Global Polio Eradication Initiative  
GPEI Strategic Plan 2010-2012  
Working Draft at 12 March 2010

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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 strategy\(^1\) that had been 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.

Despite the development, licensure and widespread application of new monovalent 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 2007\(^2\), 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%) and weak health systems, 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 4 're-established transmission' countries, in 2009 a further 15 countries suffered new importations.

At its 61\(^{st}\) 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 the 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, all but four 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

\(^1\) Overview available at http://www.polioeradication.org/strategies.asp
\(^2\) WHA Resolution 60.40
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, eight 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 >6 months.

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). 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 continued political and financial commitments, the remaining barriers to achieving eradication could be addressed and warranted the development of a new three-year GPEI Strategic Plan 2010-2012 that aimed for the interruption of all WPV transmission by end-2012.

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 presents aggressive activities to achieve milestones which are measurable, time-bound and realistic. Most 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. Country-specific details can be accessed at www.polioeradication.org.

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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 population immunity levels remain below the threshold needed to ensure interruption of WPV and prevent its re-emergence (eg 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 new economic research makes a strong case for investing heavily to finish the job of eradication⁴, insufficient international 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 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 implementing fully 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.

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**GPEI global milestones 2010-2013**

<table>
<thead>
<tr>
<th>By mid-2010</th>
<th>By end-2010</th>
<th>By end-2011</th>
<th>By end-2012</th>
<th>By end-2013</th>
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<tbody>
<tr>
<td>Cessation of all polio outbreaks with onset in 2009*</td>
<td>Cessation of all 're-established' poliovirus transmission**</td>
<td>Cessation of all polio transmission in at least 2 of 4 endemic countries***</td>
<td>Cessation of all wild poliovirus transmission†</td>
<td>Initial validation of 2012 milestones‡‡</td>
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* validated when ≥6 months without a case genetically linked to a 2009 importation (ie by end-2010).
** 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).
† validated when ≥ 12 months without a case genetically linked to an indigenous virus (by end-2013).
‡‡ 'certification will require at least 3 years of zero polio cases in the presence of appropriate surveillance across an entire epidemiologic region.

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2. Guiding principles

2.1 Major Lessons Learnt

The GPEI Strategic Plan 2010-2012 builds on dozens of important lessons that have been learnt through 20 years of polio eradication activities, particularly in the recent ‘intensified’ eradication effort of 2007-2009 (Figure X – Major Lessons Learnt). Four of these lessons are fundamentally important to the new approaches to finishing polio eradication outlined in the Strategic Plan 2010-2012.

First, it has become clear that WPV transmission can persist in much smaller geographic areas and population subgroups than had been thought previously based on the progress in countries and Regions which are currently polio-free. Secondly, 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. Thirdly, 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 than Africa, facilitating a tailoring of strategy to local circumstances. Fourthly, while monovalent OPVs (mOPVs) have provided the GPEI with much more potent tools for rapidly building population immunity, optimizing the balance of mOPVs has proven much more difficult than originally anticipated, leading to alternating outbreaks of type 1 and 3 poliovirus in certain settings and prompting the fast-track development of a completely new ‘bivalent’ OPV (bOPV).

The guiding principles of the GPEI Strategic Plan 2010-2012, in terms of both its tailored geographical and common operational tactics, derive directly from these major lessons resulting in a multi-pronged approach for addressing the longstanding barriers to interrupting the remaining WPV transmission globally.

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 important implications for programme strategy, planning, and prioritization. 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 thresholds, such that it is now understood that population immunity of >95% is required to stop transmission in certain districts of India and Pakistan, while transmission in sub-Saharan Africa appears to cease soon after immunity exceeds a threshold of approximately 80-85%.

With persistent transmission in Asia now highly localized in a limited number of districts and sub-districts (e.g. ‘blocks’ in India), but with a very high population immunity

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threshold (>95%) for stopping transmission in most of these areas, 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, 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, as virus transmission persists over a much broader area in sub-Saharan Africa, with a significantly lower population immunity threshold for interrupting transmission (i.e. approximately 80-85%), the approach in Africa 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 cVDPVs, 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.

