeria

Nigeria recorded 21 cases of wild virus in 2010, the lowest incidence of both types of wild poliovirus (WPV) over a 12 month period that the country has ever recorded and a 95% reduction compared to 2009. The scale of the achievement triggered more cautious optimism than Nigeria has ever known, although both surveillance and immunity gaps remain.

Circulating vaccine derived poliovirus (cVDPV) incidence also dropped significantly in 2010, with 26 cases in a limited number of districts compared with 154 cases in a widespread area in 2009.

While the epidemiological picture, backed by relatively robust surveillance, demonstrates that Nigeria is unquestionably closer to eradicating polio than ever before, a number of risks continue to threaten this goal, including the unacceptable number of children who have never been vaccinated with OPV.

An increase of polio case numbers in the last quarter of 2010 and health worker strikes in key states emphasize the fragility of Nigeria's progress and warn of a possible upsurge of virus in 2011 unless remaining programme gaps are quickly addressed.

While there exist significant pockets of under- or un-immunized children across the endemic zones, certain areas have a higher concentration: e.g., Kano and Yobe states did not meet the primary target for Nigeria in 2010 – to ensure less than 10% of children are zero-dose (i.e. unimmunized) – recording 18% and 12% respectively. Community surveys around these cases confirmed that mistrust of immunization plays a role in sustaining poliovirus transmission. Nearly all polio cases recorded in 2010 occurred either in one of the 85 local government areas (LGAs) identified as high risk or in adjacent areas. Despite general improvements in coverage, the high risk LGAs continued to demonstrate substantially lower immunization coverage than non-high risk LGAs in the same northern states.

As transmission declines, surveillance quality becomes increasingly important. The existence of surveillance gaps is confirmed by the high proportion of viruses (14 of 21) detected in 2010 which genetic analysis showed to come from transmission chains which had gone undetected for a long period.

CHRISTINE McNAB

Seven-year-old Umar Amino's right leg was paralyzed by polio. His knee takes a beating as it is easier for him to half-crawl than to stand up and use his crutches. Despite these difficulties, Umar is a diligent student and while he does not know what he wants to be when he grows up, he enjoys school.

WPV transmission clustered in the north-eastern (Borno) and north-western (Kebbi, Sokoto, Zamfara) corners of the country; as long as immunity gaps exist, polio can move either back into the high risk areas, or into neighbouring countries. In 2010, poliovirus from Nigeria re-infected Niger, Mali and Chad, while virus from Borno state was the cause of the only 2010 case in Kano.

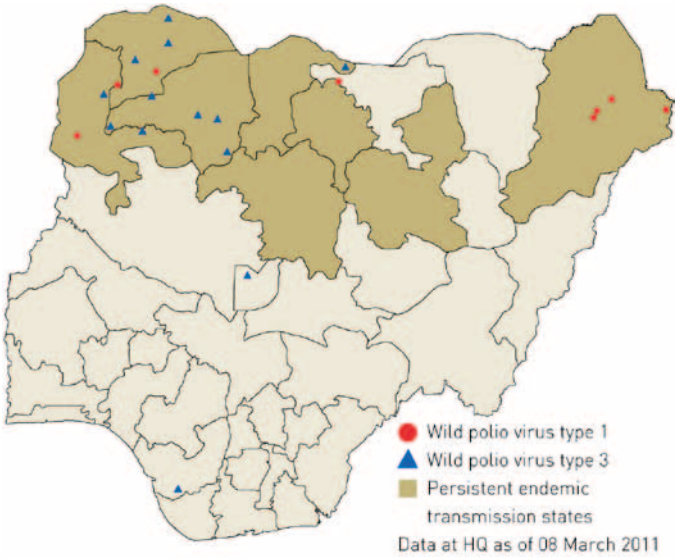
Impact of new strategic approaches

Strong leadership from national, state and local authorities continued in 2010 with sustained efforts to improve accountability. The *Abuja Commitments* – signed by state governors in 2009 as a testament to their determination to eradicate polio – was monitored quarterly, with results published in national newspapers. Vindicating the utility of this tool, the states with continued circulation in the last quarter of 2010 were also those that adhered least to the commitments, particularly Kebbi, Zamfara and Borno.

The Northern Traditional and Religious Leaders Committee led eradication efforts by chairing evening review meetings, flagging off supplementary rounds and ensuring that district, ward and village heads actively convinced parents of the need for vaccination. While engagement was by no means uniform, the committee's involvement continued to be very encouraging.

The real and visible commitment continued to drive tangible results. By the fourth quarter of 2010, the proportion of zero-dose children in the 12 highest-risk states had dropped below 5% for the first time ever (3.4%).

Nigeria WPV cases 2010



TOM MORAN, WHO

A health worker carries a three-day-old baby outside to be vaccinated.

The development in 2010 of specific operational plans for the 85 high risk LGAs channeled intensified efforts to the highest risk areas. The plans improved visibility of polio eradication efforts in these areas and better coordinated supervision and oversight from state and national government as well as partners. Incremental improvements are being tracked in most areas. Enhanced independent monitoring introduced in all 12 highest risk states in November 2010 is holding these areas to even higher expectations of quality.

Innovations in communication and social mobilization approaches including the successful scale up of 'Majigi' – a local audio-visual approach – and local engagement of women's groups began to pay off in terms of increasing demand for vaccine. The 'Majigi Strategy' empowers local leaders to show locally produced films which highlight what polio is, how it spreads and what parents can do to protect their children. These events offer communities a chance to discuss openly some of the concerns they may have about immunization while encouraging local solutions.

Nigeria
21 Cases: 8 WPV1, 13 WPV3
2 NIDs
6 SNIDs
1 Mop-up
1 CHDs
21 infected districts out of 774

To verify programme improvements, a new intensified monitoring process was expanded in the fourth quarter to cover all states in northern Nigeria. Other pilot studies in Nigeria included the use of Geographic Information Systems (GIS)-enabled mobile phones in monitoring; and, the establishment of local cross-function teams to monitor and rapidly improve SIA performance.

An active policy of periodic peer surveillance reviews at state level resulted in improvements in consistency of surveillance across LGAs. While there is no doubt that surveillance gaps remain, as evidenced by the detection of long genetic chains in WPV even in 2010, it is equally clear that surveillance quality has improved in the past 12 months. By the end of 2010, 92% of LGAs reported meeting both key surveillance indicators, an increase of 6% from 2009.

The next 12 months will determine whether Nigeria is successful in interrupting transmission of poliovirus. Polio case numbers have never been lower and plans are being finalized to ensure full implementation of the aggressive, intensive mop up strategy and to fix SIA gaps in persistently under-performing high-risk LGAs. Identification and coverage of mobile populations with immunization and surveillance is a central part of the 2011 strategy. Equally important are actions to identify and close surveillance gaps to rapidly and reliably detect poliovirus and to maintain high levels of population immunity.

A comprehensive review of successful local strategies piloted by state teams in 2010 is under way to determine what should be scaled up to close remaining operational gaps and improve local community mobilization and ownership. The use of GIS-enabled mobile phone technology will be expanded where useful. Lot Quality Assurance Sampling (LQAS) will continue to be used when independent monitoring data is not clear. A seroprevalence study, the first in Nigeria for polio, will more accurately pinpoint immunity gaps in Kano.

In 2011, a full international surveillance review is planned to identify and address any gaps; and environmental sampling will be introduced in Kano, with expansion to other suitable sites, to increase surveillance sensitivity.

Polio eradication is within reach of Nigeria in 2011. As the only country in Africa to have never interrupted poliovirus, the opportunity to secure this historic win – for not only the children of Nigeria but all of Africa – must not be lost.

TOM MORAN, WHO

A family stands outside of their house. On the wall behind them, markings in chalk indicate that all 10 children in the household have been vaccinated against polio.

Afghanistan

In 2010, poliovirus was cornered in Afghanistan's Southern Region and neighbouring Farah province, primarily within 13 high-risk and insecure districts. Cases declined by 34% compared with 2009, and no WPV3 was reported in the country after April 2010. What distinguished Afghanistan's polio eradication efforts in areas of insecurity was the active work with all parties to the conflict, through local health non-governmental organization (NGOs) and community and religious leaders, to ensure high-quality campaigns. Outside this area of endemic transmission, Afghanistan successfully prevented outbreaks following importation of WPV from its heavily infected neighbour – despite recording four separate importations – and kept the rest of the country polio-free.

In the Southern Region of Afghanistan and adjacent parts of the Western Region, conflict was a major barrier in 2010 to reaching children with vaccine. Of the 25 cases of WPV in the country, 21 were from these areas. Another indicator of the need to raise immunity was the occurrence of five cases of circulating vaccine-derived poliovirus type 2 (cVDPV2) from June to December 2010 in Nad Ali – a consistently inaccessible district of Hilmand province in the Southern Region. Polio eradication efforts centred on securing access and ensuring the safety of vaccinators.

Another challenge was to maintain high vaccination coverage in the rest of the country to mitigate the risks of virus spread from within the country (e.g. Southern Region) or from outside (e.g. Pakistan).

As a way to overcome the security obstacles, the International Committee of the Red Cross expanded its support activities in conflict-affected areas to assist in introducing service providers who are acceptable to opposition groups. Close coordination was maintained with the international military forces, while guarding the neutrality of the programme. Local access negotiators were engaged to facilitate and improve the safe access of vaccination teams to children. Consequently, the proportion of children in the south under the age of five years who could not be reached was reduced from 19% in January 2009 to 6% by the end of 2010.

Afghanistan
25 Cases: 17 WPV1, 8 WPV3
4 NIDs
8 SNIDs
15 infected districts out of 329

SIGRUN ROESEL, WHO

A group of Afghan children raise their fingers to show that they have been vaccinated against polio.

Political will was the driver of these innovations. A high-level group on polio eradication policy and strategy – chaired by the Minister of Public Health – met monthly to monitor progress and suggest ways to improve.

This support was complemented by a focus on the local level. District-specific polio eradication action plans were developed for the 13 high-priority districts and polio eradication 'district managers' were appointed in all 13 districts to strengthen SIA management. Several hundred managers and field supervisors were trained in operations and management. The programme also initiated interventions for community mobilization, through the involvement of local influencers (village elders, tribal leaders, teachers, mullahs and community health workers) to facilitate local

SIGRUN ROESEL, WHO

Health workers walk from house to house vaccinating children during the March 2010 NIDs.

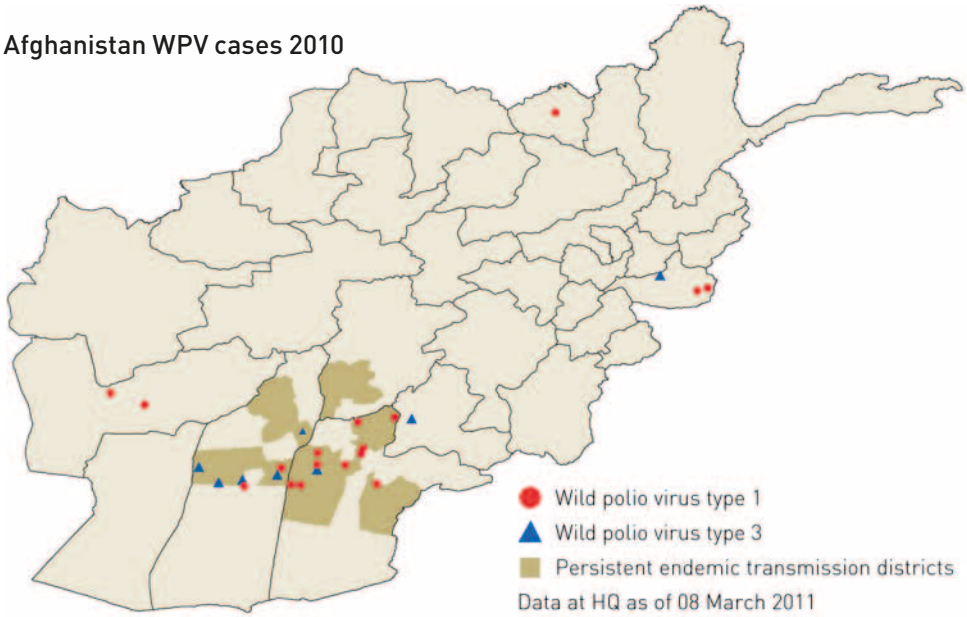
level negotiations with militants to access children during SIAs. The NGOs implementing the government's primary health care package were systematically engaged as SIA implementers in selected districts of Hilmand and Kandahar, as these organizations have effective community level networks for primary health care delivery.

An international acute flaccid paralysis (AFP) surveillance review was held in September 2010 in all regions except the southern and south-eastern to review the sensitivity of the AFP surveillance system to detect and report children with symptoms of paralysis. The review concluded that, in the reviewed regions, the AFP system is highly sensitive and the probability of missing any ongoing virus transmission is low.

Reported overall SIA coverage remained above 90% in most SIAs, except in the 13 conflict-affected districts of the southern region, where campaign quality remains below the level required to stop virus circulation. A preparedness and response plan was developed to respond to polio cases in areas of the country which are otherwise polio-free. A large four-province mopping-up activity was held within one week after receiving confirmation of a case from the north-eastern region, due to importation from north-western Pakistan. No secondary cases were found following this importation. In response to the outbreak in Tajikistan, Afghanistan established border vaccination posts, coordinated SIAs with its neighbour and maintained population immunity among communities along the border.

Afghanistan has been able to contain poliovirus circulation to limited areas and maintain levels of immunity elsewhere high enough to prevent the spread of virus to other parts of the country, even under very difficult security conditions. Almost 85% of the Afghan population lives in areas without evidence of polio virus circulation. The strategy of giving additional doses of OPV whenever the conflict allows (known as Short-Interval Additional Dose) and the consistent attention to community engagement and operations have put Afghanistan in a leading position against polio in this region. Much as Niger absorbed repeated importations from Nigeria and managed to interrupt transmission of indigenous virus, Afghanistan may find itself free of polio sooner than expected.

