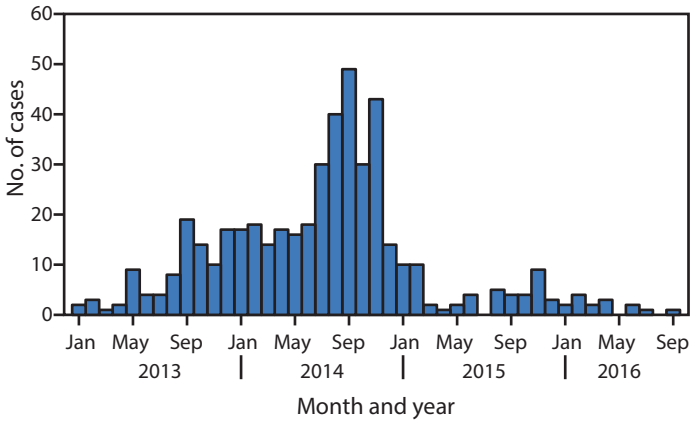
Progress Toward Poliomyelitis Eradication — Pakistan, January 2015–September 2016

Christopher H. Hsu, MD, PhD[1]; Abdirahman Mahamud, MD[2]; Rana Muhammad Safdar, MD[3]; Jamal Ahmed, MD[4]; Jaume Jorba, PhD[5]; Salmaan Sharif, PhD[6]; Noha Farag, MD, PhD[1]; Maureen Martinez, MPH[1]; Rudolph H. Tangermann, MD[2]; Derek Ehrhardt, MPH, MSN[1]

Pakistan, Afghanistan, and Nigeria remain the only countries where endemic wild poliovirus type 1 (WPV1) transmission continues. This report describes the activities, challenges, and progress toward polio eradication in Pakistan during January 2015–September 2016 and updates previous reports (*1*,*2*). In 2015, a total of 54 WPV1 cases were reported in Pakistan, an 82% decrease from 2014. In 2016, 15 WPV1 cases had been reported as of November 1, representing a 61% decrease compared with the 38 cases reported during the same period in 2015 (Figure 1). Among the 15 WPV1 cases reported in 2016, children aged <36 months accounted for 13 cases; four of those children had received only a single dose of oral poliovirus vaccine (OPV). Seven of the 15 WPV1 cases occurred in the province of Khyber Pakhtunkhwa (KP), five in Sindh, two in the Federally Administered Tribal Areas (FATA), and one in Balochistan (*3*). During January–September 2016, WPV1 was detected in 9% (36 of 384) of environmental samples collected, compared with 19% (69 of 354) of samples collected during the same period in 2015. Rigorous implementation of the 2015–2016 National Emergency Action Plan (NEAP) (*4*), coordinated by the National Emergency Operations Center (EOC), has resulted in a substantial decrease in overall WPV1 circulation compared with the previous year. However, detection of WPV1 cases in high-risk areas and the detection of WPV1 in environmental samples from geographic areas where no polio cases are identified highlight the need to continue to improve the quality of supplemental immunization activities (SIAs),* immunization campaigns focused on vaccinating children with OPV outside of routine immunization services, and surveillance for acute flaccid paralysis (AFP). Continuation and refinement of successful program strategies, as outlined in the new 2016–2017 NEAP (*5*), with particular focus on identifying children missed by vaccination, community-based vaccination, and rapid response to virus identification are needed to stop WPV transmission.

FIGURE 1. Number of cases of wild poliovirus type 1, by month — Pakistan, 2013–2016



OPV Coverage and Immunization Activities

Based on World Health Organization (WHO) and United Nations Children's Fund (UNICEF) 2015 estimates, national routine vaccination coverage of infants with 3 doses of OPV (OPV3) was 72%, unchanged from 2014 estimates (*6*). There was considerable geographic variation in reported OPV3 coverage among provinces in 2015: 40% in FATA, 29% in Balochistan, 58% in Sindh, 64% in KP and 90% in Punjab. Vaccination histories, based on parental recall and vaccination cards of children aged 6–23 months with AFP who did not test positive for poliovirus (i.e., nonpolio AFP cases [NPAFP]†), are used to estimate OPV coverage in target populations. The percentage of children with NPAFP aged 6–23 months who had never received any OPV doses through routine immunization services or SIAs declined from 6.3% in 2014 to 2.1% in 2015, and to 0.3% in 2016; the percentage of children with NPAFP who received ≥4 OPV doses (through routine immunization services or SIAs) in this age group was 96% in 2016 to date, unchanged from 2015.

