

Progress Toward Interruption of Wild Poliovirus Transmission — Worldwide, January 2010–March 2011

The Global Polio Eradication Initiative (GPEI) was launched in 1988. By 2006, transmission of indigenous wild poliovirus (WPV) was interrupted in all but four countries (Afghanistan, Pakistan, India, and Nigeria) (1). Subsequently, 39 previously polio-free countries experienced outbreaks following importation of WPV, and transmission became reestablished in Angola, Chad, Democratic Republic of the Congo (DRC), and Sudan (2,3). This update summarizes progress toward polio eradication during 2010 and the first quarter of 2011. Worldwide, 1,291 WPV cases were reported in 2010, a 19% decrease from 2009; WPV type 3 (WPV3) cases decreased 92%, but WPV type 1 (WPV1) cases increased 145%. During 2010, 232 (18%) WPV cases were reported from the four polio-endemic countries; 159 (12%) cases were reported in Angola, Chad, and DRC; and 900 (70%) cases were reported in 13 countries, including two countries with outbreaks continuing from 2009 and 11 with new importations. During 2010, WPV cases in India and Nigeria decreased $\geq 94\%$ compared with 2009. Outbreaks in Tajikistan and the Republic of the Congo (Congo) accounted for two thirds of cases (842) in 2010 (4,5). All new outbreaks in 11 polio-free countries in 2010 were stopped or were on track to being stopped within 6 months of outbreak confirmation. During January–March 2011, substantially more WPV cases occurred in Chad, DRC, and Pakistan than during the same period of 2010. To further progress toward polio eradication and achieve the 2012 target of ending all WPV transmission, significant increases in resources and political commitment are needed.

2010–2012 GPEI Strategic Plan

In May 2008, to overcome barriers to interruption of WPV transmission, the World Health Assembly sought to develop new strategies to eradicate polio. A year-long assessment led to development of the 2010–2012 GPEI Strategic Plan (6). The plan includes the following milestones, which will be assessed quarterly: 1) stopping WPV transmission following importation in countries with outbreaks in 2009 by mid-2010 and stopping WPV transmission in subsequent outbreaks within 6 months of confirmation, 2) stopping WPV transmission in countries with reestablished transmission* by the end of 2010, 3) stopping WPV transmission in at least two of the four WPV-endemic countries by the end of 2011, and 4) stopping WPV transmission in all countries by the end of 2012.

*Circulation of imported WPV for >12 months.

Routine vaccination

In 2009, the most recent year for which data are available, global routine vaccination coverage of infants with 3 doses of trivalent poliovirus vaccine by age 12 months (Pol3) was estimated to be 83% and varied by World Health Organization (WHO) Region: 72% in the African Region; 91% in the Region of the Americas; 86% in the Eastern Mediterranean Region; 96% in the European Region; 74% in the South-East Asia Region; and 97% in the Western Pacific Region.[†] In 2009, estimated national Pol3 coverage was 85% in Pakistan, 83% in Afghanistan, 67% in India, and 54% in Nigeria, but coverage in individual high-risk states/provinces was considerably below the national average.

Supplementary immunization activities

In 2010, a total of 309 supplementary immunization activities (SIAs)[§] using OPV were conducted in 49 countries (130 national immunization days, 140 subnational immunization days, 11 child health days, and 28 mop-up rounds). Of these SIAs, 87 (28%) were conducted in the four polio-endemic countries (38 in India, 20 in Pakistan, 12 in Afghanistan, and 17 in Nigeria), 94 (30%) in 16 previously polio-free countries affected by outbreaks following importation, 56 (18%) in countries with reestablished transmission (Angola, Chad, DRC, and Sudan), and 72 (23%) in 25 countries without confirmed cases of WPV during 2010. An estimated 2.21 billion doses of OPV were delivered to approximately 400 million persons, most of them children aged <5 years. Of the doses administered, approximately 33% were trivalent oral poliovirus vaccine (tOPV), 23% were monovalent OPV type 1 (mOPV1), 4% were monovalent OPV type 3, and 40% were bivalent OPV types 1 and 3 (bOPV).

Poliovirus surveillance

The quality of acute flaccid paralysis (AFP) surveillance is monitored by performance indicators, including the nonpolio

[†] Estimates as of April 19, 2011; data available at http://www.who.int/immunization_monitoring/en/globalsummary/countryprofileselect.cfm.