Afghanistan WPV cases 2010



Pakistan

The number of polio cases reported from Pakistan in 2010 (144) was higher than in any year since 2000 and higher than the combined total cases reported from the other three endemic countries – Nigeria, India and Afghanistan. Pakistan was also the only endemic country with an increase in polio from 2009, throwing it off-track for its primary programmatic milestone in the GPEI Strategic Plan, to stop polio by the end of 2012. Rent by conflict in its remote north-west and afflicted by the most catastrophic floods in living memory, Pakistan endured an unendurable year. An already fragile polio eradication effort – unable to reach enough children with vaccine – was severely tested.

And yet, polio eradication personnel and resources proved invaluable to the flood relief, and key political and health leaders at the national and sub-national level were moved by the rise in polio and the progress in other endemic countries to make significant public commitments to eradication. In December 2010, the Independent Monitoring Board discussed the alarming situation with national health leadership. The new year 2011 opened with the President of Pakistan launching a National Emergency Plan of Action for Polio Eradication.

Although polio cases occurred in every province of Pakistan, the overwhelming majority of cases were in conflict-affected parts of the Federally Administered Tribal Areas (FATA) and neighbouring areas of Khyber Pakhtunkhwa (KP) province. A limited number of high-risk districts account for the survival of poliovirus circulation in Pakistan. These 14 districts, classified as 'high risk' or 'persistent transmission' districts, are in close proximity to a further 19 districts classified as 'extended high-risk'; together, the 33 districts form the main poliovirus transmission zones in Pakistan, from where more than 80% of cases in 2010 were reported.

The major risks to polio eradication in FATA and KP are: compromised access of vaccination teams to reach children due to insecurity; and management challenges, which result in poor campaign quality. In central Pakistan, the main risks are the inconsistent quality of polio campaigns. In this region, access to children is further compromised by the poor law-and-order situation in some remote areas of the Indus river system. Central Pakistan was also badly affected by the 2010 floods, which amplified poliovirus transmission risks through large population displacement, damage to the health infrastructure, increased pressures on management, and compromised sanitation and water supply.

In conflict-affected areas of north-western Pakistan, steadfast attempts to open up access to children met some success under the leadership of FATA and KP authorities, using specific strategies for conflict-affected tribal agencies. Crisis taskforces were formed in mid-2010, comprising civil government and military personnel, to identify solutions to inaccessibility. In KP, the number of children in inaccessible areas dropped from 100,000 in February – 2%

ZAIDI, UNICEF

Zahid, 6, practices walking with the aid of metal bars, in the city of Karachi, Sindh Province. The metal bars were made by Zahid's uncle, who works in a factory manufacturing medical instruments for hospitals. Zahid was diagnosed with polio in November 2010, after he tumbled in an alley and could not get up. "It happened so suddenly", said Zahid's father.

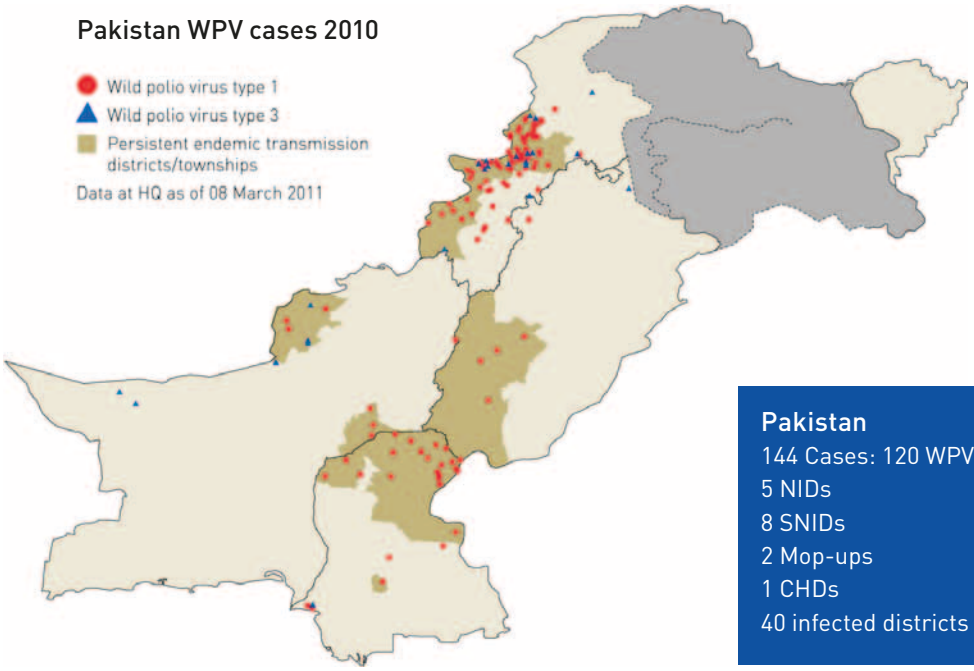
SYED HAIDER, WHO

Caked in mud, a man looks through remnants of his home after severe flooding in Pakistan in 2010.

of the target population – to a handful in December 2010. In FATA, however, this number reached just over 350,000 in the September-October NIDs and never went below 225,000 – 20% of the target population. It is hoped that the work of these agency taskforces can lead to improvements in access and quality of SIAs in 2011 to match coverage figures (regularly >80-85%) reached by Afghanistan's polio-free Eastern Region across the border.

The expansion of environmental surveillance to more sites in all four provinces revealed the true scale of transmission, enabling a much more aggressive and widespread response. Positive samples were identified in sewage in every province of the country. Political and social leaders employed the tools at their disposal: the Federal and Provincial Ministers of Health advised District Coordination Officers in areas with a surge in cases to personally oversee improvements in SIA quality. Multi-sectoral coordination continued in order to vaccinate children at every opportunity, including through motorways authorities, traffic police, national registration and the media. The Inter-religious Council for Health oriented over 16,000 religious leaders on the importance of vaccination and polio eradication; information materials were then developed by the leaders themselves to raise community awareness.

Intense support and advocacy by the international development community in response to the renewed major outbreaks in Pakistan included an official visit by World Health Organization (WHO) Director-General Margaret Chan and Regional Director of the WHO Eastern Mediterranean Office Hussein A. Gezairy, who travelled to KP to



Pakistan
144 Cases: 120 WPV1, 24 WPV3
5 NIDs
8 SNIDs
2 Mop-ups
1 CHDs
40 infected districts out of 135

launch polio vaccination campaigns and held discussions with President Asif Ali Zardari. In early 2011, the president also discussed polio eradication with Co-Chair Bill Gates of the Bill & Melinda Gates Foundation.

Pakistan now represents the greatest risk to the global polio eradication effort, with two serotypes of poliovirus circulating concurrently, an explosive outbreak along the north-western border with Afghanistan, residual transmission in multiple areas, active conflict in high-risk areas, and repeated international spread into polio-free areas of Afghanistan.

Primary targets of the National Emergency Action Plan are the 33 persistently infected and high-risk districts/agencies/towns in the country, where sub-optimal OPV coverage during campaigns continues to allow poliovirus transmission, and where accountability by district authorities is inadequate. Similar district-specific plans have had success in 2010 in Karachi and the greater Quetta area (Baluchistan). Efforts started during the first quarter of 2011 to extend the high-risk area planning concept to sub-district level through the identification of highest risk Union Councils, for which specific plans are being made. WHO and the United Nations Children's Fund (UNICEF) have begun to revise and align their staffing plan to optimally support the implementation of the National Emergency Action Plan; in a new initiative supported by CDC, additional Stop Transmission of Polio (STOP) officers have been trained to work in the 16 highest risk districts.

In the outbreak area of FATA, the programme is working to improve SIA quality, particularly through tightened supervision of SIAs in the accessible areas, in which 75% of the FATA target population lives. In the inaccessible areas – controlled by either the army or by anti-government elements – polio teams conduct advocacy to negotiate access with the army leadership and with local community and religious leaders. Increasingly, immunization campaigns will be held whenever an opportunity arises, using the Short Interval Additional Dose (SIAD) strategy.

Comprehensive strategies to track and reach migrants, internally displaced persons, refugees and nomads who contribute to polio transmission within Pakistan and into Afghanistan is a central element of the plan. Targeted migrant strategies have proven invaluable in India, and it is hoped a similar focus will help to serve these communities.

It is clear that consistent government oversight, ownership and accountability for polio programme performance at each administrative level in Pakistan is essential to keep up with the pace of progress elsewhere. The devolution of health responsibility from national to provincial levels, while it brings risks attendant with decentralization, provides some opportunities to improve accountability. The performance of district health and political leaders in implementing the National Emergency Action Plan is closely monitored, and provincial administrations are beginning to strictly sanction (through removal or transfer of staff) low-performing district officials.

NOORANI, UNICEF

Rasheeda holds her one-year-old son, Wajid, who suffers from polio, in Adilpur Village of Ghotki District, Sindh Province. The disease is spreading in the wake of the floods.

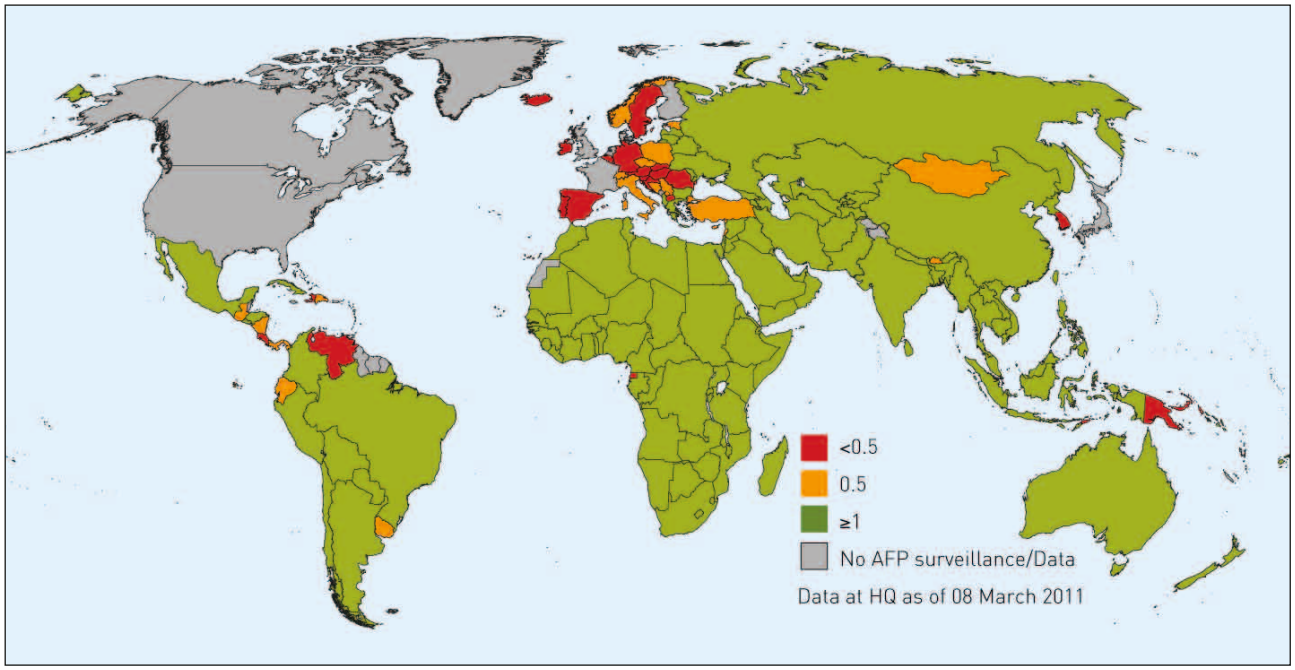
5 | Detection of poliovirus transmission

GPEI MAJOR PROCESS INDICATOR - 2010	OUTCOME		FINAL STATUS OF ACHIEVEMENT
Non-polio AFP rate >2 achieved at sub-national level in all endemic, re-established transmission, and "WPV importation belt" countries.	Endemic countries.	2 of 4 countries achieved.	Not achieved
	Re-established transmission countries.	3 of 4 countries achieved.	
	"WPV importation belt" countries.	6 of 19 countries achieved.	
	2009 or 2010 outbreak countries outside of the "WPV importation belt".	2 of 9 countries achieved.	

Surveillance for cases of acute flaccid paralysis (AFP[14]) is the core strategy to detect poliovirus transmission, be it due to wild polioviruses (WPVs) or vaccine-derived polioviruses (VDPVs). Surveillance helps guide supplementary immunization activity (SIA) strategy, and will facilitate the eventual certification of WPV eradication.

In 2010, as outlined in the new *GPEI Strategic Plan 2010-2012*, a number of additional surveillance mechanisms have been used to enhance poliovirus surveillance, including the expansion of environmental surveillance, the use of seroprevalence surveys, and the scaling up of technical support to areas with known sub-national surveillance deficits. At the same time, efforts focused on re-invigorating AFP surveillance in Regions which have already been certified as polio-free; the importance of this was in 2010 underlined by the explosive outbreak in Tajikistan which spread across central Asia and into the Russian Federation.

