

POLIO

GLOBAL
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Strategic Plan 2010-2012

EVERY
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CHILD



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Acronyms and abbreviations

ACPE	Advisory Committee on Poliomyelitis Eradication
AFP	Acute flaccid paralysis
BMGF	Bill and Melinda Gates Foundation
bOPV	Bivalent oral polio vaccine
BPHS	Basic package of health services
CDC	US Centers for Disease Control and Prevention
cVDPV	Circulating vaccine-derived poliovirus
EB	Executive Board
EPI	Expanded Programme on Immunization
eSTOP	Expanded Stop Transmission of Polio
EU	European Union
FATA	Federally Administered Tribal Area
FRR	Financial Resource Requirements
GAPIII	Third edition of the Global Action Plan to minimize post eradication poliovirus facility-associated risk
GIVS	Global Immunization Vision and Strategy
GPEI	Global Polio Eradication Initiative
GPLN	Global Polio Laboratory Network
GPMT	Global Polio Management Team
ICC	Inter-agency Coordinating Committee
ICRC	International Committee of the Red Cross
IFRC	International Federation of Red Cross and Red Crescent Societies
IPD	Immunization Plus Day
IPV	Inactivated polio vaccine
iVDPV	Immunodeficiency-associated vaccine-derived poliovirus
KAP	Knowledge, Attitudes and Practices
LGA	Local Government Area
LQAS	Lot Quality Assurance Sampling
MDGs	Millennium Development Goals
mOPV	Monovalent oral polio vaccine
NGO	Non-governmental organization
NID	National Immunization Day
NWFP	North West Frontier Province
OECD	Organization for Economic Co-operation and Development
OPV	Oral polio vaccine
PAG	Polio Advocacy Group
PRC	Polio Research Committee
RCC	Regional Certification Commission
RED	Reaching Every District
SAGE	Strategic Advisory Group of Experts on Immunization
SIA	Supplementary Immunization Activity
SIAD	Short Interval Additional Dose
SNID	Sub-national Immunization Day
STA	Supplementary Technical Assistance
TAG	Technical Advisory Group
tOPV	Trivalent oral polio vaccine
UNICEF SD	UNICEF Supply Division
VAPP	Vaccine-associated paralytic polio
VDPV	Vaccine-derived poliovirus
VPD	Vaccine-preventable disease
WHA	World Health Assembly
WHO	World Health Organization
WPV	Wild poliovirus
WPV1	Wild poliovirus type 1
WPV3	Wild poliovirus type 3

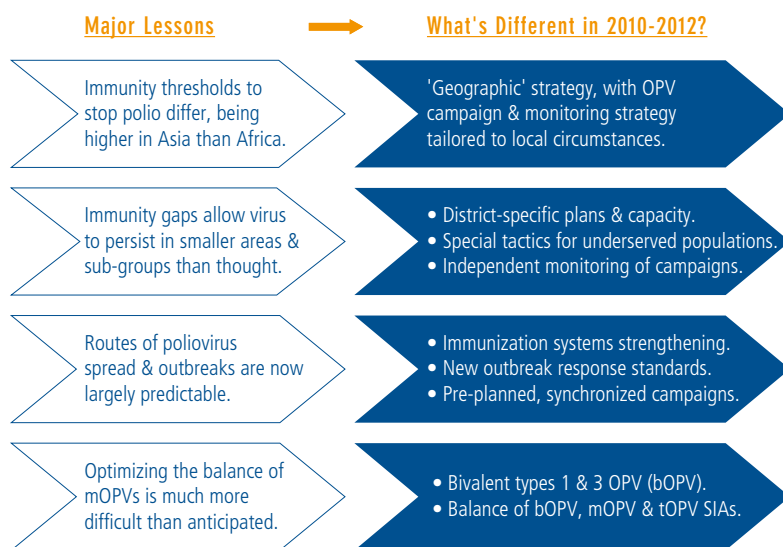
Executive summary

Alarmed that polio remained entrenched in the four countries that had never stopped transmission¹, and that an increasing number of polio-free areas were becoming re-infected, in May 2008 the World Health Assembly (WHA) called for a new strategy to complete polio eradication.

The multi-year planning process of the Global Polio Eradication Initiative (GPEI) was subsequently replaced with a one-year 2009 Programme of Work which: examined the major barriers to interrupting wild poliovirus (WPV) transmission in each of the remaining endemic areas (through an *Independent Evaluation*)²; fast-tracked the development and clinical trials of four new vaccines or vaccine approaches³; and assessed new approaches to reach children previously missed by vaccination efforts due to weak operations management, insecurity or other factors.

The new GPEI Strategic Plan 2010-2012 builds on the special 2009 Programme of Work and incorporates the myriad lessons learnt since the GPEI began. These lessons underpin the new approaches for achieving each of the Strategic Plan's major objectives: interrupting wild poliovirus transmission in Asia; interrupting wild poliovirus transmission in Africa; enhancing global surveillance and outbreak response; and strengthening immunization systems.

Figure 1 – Major Lessons Learnt



Four major lessons have had the most substantive implications for the new GPEI Strategic Plan 2010-2012 (figure 1). First, mathematical modeling has supported programme experience that the population immunity thresholds needed to interrupt WPV

¹ Afghanistan, India, Nigeria, Pakistan

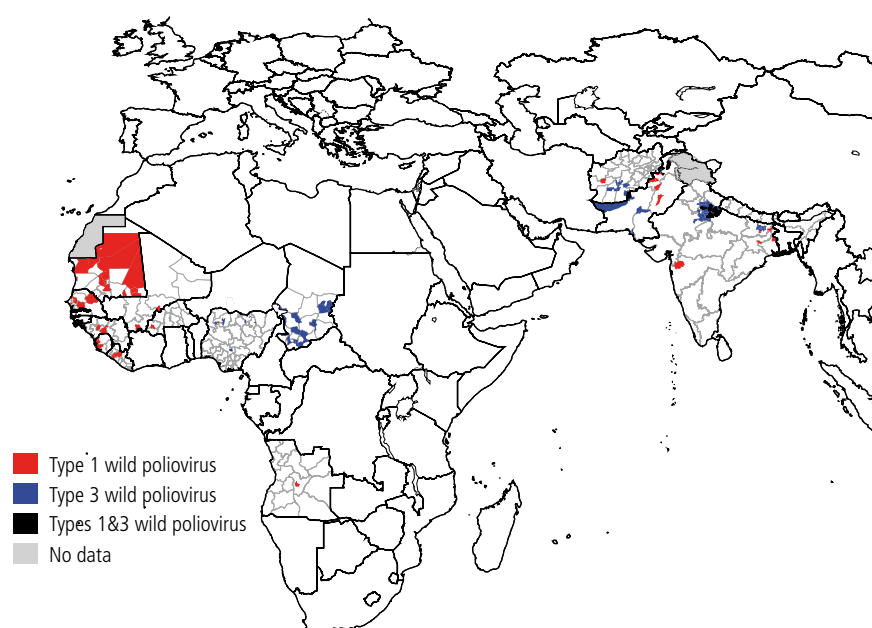
² *Independent Evaluation of Major Barriers to Interrupting Poliovirus Transmission*. 2009. Report available at www.polioeradication.org.

³ Clinical trials were conducted in 2009 on bivalent OPV, a higher-titre monovalent OPV type 1, and two inactivated polio vaccines (IPV - administered whole-dose intramuscularly and at a fractional dose given intradermally by needle-free device).

transmission differ in the remaining infected areas, being substantively higher in Asia, particularly in northern India and parts of Pakistan, than Africa. This has allowed the tailoring of polio campaign strategy and monitoring processes to each area, improving programme efficiency. Secondly, it is now clear that endemic WPV transmission can persist, and imported viruses be re-established, in areas and among sub-populations that are much smaller than previously understood. This has led to the systematic development of district- and population-specific strategies and capacity to address heterogeneity in oral polio vaccine (OPV) coverage. Thirdly, in polio-free areas the routes of WPV spread, and the risk of subsequent outbreaks, are now largely predictable, following known migration routes and exploiting evidently weak health systems; while outbreaks can occur in other geographic areas where there are gaps in OPV coverage (as evidenced by the large outbreak confirmed in April 2010 in Tajikistan), this knowledge allows for sharper targeting of both supplementary immunization activities (SIAs) and immunization systems strengthening efforts to reduce such risks. Finally, optimizing the impact of the new monovalent OPVs has proven more complicated than anticipated and in some settings contributed to alternating outbreaks of the remaining wild poliovirus type 1 (WPV1) and wild poliovirus type 3 (WPV3) serotypes. The fast-tracked development and introduction of a bivalent OPV formulation in 2009, and its scale-up globally in 2010, directly addresses this problem with a new vaccine that complements the existing armamentarium of monovalent and trivalent OPVs.

Although epidemiologic data as of May of 2010 must be interpreted cautiously due to reporting lag times and the seasonality of WPV transmission, the aggressive application of the operating principles of the new GPEI Strategic Plan 2010-2012 appears to be showing positive results (figure 2). Among the four endemic countries, WPV1 had not been detected for four months in northern Nigeria and the northern Indian states of Uttar Pradesh and Bihar. As importantly, two of the four countries with probable 're-established' transmission of an imported virus, the Democratic Republic of the Congo and Sudan, had not reported cases within the previous six months. Similarly, 10 of the 15 previously polio-free countries that were re-infected in 2009 had already stopped their outbreaks⁴.

Figure 2: Polio-reporting districts, Q4 2009-Q1 2010



⁴ Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Côte d'Ivoire, Kenya, Niger, Togo and Uganda.

Recognizing the fragility of this progress given the substantial financing gap for eradication activities and the setbacks that have been encountered in the past, the new GPEI Strategic Plan 2010-2012 details seven major enabling factors that are designed to more proactively mitigate key risks: (1) A coordinated advocacy agenda has been established to help national governments ensure their commitment to polio eradication is translated into local action to improve the quality and coverage of mass polio immunization campaigns. (2) Programme communications is being revitalized by enhancing the data and evidence base for tailoring activities and by increasing capacity to sustain community engagement in, and acceptance of, OPV campaigns in priority areas. (3) A process for real-time monitoring and management of the global OPV supply is in place to optimize supply-demand, especially for new bivalent OPV products. (4) The technical assistance deployed by WHO and UNICEF to assist national capacity-building efforts is being expanded, particularly in areas of re-established transmission. (5) The GPEI research agenda is being tailored to address country-specific issues, systematically engaging national research and academic institutions in the process. (6) Given the chronic financing challenges the GPEI has faced, a more robust system has been established for prioritizing eradication activities, based on epidemiological risks, in the event of insufficient resources. (7) Intensified engagement of the core GPEI donor partners will expand the GPEI's capacity to mobilize sufficient domestic and international financing to implement the full schedule of activities called for in the new GPEI Strategic Plan 2010-2012. Accompanying this Strategic Plan is the GPEI Financial Resource Requirements 2010-2012 (FRR) document. Updated on a quarterly basis the FRR explains the full budget for the three-year period as well as the current financing gap which at April 2010 was approximately 50% of the 2010-2012 budget.

The four major milestones of the new GPEI Strategic Plan 2010-2012 (figure 3) will be internationally analyzed every quarter and graded as 'on-track', 'progressing but with issues of concern' or 'at risk for completion' to alert countries and stakeholders as to emerging risks and guide mid-course corrections. For milestones which are 'progressing but with issues of concern' or 'at risk for completion', the appropriate national or international Technical Advisory Group (TAG) will be asked to work with the relevant national authorities to establish a corrective plan within two weeks. A new global advisory body will evaluate the milestones and major process indicators, monitor corrective action plans and provide overall guidance on policy, strategy and priorities. This body will work closely with the Strategic Advisory Group of Experts on Immunization (SAGE), consulting on its findings at each of the six-monthly SAGE meetings.

Figure 3 - GPEI global milestones 2010-2013

By mid-2010	By end-2010	By end-2011	By end-2012	By end-2013
Cessation of all polio outbreaks with onset in 2009*	Cessation of all 're-established' poliovirus transmission**	Cessation of all polio transmission in at least two of the four endemic countries***	Cessation of all wild poliovirus transmission†	Initial validation of 2012 milestones††

* validated when ≥ six months without a case genetically linked to a 2009 importation (i.e. by end-2010). The target for stopping any new outbreaks (i.e. with onset in 2010, 2011 or 2012) will be within six months of the confirmation of the index case.

** validated when ≥ 12 months without a case genetically linked to the re-established virus (by end-2011).

*** validated when ≥12 months without a case genetically linked to an indigenous virus (by end-2012); the year-to-year change in the number of polio cases will be monitored quarterly for each endemic country to guide the assessment of progress towards this global milestone.

† validated when ≥ 12 months without a case genetically linked to an indigenous virus (by end-2013).

†† 'certification' will require at least three years of zero polio cases in the presence of appropriate surveillance across an entire epidemiologic region.

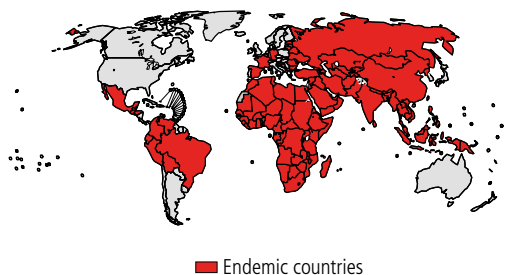
The aggressive, time-bound programme of work elaborated in this new GPEI Strategic Plan 2010-2012 exploits the lessons learnt from 20 years of experience in polio eradication. The GPEI Strategic Plan 2010-2012 was developed through an extensive consultative process with all major GPEI stakeholders, especially the endemic and re-established transmission countries. This process has led to a broad consensus that - with full financing and implementation - this Strategic Plan can lead to the interruption of the remaining reservoirs of WPV worldwide by 2013, setting the stage for eventual certification of that achievement and cessation of OPV use globally. The world now has its best opportunity ever to eradicate this devastating disease.

1. Global context

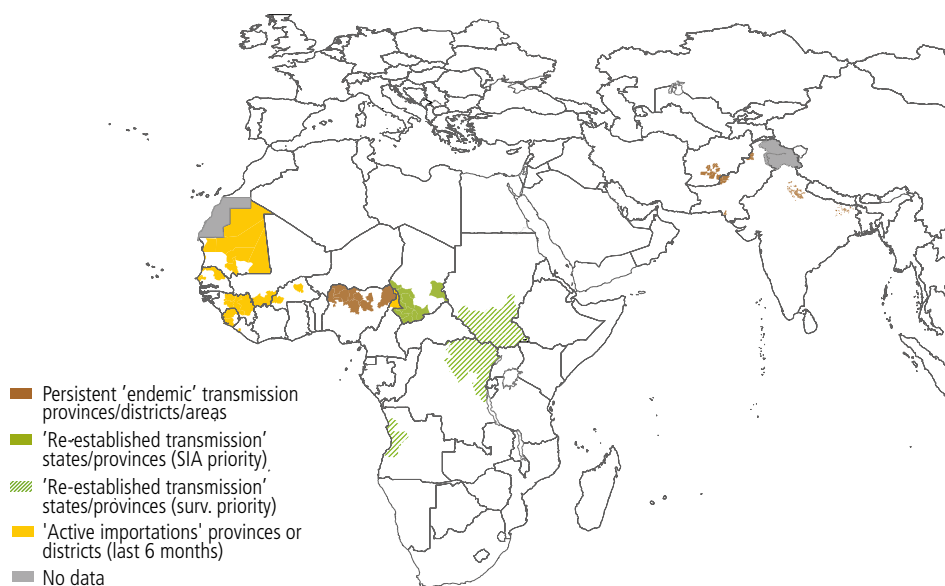
When the World Health Assembly (WHA) launched the Global Polio Eradication Initiative (GPEI) in 1988, over 125 countries were considered to be endemic for the disease (i.e., ongoing circulation of indigenous wild polioviruses - WPVs), with an estimated 350,000 children paralysed each year. Application of the four-pronged eradication strategy⁵ developed in the Americas had by 2004 resulted in the eradication of one of the three serotypes of WPVs (WPV type 2 - last isolated in 1999), a 99% drop in the annual incidence of the disease globally, and the elimination of the remaining indigenous virus serotypes from all but six countries in the world.

Worldwide there has been a 99% reduction in polio since 1988 – but progress had levelled out by 2005.

Polio in 1988



Polio in 2010



Since 2005: persistence of indigenous polio in four countries has been complicated by repeated re-infection of polio-free areas.

⁵ Overview available at <http://www.polioeradication.org/strategies.asp>

2008: alarmed by stalled progress, WHA called for new plan to complete polio eradication.

An Independent Evaluation in 2009 assessed major barriers to reaching all children and a range of innovative approaches.

Despite the development, licensure and widespread application of new monovalent oral poliovirus vaccines (OPVs) in 2005 to enhance the impact of supplementary immunization activities (SIAs) in key remaining reservoirs, and the intensification of the global eradication effort in 2007⁶, indigenous wild poliovirus type 1 (WPV1) and 3 (WPV3) transmission has continued in geographically limited areas of four countries: Nigeria, India, Pakistan and Afghanistan. The challenge of interrupting the residual WPV transmission in these areas has been compounded by the recurrent exportation of WPV from northern Nigeria and northern India into previously polio-free areas within and outside their borders. Many of these re-infected countries, particularly in sub-Saharan Africa, suffered substantial and recurrent polio outbreaks due to low routine immunization coverage (<80%), suboptimal outbreak response and weak health systems, together constituting a 'WPV importation belt' that stretched from west Africa, into central Africa and to the Horn of Africa. In four of these countries, the imported WPV was either known (Angola, Chad) or suspected (Democratic Republic of the Congo, southern Sudan) to have persisted for >12 months as of mid-2009, leading to their designation as having 're-established' transmission. In addition to these four 're-established transmission' countries, in 2009 a further 15 countries suffered new importations.

At its 61st session in May 2008, the WHA called for a new plan to complete the eradication effort. Consequently, a special one-year GPEI Programme of Work in 2009 was developed and implemented, to examine new vaccine formulations and delivery routes, test new operational approaches to reach children who were repeatedly being missed during SIAs in the endemic areas, and undertake a comprehensive *Independent Evaluation of Major Barriers to Interrupting Poliovirus Transmission* (hereafter referred to as *Independent Evaluation*). The 2009 Programme of Work also focused on supporting the rapid scale-up of those innovations that each endemic-country government deemed most important to raise the SIA coverage levels to those necessary to achieve the required 'threshold'. By end-2009, encouraging serologic, programmatic and epidemiologic data demonstrated that substantial progress had been made towards attaining these thresholds, particularly in the key reservoir areas of northern Nigeria and northern India.

In northern Nigeria, eight of twelve states had reduced the proportion of '0-dose' children (i.e. children who had previously never been immunized) to <10% by end-2009, with a subsequent 90% decline in polio cases due to WPV1, as a result of new engagement of state politicians and traditional leaders. In western Uttar Pradesh, India, serological surveys demonstrated that >95% of very young children were now protected against type 1 polio; and the government's rapid scale-up of health infrastructure in the Kosi river areas of Bihar, combined with the identification and systematic vaccination of more than five million children from migrant groups, had by end-2009 eliminated all but one genetic lineage of WPV1. In Pakistan and Afghanistan, the systematic application of objective SIA monitoring criteria, combined with environmental sampling in Karachi and Lahore (Pakistan), facilitated accurate identification and heightened political oversight of the remaining 'reservoir' districts, while the piloting of a range of new strategies in conflict-affected areas of Afghanistan demonstrated the feasibility of reaching sufficient children to interrupt the residual WPV transmission in these areas. Furthermore, by the first quarter of 2010, 10 of the 15 countries which had suffered new outbreaks due to WPV importations in late 2008 and 2009 had again stopped transmission, while two of the four 're-established transmission' countries (Democratic Republic of the Congo and southern Sudan) had not had a new case due to their re-established virus for >six months.