[§] Mass campaigns conducted during a short period (days to weeks) during which a dose of OPV is administered to all children (generally aged <5 years), regardless of previous vaccination history. Campaigns can be conducted nationally or in portions of the country (i.e., subnational SIAs). For SIAs in which more than one OPV type was administered, these were counted as more than one SIA.

AFP rate and the proportion of AFP cases with timely collection of adequate stool specimens (7).[¶] Of 20 polio-affected countries during 2010, 13 (65%) achieved ≥ 2 nonpolio AFP cases per 100,000 population aged <15 years and $\geq 80\%$ of AFP cases with adequate specimens; only 12 (60%) of these countries had at least 50% of the population in states/provinces meeting both surveillance indicator targets (7).

During 2009, sampling of sewage for WPV (environmental surveillance) in India (one city, three sites) and Pakistan (two cities, 10 sites) detected WPV in the absence of WPV-positive AFP cases (7). In 2010, environmental surveillance in these two countries was expanded to five other cities and 13 additional sites (India: one city, five sites; Pakistan: four cities, eight sites), for a total of 26 sites in eight cities (7). Environmental surveillance in many of these new sites in 2010 again detected WPV

[¶] The GPEI strategic plan sets operational targets for countries with current or recent WPV transmission, both nationally and in each province/state, as non-polio AFP ≥ 2 per 100,000 population aged <15 years, and adequate stool specimen collection from $\geq 80\%$ of AFP cases, in which two specimens are collected ≥ 24 hours apart, both within 14 days of paralysis onset, shipped on ice or frozen ice packs, and arriving in good condition (without leakage or desiccation) at a WHO-accredited laboratory.

in the absence of WPV-positive AFP cases. Although no WPV cases have been reported in Sudan since June 2009, WPV1 genetically linked to WPV1 transmission in north Sudan during 2009 was isolated from a sewage sample collected in December 2010 in Aswan, Egypt. Longstanding environmental surveillance in Egypt supplemented AFP surveillance before the last indigenous WPV case there in 2004, and since then has detected WPV intermittently that originated from outside Egypt until this finding, most recently in 2008 (8).^{**}

Incidence of WPV-confirmed AFP

As of April 19, 2011, a total of 1,291 WPV cases with onset of paralysis in 2010 had been reported worldwide (Table), a 19% decrease compared with 1,604 WPV cases reported in 2009. Outbreaks in Tajikistan and Congo accounted for 840 (70%) WPV1 cases, which contributed to a 145% increase in WPV1 cases, from 492 in 2009 to 1,204 in 2010. WPV3 cases decreased 92%, from 1,122 cases in 2009 to 87 cases in 2010.

^{**} Data on reported cases of wild poliovirus, by country and by year, for 2000–2011 are available at <http://www.polioeradication.org/dataandmonitoring/poliothisweek/wildpolioviruslist.aspx>.

TABLE. Reported wild poliovirus (WPV) cases,* by type and category of polio-affected country — worldwide, January 2010–March 2011