AFP surveillance at national level, 2010



14 *Three performance indicators are used to determine whether AFP surveillance is of 'certification' standard: the detection and investigation of >1 non-polio AFP case per 100,000 population aged <15 years; the collection of 'adequate' specimens from at least 80% of reported AFP cases; and the processing of 100% of specimens in one of the 145 WHO-accredited laboratories of the Global Polio Eradication Initiative (GPEI).*

Surveillance quality in WHO Regions

In 2010[15], in the World Health Organization African Region (AFR), 87% of countries (42/48) had a non-polio AFP rate of >1 per 100,000, with 75% (36/48) having an adequate collection rate >80%. In the Eastern Mediterranean Region (EMR), the corresponding rates were 95% (22/23) and 78% (18/23); and in the South-East Asia Region (SEAR), the rates were 90% (10/11) and 63% (7/11). Although the European Region (EUR) is certified as polio-free, it was re-infected in 2010, with outbreaks occurring in Kazakhstan, the Russian Federation, Tajikistan and Turkmenistan. While these outbreaks at this point do not affect the Region's certification standard, for operational purposes the Region is considered re-infected. In 2010, 47% of countries with AFP reporting systems (21/44) in EUR had an AFP rate of >1 per 100,000, with 45% (20/44) having an adequate collection rate of >80%.

In priority countries (all endemic, re-established transmission and 'WPV importation belt' countries), the recommended AFP detection rate, at sub-national level, for operational purposes of >2 per 100,000 population aged <15 years was achieved in two of the four endemic countries (not achieved in India and Pakistan); in three of the four countries with re-established transmission (not achieved in Angola); and in six of the 19 countries of the 'WPV importation belt' (not achieved in Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Liberia, Mali, Mauritania, Niger, Somalia and Togo).

While overall, countries in polio-infected Regions had good indicators at national level, sub-national surveillance gaps persisted in some key priority areas. Such gaps mean that poliovirus transmission may continue undetected, as was the case in the Uganda/Kenya border area, when in September 2010 wild poliovirus type 1 (WPV1) was detected in Uganda, genetically-linked to the outbreak in Kenya in 2009. In eastern Democratic Republic of the Congo and north-eastern Angola, although available indicators showed that AFP surveillance was of adequate quality, cases appeared in 2010 that demonstrated undetected transmission (for more than 12 months in the case of the former).

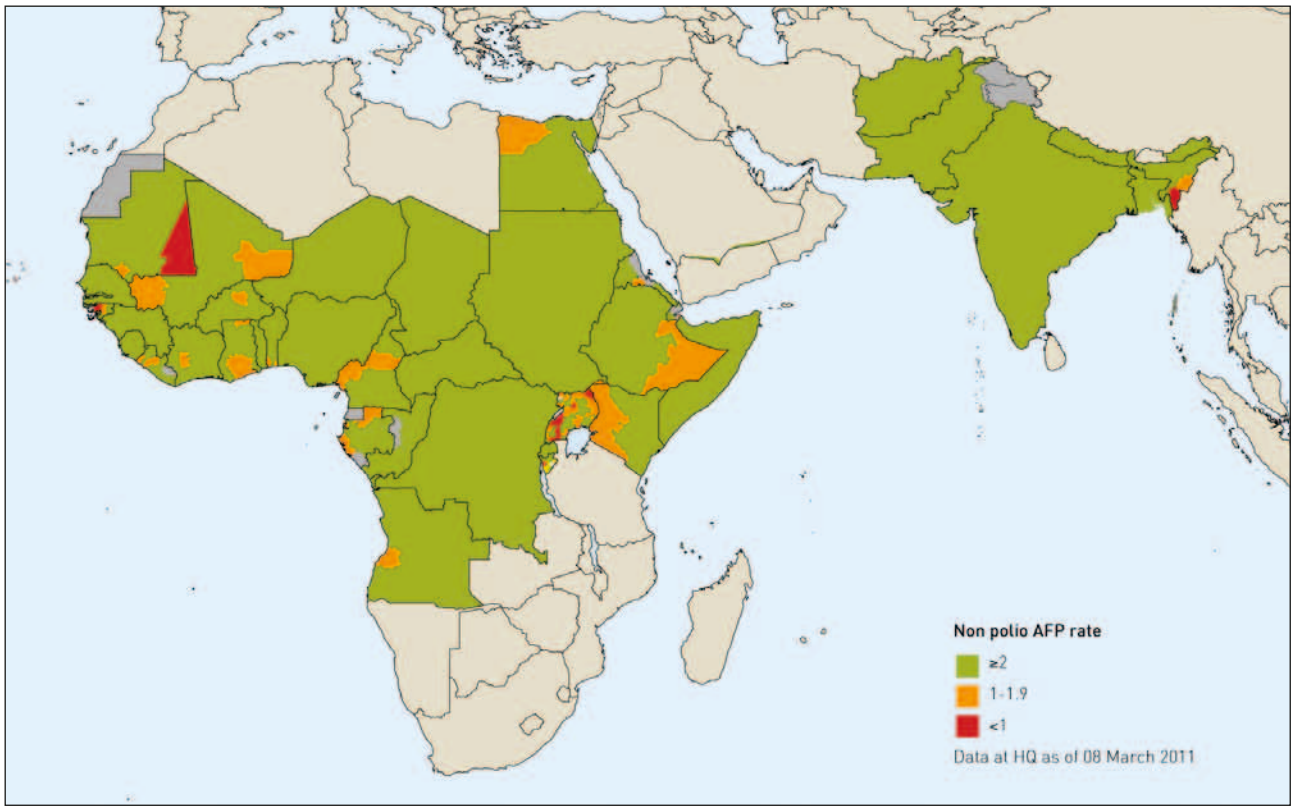
Given the substantial risks undetected transmission continues to pose to countries' eradication efforts, the Global Polio Eradication Initiative (GPEI) in 2010 focused on creating systems to identify and fill these sub-national gaps. In 2010, key surveillance assessments and reviews were conducted in EUR (in Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan); in SEAR (with four sub-national state reviews conducted in India and one in Nepal); in EMR (in Afghanistan, Egypt and Djibouti); and in AFR (in Cameroon and Mozambique, and planned reviews for the early part of 2011 to be conducted in Chad, the Democratic Republic of the Congo , Nigeria and Uganda). A new 'rapid surveillance assessment tool' was first used in Tajikistan and Uzbekistan, enabling a meaningful field surveillance review within five to seven days, instead of 10 to 14 days.

Surveillance indicators 2009 vs 2010

REGION	AFP CASES REPORTED		NON-POLIO AFP RATE		AFP CASES WITH ADEQUATE SPECIMENS (%)	
	2009	2010	2009	2010	2009	2010
AFR	15,127	16,511	3.9	4.2	89	87
AMR	1,873	1,983	1.1	1.2	79	79
EMR	10,611	11,330	4.4	4.6	91	91
EUR	1,363	2,083	0.9	1.2	84	86
SEA	54,962	60,551	8.8	9.5	84	83
WPR	6,291	6,410	1.8	1.8	87	89
Global total	**90,227**	**98,868**	**4.9**	**5.4**	**86**	**85**

15 *In 2010, the following countries in polio-infected Regions did not reach certification-standard surveillance: Algeria, Bahrain, Bhutan, Botswana, Cape Verde, Côte d'Ivoire, Djibouti, Equatorial Guinea, Guinea Bissau, Lebanon, Malawi, Maldives, Morocco, occupied Palestinian territory, Qatar, Republic of the Congo, Sao Tomé and Principé, Senegal, Timor-Leste and Thailand. Seychelles, Reunion and St Helena did not report AFP data, as no standard AFP surveillance is conducted.*

Sub-national AFP surveillance, 2010, in polio-endemic regions



To further validate epidemiological evidence with programme performance of supplementary immunization activities (SIAs), and supplement AFP surveillance, environmental surveillance continued to be expanded in 2010. The only positive sewage sample from Mumbai (India) in 2010 was detected in November 2010. Sampling was expanded from May 2010 to include new sites in Delhi, where specimens were WPV-positive from May to August and have been negative since then.

Weekly environmental sampling of sewage water was expanded in 2010 to six cities in Pakistan (Karachi, Lahore, Multan, Peshawar, Rawalpindi and Quetta): 80/157 (51%) samples collected in 2010 from all six tested positive for WPV, including samples collected in the cities of Karachi and Lahore, where no WPV-positive AFP cases were found. Environmental surveillance has proven to be a particularly important tool in Pakistan to supplement AFP surveillance. With parts of the country inaccessible due to insecurity, environmental surveillance in late 2010 and early 2011 has confirmed country-wide transmission of wild poliovirus. The Nigeria Expert Review Committee on Polio Eradication and Routine Immunization (ERC) recommended that environmental sampling in Kano be operational by early 2011. Patna (Bihar), India, plans to start sampling in 2011.

The combination of data from AFP surveillance and environmental surveillance was further supplemented in some areas by seroprevalence surveys, to provide a triangulation of data and an even clearer epidemiological and programmatic picture in key areas. Seroprevalence surveys were conducted in Uttar Pradesh and Bihar (India) and are planned for the same areas as well as Kano (Nigeria) in 2011.

The outbreak affecting central Asia and the Russian Federation in 2010 has underscored the need for ongoing strong surveillance and rapid and full transparency of reporting. While all countries in central Asia have conducted extensive SIAs, confidence that transmission has stopped requires reliable laboratory and surveillance data to demonstrate the consistent absence of wild poliovirus. It is essential that in 2011, all specimens collected from AFP cases are processed in WHO-accredited laboratories.

The focus for 2011 will continue to be to implement the new strategic approaches, in particular in high-risk areas with known sub-national surveillance gaps. The lesson learned from undetected pockets of transmission in 2010 is that the GPEI requires a full field presence and thorough surveillance reviews to ratify available data, especially in areas affected by conflict and recent transmission areas, and focusing on mobile, migrant and under-served communities. As soon as a polio-affected country has gone one month without a case, a team must be sent in to ratify progress.

Efforts continued in the three WHO Regions certified as free of indigenous wild poliovirus (the WHO Region for the Americas (AMR), EUR and the WHO Region for the Western Pacific (WPR)) to maintain the quality of AFP surveillance in Member States at levels that would allow the early detection of and response to possible WPV importations. In AMR, 47% of countries with AFP reporting systems (10/21) had an AFP rate of >1 per 100,000, with 33% (7/21) having an adequate collection rate >80%. In WPR, the corresponding rates were 56% and 31%.

In EUR and WPR, Regional Certification Commissions, supported by National Certification Committees, continued their annual detailed review of AFP quality and immunization activities to pinpoint areas where gaps might increase the risk that possible WPV would be missed, or where importations would be detected and responded to too late.

To better identify countries at risk of outbreaks following importation, all three polio-free Regions – particularly EUR and WPR following the Tajikistan outbreak – used additional detailed risk assessments prepared by the WHO secretariats; similar risk assessments of polio-free countries and areas are now also conducted in the remaining endemic Regions, particularly in EMR. Efforts are under way to standardize the methodologies used to conduct the risk assessments, including the preparation of guidelines of planning and implementing corrective actions to improve the performance of AFP surveillance in areas with surveillance gaps.

International or national reviews of AFP quality continued to be conducted in selected countries of endemic Regions as well as in EUR, to assess AFP surveillance quality and pinpoint areas of risk.

New environmental surveillance sites 2010

Global Polio Laboratory Network

The Global Polio Laboratory Network (GPLN) is comprised of 145 WHO-accredited laboratories whose primary responsibility is to analyse and characterize polioviruses. Although the primary source of poliovirus is samples from acute flaccid paralysis (AFP) cases, increasingly the GPLN analyses samples and viruses from non-AFP sources such as environmental samples, specimens from health children or AFP contacts and blood samples, particularly in the remaining endemic and high-risk countries. These analyses provide a critical understanding of poliovirus transmission dynamics, and allow for a more targeted approach of immunization strategies.

In 2010, a total of 193,374 specimens from AFP cases and 17,438 from non-AFP sources were analysed by the GPLN. The network reported a total of 975 WPV positive AFP cases[16] from 20 countries in 2010. The ratio of WPV1 to wild poliovirus type 3 (WPV3) cases was 10:1. Both WPV1 and WPV3 were detected in six countries (Afghanistan, Chad, India, Mali, Nigeria and Pakistan); WPV3 only was found in Niger; and 13 other countries[17] had only WPV1 detected.

As noted in the previous section, environmental surveillance continued to be expanded. There has been no wild poliovirus type 2 (WPV2) detected in any location since 1999.

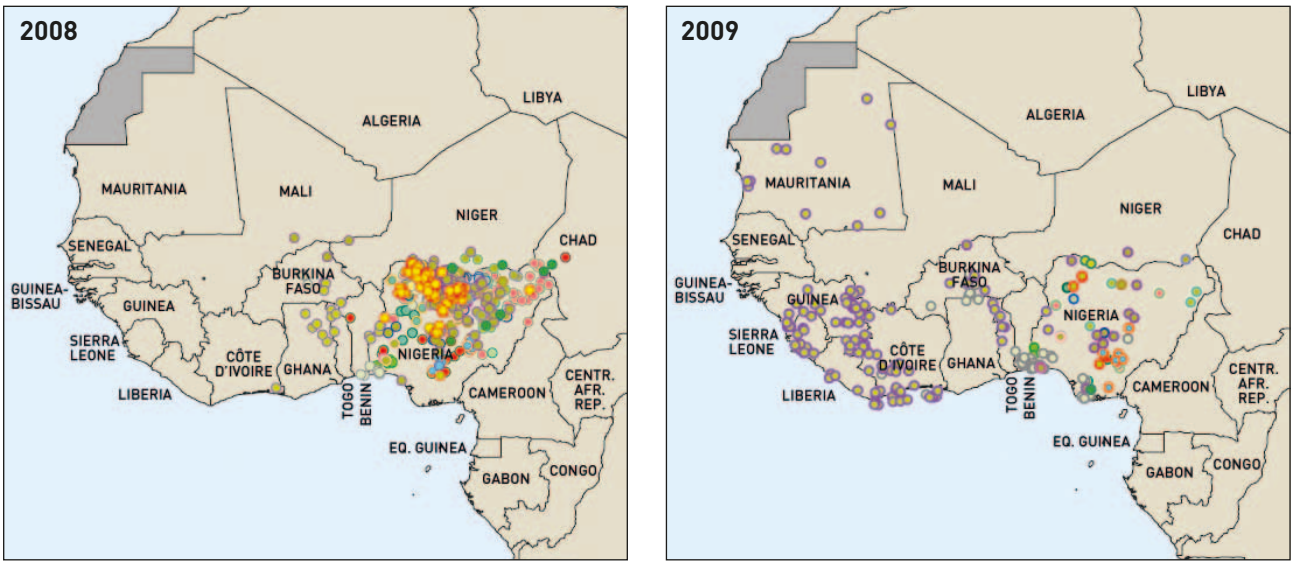
Genetic analysis of poliovirus

Genetic analysis continues to be used to investigate genetic and transmission links among WPV isolates. In 2010, four genotypes of viruses were detected: West Africa B (WEAF-B) wild polio virus of serotype 1 (PV1), WEAF-B type 3, South Asia (SOAS) type 1 and SOAS type 3.