In general, the major milestones for each country under objectives 3.1 and 3.2 of the GPEI Strategic Plan 2010-12, reflect the minimum levels 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 coverage targets are based on the estimated minimum population immunity thresholds needed in each polio-infected area. Recognizing the particular challenges to achieving such coverage levels in the remaining polio-endemic areas, the 2010 milestones primarily track whether such a coverage level has ever been achieved in that year, while the 2011 milestones track whether the coverage level is sustained long enough to exceed the minimum estimated population immunity threshold for 12 consecutive months. These SIA performance or 'outcome' indicators will be complemented in country-specific plans with critical SIA 'process' indicators that will be tracked and updated by national technical advisory bodies. Annex 1 summarizes the data sources (e.g. non-polio AFP cases, serosurveys, independent SIA monitoring) and specific information (e.g. age group) needed to monitor each country-specific population immunity milestone.

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 or refined a number of cross-cutting technical innovations and operational approaches that will be institutionalized in 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 providing immunity against both of the remaining wild poliovirus 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 OPV;

- **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 4-6 monthly basis;

- **Special Teams & Tactics for Underserved Populations**: special teams and tactics have proven essential to addressing the special needs of some population subgroups 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 subnational (eg state/province, district, union-council levels) political and administrative leaders to ensure the full resources of states/provinces 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.

- **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 SIADs 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**: recognizing the ongoing gap in credible and timely SIA coverage data to assess risk and guide improvements, particularly in re-infected countries, 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 (ie, in areas of discordant epidemiologic and SIA monitoring data).

- **Expanded Environmental Sampling**: the expansion of environmental sampling to areas such as Karachi and Lahore (Pakistan) further reaffirmed the utility of this tool in endemic areas, particularly to differentiate reservoir areas from those which are repeatedly infected, and maintain programme intensity in such reservoirs in the absence of paralytic polio cases.

- **Serologic Surveys**: serologic surveys proved particularly valuable to document programme status, prospects and plans in India by accurately documenting population immunity. New techniques to simplify serologic survey logistics will be exploited in the new GPEI Strategic Plan 2010-2012 to extend this to other key endemic areas.

- **Enhanced AFP Surveillance**: during 2008-2009, major progress was made in closing persistent gaps in acute flaccid paralysis (AFP) surveillance through the deployment of additional human resources in areas such as Chad and southern Sudan, experience which will guide further investments in 2010-2012.
• **Area & 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:** regular assessments of community perceptions around vaccines and disease risk will be conducted to provide communications planners with insights, based on social data, on issues such as vaccine safety, perceived norms towards immunization, community awareness and demand creation. Specific strategies to appeal to national identities and marginalized and high-risk communities will be elucidated, through an increased understanding of social, cultural or political barriers to immunization. This information will guide the development of communication objectives and be complemented with periodic evaluations of communication outcomes and impact on immunization uptake. In areas of weak capacity, options to contract out specific activities to commercial public relations or marketing firms will be explored. To facilitate the design and implementation of culturally appropriate and effective communication strategies, UNICEF's communications capacity will be scaled-up 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.
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 virus 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.

These persistent transmission districts constitute two distinct groups, requiring different strategic approaches. The first group of districts is characterized by very large populations 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.

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 (FATA) (Bajour, Khyber, Mohmand), and Peshawar in 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 (ie block, tehsil, union-council or 'cluster' level). As importantly, mechanisms must be established or strengthened for engaging, and ensuring the accountability of, local political and administrative leaders for SIA quality. Common across these areas is the need for very frequent SIAs. In the first group of districts, the 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 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 diarrheal 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 (eg high-titre mOPVs, supplemental doses of IPV).

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).

**VISUAL: Persistently-infected district map of Asia**

**India:**

**VISUAL: map of northern India, showing 107 highest risk blocks, including persistent-transmission blocks.**

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. Key now is to ensure both areas interrupt transmission simultaneously by addressing the different challenges in each reservoir.

In central Bihar the primary issues are operational and relate to achieving high immunization rates among populations in hard-to-reach areas (eg 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 that 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 India. In 2009, however, new clinical trial data demonstrated that very high population immunity (>95%) could be achieved, even

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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 high-risk block plan’ [URL]. 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 plan are being reviewed, with priority given to filling vacant medical officer positions, auxiliary nurse midwife positions and field volunteers, and securing higher engagement of *anganwadis* (female village health workers) 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 high-risk 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 plans will focus be 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. In western Uttar Pradesh, the emphasis on SIA quality will be complemented with a specific research agenda to study strategies for enhancing mucosal immunity and determine the risk factors for polio in highly vaccinated children. To reduce known risk factors that contribute to vaccine failure (e.g. high diarrhoeal levels, high enteric disease burden, poor nutrition), simple sanitation measures will be instigated to increase access to clean water and zinc supplementation will promoted through Village Health & Nutrition Days. Social mobilization strategies will sensitize communities to personal hygiene, routine immunization and breastfeeding.