⁶ WHA Resolution 60.40

The *Independent Evaluation* proposed a number of additional actions that could improve the prospects for interrupting the remaining WPV transmission globally in the near term, while reducing the long-term risks associated with the possible re-introduction of WPVs or the emergence of circulating vaccine-derived polioviruses (cVDPVs)⁷. In particular, the *Independent Evaluation* stressed the need to enhance the GPEI resources dedicated to interrupting WPV transmission in the re-established transmission countries (e.g. equivalent to the attention given to the four endemic countries), more systematically contribute to immunization systems strengthening, particularly across the 'WPV importation belt' of sub-Saharan Africa, and continue the rapid conduct and application of new research.

In October and November 2009, the outcomes of the 2009 Programme of Work were evaluated by the Strategic Advisory Group of Experts on Immunization (SAGE) and by a special consultation of the Advisory Committee on Poliomyelitis Eradication (ACPE) with technical experts, polio-infected country health authorities and major stakeholders, including implementing and donor partners. Both groups concluded that major developments in 2009 demonstrated that with stronger political and financial commitments the remaining barriers to achieving eradication could be addressed, warranting the development of a new three-year GPEI Strategic Plan 2010-2012 that aimed for the interruption of all WPV transmission in that period. In January 2010, the Executive Board of the WHA strongly supported the development of the new Strategic Plan.

The following sections of the GPEI Strategic Plan 2010-2012 summarize how the outcomes of the 2009 Programme of Work and recommendations of the *Independent Evaluation* will be combined with the core eradication strategies and, if appropriate, additional activities, to achieve and sustain the population immunity levels needed to detect and interrupt WPV transmission in each of the remaining infected areas. It sets out aggressive activities to achieve milestones which are measurable, time-bound and realistic. Significantly, the GPEI Strategic Plan 2010-2012 recognizes and exploits the differences in the epidemiology and broader health systems contexts in which the programme is operating in Asia and Africa (e.g. necessitating a different number and extent of SIAs in each area). Country-specific details can be accessed at www.polioeradication.org.

As at the start of 2010, there were five major cross-cutting risks to the successful implementation of the full GPEI Strategic Plan 2010-2012. First, there is a risk of complacency in areas where virus transmission dropped rapidly in 2009 but where population immunity levels still remain below the threshold needed to ensure interruption of WPV and prevent its re-emergence (e.g. Kano, Nigeria). Secondly, the combination of new OPV products and a marked increase in the number of planned SIAs now threatens vaccine supply, requiring very close management through at least end-2010. Thirdly, with repeated SIAs, communities in some areas are displaying fatigue for repeated polio vaccination. Fourthly, the limited or lack of engagement by political leaders at the state/province and district levels to redress chronic problems of polio campaign quality in some polio-infected areas could remain suboptimal. Finally, although forthcoming economic research makes a strong case for investing heavily to finish the job of eradication⁸, insufficient international and domestic financing has required a prioritization of 2010 activities and a possible scaling back of the timeline for introducing some of the innovations that were developed in 2009.

The new Strategic Plan couples the most promising new approaches to reach all children with a powerful new vaccine.

Full financing of new plan will be a major factor in its success.

⁷ *Independent Evaluation of Major Barriers to Interrupting Poliovirus Transmission - Executive Summary*. 20 October 2009. Available at www.polioeradication.org.

⁸ Thompson K and Tebbens RD, *The Economic Case for Polio Eradication*. Presentation to Financing the GPEI Strategic Plan 2010-2012 meeting, 24 February 2010, Geneva, Switzerland. More at <http://www.kidsrisk.harvard.edu/>

The GPEI Strategic Plan 2010-2012 includes key enabling factors designed to mitigate these risks. Ensuring sufficient domestic and international financing is foremost among the major enabling factors that are critical to fully implementing the GPEI Strategic Plan 2010-2012 (see section 4). The financial costs of the GPEI Strategic Plan 2010-2012 are presented in the accompanying *Financial Resource Requirements (FRR)* document which presents the corresponding three-year budgets for the activity plans of each country as well as the supporting functions of WHO and UNICEF. Reviewed and updated quarterly, the FRR is available at www.polioeradication.org.

2. Guiding principles

2.1 Major lessons learnt

With the goal of interrupting the remaining chains of WPV transmission globally, the GPEI Strategic Plan 2010-2012 builds on the numerous important lessons that have been learnt through 20 years of polio eradication activities, particularly in the recent 'intensified' eradication effort of 2007-2009. Four of these lessons are fundamentally important to the new approaches outlined in the GPEI Strategic Plan 2010-2012 given their specific operational implications for finishing polio eradication (figure 1).

First, the evolving epidemiology of polio, supported by mathematical modelling, demonstrates that the population immunity thresholds needed to interrupt WPV transmission differ between the remaining infected areas, being higher in Asia, particularly northern India and parts of Pakistan, than Africa. This has allowed a tailoring of eradication strategy to local circumstances, improving programme efficiency. Secondly, it has become clear that endemic WPV transmission can persist, and imported WPVs be re-established, in much smaller geographic areas and population subgroups, than had been previously thought based on the progress in countries and Regions which are currently polio-free. This has led to the systematic development of district- and population-specific strategies and capacity to address heterogeneity in OPV coverage. Thirdly, the national and international spread of WPVs, and risk of subsequent outbreaks, now appears to be largely predictable, following known migration routes and exploiting weaknesses in health systems. While outbreaks can occur in other geographic areas where there are gaps in OPV coverage (as evidenced by the large outbreak confirmed in April 2010 in Tajikistan), this knowledge has facilitated a better targeting of efforts to improve population immunity in highest-risk areas by enhancing the quality of both SIAs and routine immunization systems. Fourthly, while monovalent OPVs have provided the GPEI with much more potent tools for rapidly building population immunity, optimizing the balance of monovalent OPVs has proven much more difficult than originally anticipated and may have contributed to alternating outbreaks of WPV1 and WPV3 in certain settings. The fast-tracked development and introduction of a completely new bivalent OPV formulation in 2009 directly addresses this problem.

The guiding principles of the GPEI Strategic Plan 2010-2012, in terms of its tailored geographical and common operational approaches, derive directly from these major lessons - resulting in a multi-pronged strategy for addressing the longstanding barriers to interrupting the remaining WPV transmission globally. Particular attention is given to the areas with persistent transmission of endemic or imported polioviruses⁹, as well as those at highest risk of re-infection, as together these areas hold the key to the GPEI's success.

Four major lessons are fundamentally important to the new Strategic Plan.

Particular attention given to "persistent transmission" districts.

⁹ Persistent transmission area: areas in endemic and re-established transmission areas, which have either never interrupted WPV transmission or with sustained circulation for a period >12 months.

Tactics are tailored to population immunity thresholds for stopping polio, which are higher in Asia than Africa.

2.2 Geographic approaches

The differential progress by country towards polio eradication globally has long suggested that the population immunity thresholds at which WPV transmission stops can differ substantially between geographic areas, with implications for programme strategy, planning, and prioritization^{10,11}. By late-2008, understanding of the efficacy of the different OPVs (trivalent OPV and monovalent OPVs) in different settings had improved to the point where the GPEI could quantify these thresholds¹². Most significantly, it now appears that population immunity of >95% in children under five years of age is required to stop transmission in certain districts of India and Pakistan, while transmission in sub-Saharan Africa seems to cease soon after immunity exceeds a threshold of approximately 80%-85%.

Persistent transmission in Asia is now highly localized in a limited number of districts and sub-districts (e.g. 'blocks' in India), many of which have a very high population immunity threshold (>95%) for stopping transmission. Consequently, the approach in Asia focuses on district/block-specific plans to achieve exceptionally high coverage, with very frequent SIAs to exceed the necessary immunity thresholds (both humoral and mucosal). Given the very high immunity thresholds in these areas, the GPEI Strategic Plan 2010-2012 will also pilot or research a range of supplementary strategies (e.g. water/sanitation interventions, zinc supplementation, inactivated polio vaccine - IPV) to improve the effectiveness of vaccines in these settings and/or reduce the thresholds required to stop circulation.

By contrast, in sub-Saharan Africa, virus transmission persists over a much broader area and the population immunity threshold for interrupting transmission is significantly lower (i.e. approximately 80%-85%). The approach in Africa therefore focuses on high SIA coverage but in a lower number of campaigns over a substantially wider area, with state/province, national and even multi-country plans. Recognizing the problems of recurrent outbreaks following importations into previously polio-free areas, as well as the risk of emergence of cVDPVs¹³, in areas with weak health infrastructure the GPEI Strategic Plan 2010-2012 includes the implementation of pre-planned SIAs across the 'WPV importation belt' each year, enhanced technical assistance to re-established transmission areas, and further efforts to strengthen immunization systems.

The Plan also gives renewed attention to protecting polio-free areas

While the primary emphasis of the GPEI Strategic Plan 2010-2012 is on interruption of the remaining chains of WPV transmission globally, it also gives renewed attention to enhancing surveillance outbreak response activities globally, including in polio-free areas which have been certified as such.

¹⁰ New strategies for the elimination of polio from India. Grassly NC et al. *Science*. 2006 Nov 17; 314(5802):1150-3.

¹¹ Effectiveness of immunization against paralytic poliomyelitis in Nigeria. Jenkins HE et al. *N Engl J Med*. 2008 Oct 16;359(16):1666-74.

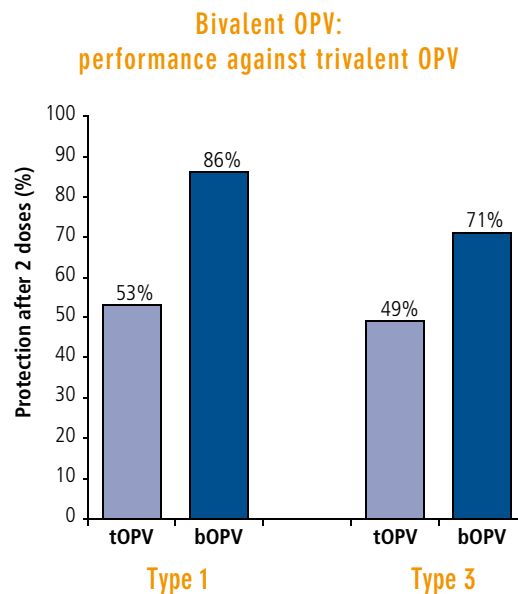
¹² The vaccine efficacy estimates used in these threshold analyses were generated using case-control analyses and, in general, corroborated with subsequent seroprevalence studies.

¹³ A cVDPV is a live virus of Sabin origin, which has changed and reverted to a form that is able to cause paralysis in humans and has developed the capacity for sustained circulation.

2.3 Common operational approaches

In addition to employing and assessing a range of new country and area-specific tactics in 2009, the GPEI developed and/or refined a number of cross-cutting technical innovations and operational approaches that will be institutionalized through the GPEI Strategic Plan 2010-2012 to improve programme performance. These include the following:

- **Bivalent OPV:** first developed and licensed in 2009, this new vaccine offers substantial programmatic advantage by simultaneously generating immunity to both of the remaining WPV serotypes (types 1 and 3) which is 35%-40% higher per dose than that of trivalent OPV and similar to that of the respective monovalent OPV¹⁴. The large-scale use of bivalent OPV in SIAs would complement the continued use of trivalent OPV in some SIAs and in routine immunization, as well as of monovalent OPVs in some mop-ups and SIAs where appropriate.
- **State/district/block-specific plans:** the development of area-specific plans proved critical to finally establishing a consolidated approach to addressing the chronic and often unique operational challenges in a number of endemic areas. This approach will be institutionalized for both endemic and re-established transmission areas with updating on a four-to-six monthly basis. Implementation of these plans will be enhanced through refresher training of vaccinators and SIA workers wherever needed to optimize their skills.
- **Special teams and tactics for underserved populations:** special teams and tactics have proven to be essential for addressing the special needs of some population sub-groups and communities. In some settings, such groups play a particularly important role in sustaining polio transmission due to their highly mobile nature (e.g. nomads, migrant labourers), their being 'underserved' by or under-utilizing public services (e.g. minorities, Koranic schools), or a combination of both. Tailored plans and approaches for these populations will be developed in concert with local leaders and implemented with special teams, as appropriate.
- **Sub-national advocacy:** in a number of countries, including Pakistan, Nigeria and India, new mechanisms and criteria have been developed to measure and track the engagement of sub-national (e.g. state/province, district, union-council levels) political and administrative leaders to ensure that the full resources of state/provincial governments are applied to improve SIA performance and accountability. These approaches will be applied in the context of the above-mentioned 'district-specific' plans, particularly in other endemic and re-established transmission areas.



New bivalent OPV increases campaign impact by simultaneously tackling types 1 & 3 polio with a higher efficacy vaccine.

District-specific plans and special approaches for underserved populations tackle chronic challenges to reaching sufficient children.

¹⁴ Randomized clinical trial of bivalent type 1 and 3 oral poliovirus vaccine. In press.

There is a new role for serosurveys, environmental sampling and research to guide strategy.

- *Short Interval Additional Dose (SIAD) strategy*: this strategy exploits the availability of monovalent OPVs to shorten the interval between SIAs in selected high-risk, infected and/or insecure areas, thereby building population immunity and terminating outbreaks and endemic transmission more rapidly. In 2009, new work to refine the SIAD operations will be applied to stop transmission more rapidly following new importations, optimize access opportunities in insecure areas, and improve operations in some re-established transmission areas.
- *Monitoring of SIA coverage*: the gap in credible and timely SIA coverage data to assess risks and guide improvements has been a continuing constraint, in both endemic and in re-infected countries. In response, in late-2009, new protocols and criteria were established to allow improved, real-time independent monitoring of SIAs, with validation through Lot Quality Assurance Sampling (LQAS) where needed (i.e. in areas of discordant epidemiologic and SIA monitoring data). From 2010, the results of independent SIA monitoring will be internationally posted within two weeks of each campaign. Areas identified as having <90% coverage will be immediately re-covered, with corrective measures implemented in advance of the subsequent SIA.
- *Expanded environmental sampling*: the expansion of environmental sampling to areas such as Karachi and Lahore (Pakistan) reaffirmed the utility of this tool in endemic areas, particularly to differentiate reservoir areas (i.e. those with persistent transmission) from those which are repeatedly re-infected, and to maintain programme intensity in such reservoirs in the absence of paralytic polio cases.
- *Serologic surveys*: in India, serologic surveys proved particularly valuable to document programme status, assess prospects and adjust plans by more accurately determining population immunity. New techniques to simplify serologic survey logistics will be exploited in the new GPEI Strategic Plan 2010-2012 to extend this approach to other key endemic areas.
- *Enhanced AFP surveillance*: in 2008-2009, major progress was made in closing persistent gaps in acute flaccid paralysis (AFP) surveillance by enhancing the scrutiny of standard performance indicators, conducting targeted surveillance reviews and deploying additional human resources to priority areas such as Chad and southern Sudan. This experience will guide further investments in 2010-2012.
- *Area and issue-specific research*: operational research that is tailored to the specific challenges of each remaining endemic area (e.g. optimizing mucosal immunity in India; LQAS in Nigeria) and key eradication issues (e.g. SIADs for outbreak response) will be applied more systematically in 2010-2012.
- *Enhancing communications/social mobilization in priority areas*: the use of AFP and SIA data to systematically identify underserved and under-immunized populations allowed much more accurate targeting of communications interventions in northern Nigeria, northern India and parts of Pakistan. This approach will be complemented by regular assessments of community perceptions and knowledge to guide strategies for demand creation, periodic evaluations of communication outcomes and impact, exploration of options for externally contracting specific activities, and scaling-up of UNICEF's communications capacity at global, regional and country levels.

- *Rehabilitation of polio-affected individuals:* people affected by polio can be isolated and excluded from experiences enjoyed by others in their communities. To help address this inequity, the GPEI will pilot an initiative to assess and improve access to rehabilitation services. This will include using health and surveillance personnel to provide simple advice to parents to minimize the physical impairments of polio, identifying mechanisms to support early intervention for children with AFP, developing rehabilitation referral networks, and implementing pilot projects to strengthen country rehabilitation capacity.

The relative importance and emphasis of each of these common operational approaches differs by country, depending on the local programmatic barriers to reaching all children with OPV and interrupting WPV transmission. Consequently, these differences are reflected in the country-specific sections (3.1 and 3.2) of the Strategic Plan and in the national plans of action (available at www.polioeradication.org).

2.4 Major process indicators:

The GPEI Strategic Plan 2010-2012 includes major process indicators for each polio-infected country (see objectives 3.1 and 3.2). These process indicators reflect estimates of the minimum level of polio campaign performance (e.g. 'missed children') or OPV coverage among young children (e.g. '0-dose children') that must be achieved and sustained to interrupt WPV transmission in that setting. These performance indicators and targets are based on a combination of (a) OPV coverage and SIA performance data from areas which are currently (or were previously) polio-free within the same country, and (b) the estimated minimum population immunity thresholds needed to stop transmission in the remaining endemic areas. Recognizing the particular challenges to achieving such coverage levels in the remaining polio-endemic areas, the 2010 process indicators primarily track whether such a coverage level has *ever* been achieved in that year, while the 2011 process indicators track whether the coverage level is *sustained* long enough to exceed the minimum estimated population immunity threshold for 12 consecutive months. These indicators will be complemented with additional SIA process indicators in the country-specific plans and tracked and updated by national technical advisory bodies. Recognizing that the first major milestone for the interruption of endemic poliovirus transmission is measured only at end-2011, the year-to-year change in the number of reported polio cases in each endemic country will also be monitored internationally on a quarterly basis to guide the assessment of progress towards this global milestone.

Independent, quarterly assessments of major milestones will enable mid-course corrections.

3. Objectives

3.1 Interrupting wild poliovirus transmission in Asia

This section provides an overview of the district-specific strategies to interrupt the remaining chains of indigenous WPV transmission in the three countries in Asia which remain endemic at the start of 2010 (India, Pakistan, Afghanistan).

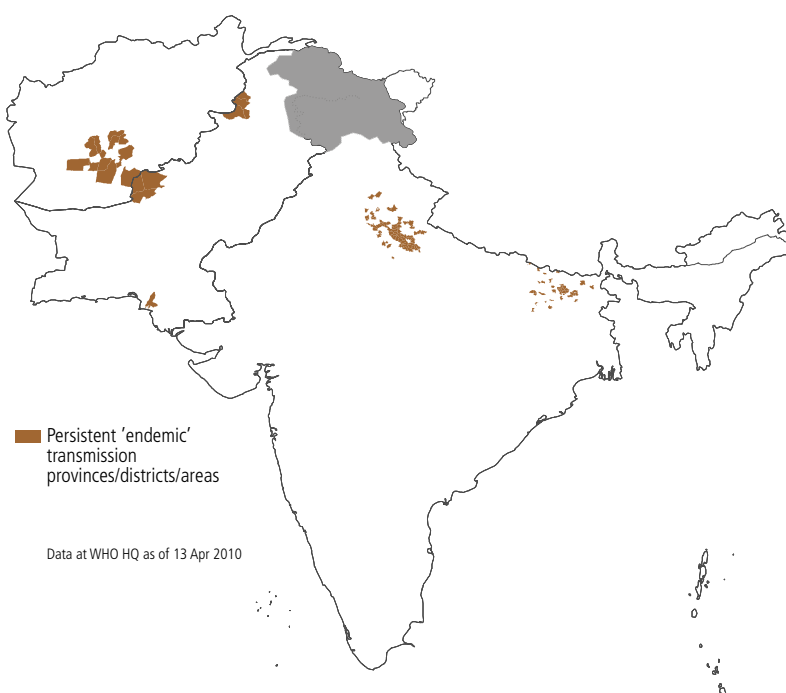
SITUATION ANALYSIS:

In Asia, WPV transmission now persists in a relatively small number of districts (<60) in just three countries: India, Pakistan and Afghanistan. From these districts, the indigenous WPV1 and to a lesser extent WPV3 has recurrently re-infected other, polio-free parts of the same country. In the case of India, since 2005 indigenous poliovirus has been exported to the bordering countries of Nepal, Bangladesh and Myanmar, as well as Angola in Africa. In the case of Pakistan and Afghanistan, each country has recurrently re-infected the other, although it appears the latter is now receiving a higher share of the importations.