During January 2015–September 2016, 21 SIAs were conducted using either trivalent OPV (tOPV [types 1, 2, and 3]) or

* Mass campaigns conducted for a brief period (days to weeks) in which 1 dose of oral poliovirus vaccine is administered to all children aged <5 years, regardless of vaccination history. Campaigns can be conducted nationally or subnationally (i.e., in portions of the country).

† Vaccination histories of children aged 6–23 months with acute flaccid paralysis who do not test WPV-positive are used to estimate OPV coverage of the overall target population and to corroborate national reported routine vaccination coverage estimates.

bivalent OPV (bOPV [types 1 and 3]); tOPV was used during one national immunization campaign before the withdrawal of type 2-containing OPV on April 25, 2016, in coordination with the worldwide withdrawal of all type 2-containing OPV. After April, fixed-post SIAs using injectable inactivated polio vaccine (IPV) and house-to-house SIAs using mostly bOPV were conducted. During the first quarter of 2016 an SIA, using both bOPV and IPV and targeting children aged 4 months to <2 years, was conducted in the core reservoir districts of Pakistan (Karachi, Peshawar, Khyber and Quetta, Killa Abdullah, and Pishin). Using only IPV, an SIA targeting all children aged 4 months–5 years was conducted in North Waziristan Agency. In 2015, eight SIAs using only IPV and targeting children aged <2 years were conducted in reservoir areas within the provinces of KP, FATA, Punjab, Balochistan, and Sindh.

Surveillance Activities

AFP surveillance. During January 2015–September 2016, the annual NPAFP rate per 100,000 population aged <15 years was 9.3 nationally, ranging from 2.2 to 15.6 among the eight provinces and regions of Pakistan (Table). In 2016, the percentage of AFP cases with adequate stool specimens[§] was 89% nationally (provincial range = 70%–89%); Gilgit-Baltistan was the only province in which stool specimen timeliness (70%) failed to meet the minimum 80% target in 2016, a decrease from 2015 when stool specimen timeliness in the province was 85%.

Environmental surveillance. Environmental surveillance was used to supplement AFP surveillance through periodic testing of sewage samples for polioviruses. During January–September 2016, WPV1 was detected in 36 (9%) of 384 environmental samples from 43 sampling sites within 18 districts, compared with 69 (19%) of 354 environmental samples from 37 sampling sites during the same period in 2015, and 98 of 294 (34%) from 30 sampling sites during the same period in 2014. Three environmental surveillance samples tested positive for vaccine-derived poliovirus (VDPV)[¶] in 2016 in the province of Balochistan (two in the district of Quetta in June and September 2016, and one in Hyderabad during July 2016) compared with 13 samples that tested positive for VDPV in the provinces of Balochistan, KP, Punjab, and Sindh during January–December 2015.

WPV and VDPV Epidemiology

During 2015, a total of 54 WPV1 cases were reported in Pakistan, an 82% decrease from the 306 WPV1 cases reported in 2014. Fifteen WPV1 cases were reported during January–September 2016, a 61% decrease from the 38 cases during the same period in 2015. Among the 38 WPV1 cases in 2015, 15 (39%) occurred in the province of KP, five (13%) in Sindh, 11 (29%) in FATA, six (16%) in Balochistan, and one (3%) in Punjab. Of the 15 WPV1 cases reported in 2016, seven (47%) occurred in KP, five (33%) in Sindh, two (13%) in FATA and one (7%) in Balochistan (Figure 2). During 2015, WPV1 cases were reported from 17 districts (the highest percentages were reported in Peshawar [26%], Khyber [16%], and Quetta [11%]), compared with 11 districts reporting WPV1 cases as of September 2016 (the highest percentages of cases

[§] AFP surveillance quality is monitored by performance indicators that include 1) the detection rate of nonpolio acute flaccid paralysis (NPAFP) cases and 2) the percentage of AFP cases with adequate stool specimens. WHO operational targets for countries with endemic-poliovirus transmission are NPAFP detection rates of ≥2 cases per 100,000 population aged <15 years and adequate stool specimen collected from ≥80% of AFP cases. Adequate stool specimen is defined as two stool specimens collected ≥24 hours apart, both within 14 days of paralysis onset, and shipped on ice or frozen packs to a WHO-accredited laboratory, arriving in good condition (i.e., without leaks or desiccation) within 3 days.