These targeted activities will be complemented by continued national and largescale subnational immunization days to maintain population immunity in the rest of the country, particularly in those areas at highest risk of ‘importations’ (Annex 2).

Milestones:
- **End-2010**: >95% population immunity to type 1 polio in the persistent transmission areas of western Uttar Pradesh and 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.

**Pakistan:**

[VISUAL: map of Pakistan, showing 3 reservoir zones]
In Pakistan, persistent WPV transmission is restricted to three groups of districts: Karachi (Sindh); the adjoining districts of Quetta, Pishin and Killah Abdullah (Balochistan); three adjoining agencies in the Federally Administered Tribal Agencies (FATA); and the district of Peshawar in NWFP. In total, only 11 of Pakistan's 152 districts, agencies and towns are now considered to have persistent WPV transmission. 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' (districts) or 'tehsils' (agencies). Eliminating the remaining WPV 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 security-compromised 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 for targeting additional resources to improve SIA quality and, as importantly, enhance 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 11 districts, agencies or towns with persistent transmission. This will be supplemented with regular national and subnational polio immunization days to maintain population immunity against importations in the polio-free areas, particularly the five districts at highest risk of repeated importations (Annex 2). 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 4-6 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 at highest-risk of persistent virus due to weak routine immunization and SIA coverage and the presence of highly mobile groups with links to endemic areas in NWFP, FATA and Baluchistan, as well as the southern region of 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 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 Baluchistan, 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 antigovernment elements), employing community focal persons to support 'access negotiators' and community mobilization, exploiting windows of opportunity to implement SIADs with bivalent OPV, working with and through the Health Cluster NGOs, and increasing the use of other 'addon' 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 districts, social mobilization activities will continue to be refined based on the issues which are particular to each district/agency/town and regular Knowledge, Attitudes and Practices (KAP) evaluations. 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. In terms of SIA operations, a new SIA training methodology which utilizes external expertise will be further refined based on an independent assessment. Environmental sampling will complement the active AFP surveillance, with possible expansion to include Peshawar. Polio survivors will be provided with physical and social rehabilitation support.

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.

Milestones:

- end-2010: <10% missed children during at least 2 SIAs in all towns of Karachi; <15% missed children during at least 2 SIAs in all districts of the Quetta area and the persistent transmission districts of NWFP and FATA.
• end-2011: <10% missed children during at least 90% of SIAs in the Quetta area and in the persistent transmission districts of NWFP and FATA; >90% of children with >3 doses of OPV in Sindh and Punjab.
• end-2012: <10% missed children during each SIA in all districts; >90% of children with >3 doses of OPV sustained in all provinces.

Afghanistan:

VISUAL: map of Afghanistan, showing 13 high-risk districts in Southern Region.

In Afghanistan, persistent WPV transmission is now restricted to 13 security-compromised districts in the provinces of Helmand, Kandahar and Uruzgan in Southern Region. However, virus from these districts, and adjoining areas of NWFP, FATA and Baluchistan in Pakistan, is regularly imported into these provinces and other, polio-free areas of Afghanistan.

In 2009, a range of new approaches to improve access to children in southern Afghanistan were piloted. For example, the Government of Afghanistan contracted two local non-governmental organizations (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, key communications and social mobilization activities, and systematic use of the SIAD strategy to exploit fully any windows of opportunity that were created by

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

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 key 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 the southern and south-eastern Regions. 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 priority 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 subnational polio immunization days will complement the SIAs in the 13 priority districts to maintain the high levels of population immunity needed to reduce the risk of outbreaks following importations (Annex 2).

Milestones:
- end-2010: <10% missed children during at least 2 SIAs in the 13 conflict-affected districts with persistent transmission in the Southern Region.
- end-2011: <10% missed children during at least 80% of SIAs in the 13 conflict-affected districts with persistent transmission in the Southern Region.
- end-2012: >90% of children with ≥3 doses of OPV in all provinces.