In Asia, polio persists in 5% of the districts in all of India, Pakistan and Afghanistan.

These persistent transmission districts constitute two distinct groups, requiring different strategic approaches. The first group of districts is characterized by very large populations, high birth rates and high population density, often with suboptimal sanitation, and requiring very high population immunity (>95%) to interrupt transmission. This group includes the persistent transmission districts of western Uttar Pradesh and central Bihar in India and the city of Karachi in Pakistan.

Asia: areas with persistent transmission of wild poliovirus



The second group of districts is characterized by a lower population density and, in all likelihood, a lower immunity threshold to stop transmission, but with compromised access for SIAs due primarily to law and order problems, insecurity or outright conflict. This group includes in Pakistan the adjoining districts of Quetta, Pishin and Killah Abdullah in the province of Balochistan, three Federally Administered Tribal Agencies (Bajour, Khyber, Mohmand), and Peshawar in North West Frontier Province (NWFP). In Afghanistan, this group includes 13 districts of Helmand, Kandahar and Uruzgan provinces in Southern Region.

STRATEGIC APPROACH:

Achieving and sustaining the necessary immunity levels to stop transmission in both groups of districts requires area-specific strategic and operational plans at the district and often sub-district levels (i.e. block, tehsil, union-council or 'cluster' level). It is also essential to establish or strengthen mechanisms for engaging local political and administrative leaders to ensure accountability for the quality of SIAs in their areas. Both groups of districts share a common need for very frequent SIAs. In the first group, frequent SIAs are needed to achieve and maintain the extremely high humoral and gut mucosal immunity levels needed in the face of the very high population density and birth rates. In the second group, this approach is needed to optimize the windows of opportunity that arise to reach and vaccinate additional children in insecure areas. In polio-free areas of these countries, regular SIAs are required to maintain sufficiently high population immunity to prevent new outbreaks as the persistent transmission areas are eliminated.

The highest priority in all areas must be enhancing the coverage achieved during routine immunization activities and SIAs with the appropriate OPV. The introduction of bivalent OPV offers particular programmatic and strategic advantages in both settings. In the first group of districts, this approach must be supplemented with additional interventions to enhance the efficacy of OPV in these settings and/or reduce the threshold needed to stop transmission. Such interventions may include zinc supplementation to reduce acute diarrhoeal disease rates and possibly improve OPV 'take', water and sanitation improvements to reduce faecal contamination and the efficiency of virus transmission, and clinical trials of other vaccine strategies to improve mucosal immunity to WPVs (e.g. high-titre monovalent OPVs, supplemental doses of IPV, immunization of older children).

The following country-specific sections give particular attention to the major elements of the district- or block-specific planning processes that the government in each country is implementing in 2010-2012, as well as key differences between them (further country-specific details are available at www.polioeradication.org).

District- and block-specific approaches must address technical, security and operational challenges.

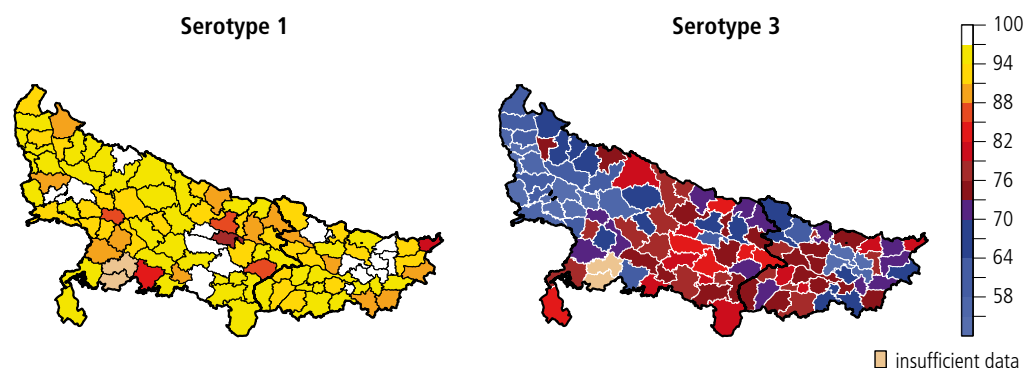
Polio transmission persists within just 107 blocks (sub-districts) of western Uttar Pradesh and central Bihar.

Operational challenges of mass campaigns are compounded by under-immunized mobile populations and compromised OPV efficacy.

India:

Most of India is polio-free. Furthermore, at least one of the two remaining WPV serotypes had been interrupted at one point in each of the persistent transmission areas of western Uttar Pradesh and central Bihar, underscoring the feasibility of eradication in this setting. It is now essential to ensure both areas interrupt transmission simultaneously by addressing the different challenges in each reservoir.

Uttar Pradesh and Bihar: percentage of population immunity levels to type 1 & 3 polio in 2009



In central Bihar the primary issues are operational and relate to achieving high immunization rates among populations in hard-to-reach areas (e.g. the Kosi river basin). In western Uttar Pradesh the population is readily accessible but extremely high levels of both humoral and mucosal immunity appear to be needed. The experience of 2009 also demonstrates the importance of identifying and systematically vaccinating the millions of people who comprise the migrant population, which is now understood to play an important role in transmitting the virus between the major reservoir areas as well as to previously polio-free states.

Compounding the problem of achieving sufficiently high population immunity to stop transmission in western Uttar Pradesh, and possibly in central Bihar, is the compromised efficacy of OPV compared with the rest of India¹⁵. In 2009, however, new clinical trial data demonstrated that very high population immunity (>95%) could be achieved, even among very young children, with the very intensive use of monovalent OPV in SIAs which achieve very high coverage.

To systematically address these problems in 2010-2012, the Union and state Governments of India developed a '107 block plan' that encompasses the persistent transmission areas. This '107 block plan' lays out specific interventions to optimize SIA coverage and additional activities to mitigate the factors that are facilitating WPV transmission in these areas. Implementation of the plan will be supervised by senior state officials, District Magistrates and designated block officials to oversee activities and ensure accountability. The human resource requirements for implementing the '107 block plan' are being reviewed, with priority given to filling vacant positions for medical officers, auxiliary nurse midwives, surveillance medical officers, and field volunteers, and securing higher engagement of 'accredited social health activists' and staff of *anganwadi* (child

¹⁵ Protective efficacy of a monovalent oral type 1 poliovirus vaccine: a case-control study. Grassly NC et al. Lancet. 2007 Apr 21; 369(9570):1356-62.

nutrition centres) in these blocks. To ensure the highest possible SIA coverage, vaccinators and supervisors in each of these blocks will be re-trained after every third SIA, and team workloads and composition reviewed and adjusted as necessary.

In both western Uttar Pradesh and central Bihar, the '107 block plan' will seek to sustain high-quality SIAs through the regular review and updating of microplans, quarterly trainings of staff, and extensive social mobilization and communications. Newborn tracking data will facilitate follow-up for routine immunizations and polio SIA microplans will form the basis for regular updating of routine immunization microplans. Special strategies to identify and reach the mobile populations, including in migrant destination states, will continue to be refined. In central Bihar, the 'block plan' will focus on further refining and implementing the special Kosi river strategy that was developed in 2008-2009 to vaccinate hard-to-reach groups. For example, the Social Mobilization Network in Bihar will be expanded to 1,500 community mobilizers.

Recognizing the particular challenge that the very high force of WPV transmission in western Uttar Pradesh poses to the national and global polio eradication effort, the country-specific research agenda will be further accelerated to inform refinements of the operational plan. This research agenda will focus on the development and testing of supplementary approaches to reduce the force of infection and increase mucosal gut immunity. To reduce known and potential risk-factors that contribute to vaccine failure (e.g. high diarrhoeal levels, high enteric disease burden, poor nutrition), simple sanitation interventions will be delivered to increase access to clean water and zinc supplementation, all of which will be promoted through Village Health and Nutrition Days. Social mobilization strategies will sensitize communities to the importance of personal hygiene, routine immunization and breastfeeding.

These targeted activities will be complemented by continued national and large-scale sub-national immunization days to maintain population immunity in the rest of the country, particularly in those areas at highest risk of 'importations'.

Major process indicators:

- End-2010: >95% population immunity to type 1 polio sustained in the persistent transmission areas of western Uttar Pradesh, and achieved in the persistent transmission areas of central Bihar.
- End-2011: >95% population immunity to type 1 and type 3 polio in the persistent transmission areas of western Uttar Pradesh and central Bihar.
- End-2012: >95% population immunity to type 1 and type 3 polio maintained.

A '107 Block Plan' is specifically designed to address gaps in OPV coverage.

The '107 Block Plan' is complemented by research and supplemental strategies to optimize mucosal immunity and address the very high force of infection.

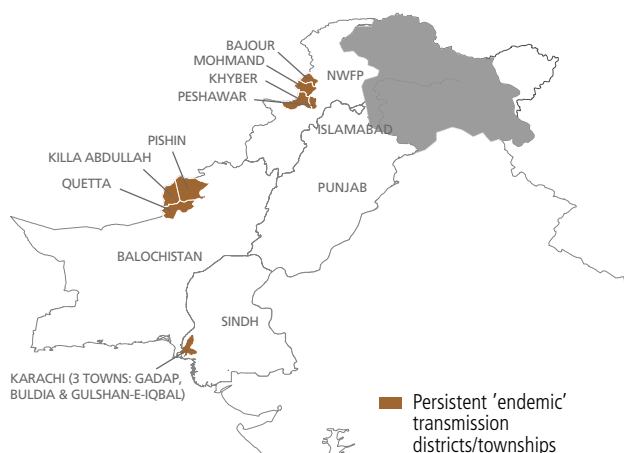
Polio persists in just 10 towns or districts of Karachi, Balochistan, NWFP and FATA.

New, independent monitoring of OPV campaign performance guides district-level assessments and enhances accountability.

Pakistan:

Of the 152 districts in Pakistan, persistent WPV transmission is restricted to 10. These 10 districts are clustered in three groups: the towns of Gadap, Buldia and Gulshan-E-Iqbal in Karachi (Sindh); the districts of Quetta, Pishin and Killa Abdullah (neighbouring each other in Balochistan); and, the district of Peshawar in NWFP and the adjoining tribal agencies of Bajour, Khyber and Mohmand in the Federally Administered Tribal Areas (FATA). Within these districts and agencies, it appears that the virus is circulating primarily in a number of sub-district administrative units known as 'union-councils' (sub-districts). Eliminating the remaining WPVs from these 'reservoir' areas is complicated by the recurrent re-infection of other, polio-free areas of Pakistan as well as adjoining provinces of Afghanistan due to the substantial population movements within and between the countries. A number of these 'non-reservoir' districts are at especially high risk of repeated importations and require particular attention. In 2008-2009, this situation was further complicated by the upsurge in population movements associated with the deterioration of security in polio-infected districts of FATA and NWFP. During this time, Pakistan had one of the largest-ever internally-displaced populations from conflict-affected areas.

Three transmission zones and high-risk areas



In 2009, the eradication effort in Pakistan took a major step forward when the Government decided to accept only SIA coverage results based on independent monitoring of 'finger-marked children'. For the first time, SIA coverage data began to align closely with the known distribution of WPV, providing a solid foundation both for targeting additional resources to improve SIA quality and for enhancing accountability. The expansion

of environmental sampling to include the cities of Karachi and Lahore from mid-2009 provided additional data for monitoring virus transmission and targeting interventions. At the same time, high-level, multi-sectoral commitment to improve SIA quality was secured with the launching of the Prime Minister's 'Polio Action Plan' and the direct engagement of H.E. the President. An Inter-provincial Committee for Polio (IPCP) was established, chaired by the Federal Minister of Health and bringing together all provincial health ministers to overcome barriers to the implementation of polio eradication strategies.

In 2010-2012, the Federal and Provincial governments will build on the lessons of 2009 to develop and implement district-specific plans to interrupt WPV transmission in the 10 districts, agencies or towns with persistent transmission. This will be supplemented with regular national and sub-national polio immunization days to maintain population immunity against importations in polio-free areas, particularly the five districts which have historically been at highest risk of re-infection (Swat in NWFP; Multan and Muzaffargarh in Punjab; and, Jacobabad and Hyderabad in Sindh). The first District Planning Workshop, for both polio eradication and routine immunization activities in

the persistent transmission areas, was held on 8-9 February 2010 and will be followed by four-to-six monthly meetings to monitor implementation, assess progress and adapt the plans as appropriate. On 10 February 2010, the Federal Minister of Health charged the IPCP with enhancing the oversight and accountability of district/union-council leaders for implementing these plans.

In Karachi, the district-specific planning process focuses on the three towns which appear to constitute the main reservoir of persistent transmission in this area due to weak routine immunization coverage, low SIA coverage and the presence of highly mobile groups with links to endemic areas in NWFP, FATA, Balochistan and Southern Region, Afghanistan. To improve SIA coverage, the plans include targeted advocacy with the political leadership of all ethnic groups, hiring of staff from the high-risk communities, community-specific communications activities, further engaging the private sector and local NGOs in new settlements and slums, and continuing to partner with academic institutions for independent monitoring. Joint district/town coordination meetings will continue in each town to track performance.

In the Quetta block (Quetta, Pishin, Killah Abdullah districts) the weak management of SIAs is complicated by the weak health infrastructure, ultra-conservative culture, extensive population movement (especially with southern Afghanistan) and by the overall law and order situation. Consequently, the district-specific planning process focuses on securing the direct oversight of the District Coordinating Officers, effectively engaging the leadership of the paramedic associations which are critical to strategy implementation, continued cross-border collaboration, and direct advocacy with the religious leadership which is essential to securing community engagement and acceptance in this area. SIA supervision will be complemented by senior federal and provincial officials.

The persistent transmission districts and agencies of NWFP and FATA, respectively, face similar challenges to the Quetta block of Balochistan, but with access to children in substantial geographic areas further compromised by insecurity and active conflict. In these areas, the district-specific plans focus on engaging all parties to support SIA implementation (including the Special Support Group and anti-government elements); employing community focal persons to support 'access negotiators' and community mobilization; exploiting windows of opportunity to implement SIADs; working with and through the Health Cluster NGOs; and increasing the use of other 'add-on' interventions. The 'community focal person' approach will be taken to scale to enhance local ownership, monitoring and supervision. Quarterly reviews of the evolving security situation will help to guide strategy and update the district-specific plans.

In all areas, social mobilization activities will continue to be refined based on SIA and AFP data, with the new SIA training module to include a revised Interpersonal Communication (IPC) component. Regular Knowledge, Attitudes and Practices (KAP) evaluations and other social research will help inform appropriate communication strategies for issues which are particular to each district/agency/town. These district-specific communications plans will harness broader support for eradication activities by partnering with other (non-health) line agencies and local leaders to improve access and build caregiver demand.

District-specific plans are tailored to the relevant management or communications challenges.

A comprehensive approach to inaccessible, conflict-affected areas in FATA and NWFP is now essential.

Tactics will be reviewed and refined quarterly to reach never-immunized children in conflict-affected border areas.

To enhance understanding of the remaining poliovirus reservoirs in Pakistan, and more accurately track the progress being made in each, environmental sampling will continue to complement the active AFP surveillance, with possible expansion to include Peshawar. A seroprevalence survey will be conducted in 2010 to validate programme understanding of population immunity estimates from AFP and SIA monitoring data. If substantial discrepancies are found, consideration will be given to revising the process indicators to incorporate such data.

Coordination with neighbouring Afghanistan will be further improved, in particular for tracking/mapping of population movements, through regular cross-border coordination meetings and sharing of epidemiological and SIA operational information. Where necessary, additional temporary or permanent vaccination posts will be set up at key gathering sites and border crossings.

Major process indicators:

- end-2010: <10% missed children during at least four SIAs in every town of Karachi; <15% missed children during at least eight SIAs in every district of the Quetta area and the persistent transmission districts and agencies of NWFP and FATA.
- end-2011: <10% missed children during at least eight SIAs in the Quetta area and in the persistent transmission district NWFP and agencies of FATA; >90% of children with >six doses of OPV in Sindh and Punjab¹⁶.
- end-2012: <10% missed children during each SIA in all districts; >90% of children with >six doses of OPV sustained in all provinces.

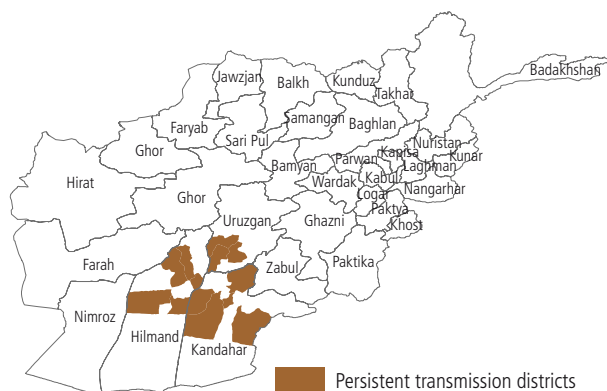
NOTE: these major process indicators are complemented by the standard AFP surveillance and SIA performance indicators which must be achieved in all areas of the country to achieve, confirm and maintain national polio-free status.

¹⁶ Assessed in children with non-polio AFP 6-35 months of age.

Afghanistan:

In Afghanistan, persistent WPV transmission is now concentrated in 13 conflict-affected districts of the 36 districts in total in the provinces of Helmand, Kandahar and Uruzgan in Southern Region. However, virus from these districts, and adjoining areas of NWFP, FATA and Balochistan in Pakistan, is regularly exported into other districts of these provinces as well as into the polio-free provinces of Afghanistan.

Afghanistan: 13 persistent transmission districts in Southern Region



Persistent transmission is restricted to 13 high-risk, conflict-affected districts in Southern Region.

In 2009, a range of new approaches were piloted to improve access to children in southern Afghanistan. For example, the Government of Afghanistan contracted two local NGOs that were responsible for delivering the basic package of health services in these areas (BPHS NGOs) to assume responsibility for SIA implementation in their areas. Local 'access negotiators' were recruited to work with all parties/sides in the conflict and the International Committee of the Red Cross (ICRC) continued to secure directives of support for SIAs from the leaders of anti-government elements. Communications with Afghanistan forces and the International Security Assistance Force (ISAF) were enhanced to reduce the risks to vaccinators and communities during SIAs.

The combination of these activities and other factors helped to considerably reduce the proportion of inaccessible children in Southern Region to <5% by July 2009, from >20% at the start of the year. However, improved access did not immediately lead to SIA quality improvements everywhere. In the 13 persistent transmission districts with >670,000 children aged <5 years, the proportion of '0-dose' children (per non-polio AFP data) was still 20% at end-2009, as compared to the 5% in other districts of Southern Region, highlighting the need for district-specific plans to address the particular access challenges in these areas.