| Category/country [†] | 2010 | | | | | | 2011 | | |
|--|-----------|-----------|-----------|--------------|-----------|--------------|-----------|----------|------------|
| | Jan-Mar | | | Total 2010 | | | Jan-Mar | | |
| | WPV1 | WPV3 | All WPV | WPV1 | WPV3 | All WPV | WPV1 | WPV3 | All WPV |
| Polio-endemic countries | 7 | 33 | 40 | 163 | 69 | 232 | 34 | 2 | 36 |
| Afghanistan | 1 | 6 | 7 | 17 | 8 | 25 | 1 | — | 1 |
| India | 3 | 16 | 19 | 18 | 24 | 42 | 1 | — | 1 |
| Nigeria | — | 2 | 2 | 8 | 13 | 21 | 6 | 2 | 8 |
| Pakistan | 3 | 9 | 12 | 120 | 24 | 144 | 26 | — | 26 |
| Countries with reestablished transmission | 1 | 7 | 8 | 144 | 15 | 159 | 56 | 2 | 58 |
| Angola | 1 | — | 1 | 33 | — | 33 | 2 | — | 2 |
| Chad | — | 7 | 7 | 11 | 15 | 26 | 18 | 2 | 20 |
| Democratic Republic of the Congo | — | — | — | 100 | — | 100 | 36 | — | 36 |
| Countries affected by outbreaks | 47 | 0 | 47 | 897 | 3 | 900 | 3 | 5 | 8 |
| Côte d'Ivoire [§] | — | — | — | — | — | — | — | 3 | 3 |
| Gabon [§] | — | — | — | — | — | — | 1 | — | 1 |
| Kazakhstan | — | — | — | 1 | — | 1 | — | — | — |
| Liberia | 1 | — | 1 | 2 | — | 2 | — | — | — |
| Mali [§] | 1 | — | 1 | 3 | 1 | 4 | — | 1 | 1 |
| Mauritania | 4 | — | 4 | 5 | — | 5 | — | — | — |
| Nepal | 1 | — | 1 | 6 | — | 6 | — | — | — |
| Niger [§] | — | — | — | — | 2 | 2 | — | 1 | 1 |
| Republic of Congo [¶] | — | — | — | 382 | — | 382 | 1 | — | 1 |
| Russian Federation | — | — | — | 14 | — | 14 | — | — | — |
| Senegal | 13 | — | 13 | 18 | — | 18 | — | — | — |
| Sierra Leone | 1 | — | 1 | 1 | — | 1 | — | — | — |
| Tajikistan | 26 | — | 26 | 458 | — | 458 | — | — | — |
| Turkmenistan | — | — | — | 3 | — | 3 | — | — | — |
| Uganda | — | — | — | 4 | — | 4 | 1 | — | 1 |
| Total | 55 | 40 | 95 | 1,204 | 87 | 1,291 | 93 | 9 | 102 |

* Case data reported to the World Health Organization as of April 19, 2011, by date of onset.

[†] Country category according to Global Polio Eradication Initiative 2010–2012 Strategic Plan.

[§] Countries with new outbreaks in 2011.

[¶] The 2010 total includes 317 cases with inadequate specimens that have been classified provisionally as confirmed polio based on their association with a WPV1 outbreak.

In the first quarter of 2011, 102 WPV cases (93 WPV1 and nine WPV3) were reported, compared with 95 WPV cases in the first quarter of 2010 (55 WPV1 and 40 WPV3) (Table).

Polio-endemic countries. India reported 42 WPV cases with onset in 2010 (18 WPV1 and 24 WPV3), a 94% reduction compared with 741 cases reported in 2009 (79 WPV1, 661 WPV3, and one mixed WPV1/WPV3). Until 2009, the majority of polio cases in India occurred in, or were directly related to cases in the northern states of Uttar Pradesh and Bihar. No WPV cases have been confirmed from Uttar Pradesh since April 21, 2010 (WPV3), and none from Bihar since September 1, 2010 (WPV1). During the fourth quarter of 2010, two WPV1 cases occurred at a focus of persistent transmission in northern West Bengal and adjacent Jharkhand, and one WPV3 case in Jharkhand. During January–March 2011, one WPV1 case was reported near Kolkata in West Bengal.

Nigeria reported 21 WPV cases with onset in 2010 (eight WPV1 and 13 WPV3), a 95% decrease compared with 388 cases reported during 2009 (75 WPV1 and 313 WPV3); however, 12 WPV cases occurred during the fourth quarter of 2010. In the first quarter of 2011, eight WPV cases were reported (six WPV1 and two WPV3), compared with two WPV3 cases reported during the first quarter of 2010. As of April 2011, WPV3 originating from Nigeria was detected in a case in Mali and a case in Niger; in Cote d'Ivoire, WPV3 from cases in 2011 was distantly related to WPV isolated from cases in Nigeria in 2009.

Afghanistan reported 25 WPV cases with onset in 2010 (17 WPV1 and eight WPV3), a 34% decrease from 38 WPV cases reported in 2009 (15 WPV1 and 23 WPV3). Among the 25 WPV cases, 21 (84%) (13 WPV1 and eight WPV3) were reported from districts in the conflict-affected south region, and four WPV1 cases in districts of the east and northeast regions followed importation from Pakistan. In the first quarter of 2011, one WPV1 case was reported compared with seven WPV cases (one WPV1 and six WPV3) in the first quarter of 2010.