WEAF-B type 1 and type 3 genotypes in Africa

All cases associated with the two genotypes of West Africa B (WEAF-B) occurred in Africa. Transmission of these two genotypes has never been interrupted in Nigeria; they have been the source of viruses exported to numerous other countries over the past five to eight years. However, most of the WEAF-B genotype viruses detected outside of Nigeria in 2010 represented continued transmission of previously imported viruses within individual countries or importations via intermediate countries and not direct importations from Nigeria.

Reduction in transmission chains in Nigeria 2008-2011



16 *An additional 317 AFP cases from Congo with inadequate specimens were exceptionally classified as confirmed polio based on their association with the WPV1 outbreak in that country.*

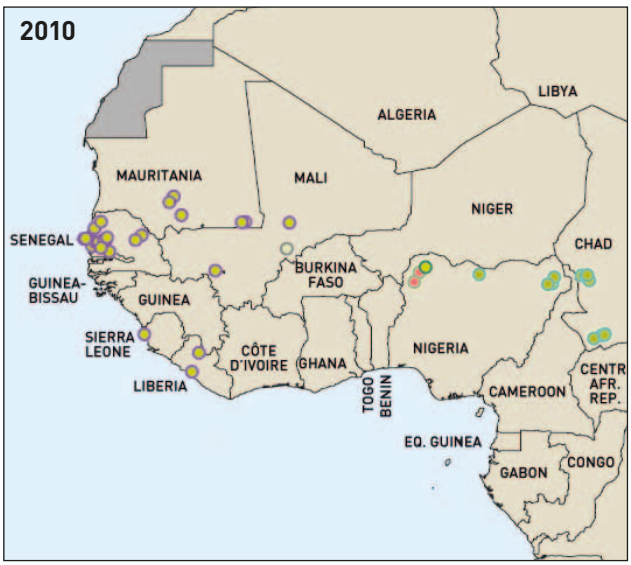
17 *Angola, Congo, Democratic Republic of the Congo, Kazakhstan, Liberia, Russian Federation, Mauritania, Nepal, Senegal, Tajikistan, Turkmenistan, Sierra Leone, and Uganda.*

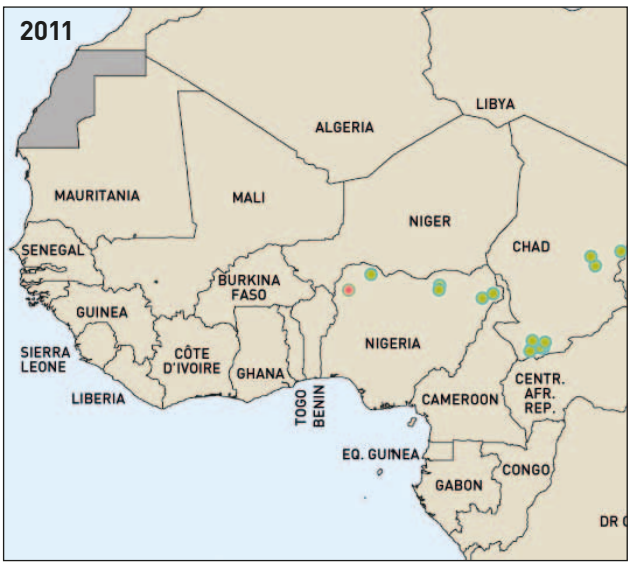
WEAF-B type 1 was also found in seven other countries: Chad, Liberia, Mali, Mauritania, Sierra Leone, Senegal and Uganda. WEAF-B type 3 was found in three other countries (Niger, Mali and Chad).

SOAS type 1 and type 3 genotypes linked to India

South Asia (SOAS) type 1 and type 3 genotypes were detected in India in 2010. Transmission of both genotypes declined substantially compared to 2009, based on the number of total reported WPV cases. In 2010, viruses from the northern provinces of Uttar Pradesh and Bihar together accounted for 45% of all detected WPV in India, compared to 97% in 2009. However, there was exportation of WPV1 from Uttar Pradesh and Bihar to four other Indian states in 2010, to neighbouring Nepal and to Tajikistan in central Asia and from there to Kazakhstan, Turkmenistan and the Russian Federation.

WPV3 viruses detected in Haryana, Jharkhand and West Bengal in India in 2010 were related to those found in Uttar Pradesh in 2009. Environmental surveillance found SOAS type 1 and type 3 in Delhi sewage and signalled at least three introductions of viruses from Bihar, although no cases were confirmed in Delhi in 2010. In Mumbai, WPV1 linked to Bihar was found in both sewage and cases in 2010.





Colours represent different genetic transmission chains.

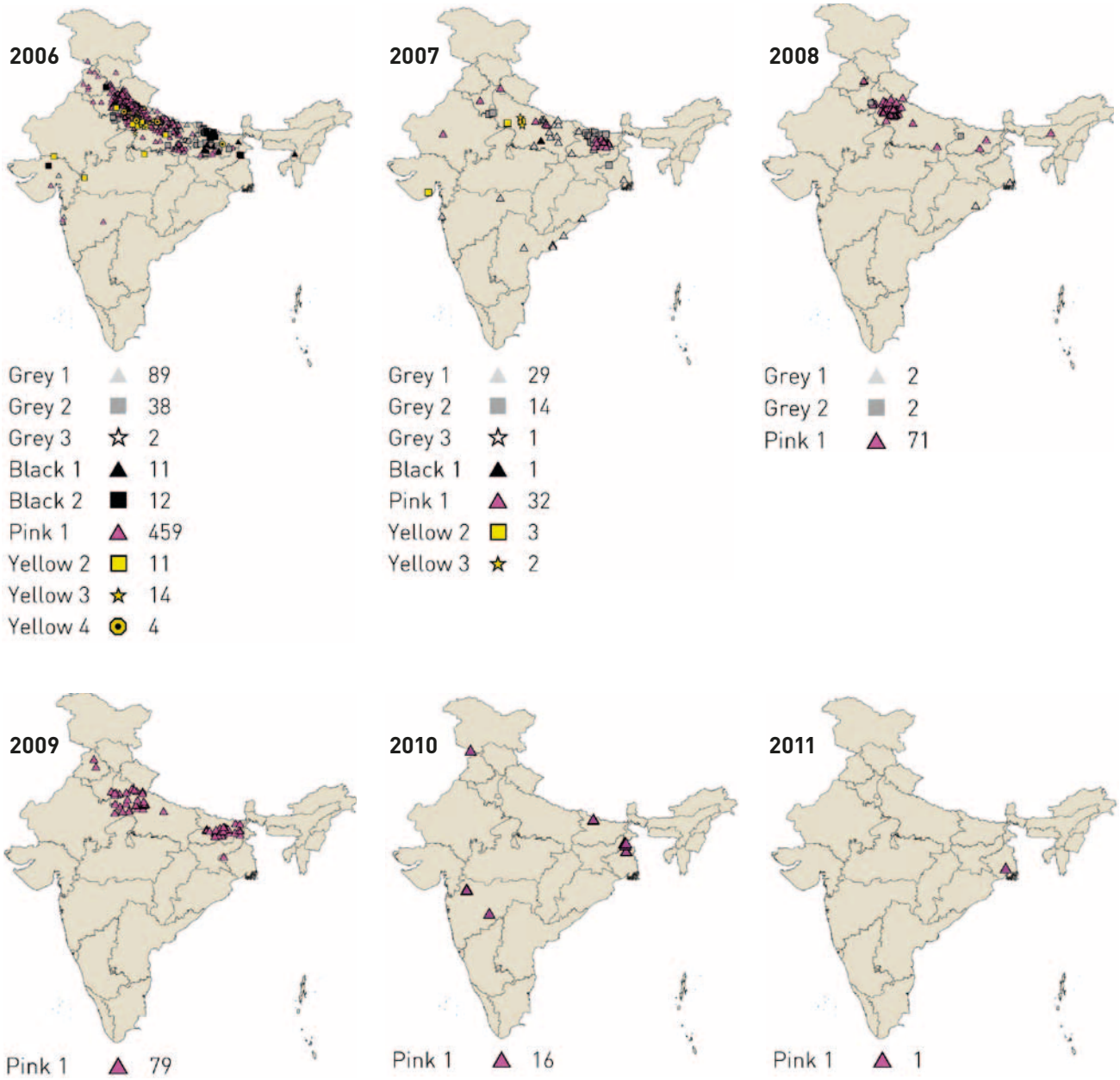
Transmission of SOAS type 1 genotype viruses also occurred in three African countries in 2010: Angola, the Democratic Republic of the Congo and the Republic of Congo.

SOAS genotype PV1 and PV3 detected in Afghanistan and Pakistan are genetically distinct to those from other locations. Type 1 in the southern provinces of Afghanistan and Sindh and Khyber Pakhtunkhwa in Pakistan represented uninterrupted endemic transmission. SOAS type 3 transmission continued without interruption in Afghanistan and Pakistan, and genetic diversity increased.

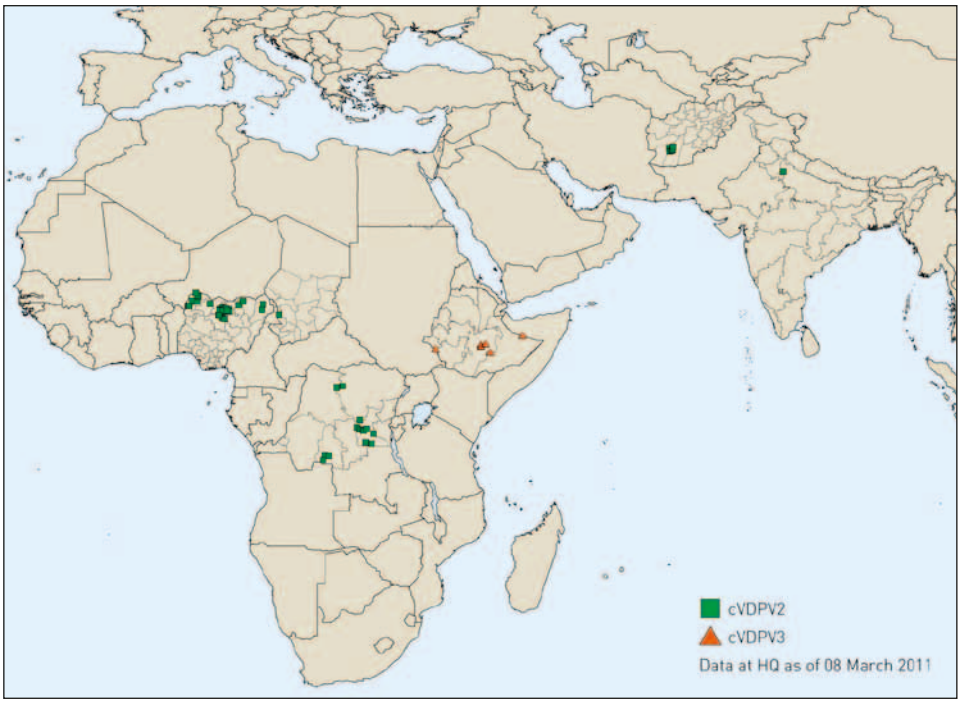
VDPV detection

Outbreaks of type 2 circulating vaccine-derived polioviruses (cVDPVs) were newly detected in Afghanistan and Ethiopia and continued in India into the first quarter of 2010. In Ethiopia, cVDPV detected in 2010 was due to type 3. Previously detected cVDPV type 2 continued in the Democratic Republic of the Congo, Nigeria and Somalia. Single VDPV type 2 isolates, from AFP cases, in Niger and Chad in 2010 were genetically linked to the cVDPV outbreak in Nigeria. Type 1 and type 2 VDPVs were isolated from a single immunodeficient person each in Tamil Nadu

Reduction in transmission chains in India 2006-2010



Circulating VDPV cases 2010



and Delhi, India in 2010. A number of ambiguous VDPVs were detected (not linked to outbreaks), in Afghanistan, China and India. Consistent with trends from previous years, a number of ambiguous VDPVs have been isolated, including in Afghanistan, China, India and Israel, from various sources (including environmental surveillance). As in past years, no secondary cases have been associated with these isolates.

Accreditation of GPLN laboratories and expansion of real-time PCR

WHO continues to coordinate a quality assurance programme for the laboratory network, using a combination of on-site performance reviews, annual proficiency tests and weekly review of results to evaluate the accuracy and timeliness of reporting. Overall, 140 laboratories (95.8%) were fully accredited by WHO in 2010.

Introduced in 2009, the implementation of new real-time polymerase chain reaction (rRT-PCR) procedures for intratypic differentiation of polioviruses and screening for VDPVs was expanded in 2010. This procedure has played a critical part in further enhancing detection of all polioviruses, to enable rapid outbreak response. Emphasis shifted to providing on-site or remote training support to a few laboratories that had experienced initial implementation problems. An rRT-PCR training workshop was supported in the region of South East Asia in 2010: 35 labs are now conducting rRT-PCR as standard procedure, an increase of 66% from 2009.