On 11-13 January 2010, the first District Planning Workshop was conducted with district teams from the 13 persistent transmission districts. The workshop highlighted problems of inappropriate vaccination team composition and training materials, inadequate supervisor selection and training, a lack of updated and detailed cluster microplans, and the substantial time demands of the constant negotiations with anti-government elements to obtain access in many areas. The initial district-specific plans included the scale-up of promising tactics from 2009, such as enhanced collaboration with BPHS NGOs, revision of all microplans (including communities covered, team workloads, transport, etc), prioritization of key village 'clusters' in each district, local advocacy plans to enhance access, evidenced-based communications and social mobilization activities, and systematic use of the SIAD strategy to exploit fully any windows of opportunity that were created by improvements in access. These district-specific plans will be reviewed and updated quarterly based on the evolving security situation, the local epidemiology, and the quality of strategy implementation.

District-specific plans engage new partners and incorporate new approaches to access children in insecure areas and improve vaccinator safety.

Key approaches include additional OPV doses at short intervals, use of local 'access negotiators' and cross-border coordination with Pakistan.

The success of these and subsequent district-specific plans will depend wholly on upgrading and updating the skills of the provincial and district level staff in micro-planning and other basic aspects of SIA management, as well as establishing a sufficient support infrastructure to undertake and implement the district-specific planning process. To this effect, full-time District SIA Managers will be recruited for each of the 13 persistent transmission districts, the Southern Region EPI/Polio team will be strengthened with an additional experienced national officer, and an additional international officer will provide direct support to Southern Region and South-Eastern Region. A proven SIA training package for immunization teams and supervisors has been adapted for Southern Region, with training of trainers initiated in February 2010. A specific communications/ social mobilization plan will be developed for Southern Region with a strong focus on the 13 persistent transmission districts.

In addition to the district-specific planning process, coordination with neighbouring Pakistan will be further improved, in particular for tracking and mapping population movements and supplementing, if needed, the current vaccination posts at key gathering sites and border crossings. National and sub-national polio immunization days will complement the SIAs in the 13 persistent transmission districts to maintain the high levels of population immunity needed to reduce the risk of outbreaks following importations (Annex).

Major process indicators:

- end-2010: <10% missed children during at least four SIAs in each of the 13 conflict-affected districts with persistent transmission in Southern Region.
- end-2011: <10% missed children during at least six SIAs in each of the 13 conflict-affected districts with persistent transmission in Southern Region.
- end-2012: >90% of children with >3 doses of OPV in all provinces of the country.

NOTE: these major process indicators are complemented by the standard AFP surveillance and SIA performance indicators which must be achieved in all areas of the country to achieve, confirm and maintain national polio-free status.

3.2 Interrupting wild poliovirus transmission in Africa

This section provides an overview of the strategies to interrupt the remaining chains of indigenous WPV transmission in Nigeria, to interrupt the known or possible re-established transmission chains in Angola, Chad, the Democratic Republic of the Congo (DR Congo) and southern Sudan, and to reduce the risk of international spread of WPVs in the 'WPV importation belt' of sub-Saharan Africa.

CONTEXT:

By comparison with Asia, the transmission of both indigenous and imported WPVs in Africa has been sustained over larger geographic areas, such as provinces/states or groups of provinces/states, as opposed to districts. Furthermore, polio outbreaks due to imported WPVs in Africa have generally resulted in more polio cases over longer periods of time than in Asia. Both of these phenomena are primarily due to the weaker health systems in the remaining polio-infected countries of sub-Saharan Africa, resulting in low routine immunization coverage levels and suboptimal outbreak response. However, these challenges are in part offset by the consistently high per-dose efficacy of OPVs in sub-Saharan Africa, and by the substantially lower population immunity threshold needed to stop WPV transmission as compared to northern India and parts of Pakistan in Asia (i.e. possibly as low as 80% in some rural areas of Africa vs. >95% in densely population areas of Asia). Consequently, the immunity thresholds needed to stop polio transmission in sub-Saharan Africa can be achieved with relatively fewer SIAs per year compared to Asia, provided that high coverage is maintained.

These advantages are part of the reason for the particularly rapid progress towards polio eradication that was seen in sub-Saharan Africa in the late 1990s, when indigenous WPV transmission was interrupted within three years of starting SIAs in almost every country. However, it has been difficult to capitalize on this biological advantage due to the repeated re-infection of a wide band of polio-free countries stretching from west Africa, into central Africa and to the Horn of Africa (the 'WPV importation belt'). These importations, which were the result of persistent indigenous virus circulation in northern Nigeria and northern India, frequently resulted in substantial outbreaks due to low routine and SIA coverage in many countries of the 'WPV importation belt'.

By end-2009, indigenous WPV poliovirus circulation in Africa was restricted to a group of eight to 12 states of northern Nigeria, though a further four countries were known (Angola, Chad) or suspected (DR Congo, southern Sudan) of having re-established transmission¹⁷ on a national or sub-national scale. At early 2010, an additional six west African countries in the 'WPV importation belt' still had ongoing outbreaks due to recent importations. Encouragingly, WPV1 cases fell by 90% in Nigeria in 2009 due to a combination of (a) higher vaccine-induced immunity following the major improvements in SIA performance in 2009 and (b) a certain degree of natural immunity as a result of the large outbreaks in 2007-2008. Consequently, by early 2010 the risk of new exportations from Nigeria had been substantially reduced. In addition, DR Congo and southern Sudan had not reported a case of polio due to their re-established virus for over six months (i.e. since August 2008 and June 2009, respectively).

Polio circulates over a large area in Africa, but the immunity threshold to stop transmission is substantially lower than in most of Asia.

A polio 'importation belt' is now well defined in sub-Saharan Africa, allowing a targeting of preventive measures.

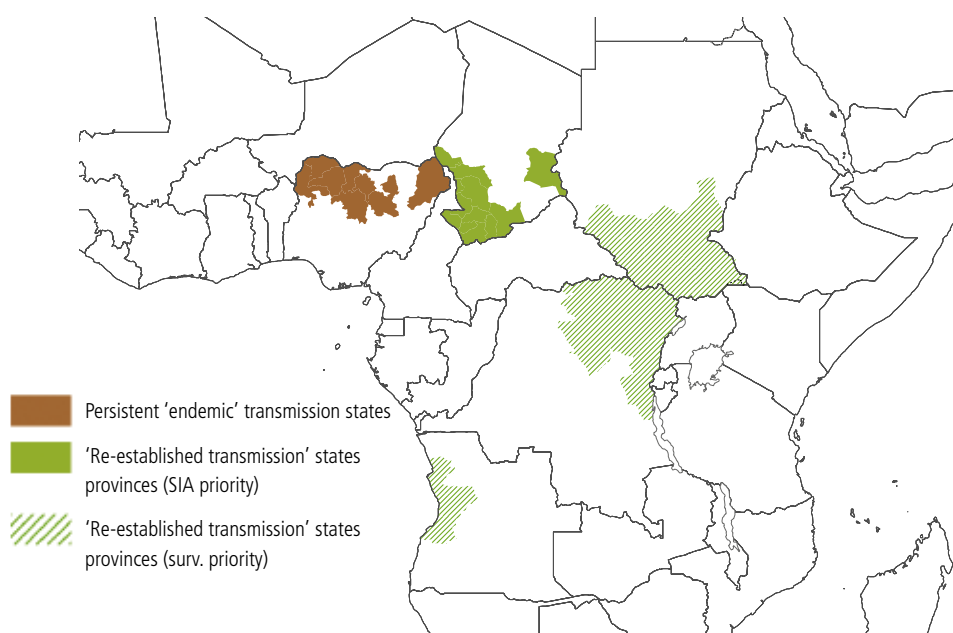
¹⁷ Re-established poliovirus transmission: the persistent circulation of an imported wild poliovirus for ≥12 months.

STRATEGIC APPROACH:

Interrupting the remaining WPV transmission in Africa requires capitalizing on recent progress by (a) institutionalizing in northern Nigeria the new tactics that rapidly raised SIA coverage in 2009 and introducing additional activities to close the remaining gap to achieve the immunity threshold needed to stop transmission in this area, (b) markedly scaling-up the resources and support provided to both SIA and surveillance activities in the re-established transmission areas, (c) improving the quality of outbreak response campaigns in the recently re-infected areas, and (d) conducting better pre-planned SIAs and immunization systems strengthening activities across as broad an area as possible in the 'WPV importation belt', to achieve the $\geq 80\%$ population immunity threshold that substantially reduces the risk of an outbreak following an importation.

A 4-pronged approach aims to reach Africa's population immunity threshold concurrently across a broad swath of infected and at-risk countries.

Africa: states/provinces with persistent transmission of wild poliovirus



As in Asia, the highest priority across all of these areas is enhancing the coverage achieved during routine immunization activities and SIAs, with the appropriate mix of OPVs, to achieve the population immunity thresholds needed to stop transmission. Given the relatively lower level of population immunity needed to stop transmission in sub-Saharan Africa, the introduction of bivalent OPV could substantially accelerate the interruption of both remaining WPV serotypes if critical gaps in SIA coverage can be addressed.

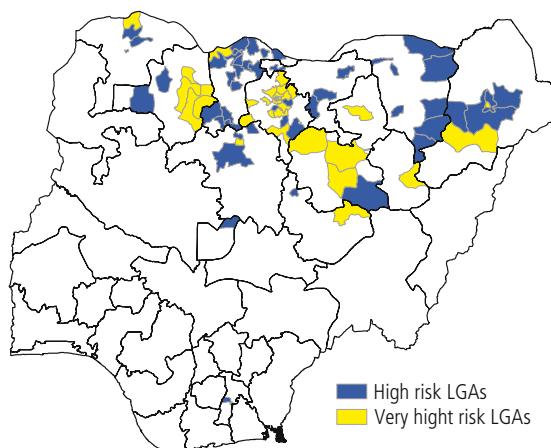
The following sections summarize the major elements of the GPEI Strategic Plan 2010-2012 to interrupt WPV transmission in Africa (further country-specific details are available at www.polioeradication.org).

Nigeria:

Nigeria is of particular importance to the global polio eradication effort as it is the only country in Africa which continues to have circulation of indigenous WPVs, and, as of 2009, is the only country in the world with ongoing transmission of all three poliovirus serotypes: WPV1, WPV3 and a type 2 circulating vaccine-derived poliovirus (cVDPV). Although WPV transmission was interrupted in the majority of states in the country by the early 2000s, transmission continued in at least 12 of the 37 states (primarily in the north), due to persistently low coverage during routine immunization activities and SIAs. This was the result of a range of factors that included a very weak health system and the residual effect of rumours about OPV side-effects that had led to the temporary suspension of all polio immunizations in some states in 2003-2004.

Following the repeated re-infection of polio-free states of Nigeria and neighbouring countries by virus originating in the northern states, and a strong statement of international concern by the WHA in May 2008, the Federal Government established a Task Force to address the situation. In December 2008, renewed advocacy outreach by the Federal Government to the Governors' Forum culminated in the signing of the 'Abuja Commitments to Polio Eradication' by State Governors in February 2009. Subsequently, the proportion of '0-dose' children in the northern endemic states fell from over 30% to <10% by the second quarter of 2009. Further improvements in SIA quality were registered following the establishment of a 'National Task Team of Northern Traditional Leaders' by His Eminence the Sultan of Sokoto in mid-2009, resulting in a 50% decline in overall cases by end-2009 compared with 2008 and a 90% decline in WPV1 cases.

High-risk and very high-risk LGAs



Nigeria's strategy builds on the strengths of State Governors & Traditional Leaders who together reduced 'missed children' to <10% in 2009.

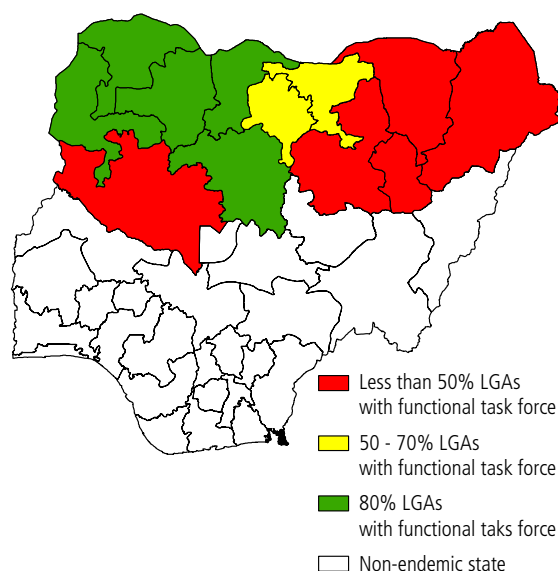
In 2010-2012, the Federal and State governments will give priority to achieving further improvements in SIA quality in the eight northern states that remained persistently infected in the second half of 2009, and especially Kano, Katsina, Zamfara and Borno where the proportion of '0-dose' children remained >10% at end-2009. The primary focus in these areas will be building on the achievements of 2009 by extending the strategies employed at state-level down to the critical implementation level of the Local Government Area (LGA – i.e. district) where the political engagement in SIAs (known as Immunization Plus Days or IPDs in Nigeria) continued to vary. Particular attention will be given to ensuring that all LGA Chairpersons are engaged and accountable for SIA performance in the 85 high-risk and very high-risk LGAs that have especially poor SIA performance and/or persistent virus transmission. In these areas, LGA-specific plans will be developed based on the local context and challenges. These plans will include

Primary focus is on the 85 of Nigeria's 774 Local Government Areas (districts) at highest risk of persistent transmission.

Bivalent OPV will be used extensively, coupled with enhanced independent monitoring of campaign coverage to enhance local accountability.

enhanced engagement of key religious leaders and the scale-up of appropriate evidence-based social mobilization activities to increase community demand. Closer collaboration between polio eradication and other primary health care activities will be fostered, particularly for strengthening routine immunization and the Midwives Service Scheme.

Political engagement and ownership at LGA level



Technical support to Nigeria will be scaled-up where requested at the national, state and LGA levels to assist authorities in the intensification of eradication activities. Partner agency initiatives, such as the CDC-supported Stop Transmission of Polio (STOP) programme, will be explored to assist in addressing additional technical support needs. Social mobilization and communications capacity will be further expanded, including through the deployment of international communications consultants to zonal and state offices in high-risk areas. Under the government's leadership, these experts will be responsible for linking overall strategic policy and technical oversight on communications to the

activities being implemented at peripheral levels and for facilitating monitoring and reporting on communications activities, including the collection and analysis of specific indicators during independent SIA monitoring.

To maintain the high levels of population immunity needed to reduce the risk of outbreaks following importations into the polio-free areas of the country, nationwide IPDs will complement the sub-national SIA activities that focus on the persistent transmission states (Annex). It is anticipated that bivalent OPV will be used extensively in these SIAs, as a complement to the use of trivalent OPV in some SIAs and all routine immunization activities. Mop-up activities will be conducted as appropriate with monovalent OPVs. Throughout the country, emphasis will be given to the enhanced independent SIA monitoring principles outlined in the 'Guiding principles' section. Surveillance reviews and activities for strengthening AFP surveillance will continue. The feasibility of enhancing surveillance for polioviruses through environmental sampling in key urban areas such as Kano will be explored to guide programme planning in the absence of polio cases.

Major process indicators:

- end-2010: <10% 0-dose children (per non-polio AFP - NP AFP - data) in each of the 12 high-risk states (including the eight persistent transmission states).
- end-2011: >80% of children with ≥ 3 doses of OPV (per NP AFP data) in each of the 12 high-risk states (including the eight persistent transmission states).
- end-2012: >90% of children with ≥ 3 doses of OPV in all states.

Countries with re-established poliovirus transmission:

Formally defined in 2009, countries with 're-established transmission' are those with areas where circulation of an imported wild poliovirus is known or suspected to have persisted for >12 months. Four such countries were identified in 2009, two of which were proven to have met these criteria (Angola, Chad) and two of which were suspected to have had re-established transmission based on the identification of a closely related virus in adjoining areas of a neighbouring country (DR Congo, southern Sudan). The strategic importance of these areas to the global eradication effort is highlighted by the fact that the re-established viruses from all four of these countries re-infected other, previously polio-free countries and/or areas in 2009.

Common to all of these countries, or at least the areas with re-established transmission, was their recent emergence from conflict that contributed to particularly weak health systems, low routine immunization coverage and insufficient capacity to fully implement international outbreak response guidelines. Consequently, GPEI resources, particularly international technical assistance (including for communications), will be substantially enhanced for these areas, to levels which are comparable to the GPEI investment in endemic areas. To rapidly achieve this, a global pool of Supplementary Technical Assistance (STA) will be drawn on to provide long-term experienced polio consultants to key areas, with deployments and needs reviewed on a six-monthly basis and adjusted accordingly. The GPEI will also continue to develop its contacts with and engagement of the wide range of organizations that often have comparative advantages at the local level, including NGOs, community-based organizations, the International Federation of Red Cross and Red Crescent Societies and faith-based organizations.

In each of these four countries, the specific programmatic priorities outlined in the GPEI Strategic Plan 2010-2012 reflect the epidemiology of the disease at end-2009.

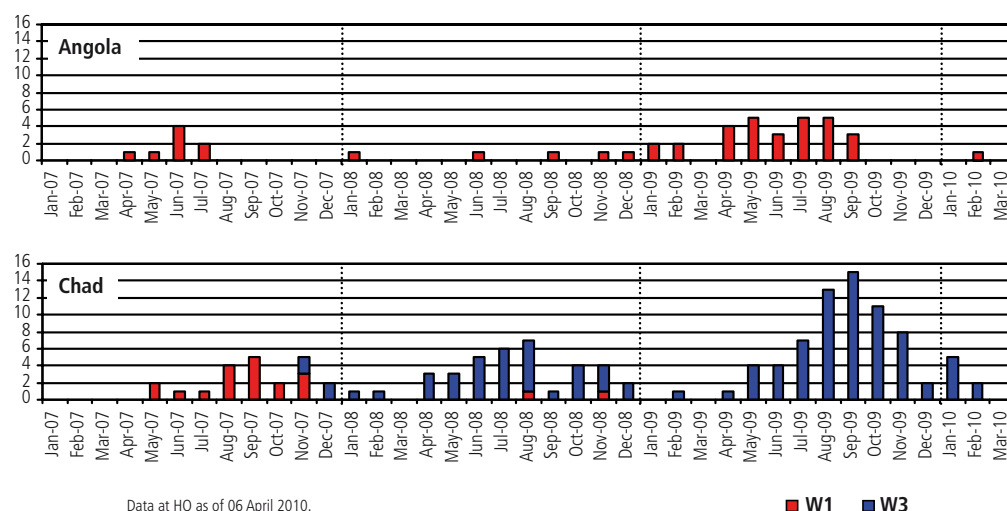
Angola and Chad

In Angola and Chad, where WPV1 and WPV3 respectively were detected in the second half of 2009, the first priority is to enhance SIA quality to interrupt these remaining chains of transmission. In Angola, where the re-established transmission is now highly concentrated in the Luanda-Benguela corridor along the Atlantic coast, the priority is high-quality monovalent OPV type 1 mop-up campaigns, complemented by nationwide SIAs with bivalent OPV and trivalent OPV to maintain population immunity in the polio-free areas. In Chad, where the re-established virus is still circulating throughout most of the country, the primary emphasis will be on improving the quality of nationwide campaigns with a combination of monovalent OPV type 3 and trivalent OPV or bivalent OPV, as appropriate to the emerging epidemiology. As virus becomes geographically restricted, monovalent OPV type 3 mop-up campaigns will be used to supplement the nationwide activities to interrupt all transmission. Although both of these countries were achieving certification standard AFP surveillance by end-2009, both had experienced periods of 'silent' transmission in the recent past due to sub-national gaps in surveillance sensitivity. Consequently, the second priority in these areas will be to further enhance AFP surveillance to ensure the rapid detection and mop-up of any residual transmission.

GPEI assistance will be substantially enhanced in areas of re-established transmission to help address common systems-related risk factors.

In Angola and Chad, higher OPV campaign coverage is needed to interrupt remaining chains of re-established poliovirus transmission.