Pakistan reported 144 WPV cases with onset in 2010 (120 WPV1 and 24 WPV3), a 62% increase from 89 cases reported in 2009 (60 WPV1 and 28 WPV3, and one mixed WPV1/WPV3); 100 (69%) cases were reported from conflict-affected areas, including 73 cases from the northwestern Federally Administered Tribal Areas and 23 cases from Khyber-Pakhtoonkhwa Province. In the first quarter of 2011, 26 WPV1 cases were reported, compared with 12 WPV cases reported in the first quarter of 2010 (three WPV1 and nine WPV3). In 2010, WPV1 from Pakistan was imported into Afghanistan.

Countries with reestablished transmission. No WPV cases were reported from Sudan in 2010. Angola reported 33 WPV1 cases with onset in 2010, a 14% increase from 29 WPV1 cases reported in 2009; in the first quarter of 2011,

What is already known on this topic?

Although global efforts interrupted transmission of indigenous wild poliovirus (WPV) in all but four countries (Afghanistan, Pakistan, India, and Nigeria) by 2006, 39 previously polio-free countries subsequently experienced outbreaks following importation of WPV and transmission became reestablished in four countries.

What is added by this report?

A total of 1,291 WPV cases with onset of paralysis in 2010 were reported worldwide, a 19% decrease from 2009, which included a $\geq 94\%$ reduction in reported cases in India and Nigeria and the lowest level of WPV type 3 cases worldwide ever reported. However, during January–March 2011, the number of WPV cases in Chad, Democratic Republic of the Congo, and Pakistan was substantially higher than in the same period of 2010, and three new outbreaks had been reported.

What are the implications for public health practice?

Although successful interruption of WPV transmission in India is possible in 2011, the goal of interrupting WPV transmission globally by the end of 2012 is in jeopardy based on current trends. Prompt and substantial commitments by the governments of polio-eradication partner and polio-affected countries and supporting agencies are needed to achieve the goal.

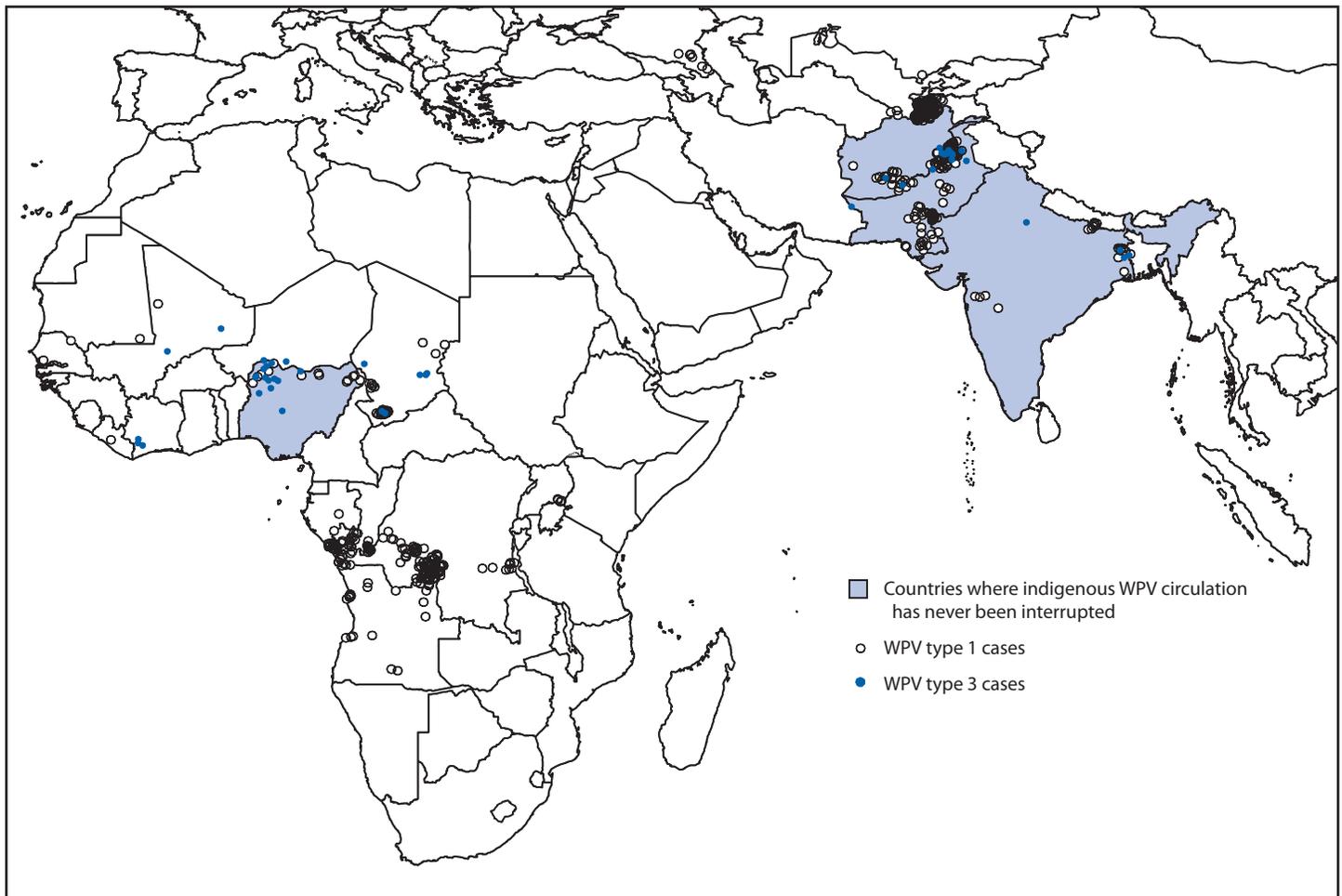
two WPV1 cases were reported, compared with one WPV1 case in the first quarter of 2010. In 2010, WPV1 spread from Angola into DRC and Congo, and subsequently to Gabon in 2011 (3,5).