### 3.2 Interrupting wild poliovirus transmission in Africa

*This section provides an overview of the GPEI Strategic Plan 2010-2012 to interrupt the remaining chains of indigenous WPV transmission in Nigeria, the known or possible re-established transmission in Angola, Chad, the Democratic Republic of the Congo and southern Sudan, and reduce international spread in the ‘WPV importation and outbreak belt’ of sub-Saharan Africa.*

**Context:**

Compared 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 weak health systems of countries where polio eradication is being pursued in the remaining infected areas of sub-
Saharan Africa, resulting in low routine immunization coverage levels and suboptimal outbreak response. These challenges are in part off-set, however, by the consistently high per-dose efficacy of OPVs in sub-Saharan Africa, as well as the substantially lower population immunity threshold needed to stop WPV transmission 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 populated 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. Unfortunately, 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 transmission on a national or subnational scale. At early 2010, an additional nine 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 major improvements in SIA performance in that year, substantially reducing the risk of new exportations. In addition, DR Congo and southern Sudan have not reported a case of polio due to the re-established virus for over six months (i.e. since August 2008 and June 2009, respectively).

**Strategic Approach:**

Interrupting the remaining WPV transmission in Africa requires (a) in northern Nigeria institutionalizing 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 ≥80% population immunity threshold that substantially reduces the risk of an outbreak following an importation.

**VISUAL: Persistently-infected district map of Africa**

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9 Re-established poliovirus transmission: the persistent circulation of an imported wild poliovirus for > 12 months.
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 in 2010-2012 (further country-specific details are available at www.polioeradication.org).

**Nigeria:**

![Map of Nigeria, showing 8 high-risk states](image)

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 circulating vaccine-derived poliovirus type 2 (cVDPV2). Although WPV was interrupted from 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 and SIAs. This was the result of 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, Federal authorities established an emergency task force to address the situation, culminating 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.

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 – ie 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 identifying the highest-risk LGAs for poor SIA performance and persistence of virus transmission, to ensure all LGA Chairpersons are engaged and accountable for SIA performance. In these areas, LGA-specific plans will be developed based on the local context and challenges. These plans will include enhanced engagement of key
religious leaders and the scale-up of appropriate 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.

International technical support for the intensification of eradication activities in Nigeria is being scaled-up through the deployment of up to 20 ‘Expanded Stop Transmission of Polio’ (eSTOP) professionals. 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. 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.

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 subnational SIA activities that focus on the persistent transmission states (Annex 2). Bivalent OPV is anticipated to 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.

Milestones:

- end-2010: <10% 0-dose children (per NP AFP data) in each of the 12 high-risk states (including the 8 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 8 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 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 specific programmatic priorities in these four countries reflects 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 subnational 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.

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 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.

**DR 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 to sustain population immunity to protect against the possible re-emergence of the most recent virus as well as new importations.

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 the need for enhanced surveillance is reflected in the fact that undetected transmission had persisted either in that area, and/or just over the border in Ethiopia, for over two years.

To improve surveillance and SIA quality improvements in DR Congo, international technical support to the highest-risk provinces will be scaled-up, and specific mechanisms established to monitor the engagement of provincial and district leaders, with oversight by the Office of the President. 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 security-compromised areas (i.e. North and South Kivu). Surveillance performance will be monitored on a quarterly basis.

In southern Sudan, international technical support was substantially scaled up in 2009, with deployments 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.

Milestones:

- **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% of missed children in each state during each SIA; AFP rate >2 with 80% adequate specimens rates in all states.
• end-2011: SIA & AFP performance of 2010 sustained.
• end-2012: SIA & AFP performance of 2010 sustained.

**Countries with recurrent importations**

**VISUAL:** high-risk district map of WPV importation belt.

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, nine countries were considered to still have 'active' outbreaks due to recent importations (i.e. most recent case had occurred within the previous 6 months: Burkina Faso, Burundi, Cameroon, Guinea, Liberia, Mali, Mauritania, Senegal and Sierra Leone.