Epidemiologic curve of re-established transmission, Angola and Chad, 2007-2010



To improve SIA quality in Angola, operational guidelines are being completely revised and updated, with retraining of supervisors, vaccination teams and mobilizers. Any districts achieving <90% coverage during any SIA (as verified by independent monitoring) will be re-covered. Piloted in late-2009, the increased involvement of military forces, political leaders and district medical doctors in the key re-established transmission areas will be taken to scale in 2010.

In Chad, a multi-pronged approach will be taken to simultaneously enhance the quality of SIA operations and the accountability of district-level leaders for the quality of SIAs in their areas. The outbreak response microplans for each area will be fully revised, with refresher training of all key staff from the level of planners to supervisors and vaccinators. Particular attention will be given to enhancing SIA quality in the capital, N'Djamena, which in 2009 appeared to be the primary virus reservoir and where some areas appear to have achieved only 50% SIA coverage. Recognizing the critical role played by H.E. the President in terminating previous outbreaks by directing Provincial Governors to hold district-level officials accountable for programme performance, similar support will be sought as a matter of priority.

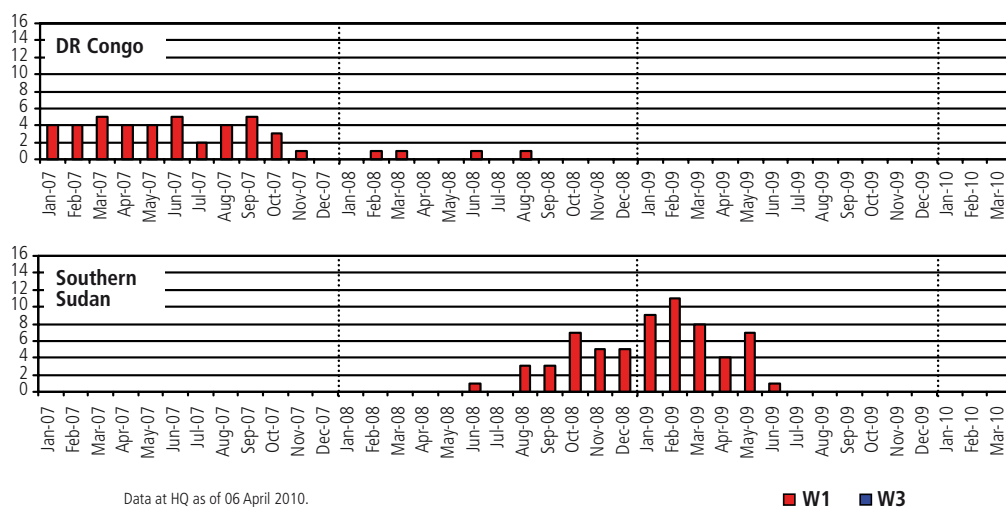
Democratic Republic of the Congo and southern Sudan

In contrast to the situation in Angola and Chad, WPVs suspected to have been re-established in DR Congo and southern Sudan have not been detected since August 2008 and June 2009, respectively. Consequently, the highest immediate priority in both countries is to enhance AFP surveillance sensitivity to determine whether virus is continuing to circulate. At the same time, large scale SIAs must be continued in order to sustain population immunity and protect against the possible re-emergence of the most recent virus, new importations and cVDPVs.

The importance of rapidly enhancing surveillance in the eastern provinces of North and South Kivu in DR Congo is evidenced by the detection of a WPV1 in September 2009 in

neighbouring areas of Burundi that was genetically linked to the WPV1 last detected in DR Congo in August 2008. Furthermore, there remains a substantial risk of new importations into the country due to the continued circulation of WPV1, and possibly WPV3, in Angola from where polioviruses have repeatedly been re-introduced into DR Congo, the most recent being a WPV3 importation in January 2009. In southern Sudan (and the border area of Ethiopia) the need for enhanced surveillance is reflected in the fact that undetected transmission had persisted for over two years in southern Sudan/Ethiopia border area.

Epidemiologic curve, DR Congo and southern Sudan, 2007-2010



To improve surveillance and SIA quality improvements in DR Congo, international technical support to the highest-risk provinces will be scaled-up. Specific mechanisms are being established to monitor the engagement of provincial and district leaders in eradication, with oversight by the Office of the President and technical leadership and coordination by the Ministry of Health. The revision of microplans and refresher training will be overseen by the appropriate political and administrative health authority. Special plans have been developed to run operations in conflict-affected areas (i.e. North and South Kivu). Surveillance performance will be monitored on a quarterly basis.

In southern Sudan, the significantly scaled-up international technical support in 2009 and early 2010 will be regularly evaluated to ensure appropriate levels of deployment to each state to rapidly increase AFP detection rates and improve SIA quality. Actions to further improve SIA operations will include fostering increased engagement of Payam (district) leaders and expanding on the major elements of the 2009 'Presidential Action Plan for Polio Eradication in southern Sudan', through which all County and Payam Executive Officers (district heads) have been issued instructions to personally oversee operations in their areas.

In southern Sudan and eastern DR Congo, enhanced surveillance sensitivity is needed to validate the apparent interruption of the re-established virus.

Major process indicators:

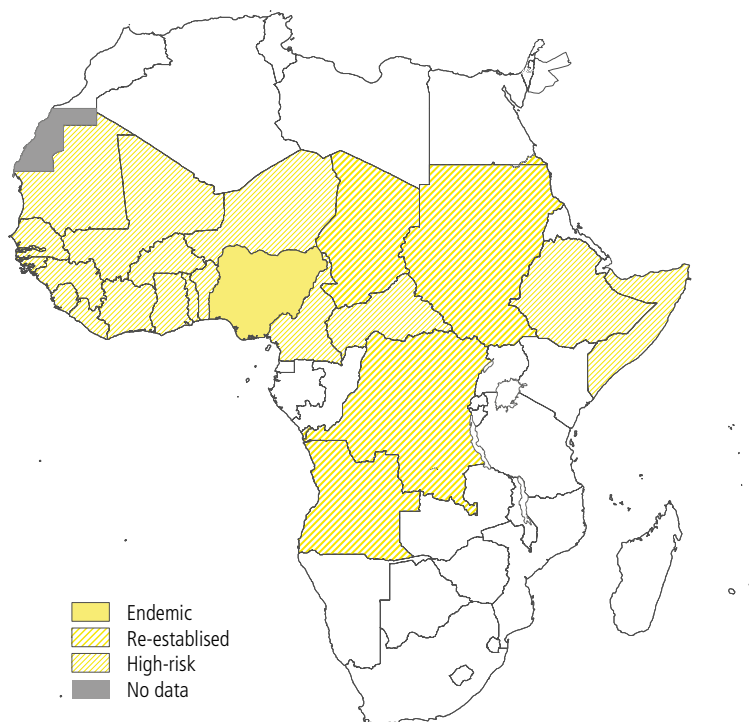
- end-2010: all re-established WPV transmission interrupted, and:
 - Angola: <10% missed children in all districts of Luanda, Benguela and Kwanza Sul during each SIA;
 - Chad: <10% missed children in greater N'Djamena and in the southern and eastern WPV transmission zones during each SIA in the second half of 2010;
 - DR Congo: <10% missed children in each SIA in Orientale, North & South Kivu (and all provincial capitals); AFP rate >2 with 80% adequate specimens in all provinces;
 - Southern Sudan: <10% missed children in each state during each SIA; AFP rate >2 with 80% adequate specimens rates in all states.
- end-2011: SIA and AFP performance of 2010 sustained.
- end-2012: SIA and AFP performance of 2010 sustained.

Countries with recurrent importations:

Since 2003, WPVs originating in northern Nigeria recurrently re-infected a band of countries across west Africa, central Africa and the Horn of Africa, which now constitutes a 'WPV importation belt'. Between January 2003 and June 2009, a total of 113 poliovirus importations were detected in these countries, resulting in 59 polio outbreaks. Analysis of the pattern of WPV spread across this area demonstrates that the risk of a country suffering an importation is significantly correlated with the intensity of transmission in northern Nigeria, its geographical proximity to that area, and the amount of population movement between the two countries. The risk of an importation resulting in an outbreak was significantly higher if OPV3 coverage was <80%. By the first quarter of 2010, five countries were considered to still have 'active' outbreaks due to 2009 importations (i.e. most recent case had occurred within the previous six months: Guinea, Liberia, Mali, Mauritania and Sierra Leone). In addition to these five countries, Senegal was re-infected in January 2010.

Clear-cut risk factors for polio importations and outbreaks guide strategy and facilitate resource allocation.

Priority countries for pre-planned SIAs



The GPEI Strategic Plan 2010-2012 sets out stronger measures to reduce the international spread of polioviruses in Africa. These include more aggressive mop-up activities to interrupt ongoing outbreaks, pre-planned campaigns and immunizations systems strengthening to reduce the risk of outbreaks following new importations, research on potential policies for reducing the risk of further importations (e.g. recommendations on the vaccination of travellers) and guidelines for more rapidly stopping outbreaks.

Rapidly stopping new and active outbreaks requires radically improving coverage in the initial mass OPV campaign response.

The immediate priority is to stop all 'active' outbreaks using mop-up activities with the appropriate monovalent OPVs in the infected areas, combined with a series of large-scale, synchronized SIAs across most of the 'WPV importation belt' to protect against further importations. To optimize the coverage achieved during these SIAs, the Head of Government or State in each participating country has been formally requested to consider directly overseeing the planning, launch and supervision, and establishing mechanisms for holding local leaders accountable for the performance of SIAs in their areas. At the local level, SIA microplans are being updated, with refresher trainings conducted where needed, particularly in areas of recent transmission. Attention will continue to be paid to mobile populations, with detailed cross-border planning to minimise the risk of missing communities in cross-border areas during synchronized SIAs. Building on the experience in rapidly controlling the four-country Horn of Africa WPV1 outbreak by mid-2009, special emphasis will be given to the rapid deployment of national and international technical support coupled with the introduction of innovative strategies such as SIAD rounds. Consequently, substantial short-term international technical assistance is being deployed to assist in the SIA microplanning, training and supervision, with prioritization based on the location of the most recent cases. Areas with especially poor performance or persistent virus transmission will be assessed for implementation of SIADs.

Collaboration will be strengthened with other organizations at the country-level, such as the International Federation of Red Cross and Red Crescent Societies (IFRC) and NGOs, through ICC and SIA operational groups, as appropriate. Such partners often have a strong presence and in-depth knowledge of local communities and civil administrations. Their human resources can often be more flexibly and rapidly mobilized than those of governments and UN agencies. In 2009, initial collaboration with IFRC National Societies in 16 countries of the 'WPV importation belt' significantly improved the engagement of broader civil society in SIA operations and ownership. In 2010, this collaboration will be institutionalized, with priority given to areas with active outbreaks.

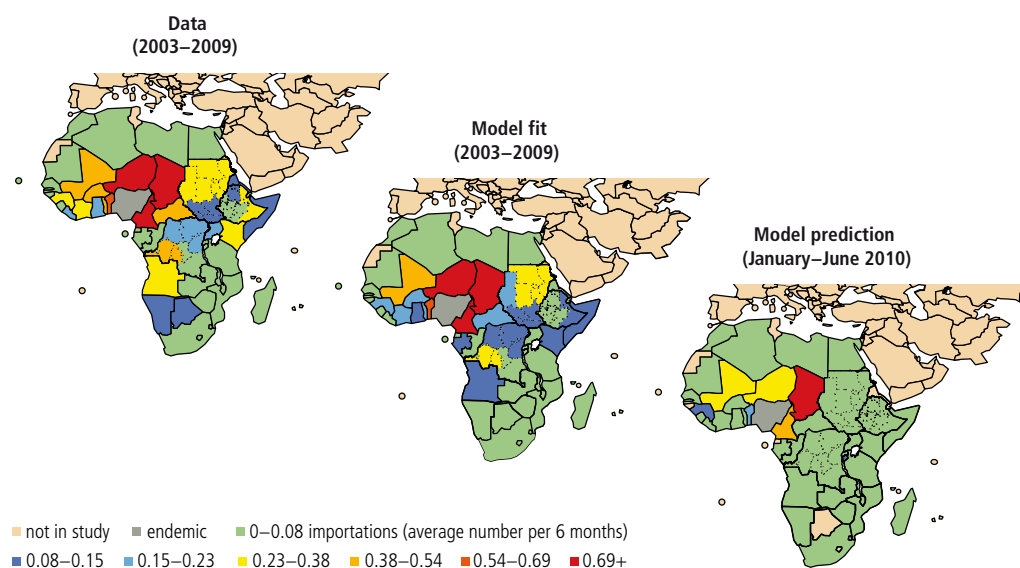
To more rapidly identify poor-performing areas for immediate re-vaccination, and to guide corrective action in advance of the next SIA, standardized 'real-time' independent monitoring will be institutionalized across the eradication programme. Standardized materials and protocols will be developed and staff trained across the 'WPV importation belt' in the first quarter of 2010. A goal of internationally posting all monitoring data within 10 to 14 days of each SIA has been established to enable rapid mid-course corrections ahead of subsequent SIAs. In areas where independent monitoring data is discordant with surveillance and other programmatic data, LQAS will be conducted to validate more definitively the level of coverage that is being achieved.

To reduce the risk of new outbreaks, a two-pronged approach will be employed to improve population immunity, particularly in the highest risk areas of the 'WPV importation belt'. First, pre-planned and coordinated OPV SIAs will be expanded to cover as many polio-free countries in the 'WPV importation belt' as possible with two OPV SIAs in 2010, 2011 and 2012. Recognizing that 'preventive' SIAs have previously failed to prevent the occurrence of outbreaks following importations in some countries due to suboptimal coverage (<80%), particular attention will be given to improving SIA performance. During the development of the GPEI Strategic Plan 2010-2012, Ministries of Health in the 'WPV importation belt' repeatedly stressed the fundamental importance of early confirmation of SIA resources (i.e. at least 12 months in advance) to achieve high coverage. The early confirmation of these resources allows enhanced planning as well as

A two-pronged approach seeks to reduce the risk and consequences of new international spread in sub-Saharan Africa.

better efficiency by bundling OPV with other interventions such as Vitamin A, measles vaccination and/or as part of Child Health Days. In view of the substantial resource demands of implementing this strategy, a mathematical model has been developed to help prioritize countries and areas based on the risk of both an importation and a subsequent outbreak (Figure 4). Regular assessments of polio immunity among the 'WPV importation belt' countries using NP AFP data, this model and other relevant information, will continue to inform this prioritization.

Figure 4: mathematical modeling-identifying and tracking the evolution of areas at risk of importations and outbreaks



These 'pre-planned' SIAs will be complemented with an increased emphasis on immunization systems strengthening in the highest-risk areas of the 'WPV importation belt'. As outlined in Objective 4 of the GPEI Strategic Plan 2010-2012 (Strengthening immunization systems), polio-funded staff will be trained and supported to more systematically identify and track progress in rectifying the major barriers to immunization systems strengthening, to support implementation of the 'Reaching Every District (RED)' approach in highest-risk areas, to improve the quality of immunization data, and to facilitate staff training and capacity building in areas such as district-level microplanning and cold-chain maintenance.

Pre-planned SIAs will be complemented by immunization systems strengthening.

Where and when appropriate, polio immunization recommendations for travellers will be promoted.

Finally, the impact of polio immunization recommendations for travellers to and from polio-affected areas, as well as the evidence base for such recommendations, will be reviewed. If and where appropriate, recommendations will be refined and country implementation supported.

Major process indicators:

- mid-2010: <10% missed children in two SIAs in all 'WPV importation belt' countries.
- end-2011: <10% missed children in two SIAs in all 1st and 2nd level priority countries in the 'WPV importation belt' (based on end-2010 prioritization).
- end-2012: <10% missed children in two SIAs in all 1st and 2nd level priority countries in the 'WPV importation belt' (based on end-2011 prioritization).

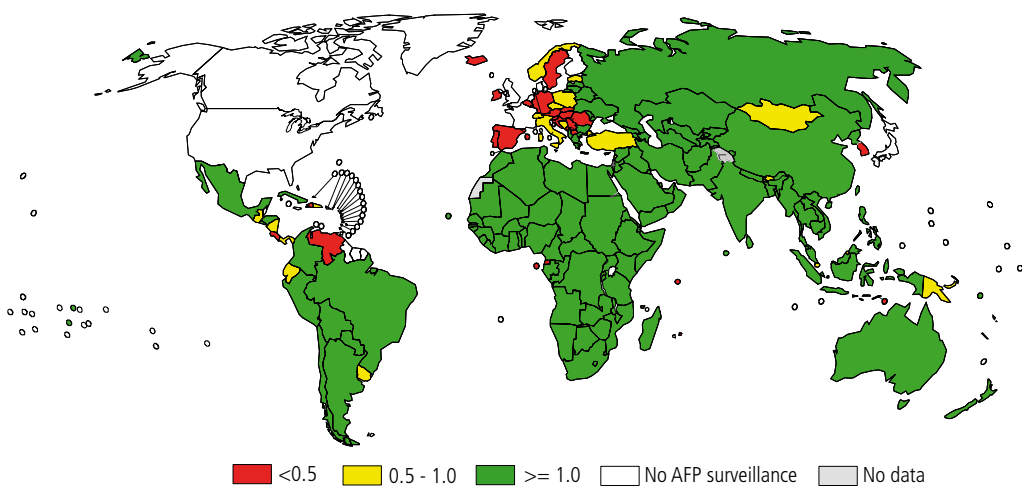
3.3 Enhancing global poliovirus surveillance and outbreak response

This section provides an overview of the strategies to address sub-national gaps in surveillance sensitivity in the three endemic Regions, to ensure certification-standard surveillance is sustained in Regions which are polio-free, and to enhance the effectiveness of WPV and cVDPV outbreak response activities.

CONTEXT:

Surveillance for cases of AFP is the core strategy employed by the GPEI to detect the transmission of WPVs or cVDPVs, guide SIA strategy, and facilitate the eventual certification of WPV eradication. 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 Laboratory Network (GPLN). In some areas of the world (e.g. Egypt, Karachi, Lahore, Mumbai), systematic environmental sampling for polioviruses is being used to supplement the data from AFP surveillance.

Global AFP surveillance performance, 2009



Environmental sampling, new laboratory procedures and new diagnostics supplement AFP surveillance sensitivity and speed.

In 2005, the AFP target rate for endemic, re-infected and high risk countries was increased to >2 cases per 100,000 population to close residual surveillance gaps, as indicated by the occasional detection of 'orphan viruses', and facilitate more rapid detection and response to circulating viruses. Since 2006, new laboratory procedures have reduced the average time needed to confirm poliovirus by 50% (from 42 days to 21 days). In 2008 and 2009, new Real-time Polymerase Chain Reaction (PCR) assays to improve screening for VDPVs were evaluated and introduced into the GPLN. Subsequently, the speed of outbreak detection and response improved to such an extent that by 2009 the median time from an index case to the first large-scale immunization response was 57 days, compared to 91 in 2005.

In Regions certified as polio-free, >50% of countries had suboptimal AFP surveillance in 2009.

Persistence of polio outbreaks is primarily due to sub-optimal implementation of WHA Resolution 59.1.

The Strategic Plan is designed to address known surveillance gaps in both endemic and polio-free Regions.