Chad reported 26 WPV cases with onset in 2010 (11 WPV1 and 15 WPV3), a 55% decrease from 58 WPV cases (all WPV3) reported in 2009; a new WPV1 outbreak in late 2010 followed importation from Nigeria (3) (Figure). During January–March 2011, 20 WPV cases (18 WPV1 and two WPV3) were reported, compared with seven WPV cases (all WPV3) during January–March 2010.

DRC reported 100 WPV1 cases with onset in 2010; no WPV cases were reported in 2009 (3). Of the 100 WPV1 cases, six cases from the southeastern province of Katanga were linked genetically to the reestablished transmission of WPV1 circulating during 2006–2008. The other 94 WPV1 cases were linked to an outbreak beginning in early 2010 in Kasai-Occidental, a southwestern province bordering Angola, following an importation from Angola; the outbreak subsequently involved three other western provinces (Figure). In the first quarter of 2011, 36 WPV1 cases were reported in western provinces, all related genetically to the 2010 importation from Angola.

Countries affected by outbreaks. Three countries (Mali, Mauritania, and Sierra Leone) with ongoing transmission since 2009 had onset of the last case and stopped transmission in 2010. Imported WPV cases were reported in 11 countries during 2010 and four in 2011 (Table), including an outbreak

FIGURE. Distribution of wild poliovirus (WPV) cases — worldwide, April 2010–March 2011*



* Data reported to the World Health Organization as of April 19, 2011.

with 458 reported WPV1 cases in Tajikistan genetically related to WPV circulating in 2009 in India, with subsequent spread to Turkmenistan, Kazakhstan, and the Russian Federation (4). Congo provisionally has reported 382 cases in 2010 and one in 2011 (5). Outbreaks in nine countries in 2010 have been stopped (≥ 6 months have passed since the latest reported case under surveillance approaching performance indicator targets). Outbreaks in two countries (Congo and Uganda) in 2010 and in four countries (Cote d'Ivoire, Gabon, Mali, and Niger) in 2011 are on track to being stopped within 6 months of confirmation, although the civil disorder in Cote d'Ivoire has delayed response immunization activities.

Reported by

Polio Eradication Dept, World Health Organization, Geneva, Switzerland. Div of Viral Diseases; Global Immunization Div; National Center for Immunization and Respiratory Diseases, CDC. **Corresponding contributor:** Ikechukwu U. Ogbuanu, MD, EIS Officer, Global Immunization Div, National Center

for Immunization and Respiratory Diseases, CDC, 404-639-8757, ige2@cdc.gov.

Editorial Note

In 2010, progress toward polio eradication included 1) a $\geq 94\%$ reduction in reported cases (with record lows) in India and Nigeria compared with 2009, 2) success in interrupting all outbreaks following importations in 2009, 3) success in or being on track for interruption of new outbreaks in 2010, and 4) the lowest level of WPV3 cases worldwide ever reported. During 2006–2009, mOPV1 was the predominant vaccine used in SIAs. The introduction of bOPV has contributed to the reduction in WPV3 cases by increasing the number of SIAs with type 3–containing OPV (1). Both India and Nigeria devoted significant domestic resources to polio eradication, and mobilized all levels of government, along with traditional and religious leaders, to oversee and support eradication efforts (1,9,10).