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

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 and outbreak 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 in their areas. At the local level, SIAs microplans are being updated, with refresher training where needed, particularly in areas of recent transmission. 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. 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 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 ten to 14 days of each SIA has been established to enable rapid mid-course corrections ahead of subsequent SIA. 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. In discussions with Ministries of Health in the 'WPV importation belt', early confirmation of resources has been repeatedly stressed as fundamentally important to achieving high coverage as this allows enhanced planning and bundling with other interventions such as Vitamin A, measles vaccination and/or Child Health Days. Recognizing 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. 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.

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.

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.

**VISUAL:** map from Nick Grassly showing risk-area prioritization.

**Milestones:**

- mid-2010: cessation of all outbreaks due to importations occurring in 2009; <10% missed children in 2 SIAs in all 'WPV importation belt' countries.
• end-2011: cessation of all outbreaks due to importations occurring in 2010; <10% missed children in 2 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 2 SIAs in all 1st and 2nd level priority countries in the 'WPV importation belt' (based on end-2011 prioritization).

3.3 Enhancing poliovirus surveillance and outbreak response

This section provides an overview of the GPEI Strategic Plan 2010-2012 to address sub-national gaps in surveillance sensitivity in the 3 endemic Regions, ensure certification-standard surveillance is sustained in those which are polio-free, and 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 wild or circulating vaccine-derived polioviruses (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 Poliovirus Laboratory Network (GPLN). In some areas of the world (e.g. Egypt, Mumbai, Karachi, Lahore), systematic environmental sampling for polioviruses is being used to supplement the data from AFP surveillance.

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 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 substantially such 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.

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 6-12 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 evident in the fact that 97% of WPV importation events from 2003-2007, and 70% of the events with onset in 2008-2009, had been stopped. As importantly, 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 >6 months and, occasionally, the re-establishment of transmission.

Strategic Approach:

Surveillance for polioviruses:

The GPEI Strategic Plan 2010-2012 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 >6 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 performance will be conducted at the regional levels, with monthly feedback provided on the key indicators. 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.

Milestones:

- **End-2010**: non-polio AFP rate >2 achieved at subnational level\(^{10}\) 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 subnational 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 milestones 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 cVPVs.

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 (6-12 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 wild polioviruses. 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 areas of <90% coverage are immediately re-vaccinated. The persistent circulation of an imported virus for >6 months will automatically trigger an international, in-country assessment.

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 Short Interval Additional Dose (SIAD) strategy. This trial will compare immunity after intervals of 7, 14 and 28 days between mOPV1 doses, 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.

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\(^{10}\) States/provinces with population aged <15 years of >100,000
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 4 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 cases.

Milestones:

- **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 >6 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 >6 months.
- **end-2012**: Milestone sustained.

### 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 national routine immunization coverage with at least three doses of OPV (OPV3) 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

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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.

As importantly, 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 Millenium 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 pneumococcus 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 2010), 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 operating procedures of the GPEI include national and international advisory bodies (e.g. Technical Advisory Groups - 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 GAVI's work in sub-Saharan Africa and Asia, especially 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 has been implemented in >55 countries using polio-funded staff and resulted in substantial increases in routine coverage in some areas. The RED strategy was developed to systematically employ GPEI approaches to improve 5 key aspects of routine immunization systems: service delivery; supply, logistics and cold chain; surveillance and monitoring; community participation; and programme planning and management.

**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 Global Alliance for Vaccines and Immunization (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 investor 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 programme. 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 subnational 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 subnational zones.

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 (eg percent vaccinator positions filled), the completeness of vaccination sessions (eg percent 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 (eg aligning polio and routine immunization activities), (2) service delivery (eg enhancing microplanning,
implementation and monitoring of routine immunization sessions), (3) vaccine supply, logistics and cold chain, (4) surveillance and monitoring (eg 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 communications training for health workers to cover topics such as routine immunization, child survival issues, hygiene, sanitation and nutrition 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 2 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.

Milestones:

- **end-2010**: multiyear plan for all immunization services (incl. polio) established in at least 80% of countries with GPEI international support staff; survey of GPEI staff completed.
- **end-2011**: at least 25% of polio field staff time contributing to immunization systems strengthening (i.e. barriers assessment & RED implementation) in countries of the 'WPV importation belt' of sub-Saharan Africa; immunization systems refresher/review workshops conducted for all GPEI staff supporting countries of the 'WPV importation belt'.
- **end-2012**: milestones sustained.
4. Major enabling factors

This section summarizes 5 of the most important enabling factors for the GPEI Strategic Plan 2010-2012, the successful implementation of which assumes that major cross-cutting challenges can be addressed in the areas of political engagement and oversight, community mobilization, vaccine supply, financing, and prioritization of activities.