At end-2009, 56 of the 68 countries in the three remaining polio-endemic Regions (Africa, Eastern Mediterranean, South-East Asia) with populations >1 million had certification-standard surveillance, with 49 of these countries sustaining AFP rates >2 per 100,000. *In the three polio-free Regions (Americas, Europe, Western Pacific), however, only 25 of the 80 countries with AFP surveillance (and populations >1 million) had AFP rates of >1 per 100,000 and adequate specimen collection.*

To improve the speed and quality of outbreak response activities globally, in 2005 the ACPE recommended a set of international standards that were subsequently endorsed by the WHA in May 2006 (Resolution WHA59.1). Recognizing that many outbreaks were still persisting for six to 12 months, since 2007 further refinements to the outbreak response guidelines have been piloted in an effort to exploit the availability of monovalent OPVs to more rapidly enhance population immunity and curtail transmission. Most notable in this regard has been the development and use of the SIAD strategy which in 2009 proved particularly helpful in curtailing the final chains of the Horn of Africa outbreak.

By end-2009, the overall efficacy of the new poliovirus detection methods and outbreak response standards was evidenced by the fact that 97% of WPV importation events from 2003-2007, and 70% of the events with onset in 2008-2009, had been stopped. Moreover, there was a steady decline in the duration and average size of outbreaks. However, sub-national surveillance gaps persisted in some endemic and re-infected areas, as reflected in the continued detection of 'orphan' viruses in areas such as central Africa, the Horn of Africa and parts of Afghanistan and Pakistan. Furthermore, outbreak response guidelines had not always been optimally implemented, leading to the frequent persistence of outbreaks for >six months and, occasionally, the re-establishment of transmission.

STRATEGIC APPROACH:

Surveillance for polioviruses:

The strategic approach for enhancing poliovirus surveillance is designed to address known sub-national surveillance gaps in endemic and re-infected Regions, re-invigorate AFP surveillance in Regions which have been certified as polio-free, and expand environmental surveillance in key endemic areas.

As the first priority, additional technical assistance will be deployed to areas with known sub-national surveillance gaps to further improve AFP detection rates. Particular emphasis will be given to the areas with re-established transmission and a history of 'orphan' virus detection and/or gaps of >six months in the detection of virus (e.g. Chad, southern Sudan, Angola and parts of Afghanistan and Pakistan). This additional technical assistance will serve a dual purpose by also helping to improve SIA quality in these areas. In the large population endemic countries of India, Pakistan and Nigeria, the feasibility of expanding environmental surveillance to centres such as Delhi and Patna (India); Peshawar and Quetta (Pakistan); and Kano (Nigeria), will continue to be assessed and, if appropriate, implemented.

Building on the experience of 2007-2009, the second priority will be to conduct, at the regional and global levels, quarterly desk reviews of sub-national AFP performance in these countries to closely monitor surveillance sensitivity and identify gaps. Particular emphasis will be given to the 'WPV importation belt' of sub-Saharan Africa, again with priority to central Africa and the Horn of Africa. Field-level surveillance reviews will be implemented within three months in areas identified as having major performance concerns during these desk reviews. Surveillance reviews will also be planned for areas with historical weaknesses in AFP surveillance and for the areas with polio cases in 2009 and 2010 that are deemed to be at highest risk for undetected transmission. Based on the recommendations from these reviews, technical assistance will be scaled up as necessary.

The third priority will be the revitalization of AFP surveillance in polio-free Regions. Quarterly desk reviews of national AFP surveillance indicators will be conducted at the Regional level, with monthly feedback provided to countries with suboptimal performance. The work of Regional Certification Commissions (RCCs) will be enhanced, including through more frequent meetings where needed, to help advocate for re-establishing sensitive AFP surveillance as a high public health priority in these areas.

Major process indicators:

- End-2010: non-polio AFP rate >2 achieved at sub-national level¹⁸ in all endemic, re-established transmission and 'WPV importation belt' countries. Environmental sampling expanded by two additional reservoir areas.
- End-2011: non-polio AFP rate >2 and >80% adequate specimen rate achieved at the sub-national level in all endemic, re-established transmission and 'WPV importation belt' countries; environmental sampling expanded to two additional reservoir areas.
- End-2012: AFP and adequate specimen rate process indicators sustained.

Poliovirus outbreak response activities:

A two-pronged approach will be used to enhance the speed, quality and impact of outbreak response activities for both WPVs and cVDPVs.

The first priority will be to improve the application of the existing international guidelines for responding to a poliovirus outbreak. To do this, the GPEI will more rapidly ensure that the top-level political leadership is aware of such outbreaks and their implications from the outset. Recognizing the value of a rapid initial response to curtailing the overall duration of an outbreak following an importation, particular attention will be given to optimizing the application of this aspect of the outbreak response guidelines. Upon notification of an index case, longer-term (six to 12 months) technical assistance will be systematically deployed to assist in-country teams with the planning and implementation of outbreak response activities in re-infected areas, with priority given to those countries and areas that have historically had prolonged circulation of imported WPVs. Very high priority will be given to ensuring full application of the guidelines for independent SIA monitoring to facilitate more timely improvements in subsequent rounds as well as international risk assessment. Particular attention will be given to ensuring that in areas of <90% coverage children are immediately re-vaccinated. The persistent circulation of an imported virus for >six months will automatically trigger an international, in-country assessment.

Closer international monitoring of response activities is essential to manage risks associated with new polio outbreaks.

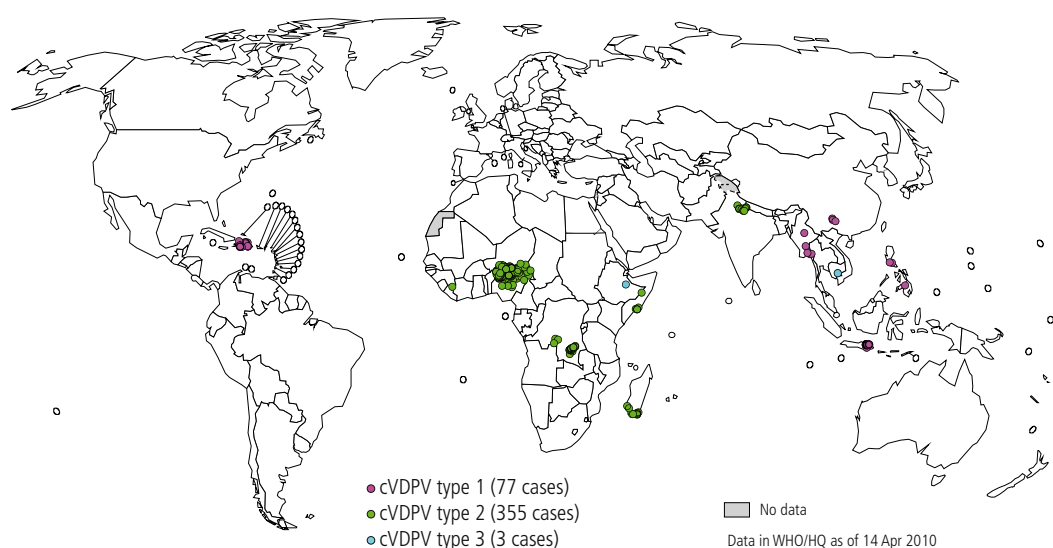
¹⁸ States/provinces with population aged <15 years of >100,000.

Pilot studies, operational research and clinical trials are informing new international outbreak response guidelines.

The second major priority will be to consolidate the outcomes of ongoing pilot studies, operational research and clinical trials to inform, if appropriate, further revision to the international guidelines for outbreak response. Most importantly, a planned clinical trial will be conducted to determine the degree to which population immunity in outbreak settings may be more rapidly enhanced through the application of the SIAD strategy. This trial will compare immunity after intervals of seven, 14 and 28 days between doses of monovalent OPV type 1, to inform policy on whether conducting the initial response rounds with shorter intervals might shorten the duration of an outbreak. If appropriate, outbreak response guidelines will be adapted accordingly.

The importance of extending the international outbreak response guidelines designed for WPVs to include cVDPVs is evidenced by (a) the increased frequency of cVDPV detection following the introduction of new laboratory diagnostic procedures in 2008 (i.e. real-time PCR assays), and (b) the experience of northern Nigeria where a type 2 cVDPV circulated for more than four years, paralysing 301 children (as at end-January 2010). Since 2000, 14 cVDPV events have been confirmed in 14 countries, resulting in a total of 413 cases¹⁹.

cVDPVs, 2000-2009: 14 episodes in 14 countries



Major process indicators:

- end-2010: 100% of WPV importations and cVDPVs in previously polio-free areas responded to per international outbreak response guidelines; international assessment conducted in 75% of countries with importation events persisting for >six months.
- end-2011: 100% of WPV importations and cVDPVs in previously polio-free areas responded to per updated outbreak response guidelines based on 2010 operational research and clinical trials; international assessment conducted in 90% of countries with importation events persisting for >six months.
- end-2012: Process indicators sustained.

¹⁹ Global detection of wild and vaccine-derived polioviruses, January 2008-June 2009. *Weekly Epidemiological Record*. 4 September 2009, vol. 84, 36 (pp 361-372).

3.4 Strengthening immunization systems

This section provides an overview of the expanded role the GPEI will play in the broader effort to strengthen immunization systems, with a focus on areas that are currently infected or at highest risk of polio and where GPEI resources are most concentrated.

CONTEXT:

Ensuring strong immunization systems for the delivery of routine childhood vaccines has been one of the four core strategies of the GPEI since its launch in 1988. Although high routine immunization coverage alone has not been sufficient to interrupt indigenous WPV transmission and completely prevent outbreaks in tropical and semi-tropical environments, it has greatly enhanced the efficacy of the other eradication strategies. In settings where the national OPV3 coverage rate is >80%, indigenous polioviruses are more rapidly interrupted, there is a statistically lower risk of having a polio outbreak following a WPV importation, and there appears to be a lower risk of both the emergence and spread of cVDPVs.

While the implementation of high-quality SIAs has made it possible to interrupt indigenous WPV transmission in countries with weak routine immunization services in both Asia and Africa, it has been much more difficult to sustain that achievement in such areas, especially in sub-Saharan Africa. The particular vulnerability to re-infection of many previously polio-free countries of sub-Saharan Africa is driven primarily by their proximity to and population movements with northern Nigeria, as well as the intensity of transmission there. Even among these countries, however, a national OPV3 coverage rate of >80% significantly reduces the risk that an importation will result in an outbreak. From an eradication perspective, immediate action to improve OPV3 coverage is also warranted by the impact this would have in reducing the risk of new cVDPVs both during the pre-eradication era and, eventually, at the time of cessation of routine OPV use worldwide following the certification of WPV eradication globally.

The GPEI's work to strengthen immunization services is essential to optimizing the broader benefits of the GPEI investment. In particular, this work can accelerate progress towards the Millennium Development Goals (MDGs) by increasing coverage with the full range of classical EPI childhood vaccines (especially measles), facilitating the timely introduction of new vaccines against pneumococcal and rotavirus infections, and assisting with the delivery of other important child survival interventions such as vitamin A and zinc supplementation and the distribution of anti-malarial bednets.

The infrastructure that has been established by the GPEI for the purposes of polio eradication encompasses both physical assets (including skilled human resources) and a combination of institutional arrangements and operating procedures. The physical assets of the GPEI include an extensive network of human resources/technical assistance (approximately 3,400 people in 70 countries, at December 2009), offices, vehicles, materials and equipment (e.g. computers, telephones). GPEI-funded staff are posted at the international, national and sub-national levels but are highly concentrated in polio-affected areas. Of these staff, 52% are working in polio-endemic countries, with a further 30% in the countries of Africa and Asia that are at highest risk for importations, particularly those that suffer recurrent outbreaks. The institutional arrangements and

Routine OPV coverage of >80% significantly reduces the risk of outbreaks following poliovirus importations.

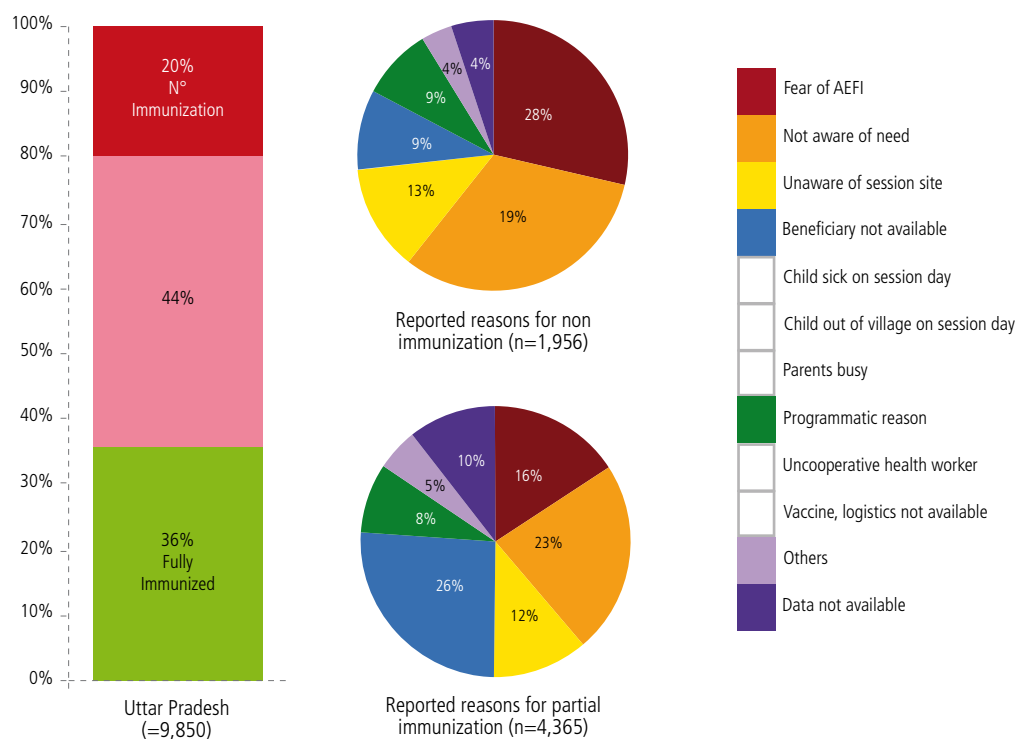
**Making GPEI's work
in immunization
systems
strengthening more
systematic can
accelerate progress
towards the MDGs.**

operating procedures of the GPEI include national and international advisory bodies (e.g. TAGs), partnership coordination and resource management mechanisms (e.g. Inter-Agency Coordinating Committees - ICCs), standardized guidelines and procedures for strategy implementation, standardized monitoring processes and indicators (e.g. AFP surveillance standards, laboratory accreditation processes) and the GPLN of 145 facilities in approximately 100 countries.

The deep involvement of the GPEI infrastructure in immunization systems strengthening is reflected in a number of ways. A 2001 survey of over 1,000 GPEI staff documented that 100% of national staff and >90% of international staff were already engaged in routine immunization and surveillance for other diseases of public health importance. These staff devoted, on average, 22% and 44% of their time, respectively, to such activities. With >95% of WHO's immunization staff in GAVI-eligible countries funded by the GPEI, this infrastructure has been critical to the rapid scale-up of the work of the GAVI Alliance in sub-Saharan Africa and Asia, especially for the introduction of new and under-used vaccines.

In terms of building on the GPEI's institutional arrangements, the remit of the polio eradication TAGs and ICCs in most low-income countries has already been expanded to include immunization systems strengthening. The GPLN has served as the core around which the broader laboratory network for measles, yellow fever and other vaccine-preventable diseases (VPDs) has been built. The GPEI's operating procedures have also contributed to the strengthening of immunization systems. Two of the most important examples in this regard have been (a) the application of GPEI approaches to develop the 'Reaching Every District (RED)' strategy to improve routine immunization coverage in priority areas and (b) the expansion of the AFP surveillance network in >100 countries to detect and investigate other VPDs, particularly measles, yellow fever, neonatal tetanus and meningitis. The RED strategy was developed and introduced in 2002 by WHO, UNICEF and other partners to help improve immunization systems by building upon the successful approaches of the GPEI. Emphasis was placed on improving five key aspects of routine immunization systems: service delivery; supply, logistics and cold chain; surveillance and monitoring; community participation; and programme planning and management. Polio-funded staff have supported the implementation of the RED strategy in >55 countries, resulting in substantial increases in routine coverage in some areas.

Example of monitoring of RI sessions: Monitoring of 2,579 RI sessions, Uttar Pradesh, India, October-December 2009



STRATEGIC APPROACH:

This element of the GPEI Strategic Plan 2010-2012 will build on the substantial experience and work of the GPEI in immunization systems strengthening. The primary objective will be to ensure the more systematic application and documentation of this work in support of the goals of the *Global Immunization Vision and Strategy* (GIVS) and the GAVI Alliance. Strategically, the emphasis will be on the immunization systems strengthening aspects of those goals. The work of the GPEI in immunization systems strengthening recognizes that the primary investors in such systems are national governments which, even in very low income countries, provide the majority of funding for the human resources, health facilities, cold chain and logistics and other major elements that form the foundation of national immunization programmes. The GPEI will seek to assist governments in optimizing their investments in immunization by systematically assessing the status and gaps in these key elements, at the national and sub-national levels, as a basis for improving the quality of immunization services and the coverage achieved with both new (e.g. pneumococcal, rotavirus) and existing (e.g. measles) high-impact vaccines.

Geographically, the GPEI's work in immunization systems strengthening will be focused on countries and areas at highest risk of sustaining indigenous or imported WPV transmission. These countries also constitute the areas with the highest concentration of GPEI human resources and infrastructure. Particular attention will be given to those countries of the poliovirus 'WPV importation belt' in sub-Saharan Africa where OPV3 is <80% nationwide or in large sub-national zones.

GPEI's work in immunization systems strengthening aligns with the goals of the GAVI Alliance.

Immediate priorities are immunization systems barriers and 'RED' implementation in the 'WPV importation belt' of sub-Saharan Africa.

Programmatically, the focus of the GPEI's work in support of immunization systems strengthening will be in two major areas. The first, per the rationale provided above, will be to assist countries in monitoring and documenting the status of key elements of their immunization systems to establish accurate baseline data on the system's capacity and performance. This will include assisting with the collection, collation and analysis of basic data on essential elements of a functioning immunization system including the human resources available for routine immunization (e.g. the percentage of vaccinator positions filled), the completeness of vaccination sessions (e.g. the percentage of planned sessions conducted), the status of vaccine stocks and cold chain capacity for routine immunization and the coverage achieved.

The second major element of the GPEI's work in this area will be to assist with the planning and implementation of the RED strategy in those areas with especially weak performance. Particular attention will be given to supporting national capacity building in the areas of (1) programme planning and management (e.g. aligning polio and routine immunization activities), (2) service delivery (e.g. enhancing microplanning, implementation and monitoring of routine immunization sessions), (3) vaccine supply, logistics and cold chain, (4) surveillance and monitoring (e.g. building on AFP activities to conduct active surveillance activities for other VPDs) and (5) community mobilization. For this latter activity, GPEI communication activities will be expanded by, for example, extending polio communications training for health workers to enable them to address routine immunization topics and, if possible, basic child survival, hygiene, sanitation and nutrition issues with caregivers.

As a basis for refining the GPEI's work in immunization systems strengthening, a second survey of GPEI staff working at national and sub-national levels will be conducted in 2010 to determine the amount of time that they are currently spending on non-polio work and their experience and skills in immunization systems strengthening. The results of this survey will be used to guide GPEI training and capacity building in immunization systems strengthening for its own staff to maximize the effectiveness of their work in this area. The terms of reference (ToRs) of GPEI staff will be reviewed and where necessary adapted to ensure appropriate attention to immunization systems strengthening. ToRs and tasks will be adapted to the specific country context and national priorities. It is expected that GPEI staff will on average spend a minimum of 25% of their time on systems strengthening in the two areas of work discussed above. The specific percentage of time targeted for a particular staff will depend on factors such as the staff's location and the status of polio transmission in the country. In countries with active poliovirus transmission, emphasis will be given to activities that can be done during the course of AFP surveillance, SIA work and other polio duties.