Circulating VDPV 2009 vs 2010

COUNTRY		2009	2010
Afghanistan	VDPV 2		5
Chad	VDPV 2		1
DR Congo	VDPV 2	4	14
Ethiopia	VDPV 2	1	
Ethiopia*	VDPV 3	1	6
India	VDPV 2	15	1
Niger	VDPV 2		1
Nigeria	VDPV 2	153	27
Somalia	VDPV 2	4	1
Grand Total		**178**	**55**

6 | Management of long-term risks after polio eradication

With progress towards global eradication, attention is swinging towards preparations for a post-polio and post-oral polio vaccine (OPV) world. After the interruption of wild poliovirus (WPV) transmission globally, once WPV stocks have been contained and eradication has been certified, the long-term risks of polio will arise from continued cases due to vaccine-associated paralytic polio (VAPP) and vaccine-derived polioviruses (VDPVs), stemming from the continued use of oral polio vaccine (OPV) in routine immunization programmes. Research in the year 2010 generated new knowledge on VDPVs and on ways to make inactivated polio vaccine (IPV) safer to manufacture and more affordable to use. The individual tools currently in hand for the post-eradication era remain imperfect; however, by using these new tools in a smart combination, the balance of risk shifts such that sustaining routine OPV immunization after wild virus eradication would be a much riskier proposition than synchronizing OPV cessation globally and aggressively managing any residual VDPVs.

HANS EVERTS, WHO

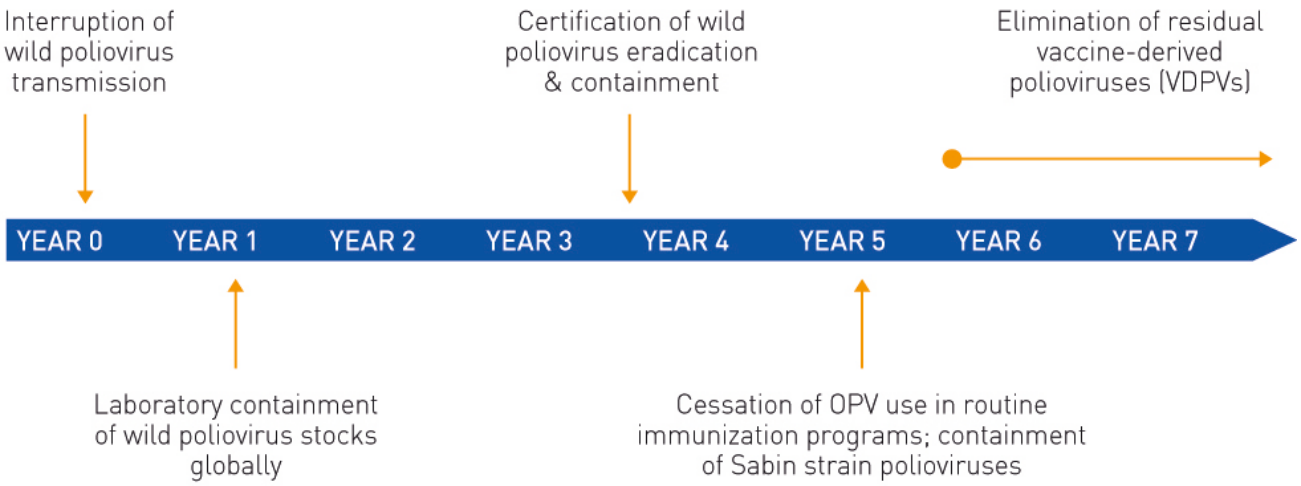
A happy mother holds up the bednet she received during NIDs in Niger.

OPV cessation

In 2008, appreciating the growing understanding of the risks posed by VAPP and VDPVs as wild poliovirus transmission is brought to a close, the World Health Assembly (WHA) requested the Director-General of the World Health Organization (WHO) to accelerate the programme of work on post-eradication risk management, including establishing a timeline for the eventual cessation of OPV.

With OPV cessation, the risk of new cases of VAPP or VDPVs would be all but eliminated. The challenge will be to synchronize OPV cessation globally, and manage the risks in the transition period between OPV cessation and the elimination of any residual VDPVs. The successful management of this transition period depends on an understanding of the risks associated with the eventual cessation of OPV, the development of new technology to prevent and treat emerging VDPVs and a risk management policy.

Timeline for OPV cessation and beyond



Generating new knowledge on VDPVs

While the risk of VAPP is already well-characterised (at a rate of approximately 1 in 2.7 million doses administered, almost exclusively at the first administered dose), efforts were accelerated in 2010 to further characterise and understand the risks associated with VDPVs. Using diagnostic procedures introduced in 2009, a clearer epidemiological picture was built of VDPV emergence and – in some cases – circulation (cVDPVs). A landmark study by Jenkins et al, published in the New England Journal of Medicine in June 2010, analysed the largest-ever recorded cVDPV outbreak, detected in Nigeria. For the first time ever, analysis unequivocally showed that – contrary to previous thinking – cVDVPs can be associated with an attack rate and severity of disease similar to that associated with WPV outbreaks. This new understanding of the potential impact of cVDPVs has significant implications for the post-eradication era. It is now very clear that post-eradication planning must plan and manage for the possibility of the emergence of cVDPVs which are equally-neurovirulent as WPVs, and must therefore be managed in the same manner.

Studies on the prevalence of immunodeficiency-associated VDPVs (iVDPVs) in Bangladesh, China, the Russian Federation, Senegal, Sri Lanka and Tunisia have in 2010 provided critical additional evidence on the prevalence and scale of risk associated with iVDPVs. Even rarer than cVDPVs, and never known to be associated with secondary cases, extended intestinal replication of OPV viruses has been observed in 33 individuals with rare immune deficiency disorders (with only two of the 33 known to continue to excrete).

Inactivated polio vaccine

The ability to affordably maintain immunity against polio in countries which choose to do so will be key to safely managing the transition period following OPV cessation, after which inactivated polio vaccine (IPV) will be the only appropriate vaccine. Recognizing that current costs of IPV are substantially higher than OPV, the Global Polio Eradication Initiative (GPEI) has intensified its programme of work to study a range of affordable IPV strategies. The four branches of this work are: schedule reduction (evaluating the use of one or two IPV doses to immunize and/or prime children); dose reduction (evaluating fractional dose- IPV given intra-dermally by needle-free device or micro-needle patch to spare antigen); antigen reduction (using adjuvant to reduce antigen contents per dose); and, production cost reduction (further optimizing production processes and producing IPV in developing countries with less or non-infectious strains).

In 2010, GPEI made significant progress in evaluating these strategies. Sonia Resik et al published in the Journal of Infectious Diseases the results of a clinical trial of fractional doses of IPV in Cuba. The study found a fractional dose (1/5th of a full dose) can prime 90% of children and two fractional doses can sero-convert 94% of children. The trial therefore demonstrated, on a large-scale, the feasibility of both schedule and dose reduction of IPV with intradermal administration.

An animal study completed in 2010 suggested that a tenfold reduction of IPV antigen is feasible with inclusion of an oil-in-water adjuvant. This approach is currently being evaluated in human studies.

With the stringent containment requirements after polio has been eradicated, the production of IPV in developing countries must be based on less or non-infectious strains. In 2008, WHO had established a collaboration with the Netherlands Vaccine Institute (NVI) to develop a Sabin-based IPV. By end-2010, this collaboration saw the completion of pre-clinical studies and the selection of the first two recipients of technology transfer.

In addition, six research collaborations are ongoing to assess further attenuated poliovirus strains, including with the University of California at San Francisco, the US Centers for Disease Control and Prevention (CDC), the National Institute for Biological Standards and Control (NIBSC) in the United Kingdom, the University of Leeds, and two projects with State University of New York (SUNY).

This area of work is expected to reduce the IPV price from a current US$ 3 per full dose to less than US$ 0.50 per immunizing dose.

Antivirals

The other option to address risks of emerging VDPV is treatment with antiviral drugs. Dozens of antiviral compounds have been tested for activity against polioviruses, with two promising candidates now in pre-clinical development. Such antivirals could play a key role in ensuring that infections are rapidly cleared in immunodeficient individuals who might be chronically shedding poliovirus. At the same time, antivirals could offer protection for persons exposed to poliovirus (e.g. through unintentional laboratory exposure) and for communities exposed to cVDPVs.

OPV stockpile

Finally, WHO has made progress in developing an OPV stockpile to respond to residual cVDPVs. By the end of 2010, nine monovalent OPVs (for type 1 and type 3 polio) had been licensed, and a global stockpile is under tender. The global stockpile of monovalent OPVs, and internationally-agreed processes for its management and use, will be critical to carry out timely response to any residual cVDPVs in the post-eradication era.

International coordination in the post-eradication era

With greater knowledge and new tools, the policy requirements for a post-eradication era are becoming clearer, particularly on those aspects requiring international coordination: synchronized OPV cessation, containment of all polioviruses and agreed processes for the use of OPV in response settings. A range of expert and advisory groups continue to help guide this work, including the Polio Research Committee (PRC) and the Strategic Advisory Group of Experts on Immunization (SAGE) Working Group on Inactivated Polio Vaccine (IPV).

Established in late 2008, the SAGE IPV Working Group is a critical forum to help advise on the development of a comprehensive immunization policy guidance in the post-eradication era in low- and middle-income settings, just as it continues to help identify ongoing research and knowledge gaps. Following discussion and consultation, in 2010 the SAGE IPV Working Group published the WHO position paper to inform policy on *Polio vaccines and polio immunization in the pre-eradication era*. At its March 2011 meeting, the group discussed the potential feasibility, rationale and implications of replacing trivalent OPV in routine immunization programmes with the newly-developed bivalent OPV (containing type 1 and 3 serotypes). The discussion stems from increasing evidence that VDPVs are associated significantly more with the type 2 vaccine component. With global wild poliovirus type 2 (WPV2) transmission having been successfully interrupted since 1999, the debate has begun on whether the risk of type 2 VDPVs emerging due to continued use of trivalent OPV now outweighs the public health benefits originally reaped from this vaccine.

OPV cessation

A new global Roadmap in 2011

The cornerstone of the strategy to minimise the long-term risks of polio in the post-eradication era is the cessation of OPV from routine immunization programmes. But how to go about it?

With progress towards polio eradication, attention is increasingly on preparation for eventual OPV cessation. New knowledge and available tools have helped to clarify which products and policies will need to in place, to minimise the risks associated with OPV cessation.

To this effect, 2011 will see the development of a new comprehensive 'Roadmap to OPV Cessation'. This paper will summarise current knowledge and strategy to shepherd the world through OPV cessation and beyond. While frameworks to prepare for the post-eradication period have been set out in the past, the new roadmap aims to consolidate all previous, foundational thinking into one plan. The aim is to provide global policy makers at regional and country level with an overview of the necessary steps and tools required to prepare for the post-eradication era, and to outline a justification for the international donor community's continued investment in the GPEI.

Intensification of preparation for polio-free world

While new tools – some ready and some in development – will go a long way to helping eliminate any residual VDPVs following OPV cessation, there is a need for further research and for product and policy development. In 2011, ongoing research will continue to find new solutions, and new research will be undertaken to provide the GPEI with additional tools for the post-eradication era. These projects involve learning more about the frequency and nature of VDPVs, strategies to enhance mucosal immunity and new vaccination approaches. With the progress in interrupting wild poliovirus transmission globally, preparation for the post-eradication era will intensify.

A health worker, a mother and her child. Oral polio vaccine is administered alongside measles vaccine during Child Health Days in Nigeria in 2010. Thomas Moran, WHO.

7 | Strengthening immunization systems

Strengthening immunization systems for the delivery of all childhood vaccines has been one of the four core strategies of the Global Polio Eradication Initiative (GPEI) since its launch in 1988. The GPEI's work to strengthen immunization services is essential to optimizing the broader benefits of the GPEI investment. A key objective of the *GPEI Strategic Plan 2010-2012* has been to further scale up this area of work.

GPEI MAJOR PROCESS INDICATOR 2010	MEASUREMENT	FINAL STATUS OF ACHIEVEMENT
By end-2010 : >80% of countries with GPEI international staff establish multiyear plan for all immunization services (including polio).	Reports from regional offices on countries that have established multiyear plans for all immunization services.	By end-2010 : >80% of countries with GPEI international staff establish multiyear plan for all immunization services (including polio). 100% of countries with GPEI international staff have multi-year plan for all immunization services (including polio).
>25% of polio field staff time documented as contributing to immunization systems strengthening in the 'WPV importation belt'.	Results from AFRO staff surveys.	>25% of polio field staff time spent contributing to immunization system strengthening.

Polio staff and expertise for health systems

Ever since the inception of the GPEI in 1988, polio-funded field staff have been working within national immunization systems; the key components, including service delivery, cold chain and logistics, linking with the community, surveillance and monitoring, management and supervision are fundamental to polio eradication.

To determine the nature of activities and time spent on various areas of work, a staff survey was conducted in the World Health Organization (WHO) African Region in 2010. Questionnaires were sent to the Regional Office, inter-country, national and sub-national polio eradication staff. A total of 407 staff (97%) responded from 38 countries, including Nigeria, the Democratic Republic of the Congo (DR Congo), Angola and Ethiopia.

The survey showed that all staff were engaged in health system strengthening through a range of activities, as shown schematically below.