**Oversight & Engagement of National and Subnational Leaders in SIA Operations:**

Given the scale and resource demands of the SIAs needed to interrupt wild poliovirus transmission in the remaining infected areas, the engagement and oversight of national and subnational 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 Strategic Plan 2010-2012 will be to assist the remaining polio-infected countries to build on the existing political engagement and oversight to extend it to the local, operational levels. Particularly important will be to translate the existing national commitments into consistent engagement of state/province authorities and extend it to the district and sub-district levels, with priority given to the persistent transmission districts 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 where appropriate sub-district) leaders in SIA operations in programme-critical areas (e.g. through their constituting and participating in sub-national ‘Polio Task Forces’), 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. Full implementation of such advocacy plans at the subnational 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.
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 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.

Enhanced Communications and Community Engagement:

To complement the advocacy activities outlined above, for 2010-2012, polio eradication communications and community engagement will be enhanced. UNICEF, as the lead GPEI partner on social mobilization and communications, 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 will focus on two main areas of work: social mobilization and programme communications. Social mobilization will entailing activities to increase community participation in polio eradication and routine immunization activities (such as supporting local leaders to speak to communities; harnessing the strength of local partners to spread information about health activities). Social mobilization will continue to rely heavily on interpersonal communications and local networks to increase community engagement. Programme communications will focus on the basic elements of message design and information exchange, including the utilization of mass media. Communications strategies will follow global structures, but be adapted to national and subnational circumstances to maximize community participation, and ensure messages are appropriate to local conditions.

Communications strategies will adopt two separate but related themes: general public communications (i.e. to provide basic information on eradication activities such as the time, date and place of OPV campaigns); and, the high-risk approach, which requires a more in-depth understanding of and engagement with communities. General public communications seeks to maintain interest and awareness and sustain demand for services. The high-risk approach uses 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 these populations. Both approaches will be tailored to the area and population, adopting a more mass media or targeted social mobilization and local media approach, as appropriate.

A data-driven planning process has been developed to serve as the backbone for polio eradication communications activities, using a health communication theory approach (e.g. social marketing; risk communication) for individual and social change, guided by social data collection, objective setting and strategy development. Communications indicators and milestones (e.g. human resources deployment, strategy development, reporting) have been identified. The use of standard communication indicators and
country-specific milestones will ensure better monitoring, improved transparency and rapid adjustments as necessary. In addition to regular assessments of community perceptions through KAP studies, monitoring of communication activities will be increased by incorporating these elements into the independent post-SIA monitoring processes.

A Safe and Secure Supply of Effective Oral Poliovirus Vaccines (OPVs):

Fully implementing the planned SIA activities of the GPEI Strategic Plan 2010-2012 will require a total over 5 billion doses of OPV, in at least four different formulations: trivalent OPV (tOPV), monovalent OPV1 (mOPV1), monovalent OPV3 (mOPV3) and bivalent OPV (bOPV). The introduction of bOPV 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 bOPV products are submitted for licensure and WHO-prequalification (by early 2010, three bOPV 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 3-5 year demand forecasts are also presented and discussed.

As importantly, 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 SIA as necessary.

These operating procedures will be continued through 2010-2012 to ensure that through its regular interactions, engagement and close collaboration with industry, the GPEI is able to ensure 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’).

**Sufficient Domestic and International Financing:**

Fully implementing the GPEI Strategic Plan 2010-2012, requires mobilizing 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.

The Polio Advocacy Group (PAG), which has since 2000 overseen the mobilization of more than US$5 billion for GPEI activities, and is now comprised of resource mobilization focal points from WHO, UNICEF, Rotary International, the UN Foundation, and participation from the Bill and Melinda Gates Foundation (BMGF) and CDC. PAG members are working together to both secure these 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 G8 priority, 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), and re-engaging non-G8 OECD donors. This work is complemented by efforts to explore links to innovative financing mechanisms, engage new EU member states 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, through which these core donors have committed to enhancing their outreach to 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.