Major process indicators:

- end-2010: multiyear plan for all immunization services (including polio) established in at least 80% of countries with GPEI international support staff; at least 25% of polio field staff time documented to be contributing to immunization systems strengthening in countries of the 'WPV importation belt' of sub-Saharan Africa.
- end-2011: RED implemented in at least 80% of districts at highest risk of importations in the 'WPV importation belt' of sub-Saharan Africa and Asia: tracking of 'immunization systems' indicators in at least 80% of countries in the 'WPV importation belt' of sub-Saharan Africa and highest risk areas of Asia.
- end-2012: process indicators sustained.

4. Major enabling factors

This section summarizes seven of the most important enabling factors for the GPEI Strategic Plan 2010-2012, the successful implementation of which assumes that the major cross-cutting challenges can be addressed.

4.1 Strengthened oversight of SIA operations by national and sub-national leaders

Given the scale and resource demands of the SIAs needed to interrupt WPV transmission in the remaining infected areas, the engagement and oversight of national and sub-national political leaders is essential to accessing the human and other resources needed to implement these campaigns, to hold local implementing entities accountable for SIA performance and coverage, and to enhance community support.

By end-2009, the Heads of State in all polio-endemic countries had publicly committed to - and were personally engaged in - supporting polio eradication activities. Leaders in many re-infected and re-established transmission countries had also intervened to highlight polio eradication efforts and its importance. In Nigeria, the level of political engagement extended to state governors, most of whom have established State Task Forces to monitor the implementation of SIAs. In India, the Chief Minister of Bihar has been personally monitoring the quality of SIAs with periodic calls with District officials. In Pakistan, the visible engagement of the President and Prime Minister has mobilized other sectors, including education, communication, highways, and the military, and supported the participation of Provincial Chief Ministers and Governors in the planning, implementation and/or review of SIAs. The President of Afghanistan has been a longstanding supporter and advocate for eradication, frequently launching NIDs.

A key element of the GPEI Strategic Plan 2010-2012 will be to assist the remaining polio-infected countries in building on their existing political engagement and oversight in order to extend it to the local, operational levels. Of particular importance will be to translate the existing national commitments into consistent engagement of state/province district and sub-district authorities, with priority given to the persistent transmission areas in both Asia and Africa. The GPEI will facilitate national efforts in this regard by ensuring the collection and feedback of accurate data on district-level performance (i.e. independent SIA monitoring data, AFP surveillance data), tracking the engagement of district and sub-district leaders in SIA operations in programme-critical areas (e.g. in constituting and participating in sub-national 'Polio Task Forces' and in addressing vaccination refusals), and undertaking direct advocacy at these levels. Comprehensive advocacy plans will be developed for officials at all levels to optimize the GPEI partnership inputs and strengthen their coordination in the area of advocacy. Full implementation of such advocacy plans at the sub-national level should facilitate the engagement of the political, administrative and traditional leadership structures at the state (provincial) and sub-state (e.g. district, LGA, block, union-council, ward) levels in SIA planning, implementation, monitoring and review to ensure that all children are reached and vaccinated.

Polio-affected countries are establishing mechanisms to ensure national commitments translate into local action.

Communications must be scaled up to further engage communities and local leaders.

Social mobilization strategies are increasingly data-driven to optimize impact.

These national and sub-national advocacy efforts will be complemented at the global and regional levels through activities that maintain polio eradication on the global and regional health and development agendas in order to facilitate support among donor nations and key multilateral organizations. Advocacy plans at the global, regional and national level will also endeavour to identify and provide opportunities for Heads of State to re-affirm their commitment to polio eradication and to position polio eradication as a national priority. Opportunities will also be developed for Heads of State and Ministers of Health to express their support for achieving specific national SIA coverage targets, holding officials at all levels accountable for SIA quality, announcing the allocation of domestic resources for polio eradication, and reaching out to all sectors of society, including traditional and religious communities and civil society, to seek their active engagement in SIA implementation.

4.2 Enhanced communications and community engagement

Communication support for polio eradication will receive even greater attention in 2010-2012 to optimize the participation of communities in eradication activities and the acceptance of OPV vaccination by parents, particularly in persistent transmission areas. UNICEF, as the lead GPEI partner in social mobilization and communication, will continue to coordinate activities across the partnership, including - where appropriate and/or necessary - through contracting out specific activities to commercial public relations or marketing firms. Communication support will focus on two main areas: social mobilization and programme communications.

Social mobilization activities are designed to engage communities and local leadership in eradication activities to increase community participation (e.g. by supporting local leaders to speak to communities and harnessing the strength of local partners to spread information about health activities). These activities will be guided by social mapping and cultural relevance, relying heavily on interpersonal communications and local networks to increase community engagement before, during and in between SIAs. Given the particular importance of strong interpersonal communication skills in vaccinators and supervisors to increase the likelihood of vaccination at first contact with caregivers, this will be a standard component of all training activities. Programme communications activities, which are designed to maximise community participation in SIAs through such channels as print and electronic mass media, will adhere to the basic elements of message design and information exchange while ensuring messages are adapted to local conditions.

Both the social mobilization and programme communication work will have two major aspects: general public communications (i.e. to provide basic information such as the time, date and place of SIAs); and a high-risk area approach. The general public communication seeks to maintain interest and awareness and sustain demand for services. The high-risk area approach requires a more in-depth understanding of - and engagement with - specific communities, using epidemiological data to identify populations at higher risk of polio and social data to elucidate social, cultural or political issues which might affect outreach to them. Both approaches will be tailored to the area and population, with particular attention to areas of persistent WPV transmission.

A data-driven planning process has been developed to serve as the backbone for polio eradication communication activities. Standard communications indicators (e.g. human resources deployment, strategy development, reporting) will guide the refining of strategy in endemic and re-established transmission countries. In addition, community perceptions will be regularly assessed through KAP studies and other methods, while communication activities and outcomes will be monitored more closely by incorporating key communication questions into the independent SIA monitoring process (e.g. whether caregivers received SIA information prior to the vaccinator's visit, the source of SIA information, reasons for refusals or non-compliance). These data will provide real-time information on how effectively the programme is communicating with parents, what channels are most effective and which issues will need to be addressed to improve demand ahead of the next SIA.

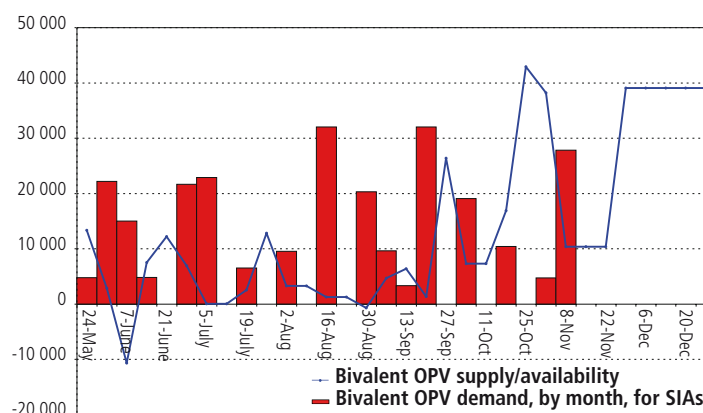
4.3 Safe and secured supply of effective oral poliovirus vaccines (OPVs)

Efforts to fully implement the planned SIA activities of the GPEI Strategic Plan 2010-2012 will require over five billion doses of OPV, in at least four different formulations: trivalent OPV, monovalent OPV type 1, monovalent OPV type 3 and bivalent OPV. The introduction of bivalent OPV into the GPEI strategy in late-2009, and the immediate increase in the demand for that product by many countries, substantially increased the complexity of managing global OPV supply, particularly until additional bivalent OPV products are submitted for licensure and WHO-prequalification (by early 2010, three bivalent OPV products had been licensed and WHO-prequalified).

Given the need to optimize the management of OPV demand and supply, this aspect of the GPEI is centrally coordinated by UNICEF Supply Division (SD), in close collaboration with WHO. The processes and structures for managing global OPV demand and supply for the GPEI Strategic Plan 2010-2012 build on the long history of coordinated work by the GPEI partners in this area. Vaccine quality is assured through the procurement by UNICEF SD of only WHO pre-qualified OPV products, using long-term arrangements with all six manufacturers of such vaccines. This principle of long-term arrangements is central to this work, given the particular challenges and risks for OPV manufacturers posed by the eradication initiative and the resultant uncertainties in the life-cycle of OPV products. For this reason UNICEF SD has established a multi-year tender process to provide industry with some stability and visibility in an otherwise uncertain market. Before each tender is issued, UNICEF SD holds a pre-tender meeting with manufacturers, at which WHO provides updates on the GPEI strategies and multi-year OPV requirements. This meeting is complemented by an annual UNICEF-WHO co-hosted meeting of all vaccine producers at which strategy and four to five year demand forecasts are also presented and discussed.

Tested processes are in place to manage >5 billion doses of OPV in 4 different formulations.

Example of bivalent OPV supply and demand tracking
May - December 2010



In addition, UNICEF SD uses the strong professional relationships that it has developed through its vaccine security principles to maintain regular communications on OPV demand and supply with each of these manufacturers. In this way, UNICEF receives detailed information about manufacturer OPV production schedules and is able to monitor the global availability of all OPV supply on a weekly basis. UNICEF SD in turn shares with manufacturers on a regular basis the updated overviews of GPEI requirements that it develops with WHO through a weekly teleconference process. This approach allows industry to keep up-to-date with the GPEI's OPV requirements and the GPEI to monitor the weekly availability of each type of OPV and adjust SIAs as necessary.

These operating procedures will be continued during 2010-2012 so that through its regular interactions, engagement and close collaboration with industry, the GPEI is able to ensure that sufficient OPV of the correct type is available at the appropriate time to meet the SIA requirements for interrupting WPV transmission. In the event of irreconcilable gaps in OPV supply, priority will be given to countries and SIAs in keeping with the principles outlined below (see sub-section '*Prioritization of eradication activities*').

4.4 Enhanced technical assistance

The provision of technical assistance to countries for the planning, implementation and/or monitoring of polio eradication activities has been a major element of the work of the GPEI partners, particularly since the late 1990s. In 2009, the *Independent Evaluation of Major Barriers to Interrupting Poliovirus Transmission* stressed the importance of this enabling factor for achieving and sustaining polio-free status, especially in countries or areas with weak health systems. The *Independent Evaluation* highlighted the cost of compromising on such technical assistance, citing cutbacks in this area due to insufficient funding as a major contributing factor to the persistence of some polioviruses following importations, particularly in the four countries that were found in 2009 to have re-established transmission. In contrast, the coordinated deployment of international staff from multiple agencies during the Horn of Africa outbreak in 2009 clearly played an important role in helping the governments of the four affected countries to bring that outbreak to a close.

Rapidly improving strategy implementation as efficiently as possible requires tailoring deployment of large-scale technical assistance to each setting.

Consequently, in the context of the GPEI Strategic Plan 2010-2012, technical assistance will be reinforced and, where necessary, augmented in three key settings: 1) areas of endemic poliovirus transmission, 2) areas of re-established transmission, and 3) re-infected countries. In the endemic areas, supplemental technical assistance will be deployed primarily to the persistent transmission districts and maintained for the life of the GPEI Strategic Plan 2010-2012. In countries with re-established transmission, as recommended by the *Independent Evaluation*, technical assistance will be brought up to par with that provided in endemic countries, with priority given to those states/provinces with persistent transmission. This support will be sustained at that level until at least 12-18 months have passed without the detection of virus in the presence of appropriate surveillance sensitivity. Finally, in countries with ongoing or new importations, additional technical assistance will be deployed to the infected areas and sustained until the outbreak is verified to have been resolved (i.e. at least three to six months after the last virus, depending on the setting).

Technical support from the GPEI partners will be coordinated to ensure that the maximum impact can be achieved across all three of the settings described above. The CDC-WHO coordinated 'expanded Stop Transmission of Polio' programme (eSTOP) will be fully utilized to enhance the deployment of technical teams for prolonged periods to the areas of highest priority.

4.5 Intensified research agenda

In 2008, the Polio Research Committee (PRC) was reconstituted, with more substantive financing to support its work. This resulted in an intensified GPEI research agenda with heightened emphasis on the acceleration of both eradication activities and preparations for the post-eradication era. The core elements of the research work to accelerate eradication include developing new vaccines (e.g. monovalent OPVs, bivalent OPV), improving immunogenicity of existing vaccines, closing gaps in population immunity, and improving surveillance sensitivity. The post-eradication research agenda encompasses the assessment of post-eradication risks and the development of new products and approaches to mitigate those risks (i.e. affordable IPV options, antivirals, new diagnostics).

The research agenda to accelerate eradication includes both cross-cutting and country-specific studies. Examples of key cross-cutting studies, the results of which will be applicable in multiple settings, include those on bivalent OPV and the 'SIAD' strategy. Given that the new bivalent OPV is a cornerstone of the GPEI Strategic Plan 2010-2012, research to further evaluate its efficacy will be carried out in a second clinical trial. To assist the acceleration of eradication in areas with compromised security and/or outbreaks, research on the SIAD strategy will evaluate whether monovalent OPVs can be administered with shorter intervals between doses and still achieve the same immunologic effect (i.e. seven and 14 days between doses of monovalent OPV type 1 compared to the customary interval of 30 days with trivalent OPV).

Country-specific studies include clinical trials, mathematical modelling, seroprevalence studies and operational research. This research will, for example, seek to better quantify the observed differences in the efficacy of OPV and IPV in different geographical areas through seroprevalence and mucosal challenge studies. Such results will facilitate the

A combination of cross-cutting and country-specific research is central to adjusting and optimizing strategy.

At January 2010, only 50% of total GPEI budget 2010-2012 was secured, posing significant risks as countries cut back on eradication activities.

formulation and execution of tailored eradication strategies that address particular needs of communities. This area of research will also explore the impact of zinc supplementation on OPV take rates and the use of fractional dose IPV to potentially boost the efficacy of OPVs and close susceptibility gaps in particular communities. Operational research to expand vaccine coverage by enhancing the quality of SIAs will be selectively carried out in areas where known operational challenges impede success. Following a rapid but rigorous evidence-based selection process, operational interventions will be piloted in Nigeria and expanded to other areas where coverage remains suboptimal or where seroprevalence surveys suggest low vaccine efficacy.

Overall, the full GPEI research agenda will help to evaluate the strategies and activities outlined in the new GPEI Strategic Plan 2010-2012, and provide insights for further refining the activities that are designed to interrupt the remaining chains of WPV transmission.

4.6 Sufficient domestic and international financing

Full implementation of the GPEI Strategic Plan 2010-2012 will require the mobilization of US\$750-800 million per year in domestic and international financing for planned activities. At January 2010, approximately 50% of the necessary financing had been secured, with sound prospects for a further 25%. However, the remaining funding gap poses important short- and medium-term risks for the successful implementation of the GPEI Strategic Plan 2010-2012.

Over the past decade, the Polio Advocacy Group (PAG) - comprised of resource mobilization focal points from WHO, Rotary International, UNICEF and the UN Foundation - has overseen the mobilization of more than US\$5 billion for GPEI activities. PAG members, with the participation of CDC and the Bill and Melinda Gates Foundation (BMGF), are now working together to secure existing funding prospects and to identify additional funding, including through Rotary International's US\$200 million challenge to match BMGF funding.

In terms of securing and building on the existing GPEI funding streams, the PAG's work focuses on maintaining polio eradication as a priority for the G8 group of countries; increasing domestic funding by the governments of polio-endemic countries; expanding country-level resource mobilization efforts into other polio-infected/high-risk countries; reaching out to emerging donors (including the G20 group of countries); and re-engaging non-G8 members of the Organization for Economic Co-operation and Development (OECD). This work is complemented by efforts to explore links to innovative financing mechanisms, engage new member states of the European Union (EU) and continue outreach to member states of the Gulf Cooperation Council.

In June 2009, a group of major GPEI donors embarked upon a process of deeper engagement in the GPEI. These core donors have committed to supporting GPEI outreach to enhance their efforts with other public and private sector donors and polio-affected countries as a major element in mitigating both the financial and non-financial risks to polio eradication.

The justification for further financing to complete the job of polio eradication is sound, both from a humanitarian and economic perspective. Failure to achieve success would have significant humanitarian and economic consequences. Within the next decade, hundreds of thousands of children would again be paralysed for life by the disease. Billions of dollars would have to be spent on outbreak response activities, rehabilitation and treatment costs, and the associated loss of economic productivity. Success, on the other hand, will ensure that this 21-year investment is protected in perpetuity.

4.7 Prioritization of eradication activities

The GPEI continually operates in a resource-constrained environment due primarily to a chronic medium-term funding gap, compounded by a very tight short-term cash flow situation (in-hand financing rarely fully meets the short-term six-month requirements). These financing challenges are intermittently compounded by a tight vaccine supply situation, particularly since late 2009 due to the need to manage and match supply to epidemiology across four different OPV products (trivalent OPV, monovalent OPV type 1, monovalent OPV type 3 and bivalent OPV). These resource constraints require an ongoing process of prioritization and re-prioritization of eradication activities, for which the GPEI has developed a weekly process based on the global cash flow, vaccine availability, and the evolving epidemiology of polio.

The GPEI's prioritization process differentiates between 'core costs' and SIA OPV and operational costs (including social mobilization). 'Core costs' encompass the basic GPEI infrastructure and activities that are fundamental to detecting WPVs globally, optimizing technical advice and national capacity building for strategy implementation, and managing GPEI resources at the international and national levels. Thus these 'core costs' include programme management and administration, technical assistance for strategy implementation, surveillance and laboratory running costs, major recurring costs (e.g. vehicles) and most research. While the 'core costs' are usually updated only semi-annually, SIA priorities must be updated weekly. In general, when GPEI financing and/or vaccine supply is constrained, the priority afforded to specific SIAs will be based on: (a) the presence of confirmed WPV transmission within the previous six months (or 12 months for areas of endemic or re-established transmission), (b) the presence of a cVDPV, (c) the proximity to a polio-infected area(s), (d) patterns of poliovirus spread since the year 2000, and (e) whether routine OPV3 coverage is below 80%. SIAs are sometimes assigned a higher level of priority than might initially seem warranted by these criteria. This is due to other factors such as the advantages of SIA synchronization with adjoining countries to optimize performance and coverage in some epidemiologic blocks (e.g. west Africa).

The overall SIA strategy is reviewed and updated every six months through the Global Polio Management Team (GPMT) process. Plans are then adjusted, and priorities assigned if necessary, through a weekly consultative process between WHO, UNICEF (Programme and Supply Divisions) and CDC that matches the available financing and vaccine to the most current data on WPVs which is updated on a weekly, if not daily, basis. The postponement or cancellation of any planned SIA due to insufficient cash-flow and/or vaccine supply incurs a certain degree of increased risk (depending on the activity) of failing to achieve the major milestones of the GPEI Strategic Plan 2010-2012.

**New mechanisms
evaluate and
prioritize activities
for maximum effect
when resources are
insufficient.**

5. Roles and responsibilities

5.1 Milestone monitoring, mid-course corrections and strategic guidance

The successful implementation of the GPEI Strategic Plan 2010-2012 will be facilitated by an independent process for evaluating the major milestones, monitoring the development and implementation of mid-course corrections, and guiding the programme on major issues of policy, strategy and priorities.

A fully independent global advisory body will monitor major milestones and indicators on a quarterly basis.