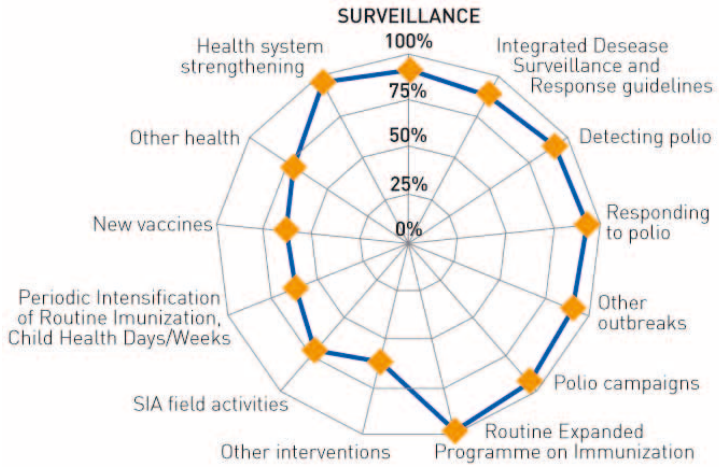
Staff spent 61% of their time on work that was not for polio alone; 39% working on control of multiple diseases at the same time (including polio), and 22% on non-polio related activities. Often staff worked on outbreaks of other diseases: measles, meningitis, cholera, H1N1, yellow fever and malaria, among others. The survey also documented work beyond routine immunization, including leading trainings on maternal and child health and child survival and conducting primary healthcare reviews.

These linkages between polio eradication and routine immunization strengthen entire immunization systems. Routine immunization microplans can be reviewed against the polio-prepared supplementary immunization activity (SIA) microplans, to ensure children – including those of the most marginalized groups and migrants – can be mapped and reached. Vaccine doses administered as part of routine immunization activities are regularly tracked during SIAs and surveillance investigations, to validate routine data collection. In some areas, including Uttar Pradesh in India, newborns identified during SIAs are recorded to ensure they are registered for routine services. Technical staff provide crucial trainings to district-level staff, and regular reviews and house-to-house sessions help assess where crucial gaps remain. All of these activities are helping reach more children with a range of life-saving vaccines, even in the most remote areas. An analysis of routine immunization services in Bihar, India, for example, indicates that with the support of the GPEI infrastructure on the ground, routine immunization levels have significantly increased over the past five years, from 18 to 54%.

Polio eradication staff strengthen immunization systems by:

- Collecting and analysing routine immunization statistics
- Focusing on increasing outreach to marginalized groups
- 'Reaching Every District' (RED) microplanning
- Helping ensure injection safety and leading investigations into adverse events following immunization
- Supporting vaccine stock management, cold chain and logistics
- Ensuring safe needle disposal management
- Forecasting vaccine supply requirements
- Developing strategies to increase access to all populations
- Supporting GAVI activities and applications
- Monitoring vaccination coverage
- Compiling multi-year plans
- Conducting surveillance for vaccine preventable diseases

STAFF ACTIVITIES



At the same time, GPEI staff have been instrumental in supporting the planning and forecasting for immunization needs at country-level. In all countries with GPEI technical staff, multi-year immunization plans have now been finalized, running through 2014. In most countries, these plans were submitted in 2010 to the Global Alliance for Vaccines and Immunizations (GAVI) for application for GAVI-eligible funding. The country plans include activities to sustain AFP surveillance at recommended levels, to integrate it with other disease surveillance and to conduct SIAs in high-risk areas.

Integration with broader health interventions

Many countries integrate other health interventions with polio vaccination campaigns. During measles elimination SIAs for the under 5 population, oral polio vaccine (OPV) is frequently given alongside measles vaccine. Vitamin A has been widely distributed for many years during polio SIAs, and has resulted in measurable improvements in indicators associated with Vitamin A deficiency in many countries. Another simple intervention that has been added in recent years is deworming in the form of Mebendazole or Albendazole tablets. Tetanus toxoid and yellow fever vaccines have different target populations, so are not readily added to polio intervention, while insecticide-treated bed nets (ITNs) require a large scale transport and logistics operation beyond the capacity of the vaccine cold chain. Nevertheless, there have been considerable successes in reaching children in 2010 with all of these added interventions, as shown in the table below.

Nigeria regularly adds other health interventions to its polio Immunization 'Plus' Days (IPDs) – this approach has been successfully used to further engage local communities and administrative leadership in polio eradication activities. During IPDs, a number of health add-ons are offered to communities during polio SIAs, including de-worming, ITNs, oral rehydration salts (ORS), soap, sweets and biscuit. Other antigens are also offered to infants during IPDs; these are recorded in routine immunization reports.

Integrated delivery of broader health interventions during polio SIAs

INTERVENTION	CHILDREN REACHED IN 2010*
OPV (ALL TYPES)	400 million
Measles	27 million
Deworming tablets	34 million
Insecticide treated bednets (ITN)	4 million
Tetanus toxoid (TT)	5 million
Vitamin A (Vit A)	82 million
Yellow fever (YF)	7 million

COUNTRY	DEWORMING	ITN	MEASLES	TT	VIT A	YF	FOLIC ACID
Afghanistan							
Angola	√		√	√	√	√	
Cape Verde			√				
DR Congo	√	√	√		√		
Eritrea			√		√		
Ethiopia			√				
Cameroon	√		√		√	√	
Chad	√		√		√		
Cote d'Ivoire	√				√		
Ghana	√				√		
Guinea	√				√		
Kenya			√		√		
Lao PDR	√			√			
Mozambique	√				√		
Pakistan				√			
Rwanda	√	√	√		√		√
Sierra Leone	√				√		
Uganda							
Yemen			√				

**Data as of 21 March 2010*

Polio eradication and equity

In every country, the last cases of polio are always among the poorest, most disadvantaged people in the community. They may live in slums or temporary housing or on boats; often they are migrant workers, ethnic minorities, and people living and working in the worst conditions, such as brick kilns or refuse dumps. What is certain is that they must receive the same protection from polio as everyone else in society if polio is to be eradicated.

History shows that this 'equity gap' is not always immediately recognized as a country embarks on polio eradication. The disadvantaged are not usually on anybody's 'beneficiary list' whether for vaccination, antenatal care, health education or nutritional supplements and many other basic services. So it is no surprise that polio transmission still continues in disadvantaged communities long after it has been eliminated in other areas.

TOM MORAN, WHO

Girls are just as likely as their brothers to be vaccinated against polio.

As countries develop specific plans to reach the disadvantaged, so they make progress to eliminate the last chains of transmission. There are many examples of how the disadvantaged have been reached: the boat-dwelling fishing communities in Cambodia and Vietnam, nomads in Pakistan and Afghanistan, and construction sites in Delhi. On a large scale, the Kosi River Plan targeted an area from where many migrant workers start their long journeys across India in search of employment.

Achieving equity for polio vaccination has dramatic results on polio transmission. At the time of writing, the states of Bihar and Uttar Pradesh in India, home to over 150 million people, many of them desperately poor, have been free of polio for over 6 months.

More evidence of these improvements in equity can be found from household surveys. The table opposite shows data from three successive Demographic and Health Surveys (DHS) household studies in India. The OPV3 data shows that by 2005-2006, the most disadvantaged had doubled their access to polio vaccine. Routine DTP3 (diphtheria, pertussis and tetanus) vaccine coverage had changed relatively little during this time, so it can be assumed that the increase in OPV coverage is due to polio eradication SIAs.

The table below shows that polio vaccination reaches children regardless of sex, an achievement not to be taken for granted in a world where girls routinely receive poorer health services than their brothers.

Immunization status of children by sex*

COUNTRY	% OPV3+ FEMALES	% OPV3+ MALES
Nigeria	85.32	85.57
Afghanistan	97.75	94.78
Pakistan	97.60	97.03
India	98.50	98.57
Chad	63.16	70.73
DR Congo	59.16	58.11
Angola	61.00	59.44
Sudan	88.32	86.81

** analysis of non-polio AFP cases 6-59 months reported to have received 3 or more OPV doses during SIAs.*

DHS India

	DTP3			OPV3			INFANT MORTALITY
	1992-1993	1998-1999	2005-2006	1992-1993	1998-1999	2005-2006	2005-2006
Highest education level							
No education	38	38	37	40	48	74	70
Primary	66	62	58	68	67	77	66
Secondary or higher	82	81	77	83	77	84	26
Household wealth index							
Lowest	31	34	34	33	44	70	70
Second	36	42	47	39	50	77	69
Middle	53	57	58	54	63	81	58
Fourth	66	71	69	68	71	81	44
Highest	83	83	82	84	78	87	29
Residence							
Urban	69	73	69	71	72	83	42
Rural	47	50	50	49	56	77	62

The gap between rich and poor has been narrowed with respect to access to polio vaccine, but not to other interventions, as illustrated by infant mortality rates. The DHS survey also showed that access to Vitamin A and de-worming medication is 50% less for the poorest compared to the highest wealth index.

Polio eradication has led the way in reducing inequities in access to polio vaccine for marginalized communities as well, by deliberately aiming to reach the most disadvantaged. For example, in the district of Gurgaon, a densely populated area of construction sites outside Delhi, WHO polio staff visited and documented families living in 750 migratory sites, adding their children to the polio microplans and then vaccinating them with OPV during the SIAs.

The lessons learnt in reaching marginalized populations have been incorporated into the Reaching Every District Strategy (RED), which has been successfully used in routine immunization since 2002. However, to realize the benefits of all vaccines, new and old, national immunization programmes will have to follow polio eradication's lead. Immunization should reach every community, every village, with special efforts to those who are often neglected.

The benefits of polio eradication stretch far beyond stopping the immediate economic and social costs of polio alone. The real long-lasting legacy is improving equity and access for the poorest and most disadvantaged in society.

8 | Financing

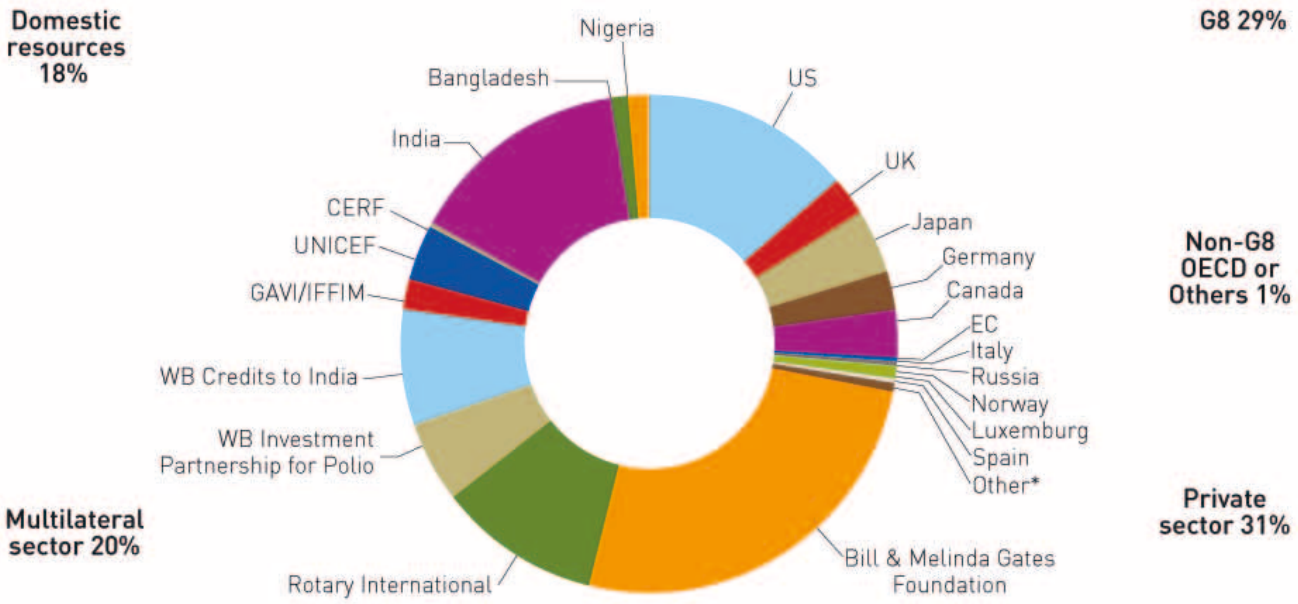
The year 2010 drummed home the significant risk that large funding gaps pose for the successful implementation of the *GPEI Strategic Plan 2010-2012* – and ultimately the success of the entire two-decade global effort that has brought polio so close to eradication. In February 2010, there was a US $330 million funding gap for 2010, against a $933 million budget. By May, insufficient financing forced the cancellation of planned activities in Burundi, Rwanda, Kenya, Uganda, Djibouti Eritrea, Yemen and the Congo, the scaling back of planned activities in the Democratic Republic of the Congo and Ethiopia and cuts to surveillance and campaign budgets in the World Health Organization (WHO) African Region. These cuts reduced the 2010 budget to $896 million, and by September the funding gap stood at $100 million. A combination of new funding and forwarding funds meant for 2011 activities filled this reduced funding gap.

"Not because of a lack of funds"...

On 18 June 2010, the final *GPEI Strategic Plan 2010-2012* was launched at a key stakeholders meeting in Geneva. The stakeholders stated loud and clear that polio eradication would not – could not – stumble at this final inch because of a lack of funds. Following the launch, US $495 million in new contributions and funding projections reduced the funding gap of US $1.3 billion to $810 million by September for the 2010-2012 period, the largest funding commitments coming from the Bill & Melinda Gates Foundation ($311.95 million) and Rotary International ($79.35 million).

Recognizing the critical juncture of the programme, UNICEF's Executive Director allocated US $20 million of the agency's discretionary regular resources for oral polio vaccine (OPV) procurement for activities across West and Central Africa. Additionally of note were Japan's greatly increased annual contribution; the 2010 commitments by Austria, Finland, Monaco, New Zealand and Spain; the multi-year commitment by Norway; and the additional year-end funding from Luxembourg.

Financial Contributions for 2010



*'Other' includes: Angola, Australia, Austria, CERF, Congo, India, Kazakhstan, New Zealand, Finland, Monaco, Netherlands, OCHA, Portugal, Qatar, Shinnyo-en, Turkey, UAE Red Crescent Society, UN Foundation.