**Prioritization of Eradication Activities:**

The GPEI continually operates in a resource-constrained environment due primarily to a chronic medium-term funding gap, compounded by very tight short-term cash flow (in-hand financing rarely fully meets the short-term 6 month requirements). These financing
constraints 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 (tOPV, mOPV1, mOPV3 and bOPV). 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 cashflow, 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 6 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 6 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 wild polio viruses 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 Strategic Plan 2010-2012.
5. Roles and responsibilities

5.1 Technical Guidance & Monitoring

Technical Guidance:

At the global level, the GPEI will consolidate and reconstitute its major technical advisory bodies to optimize the efficiency with which it receives guidance on issues of policy, strategy and priorities. The work of the Advisory Committee on Poliomyelitis Eradication (ACPE) and the Polio Research Committee (PRC) will be merged under a new ACPE. As the 6 year mandate of the current ACPE members expires in November 2010, the opportunity will be used to reconstitute the full 13-person membership, with at most 2 of the current ACPE members being extended to facilitate the transition.

The nomination and appointment of members to the new ACPE will follow a process similar to that instituted for the Strategic Advisory Group of Experts on Immunization (SAGE), with similar criteria for eligibility. Per the current ACPE, appropriate technical expertise will be sought across all major disciplines relevant to optimizing policy and strategy for interrupting wild poliovirus transmission and managing the attendant risks. The Chairman of the PRC, which will function as a subgroup of the ACPE, will be invited to serve on the new ACPE as will the focal point for polio on SAGE. The ACPE will have 2 meetings annually, one of which will be by video or teleconference unless deemed otherwise by the Chair.

In the endemic Regions and countries, advice on issues of local strategy, priorities and programme operations, including communications, will be provided by existing technical advisory bodies, 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 country technical advisory body will be sought in advance of each ACPE meeting, with the Chairs of these bodies invited to attend.

Monitoring the GPEI Strategic Plan 2010-2012:

From 2010, monitoring of the GPEI milestones will be separated from the technical advisory functions, with SAGE taking over primary responsibility for independent monitoring and reporting of the major impact and outcome milestones of the Strategic Plan 2010-2012. In summary, SAGE will analyze the data underpinning each of the major milestones on a 6-monthly basis and report its findings directly to the Director-General of WHO. SAGE will rank each milestone as 'on-track', 'progressing but with issues of concern', or 'not on track and at risk for completion'. WHO will in turn report to the Executive Board and the WHA, seeking the guidance of Member States for milestones with 'issues of concern' or which are 'not on track'. For such milestones, WHO will also consult directly with relevant Member States and/or spearheading partner agencies as a matter of urgency.

To maintain an arm's length relationship between the UN implementing agencies (WHO and UNICEF) and the monitoring process, primary responsibility for presenting data on each milestone for review by SAGE will rest with CDC. This approach exploits CDC's long involvement with - and deep understanding of - the GPEI, and its substantial
expertise in the surveillance, laboratory and operational aspects of the GPEI worldwide. For milestones which SAGE deems there to be ‘issues of concern’ or ‘not on track’, CDC has the human resources to work with health authorities in the relevant polio-affected country to collect and further assess area- or issue-specific process indicators. When appropriate, such process-specific indicator data will also be presented to SAGE to assist its deliberations as to the gravity of the problem when a particular milestone is found to be at risk. CDC may also report additional information on programme impact to complement the major milestones (e.g. number of infected districts over time).

WHO will continue to monitor and disseminate information on the major milestones on a quarterly basis, to facilitate the work of national and international advisory bodies in guiding the mid-course corrections which will be necessary to achieve the major milestones. This interim information on the major milestones will in addition assist donor partners in their planning and allocation of financial support. WHO will also continue to disseminate key programme data weekly (e.g. polio epidemiology), monthly (e.g. surveillance performance; VDPVs), quarterly (e.g. country-specific AFP performance reports) or on an ad hoc basis (e.g. independent SIA monitoring reports; surveillance desk reviews). UNICEF will 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. 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 milestones will require polio-affected countries to hold themselves fully accountable to working at national, subnational and district level, and with other GPEI partners, to plan, implement and monitor the activities 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 endemic Regions, have 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 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 Global Polio Laboratory Network, 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 in 122 countries from polio. Rotary provides urgently needed funds - 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 program. Rotary members also provide valuable field support during NIDs through social mobilization and by administering the oral polio vaccine to children.