To oversee this process at the global level, the GPEI will establish a new, high-level advisory body. This global advisory body will meet face-to-face or by telephone/video conference on a quarterly basis to evaluate whether each of the major milestones of the GPEI Strategic Plan 2010-2012 is 'on track', 'progressing but with issues of concern' or 'at risk for completion'. For milestones with 'issues of concern' or 'at risk', the relevant national governments will be engaged to work with the appropriate national or regional TAGs to establish and initiate a corrective action plan, ideally within two weeks of notification. The global advisory body will subsequently review the progress on implementation of such corrective action plans as part of their quarterly evaluation of the major milestones. Depending on the issue, it is expected that the relevant national and/or regional TAG will assess the plan's implementation more frequently. The global advisory body will periodically invite national authorities and the TAG Chairperson to present directly to it to facilitate its guidance to GPEI's spearheading partners, stakeholders and the broader international community on additional steps they might consider to support countries in fully implementing their corrective plans.

National Technical Advisory Groups (TAGs) have key role in guiding 'mid-course' corrections.

The global advisory body will be assisted in the formulation of its guidance on policy and technical issues by the Polio Research Committee (PRC), which will serve as a subcommittee. CDC will assist the global advisory body in its quarterly evaluation of the major milestones by preparing a preliminary report on the status of each major milestone and, where appropriate, key process indicators and corrective action plans. In addition, CDC will prepare comprehensive annual reports on all of the major milestones and process indicators of the GPEI Strategic Plan 2010-2012. All CDC reports will be simultaneously shared with the polio-infected countries, relevant national and regional TAGs, SAGE, the GPEI spearheading partners, donor partners, and other stakeholders.

The nomination and appointment of members to the global advisory body will follow a process similar to that instituted for SAGE, with similar criteria for eligibility. Appropriate expertise will be sought across the major disciplines relevant to optimizing policy and strategy for interrupting WPV transmission and managing the attendant risks. The findings and recommendations of the global advisory body, including the evaluation of each milestone and key corrective action plans from infected countries, will form the basis for the reports of the WHO Secretariat on polio eradication to the Executive Board and the WHA. The global advisory body will work closely with SAGE, consulting on its findings at each of the six-monthly SAGE meetings. This new global advisory body will supersede the Advisory Committee on Poliomyelitis Eradication (ACPE).

In the endemic Regions and countries, advice on issues of local strategy, priorities and programme operations will be provided by existing TAGs, the constitution and convening of which will continue to be the purview of the relevant national government or WHO Regional Office, as appropriate. Input and issues from each Regional and national TAG will be sought in advance of each meeting of the global advisory body.

WHO will continue to monitor and disseminate information on the epidemiology of polio on a weekly basis and on key process indicators on a monthly (e.g. AFP surveillance performance) or quarterly basis (e.g. population immunity profiles, financing), depending on the indicator. UNICEF will also disseminate country-specific communications performance data on a quarterly basis.

5.2 Implementation and financing

NATIONAL GOVERNMENTS:

National governments are both the owners and beneficiaries of the GPEI, on behalf of their people. Polio-affected countries will undertake the full range of activities detailed in their country plans and summarized in this GPEI Strategic Plan 2010-2012. Achievement of country process indicators will require polio-affected countries to hold themselves fully accountable to working at national, sub-national and district level, and with other GPEI partners, to plan, implement and monitor the activities required to reach every child with polio vaccine.

At the same time, national governments in the three WHO Regions already certified as polio-free, and polio-free Member States in the three remaining polio-endemic Regions, have a clear responsibility to maintain high population immunity and sensitive surveillance for AFP and to fully implement internationally-agreed processes to manage the long-term risks after WPV eradication.

National governments play a critical financing role in the eradication initiative. Of note, the proportion of the GPEI budget that is funded by domestic resources of polio-affected countries has increased from less than 10% in 2003-2005 to more than 30% in 2007-2009. This increase is driven largely by India, but also by Nigeria, Pakistan and Bangladesh. Other major in-kind contributions from polio-affected countries - such as the time of volunteers, health workers and others in SIA planning and implementation - have an estimated dollar value similar to that of international financial contributions.

SPEARHEADING PARTNERS:

World Health Organization (WHO)

WHO, through its headquarters, regional and country offices, coordinates the major GPEI strategic planning, management and administration processes. WHO is responsible for the systematic collection, collation and dissemination of standardized information on GPEI strategy implementation and impact, particularly in the areas of surveillance

**Full ownership
by national
governments is the
overriding, critical
factor for full
application of new
Strategic Plan.**

Rotary's 1.2 million volunteers contribute their time, skills, advocacy and funds in every polio-infected and donor country.

and SIAs. WHO also coordinates operational/basic science research, provides technical and operational support to ministries of health, and the training/deployment of human resources for supplementary technical assistance. WHO has a lead role in supporting the establishment of certification standard AFP surveillance, the coordination and assessment of the work of the GPLN, resource mobilization, donor coordination, advocacy and communication of information. WHO serves as secretariat to the certification process and facilitates implementation and monitoring of biocontainment activities.

Rotary International

Rotary International is the world's first and largest humanitarian service organization with a global network of 1.2 million members in more than 170 countries. Through its *PolioPlus* programme, established in 1985, Rotary was the first to have the vision of a polio-free world, and continues to play a crucial role in global efforts to eradicate polio. More than one million Rotary members have volunteered their time and personal resources to protect more than two billion children from polio in 122 countries from polio. Rotary provides urgently needed funds and to date, the organization has contributed more than US\$900 million. In addition, Rotary has played a major role in decisions by donor governments to contribute over US\$5 billion to the effort. That amount, combined with direct funds from Rotary, is more than half the money needed for the entire global polio eradication programme. Rotary members also provide valuable field support during NIDs through social mobilization and by administering the OPV to children.

In November 2007, Rotary International joined with the BMGF, to inject a further US\$555 million into the GPEI through a challenge grant mechanism. By the time the world is certified polio-free, Rotary International's contribution to the GPEI will exceed US\$1.2 billion.

US Centers for Disease Control and Prevention (CDC)

The most important contribution of the Atlanta-based CDC to polio eradication continues to be deployment of its epidemiologists, public health experts, and scientists to WHO and UNICEF. In addition, a number of international and national staff in WHO and UNICEF headquarters, regional, and country offices are funded by CDC grants to WHO and UNICEF. CDC also provides funding for OPV required for international mass immunization campaigns, and for a wide range of GPEI technical expertise and laboratory support. This includes staff support for disease surveillance at global, regional, and national levels and investigating outbreaks of polio, especially in areas within or bordering polio-free zones. CDC works as the 'viral detective' of the four partners, using its state-of-the-art virological surveillance expertise (genetic fingerprinting) to identify the strain of poliovirus involved in paralytic polio cases and pinpoint its geographical origin. CDC also provides assistance in the development and monitoring of the 145 laboratories that are members of the GPLN, including by funding short-term and long-term technical support in key countries. In addition, CDC conducts research designed to facilitate the development of post-certification immunization and surveillance policies. CDC will play a lead role in supporting the independent monitoring of the GPEI Strategic Plan 2010-2012 by preparing for the global advisory body the data necessary to evaluate each of the major milestones.

UNICEF

UNICEF is the lead partner for the provision of expert technical advice and capacity-building in the areas of programme communications and social mobilization and in the procurement and distribution of polio vaccines for routine and supplementary immunizations and, together with WHO, in strengthening of routine immunization. In its communication role, UNICEF leads the development of materials for training and public information, strengthens social mobilization efforts through its network of communications officers, and acts as secretariat for internal and external communication reviews. Additionally, UNICEF supports countries in the implementation of intensified NIDs, SNIDs and mop-up campaigns at country level, and provides technical assistance to national coordinators to develop action plans and secure logistics to access hard-to-reach places, including in countries affected by conflict, and provides cold chain support. From its Supply Division, UNICEF also coordinates the global supply and demand of OPV, to ensure the availability of more than five billion doses of OPV for 2010-2012, in at least four different formulations (see 'Major enabling factors' section). Along with the other GPEI partners, UNICEF actively participates in the global process by which eradication policies and plans of action are developed, and is an active partner in resource mobilization, advocacy and public information.

DONOR PARTNERS:

Since the 1988 WHA resolution to eradicate polio, funding commitments to the GPEI have totalled US\$8.2 billion. In addition to contributions by national governments to their own polio eradication efforts, 45 public and private donors have given more than US\$1 million, with 19 of these having given US\$25 million or more.

Donors to the GPEI include a wide range of donor governments, private foundations (e.g. Rotary International, BMGF, UN Foundation), multilateral organizations, development banks, NGOs and corporate partners. Several of these partners have contributed in excess of US\$250 million to the global eradication effort, including the United States of America, Rotary International, India, the United Kingdom, the World Bank, BMGF, Germany, Japan and Canada. Achieving the GPEI Strategic Plan 2010-2012 milestones as efficiently as possible will require increased, flexible, multi-year financing from the international development community. Donor engagement in polio-affected countries, to ensure optimal planning, implementation, monitoring and financing of country activities, will be a necessary complement to their engagement at the global level.

In addition to financing, donor partners play an important advocacy role, both with polio-affected countries and donor peers. Some donor governments also provide access to technical expertise from within their national institutions, including through participation in global, regional and country-level technical advisory groups.

National governments contribute to their own polio eradication efforts.

Increased donor support is critical to implementing new strategies to reach a polio-free world.

NGOs and humanitarian organizations are crucial to engaging communities and broader civil society in polio eradication activities.

NON-GOVERNMENTAL ORGANIZATIONS (NGOS):

NGOs play key roles in advocacy and programme implementation, including by training volunteers and health workers, transporting vaccines and equipment, monitoring the quality of the cold chain, implementing communication and social mobilization activities and improving SIA quality. The NGO umbrella-organization CORE, for example, through the efforts of its many members, builds partnerships between governments and the communities they serve, supporting SIAs, assisting with AFP surveillance, and monitoring the immunization status of children. Country programmes will be encouraged to approach and engage other networks of NGOs, community-based organizations and private voluntary organizations, to assist with SIA planning and implementation as appropriate.

INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES AND THE INTERNATIONAL COMMITTEE OF THE RED CROSS:

The International Federation of Red Cross and Red Crescent Societies (IFRC) has a strong presence in countries and possesses in-depth knowledge of local communities and civil administrations, and its resources can be flexibly and rapidly mobilized. In 2009, initial collaboration with IFRC National Societies in key areas of 16 countries of west and central Africa and the Horn of Africa has yielded significant improvements in engagement of broader civil society in SIA operations and ownership. In 2010, such collaboration will be institutionalized, particularly in 'active importation' provinces of the 'WPV importation belt'.

The International Committee of the Red Cross (ICRC) is uniquely positioned to negotiate access by vaccinators to children in conflict-affected settings. Collaboration in Afghanistan has resulted in significant improvements in accessing populations, and this collaboration will be expanded to other conflict-affected areas.

6. Post-wild poliovirus eradication planning

Following the interruption of WPV transmission globally, additional activities will be needed to certify that achievement and to minimize the risks of poliovirus re-introduction or, in the case of cVDPVs, re-emergence. Recognizing the long-term poliovirus risks associated with the continued use of OPV in a 'post-eradication' era, in 2008 the WHA requested the Director-General of WHO to accelerate the GPEI's programme of work on post-eradication risk management including, if and when appropriate, establishing a timeline for the eventual cessation of the use of all OPV in routine immunization programmes (Resolution WHA61.1).

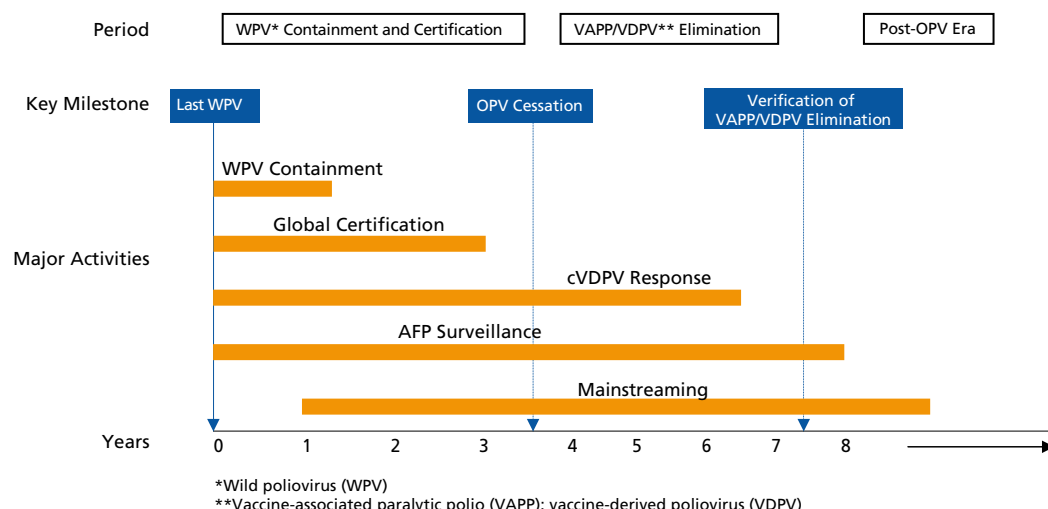
The GPEI's programme of work for minimizing long-term poliovirus risks currently envisages three stages. The first stage, referred to as the 'Wild Poliovirus Containment and Certification Phase' consists of the activities required to (a) ensure the destruction or safe storage and handling of residual stocks of WPV infectious and potentially infectious materials, and (b) certify both the interruption of WPV transmission globally and the containment of the remaining WPV stocks. The second phase, referred to as the 'VAPP/VDPV Elimination Phase' would begin with the eventual cessation of the routine use of trivalent OPV in immunization programmes globally in order to eliminate vaccine-associated paralytic polio (VAPP) and the risks of polio re-emergence posed by cVDPVs. In advance of OPV cessation, affordable options for conducting routine immunization with IPV should be available for any low- or low-middle income country which either chooses to continue immunizing against polio or follows a potential recommendation to do so as a result of ongoing policy development work²⁰. During the VAPP/VDPV Elimination Phase, AFP surveillance and poliovirus outbreak response capacity will need to be maintained globally to detect and respond to any emergent cVDPVs, especially in the three years immediately following OPV cessation. Destruction or safe storage and handling of residual Sabin-related poliovirus infectious and potentially infectious materials will also be required at this time. The final phase of the GPEI, known as the 'post-OPV era', would begin with the verification that VDPVs no longer circulate anywhere, globally.

By the time the elimination of VAPP and cVDPVs has been verified globally, it is anticipated that all long-term functions of the GPEI will have been incorporated into routine immunization programmes (e.g. vaccination with IPV in countries wishing to continue immunizing against polio) and existing mechanisms for managing the residual risks associated with eradicated pathogens (e.g. smallpox).

After certification of wild poliovirus eradication, eventual OPV cessation is needed to eliminate all polio disease in the long-term.

²⁰ In 2008, the SAGE established a Working Group on IPV, whose terms of reference included the preparation of SAGE for the development of comprehensive policy guidance by April 2011 on the use of IPV in the post-eradication era in low- and low-middle income settings.

Post-wild poliovirus eradication activities and timeline



Research and product development is ongoing to manage the long-term poliovirus risks.

Given the substantial lead time needed to prepare for the management of long-term poliovirus risks, the GPEI will during 2010-2012 continue its multi-pronged programme of work in this area, consisting of research, new product development, strategy formulation and policy development. The first major element of this work is related to better characterizing the primary long-term poliovirus risks (i.e. cVDPVs, VAPP, immunodeficiency-associated vaccine-derived poliovirus - iVDPVs - and residual stocks of WPVs, VDPVs and Sabin viruses) as well as the strategies for mitigating each. The second major element is establishing the mechanisms needed to internationally coordinate key poliovirus risk management strategies, particularly the application of appropriate safeguards and biocontainment conditions for the handling and storage of residual polioviruses and potentially poliovirus-infected materials, the synchronization of the cessation of routine immunization with OPV, the adherence to internationally-agreed processes for the 'post-eradication' use of OPV (i.e. live polioviruses) in response to new cVDPVs, and the management and monitoring of iVDPVs, including appropriate immunization of their contacts. The final major element of this work is the development of the new products required by OPV-using countries to manage the risks associated with OPV cessation in such settings. This work includes the development of an international stockpile of monovalent OPVs for cVDPV response and affordable IPV options for any low-income country that perceives the medium- or long-term risks of poliovirus re-emergence or re-introduction warrants continued routine immunization against polio after OPV cessation. Ongoing research in the areas of fractional IPV dosing, reduced dose schedules, adjuvants, and alternative seed strains for IPV production support the near-term feasibility of new 'cost neutral' options that could even facilitate universal IPV use in low- or low-middle income countries, if that were required. This research also aims to facilitate domestic IPV production in low-income settings that meet GAPIII requirements.

Supplementary immunization activities required for polio eradication, 2010-2012, as of 18 January 2010 (all activities expressed in percentages)

1st Level Priority 2nd Level Priority 3rd Level Priority

Region/ Country	2010												2011												2012														
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
1. Endemic Countries																																							
Afghanistan		50	100	100			50	50		100	100	50			100	100	30	30	100		30	30	30			100	100	30	30		30	30		30	30	30			
India	100	100	20	40	20	20	20	20	20	40	40				100	100	40	40		40	40					100	100	40	40		40	40		40	40				
Nigeria		100	100	50	50			50	25	50	50	50			100	100	30	30		30	30		30	30		100	100	30	30		30	30		30	30	30		30	
Pakistan	64	100	50	100	50		100			100		50			100	100	30	30		30	30		30	30		100	100	30	30		30	30		30	30	30		30	
2. Re-established transmission																																							
Chad		100	100	100					50	50	50				100	100										100	100								100	100		100	
Sudan		100	100	50					100	100	50				100	100										100	100								100	100		100	
Angola					100	100	100								50	50	100	100																					
Democratic Republic of the Congo					35	65	35	65	35	65	35	65			35	65	35	65	35	65																			
3. Nigeria & Chad Importation Belt																																							
West Africa																																							
Niger			100	100					80	80					100	100										100	100							100	100		100		
Benin			100	100					100	100					100	100										100	100							100	100		100		
Burkina Faso			100	100	100				100	100					100	100										100	100							100	100		100		
Côte d'Ivoire			100	100					100	100					100	100										100	100							100	100		100		
Sierra Leone			100	100	100				100	100					100	100										100	100							100	100		100		
Guinea			100	100	100				100	100					100	100										100	100							100	100		100		
Liberia			100	100	100				100	100					100	100										100	100							100	100		100		
Mali			100	100					100	100					100	100										100	100							100	100		100		
Mauritania			100	100	100				100	100					100	100										100	100							100	100		100		
Senegal		20	100	100	100				100	100					100	100										100	100							100	100		100		
Guinea Bissau			100	100					100	100					100	100										100	100							100	100		100		
Gambia			100	100					100	100					100	100										100	100							100	100		100		
Cape Verde			100	100					100	100					100	100										100	100							100	100		100		
Togo			100	100					100	100					100	100										100	100							100	100		100		
Ghana			100	100					100	100					100	100										100	100							100	100		100		
Horn of Africa																																							
Somalia		25	75	50	25	25	25		100	100					100	100										100	100							100	100		100		
Ethiopia				20	80	20	80							20	80	20	80									20	80	20	80										
Kenya				35	35	35	35							35	35	35	35									35	35												
Uganda				35	35	35	35							35	35	35	35									35	35												
Yemen				100	100									100	100	100	100									100	100								100	100		100	
Eritrea				100	100									100	100	100	100									100	100								100	100		100	
Djibouti				100	100									100	100	100	100									100	100									100	100		100
Central Africa																																							
Central African Republic			100	100					100	100					100	100										100	100							100	100		100		
Cameroon			50	50										50	50	50	50									50	50												
Congo			100	100										100	100	100	100									100	100												
4. India Importation Countries																																							
Burundi		100					100																																
Rwanda			100	100																																			
Nepal			100	100										50	50	50	50									50	50	50	50										
Bangladesh	100	100																																					



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EVERY
LAST CHILD