G8 reaffirm support: Japan leads the way in 2010

On 26 June 2010, a week after the stakeholders launch of the *Strategic Plan*, G8 leaders reaffirmed support to the Global Polio Eradication Initiative (GPEI) at the Muskoka Summit in Canada. The G8 Muskoka Declaration states that: "G8 donors also remain steadfast in their support for polio eradication and remain committed to a polio-free world." Despite the political statements made by G8 leaders, there remain stark differences in levels of financing between countries. Japan is the only G8 donor to have significantly increased its contribution. Canada, the United States, Germany and the United Kingdom also confirmed additional financing to the Initiative.

Domestic funding equals G8 Pledges

Development partner financing continued to be matched by domestic financing from the remaining polio-endemic countries as well as those suffering outbreaks due to importations. As of September 2010, domestic funding equalled G8 pledges, with each representing about 28% of total GPEI contributions and projections for the 2010-2012 period. Of note, India's self-financing topped US $200 million at end-2010, with similar funding levels projected for 2011 and 2012. The Government of Nigeria committed US $13 million in 2010 and announced its intention to contribute up to $20 million in 2011.

Contributors

Currency in this section is the US dollar except where specified otherwise.

Australia provided $1.2 million over 2010-2012 for the Uruzgan province of Afghanistan. This contributions brings Australia's total funding to $17.31 million.

Austria contributed $270,000 for polio eradication activities in Ethiopia, bringing its total support to $3.15 million.

Bill & Melinda Gates Foundation announced in September $311 million in multi-year funding for 2010 - 2012 as well as a $100 million supplemental grant for mid-2010 to mid-2011. These grants bring the Foundation's total contribution to the GPEI, including matching grants to Rotary International, to $1.27 billion.

Canada continued its support for polio eradication, disbursing $29.18 million for Afghanistan and sub-Saharan Africa. In November, further to the Muskoka Initiative for child and maternal health, Canada announced a new multi-year commitment of Canadian $58.5 million (approximately US$61 million) over three years building on the country's ongoing commitment to eradicate the disease in Afghanistan and to strengthen surveillance and immunization systems. The contribution is expected to come into operation in mid-2011. Canada is the fifth-largest public sector donor to GPEI, having provided more than $272 million.

The **Central Emergency Response Fund (CERF)** responded quickly to funding appeals for the explosive outbreaks in Central Asia and the Republic of the Congo, providing $1.93 million and $2.0 million, respectively. CERF has provided $4.67 million to date.

In addition to its role as a spearheading partner, the **United States Centers for Disease Control (CDC)** in 2010 provided funding for OPV, operational costs and programme support to UNICEF and WHO and continued to dispatch its epidemiologists, virologists and technical officers to assist polio-affected countries in implementing polio eradication activities. US Congress appropriations to the CDC for polio eradication in its fiscal year 2010 totalled $101.8 million, bringing the CDC's total contributions to more than $1.5 billion.

The **European Commission** disbursed $900,000 in 2010 as part of its €1.4 million (approximately US$ 1.8 million) 2009-2010 contribution for Bangladesh. It also responded to the outbreak in the Republic of the Congo, providing $520,000 for emergency activities. The EC is the sixth largest public-sector donor to the GPEI, with contributions totalling $193.73 million.

Through an innovative funding platform, **Finland** provided $330,000 via Rotary International for activities in Afghanistan, bringing its total support to $1.38 million.

As part of a January 2009 pledge to provide $130 million (€100 million) over the next three years, **Germany** continued to provide significant support to Nigeria through its development bank (KfW), providing $20 million (€15 million) for OPV. Germany also continued to provide unspecified global funding. Germany's total support to the GPEI is $390.94 million, making it the fourth largest public sector donor.

India, in addition to largely self-financing its own polio eradication effort, made its first-ever external contribution, of $300,000 in 2010 for OPV in Tajikistan.

Italy provided $1.35 million in global unspecified funding. Italy's total support to the GPEI is $39.27 million.

Japan reinforced its vital support in the global effort to eradicate polio. In 2010, it provided approximately $40 million in OPV and operations funding through UNICEF Maternal Child Health grants, Humanitarian Grants and direct support to the Tajikistan outbreak. The GPEI further welcomed Japan's commitment shown in its new Global Health Policy, which places polio as a "global public health emergency". Japan is the third largest public sector donor to the Initiative, with contributions totalling over $415 million.

Luxembourg continues to be the GPEI's largest per capita donor. Luxembourg contributed $700,000 in 2010 as part of a multi-year commitment covering 2009-2013, as well as a year-end contribution of $1 million, bringing its total contributions to $14.36 million.

Monaco continued to provide consistent support to the GPEI, contributing $110,000 for activities in Niger. This brings Monaco's total funding for polio eradication activities in Niger to $500,000.

The Netherlands Ministry of Health in 2010 provided $130,000 to support polio work at the Dutch Institute of Public Health and the Environment, bringing the Netherlands' total contribution to polio eradication to $ 113.35 million.

New Zealand increased its support in 2010, providing $500,000 for global polio eradication efforts through its partnership with local Rotary clubs. This contribution brings New Zealand's support to $2.81 million.

Norway continued to provide important unspecified contributions to the GPEI. In 2010, it provided $ 9.78 million, the lion's share of which was the 2010 component of a 2010-2011 global contribution, bringing its total contributions to the GPEI to $68.80 million.

The **Office for the Coordination of Humanitarian Affairs (OCHA)** provided $130,000 for OPV for activities in Somalia.

Portugal contributed $140,000 in funding for Angola, bringing its total support to $1 million.

Following the stakeholder launch of the new *Strategic Plan*, **Qatar** was the first donor to provide financing to help close the funding gap. Its $50,000 contribution brings its funding total to $380,000.

Rotary International, in addition to being a spearheading partner in the GPEI, is also the second-largest private sector donor. In 2010, Rotary International disbursed $101.85 million to the Initiative. By 2013, Rotary International will have contributed more than $1.2 billion to the GPEI.

The **Russian Federation** disbursed $2 million a part of its new $5 million multi-year commitment (2010-2012) made in response to the 2010 G8 communiqué. The Federation has provided $33 million to the Initiative since 2003.

Shinnyo-en provided US$100,000 to support technical assistance and surveillance activities in Vietnam to ensure its polio-free status and that of the Western-Pacific Region.

Spain contributed $750,000 in 2010 as part of a 2009-2011 commitment covering 2009-2011 for surveillance activities in Africa. This was complemented by $610,000 in additional unspecified funding. Since joining the GPEI in 2004, Spain has contributed $13.79 million.

For the third consecutive year, **Turkey** made a contribution to the GPEI in 2010. It provided $80,000, bringing its total support to $730,000.

In response to the floods in Pakistan, the **United Arab Emirates Red Crescent Society** provided $300,000 for OPV for activities in heavily affected areas.

In 2010, the **United Kingdom's Department for International Development (DFID)** disbursed $25.08 million in global support and specified funds for Tajikistan. The United Kingdom is the second largest public sector contributor to the Initiative with total contributions of $898.55 million.

The United Nations Foundation (UNF) in 2010 continued its support of the GPEI's resource mobilization efforts with a contribution of $200,000. This funding brings the UNF's total support for the GPEI to $43.34 million.

The US Congress in its fiscal year 2010 allocated $32 million to the **United States Agency for International Development (USAID)** for polio eradication activities. Funds were used to support social mobilization, surveillance and laboratory activities, outbreak response and monitoring in priority countries, bringing USAID's total support to $412 million.

World Bank Investment Partnership for Polio

In 2001, an innovative financing mechanism, commonly referred to as "IDA buy-downs", was developed to allow the use of credit issued by the International Development Association (IDA), the concessionary lending arm of the World Bank, for OPV procurement for polio eradication activities. Third-party donor funding (provided by the Bill & Melinda Gates Foundation, the CDC, Rotary International and the UNF) is used to "buy-down" IDA credits and turn them into grants. In 2010, $51.41 million was disbursed under the current buy-downs for Pakistan and Nigeria. The total amount of the World Bank Investment Partnership for Polio funding is $316.37 million.

Annex A | Progress report of the GPEI major process indicators for 2010

Milestone 1

MILESTONE	MEASUREMENT	BASELINE	STATUS[18]	COMMENTS
By mid-2010: Cessation of all polio outbreaks with onset in 2009	Number of countries[19] with onset of outbreak in 2009 that report a genetically-related WPV after June 2010	15 countries with WPV importation in 2009	0 countries reporting WPV after 30 Jun 2010	Countries with outbreak in 2009 reporting genetically-related WPV in 2010: **Mauritania**: latest case 28 April 2010 **Mali**: latest case 30 March 2010 **Sierra Leone**: latest case 28 February 2010
Ongoing: Cessation of new outbreaks within six months of confirmation of index case	Number of countries[20] with a new WPV importation (genetically-unrelated to previous circulation) persisting >6 months from confirmation of index case	11 countries with WPV importation in 2010 2 countries with WPV importation in 2011[21] (Gabon, Niger)	0 country with WPV importation persisting >6 months	Countries with outbreak in 2010-11 reporting WPV in last 6 months (latest case): **Republic of Congo**: 22 Jan 11 **Niger**: 19 Jan 11 **Gabon**: 15 Jan 11 **Uganda**[22]: 15 Nov 10 **Russian Federation**: 25 Sep 10

Process indicators

GPEI MAJOR PROCESS INDICATOR 2010	MEASUREMENT	BASELINE	FINAL STATUS OF ACHIEVEMENT	COMMENTS
WPV IMPORTATION BELT				
By end-2010:100% of WPV importations and cVDPVs in previously polio-free areas responded to per international outbreak response guidelines	% of WPV and cVDPV outbreaks responded to as per international outbreak response guidelines	**2009**: WPV: 87%, 13/15 importation countries responded to as per international guidelines. Median response time was 27 days, range 9-43 days.	**2010**: WPV: 82%, 9/11 importation countries responded as per international guidelines. Median response time was 14 days, range 2-33 days.	Countries not meeting outbreak response criteria in 2010: **Russia**: data not available on timing of mop-up activities **Kazakhstan**: Only 2 SIAs conducted following the WPV1 case.
		2009: cVDPV: NA. Data not systematically collected.	**2010**: cVDPV: 0% previously polio-free countries with cVDPV	
International assessment conducted in 75% of countries with importation events persisting for >6 months	International assessment conducted in 75% of countries with importation events persisting for >6 months	International assessment conducted in 75% of countries with importation	Not applicable	All outbreaks have been controlled within 6 months

18 Calculated from data reported to WHO/HQ as of 30 March 2011.
19 Excluding endemic and re-established transmission countries (analysed separately).
20 Excluding endemic and re-established transmission countries (analysed separately).
21 Niger reported a WPV3 with onset 19 Jan 2011 that is pending sequencing results.
22 WPV reported in Uganda in 2010 is linked to WVP from Kenya in 2009 and not related to previous Uganda circulation confirming the continuation of the 2009 Kenya/Uganda outbreak.

Milestone 2

MILESTONE	MEASUREMENT	BASELINE	STATUS[23]	COMMENTS
By end-2010: Cessation of all 're-established' poliovirus transmission	Number of countries with 're-established' WPV transmission reporting genetically related WPV after 31 December 2010	4 countries with 're-established' poliovirus	2 countries with continued re-established WPV in 2011 (Angola, Chad) 1 country at high risk of continued re-established WPV (DRC)	**Angola**: 4 Feb 2011 case is related to re-established WPV **Chad**: 30 January 2011 case is related to re-established WPV **DRC**: Re-established WPV1 detected as recently as 22 November 10 in Katanga along with 2 WPV1 from December (also in Katanga) pending sequencing

Process indicators

GPEI MAJOR PROCESS INDICATOR 2010	OUTCOME	FINAL STATUS OF ACHIEVEMENT
ANGOLA		
< 10% missed children in all districts of Luanda, Benguela, and Kwanza Sul during each SIA	5 of 22 districts with data achieved *(no data available for 8 districts within the 3 specified provinces)*	Not achieved
CHAD		
< 10% missed children in greater N'Djamena and in the southern and eastern WPV transmission zones during each SIA in the second half of 2010	0 of 3 zones achieved	Not achieved
DEMOCRATIC REPUBLIC OF CONGO		
> 80% adequate specimens in all provinces	2 of 11 provinces achieved	Not achieved
AFP rate > 2 in all provinces	11 of 11 provinces achieved	Achieved
< 10% missed children in each SIA in Orientale, North & South Kivu	0 of 3 provinces achieved	Not achieved
(SOUTHERN) SUDAN		
> 80% adequate specimen rates in all states	10 of 10 states achieved	Achieved
Non-polio AFP rate > 2 in all states	10 of 10 states achieved	Achieved
< 10% missed children in each state during each SIA	2 of 10 states achieved	Not achieved

23 *Calculated from data reported to WHO/HQ as of 30 March 2011.*

Milestone 3

MILESTONE	MEASUREMENT	BASELINE	STATUS[24]	COMMENTS
By end 2011 : Cessation of all polio transmission in at least 2/4 endemic countries	Number of WPV cases reported year to date 2009 and 2010	WPV Jan-Dec 2009[11] : Afghanistan : 38 India : 741 Nigeria : 388 Pakistan : 89	% change 2009 to 2010 : Afghanistan: –34% India : -94% Nigeria : -95% Pakistan : +62%	WPV Jan-Dec 2010[11] : Afghanistan : 25 India : 42 Nigeria : 21 Pakistan : 144