In November 2007, Rotary International joined with the Bill and Melinda Gates Foundation, 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 US Centers for Disease Control and Prevention (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 provides assistance in the development and monitoring of the 145 members of the Global Polio Laboratory Network, including by funding short-term and long-term technical support in key countries. CDC conducts research that will facilitate development of post-certification immunization and
surveillance policies. CDC plays a lead role in utilizing this capacity to support the independent monitoring of the GPEI Strategic Plan 2010-12 by presenting to SAGE the data necessary to assess and rank the status of each of the major milestones.

UNICEF

UNICEF is the lead partner in the procurement and distribution of polio vaccines for routine and supplementary immunizations and with WHO, the strengthening of routine immunization. UNICEF is also the lead partner for the provision of expert technical advice and capacity building in the areas of programme communications and social mobilization. UNICEF also supports countries in the implementation of intensified NIDs, SNIDs and mop-up campaigns at country level. UNICEF 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. UNICEF also participates in the global process by which eradication policies and plans of action are developed; develops materials for training and public information; strengthens social mobilization efforts through its network of communications officers; and provides cold chain support. UNICEF is also 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$9 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 (eg Rotary International, the Bill and Melinda Gates Foundation, the UN Foundation), multilateral organizations, development banks, non-governmental organizations and, corporate partners. 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.

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 and implementing communication and social mobilization activities. The NGO umbrella-organization CORE, through the efforts of its many
members for example, builds partnerships between the government and the communities they serve, supporting supplemental immunization campaigns, assisting with AFP surveillance, and monitoring the immunization status of children.

*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) have a strong presence and possess in-depth knowledge of local communities and civil administrations, and their resources can be flexibly and rapidly mobilized. In 2009, initial collaboration with IFRC National Societies in key areas of 16 countries of west, central and Horn 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 wild poliovirus 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 (Figure X). 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. During this period, 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 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).

**VISUAL: Figure X: Post-wild poliovirus timeline**

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, 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, and the adherence to internationally-agreed processes for the 'post-eradication' use of OPV (i.e. live polioviruses) in response to new cVDPVs. 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 for the use of IPV in low-income countries, as well as domestic IPV production.

<table>
<thead>
<tr>
<th>Country</th>
<th>Milestone</th>
<th>Priority Age Group</th>
<th>Primary Source/Frequency of Data Collection &amp; Analysis</th>
<th>Baseline (end-2009) for Priority Areas</th>
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<tbody>
<tr>
<td><strong>Endemic</strong></td>
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<tr>
<td>India</td>
<td>Percent population immunity to type 1 &amp; 3 polio.</td>
<td>6-12 month old children.</td>
<td>Serosurveys/6-12 monthly. Mathematical modelling using AFP data/quarterly.</td>
<td>West UP: Central Bihar:</td>
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<td>Pakistan</td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 12 month olds. &lt; 1-5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>Karachi: Quetta block: FATA block: NWFP block:</td>
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<td></td>
<td>Percent children with &gt;3 doses of OPV.</td>
<td>6-36 month olds</td>
<td>OPV status of non-polio AFP cases/quarterly</td>
<td>Sindh: Punjab:</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 12 month olds. &lt; 1-5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>Helmand districts: Kandahar districts:</td>
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<tr>
<td>Nigeria</td>
<td>Percent children with 0 or &gt;3 doses of OPV.</td>
<td>6-36 month olds.</td>
<td>OPV status of non-polio AFP cases/quarterly</td>
<td>12 northern 'persistent transmission states:</td>
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<td>Re-established Transmission</td>
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<tr>
<td><strong>Angola</strong></td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>Luanda Province: Benguela Province: Kuanza Sul Province:</td>
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<td><strong>Chad</strong></td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>N'Djamena: Southern zone: Eastern zone:</td>
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<td><strong>DR Congo</strong></td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>Orientale: Kivu north: Kivu south:</td>
</tr>
<tr>
<td><strong>Sudan</strong></td>
<td>Percent missed children during SIAs.</td>
<td>&lt; 5 years of age.</td>
<td>Independent SIA monitoring data/quarterly</td>
<td>Each state of southern Sudan:</td>
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<thead>
<tr>
<th>Active Importation</th>
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<tr>
<td>'Wild poliovirus importation' belt countries</td>
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