Although 102 WPV cases were reported in the first quarter of 2011, compared with 95 WPV cases in the first quarter of 2010, trends in previous years indicate that total annual WPV cases are driven primarily by the seasonality of WPV cases (peaking mid-year) and the occurrence and extent of any polio outbreaks. In 2010, outbreaks in Tajikistan and Congo accounted for 842 (65.1%) of all WPV cases. Nonetheless, in India, only six WPV cases (five WPV1 and one WPV3) have been reported since September 1, 2010, following an aggressive SIA schedule and 2 years of intensified immunization activities targeting migrant populations. With this progress, India has the best opportunity ever to interrupt transmission in 2011. Prospects are less promising in some other countries. In Nigeria, an increase in WPV cases from the end of 2010 to March 2011 and the continued circulation of WPV in several states indicates a leveling of progress made in the preceding 18 months (from early 2009 to third quarter of 2010). Data from the end of 2010 and the first quarter of 2011 indicate that urgent actions need to be implemented to address this limited progress in Nigeria and uncontrolled WPV transmission in Pakistan, Angola, Chad, and DRC.

A recently established Independent Monitoring Board (IMB) is overseeing progress toward achieving 2010–2012 GPEI strategic plan milestones and country response plans.^{††} At its March 2011 meeting, the IMB noted that Pakistan represents the greatest overall risk for the GPEI. The Pakistani National Emergency Action Plan was developed by national health experts at the request of Pakistan's president, with international consultation, and launched in January 2011. A national task force will oversee implementation of the plan, and the IMB will evaluate the plan's progress. Emergency action plans also have been developed for Angola and DRC, and, with full support from political and health leaders at all levels and with

strong support from GPEI partners, urgently need to be implemented. IMB also concluded that continuing reestablished WPV transmission in Chad, compounded by a new outbreak, represents a public health emergency that lacks an adequate corrective action plan and needs more partner support. The IMB indicated that a considerable surge in efforts is needed for Nigeria to reach its potential to interrupt transmission by the end of 2011. Although progress toward polio eradication was substantial during 2010, IMB judged the milestone of halting all wild poliovirus transmission globally by the end of 2012 to be “at risk” based on current trends. Keeping GPEI on track for stopping WPV transmission by the end of 2012 will require governments to react promptly with increased resources and political commitment.

References

1. CDC. Progress toward interruption of wild poliovirus transmission—worldwide, 2009. *MMWR* 2010;59:545–50.
2. CDC. Wild poliovirus type 1 and type 3 importations—15 countries, Africa, 2008–2009. *MMWR* 2009;58:357–62.
3. CDC. Progress toward interrupting wild poliovirus circulation in countries with reestablished transmission—Africa, 2009–2010. *MMWR* 2011;60:306–11.
4. CDC. Outbreaks following wild poliovirus importations—Europe, Africa, and Asia, January 2009–September 2010. *MMWR* 2010;59:1393–9.
5. CDC. Poliomyelitis outbreak—Republic of the Congo, September 2010–February 2011. *MMWR* 2011;60:312–3.
6. World Health Organization. Global Polio Eradication Initiative: Strategic Plan 2010–2012. Geneva, Switzerland: World Health Organization; 2010. Available at <http://www.polioeradication.org/content/publications/gpei.strategicplan.2010-2012.eng.may.2010.pdf>. Accessed May 5, 2011.
7. CDC. Tracking progress toward global polio eradication—worldwide, 2009–2010. *MMWR* 2011;60:441–5.
8. El Bassioni L, Barakat I, Nasr E, et al. Prolonged detection of indigenous wild polioviruses in sewage from communities in Egypt. *Am J Epidemiol* 2003;158:807–15.
9. CDC. Progress toward poliomyelitis eradication—Nigeria, January 2009–June 2010. *MMWR* 2010;59:802–7.
10. CDC. Progress toward poliomyelitis eradication—India, January 2009–October 2010. *MMWR* 2010;59:1581–5.

^{††} Reports from and information about the IMB are available at <http://www.polioeradication.org/Dataandmonitoring/Polioeradicationtargets/IMBreports.aspx>.