Process indicators

GPEI MAJOR PROCESS INDICATOR - 2010	OUTCOME	FINAL STATUS OF ACHIEVEMENT
INDIA		
>95% population immunity to type 1 polio in the persistent transmission areas of western Uttar Pradesh and central Bihar	2 of 2 states achieved *Bihar at 98% and UP at 98% for type 1. As a baseline for the 2011 major process indicator the 2010 results for type 3 were Bihar at 78% and UP at 76%*	Achieved
NIGERIA		
<10% 0-dose children (per NPAFP data) in each of the 12 high-risk states (including the 8 persistent transmission states)	11 of 12 states achieved	Not achieved
AFGHANISTAN		
<10% missed children during at least 4 SIAs in each of the 13 conflict-affected districts with persistent transmission in the Southern region	0 of 13 districts achieved	Not achieved
PAKISTAN		
<15% missed children during at least 8 SIAs in every district of the Quetta area and the persistent transmission districts and agencies of NWFP and FATA	4 of 7 districts achieved (with data from 9 rounds)	Not achieved
<10% missed children during at least 4 SIAs in every town of Karachi	18 of 18 towns achieved	Achieved

24 Calculated from data reported to WHO/HQ as of 30 March 2011.

Major process indicators - all countries

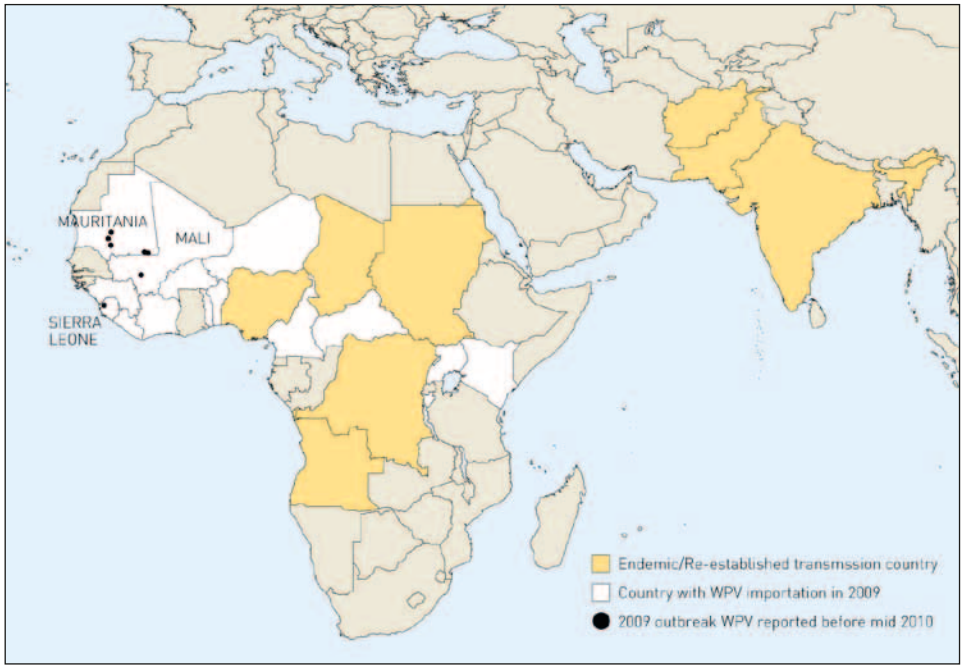
STRENGTHENING IMMUNIZATION SYSTEMS		
GPEI MAJOR PROCESS INDICATOR 2010	MEASUREMENT	FINAL STATUS OF ACHIEVEMENT
By end-2010: **>80% of countries with GPEI international staff establish multiyear plan for all immunization services (including polio)**	Reports from regional offices on countries that have established multiyear plans for all immunization services	By end-2010: >80% of countries with GPEI international staff establish multiyear plan for all immunization services (including polio) 100% of countries with GPEI international staff have multi-year plan for all immunization services (including polio)
>25% of polio field staff time documented as contributing to immunization systems strengthening in the 'WPV importation belt'	Results from AFRO staff surveys	>25% of polio field staff time spent contributing to immunization system strengthening

GPEI MAJOR PROCESS INDICATOR 2010	OUTCOME	FINAL STATUS OF ACHIEVEMENT	
Non-polio AFP rate >2 achieved at sub-national level in all endemic, re-established transmission, and "WPV importation belt" countries	Endemic countries	2 of 4 countries achieved	Not achieved
	Re-established transmission countries	3 of 4 countries achieved	
	"WPV importation belt" countries	6 of 19 countries achieved	
	2009 or 2010 outbreak countries outside of the "WPV importation belt"	2 of 9 countries achieved	

Annex B | Supporting data for progress report

Milestone 1a: By mid-2010, cessation of all polio outbreak with onset in 2009*

Status: 0 countries with 2009 outbreak WPV reported after mid-2010

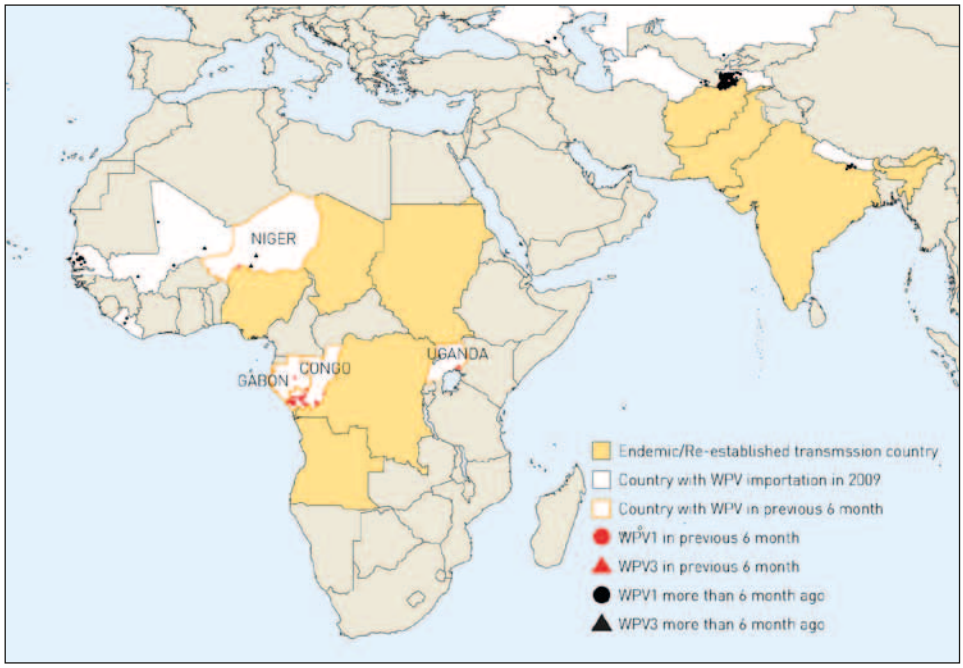


DATE OF MOST RECENT CASE	
Mauritania	28 Apr 10
Mali	30 Mar 10
Sierra Leone	28 Feb 10

Data at WHO/HQ as of 30 Mar 11.
** Excludes endemic and re-established transmission countries (separate milestones).*

Milestone 1b: Cessation of all new polio outbreaks within 6 months*

Status: 0 countries with WPV importation persisting >6 months

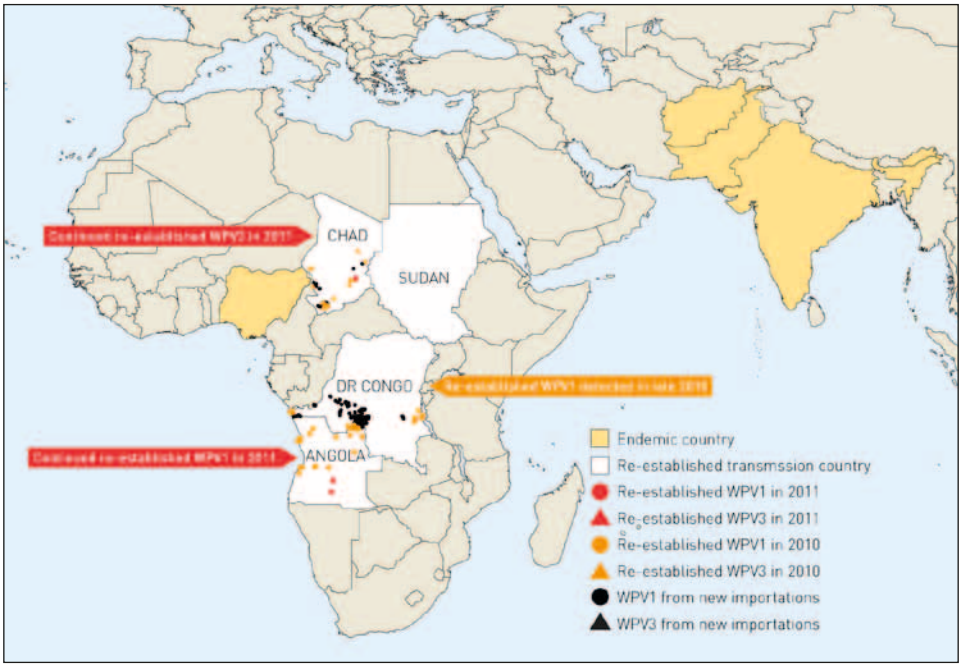


*DURATION	
Liberia	5 months
Senegal	3 months
Congo	2 months
Tajikistan	2 months
Nepal	2 months
Russia	1 month
Uganda	<1 month
Mali	<1 month
Gabon	<1 month
Kazakhstan	<1 month
Turkmenistan	<1 month
Niger	<1 month

Data at WHO/HQ as of 30 Mar 11.
** Calculated from date of notification to most recent case.*

Milestone 2: By end 2010, cessation of all re-established WPV transmission

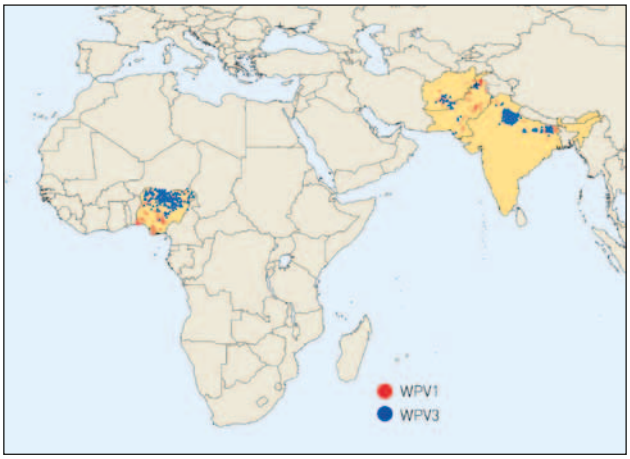
Status: 2 countries with continued re-established WPV transmission in 2011

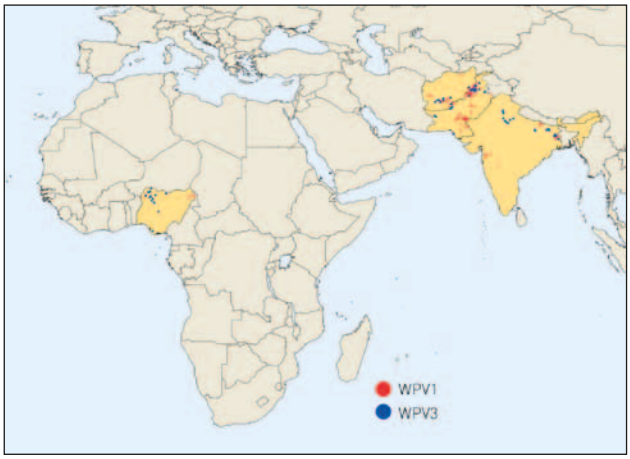


Data at WHO/HQ as of 30 Mar 11.

Milestone 3: By end 2011, cessation WPV in 2/4 endemic coutries

Status: Three countries with reduction in cases in 2010 compared to 2009





# WPV CASES IN 2009	
Afghanistan	38
India	741
Nigeria	388
Pakistan	89

Data at WHO/HQ as of 30 Mar 11.

# WPV CASES IN 2009	
Afghanistan	25 (-34%)
India	42 (-94%)
Nigeria	21 (-95%)
Pakistan	144 (+62%)

Data at WHO/HQ as of 30 Mar 11.

Acronyms and abbreviations

AFP	Acute flaccid paralysis
AFR	WHO African Region
AMR	WHO Region of the Americas
bOPV	Bivalent oral polio vaccine
CDC	US Centers for Disease Control and Prevention
CHD	Child Health Days
cVDPV	Circulating vaccine-derived poliovirus
EPI	Expanded Programme on Immunization
EMR	WHO Eastern Mediterranean Region
EUR	WHO European Region
GAVI Alliance	Global Alliance for Vaccines and Immunization
GPEI	Global Polio Eradication Initiative
GPLN	Global Polio Laboratory Network
IPDs	Immunization Plus Days
IPV	Inactivated polio vaccine
iVDPV	Immunodeficiency-associated vaccine-derived poliovirus
LGA	Local government area
LQAS	Lot Quality Assurance Sampling
mOPV	Monovalent oral polio vaccine
NGO	Non-governmental organization
NIDs	National Immunization Days
OPV	Oral polio vaccine
RED	Reaching Every District
rRT-PCR	Real-time polymerase chain reaction
SAGE	Strategic Advisory Group of Experts on Immunization
SEAR	WHO South-East Asia Region
SIAD	Short Interval Additional Dose
SIAs	Supplementary Immunization Activities
SNIDs	Sub-national Immunization Days
STOP	Stop Transmission of Polio
tOPV	Trivalent oral polio vaccine
UNICEF	United Nations Children's Fund
VAPP	Vaccine-associated paralytic polio
VDPV	Vaccine-derived poliovirus
WHA	World Health Assembly
WHO	World Health Organization
WPR	WHO Western Pacific Region
WPV	Wild poliovirus

www.polioeradication.org

EVERY LAST CHILD