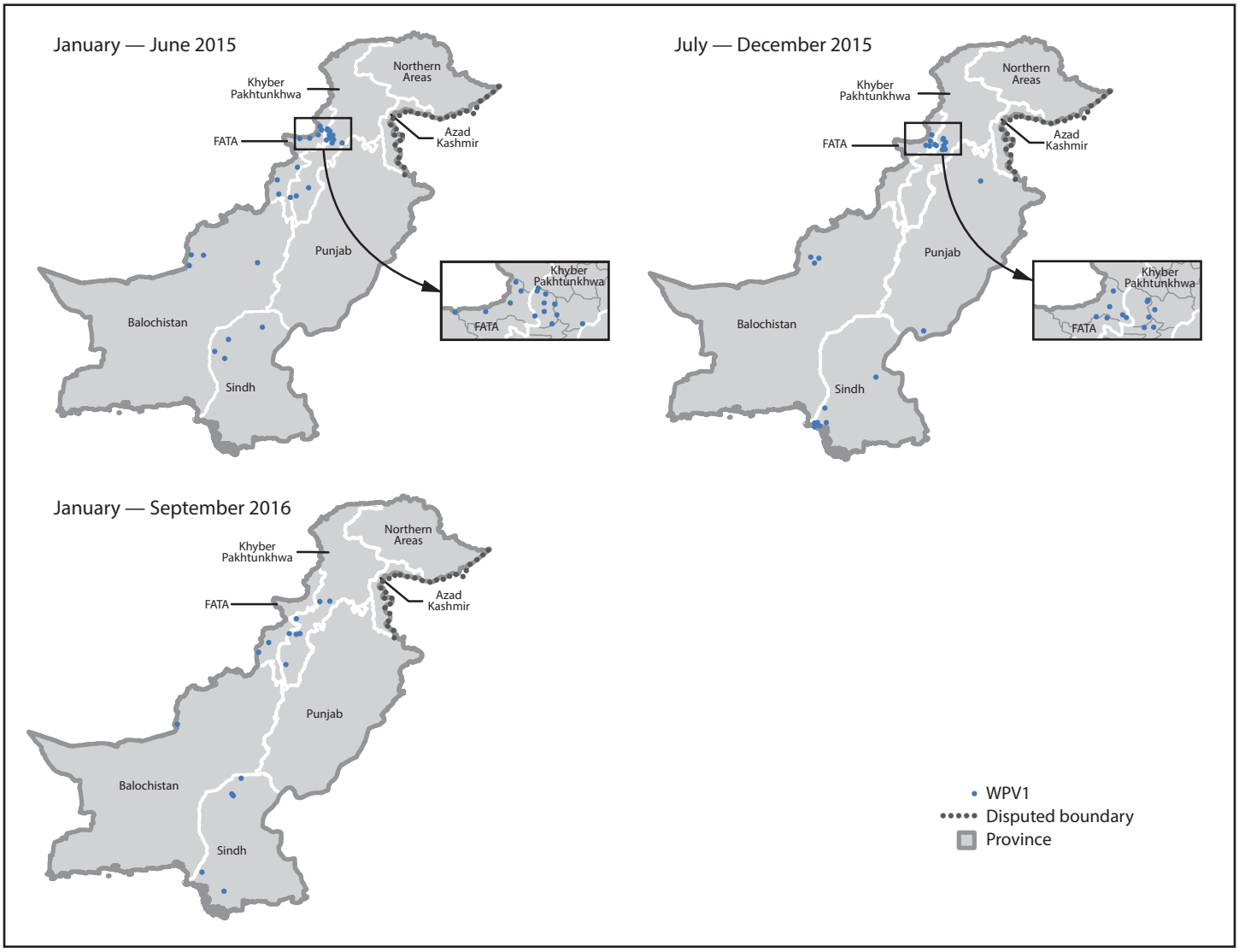
[¶] VDPVs can cause paralytic polio in humans and have the potential for sustained circulation. VDPVs resemble WPVs biologically and differ from the majority of Sabin vaccine–related poliovirus isolates by having genetic properties consistent with prolonged replication or transmission.

TABLE. Acute flaccid paralysis (AFP) surveillance indicators and reported wild poliovirus (WPV) cases by region and period — Pakistan, January 2015–September 2016

Region	AFP surveillance indicators (2015)			Reported WPV cases			
				Period			
	No. of AFP cases	Nonpolio AFP rate*	% shipped with adequate specimens†	Jan–Jun 2015	Jul–Dec 2015	Jan–Sep 2016	Total
Pakistan overall	**5,793**	**9.3**	**88**	**29**	**25**	**15**	**69**
Azad Jammu Kashmir	72	4.5	83	0	0	0	**0**
Gilgit-Baltistan	15	2.2	85	0	0	0	**0**
Islamabad	37	6.1	73	0	0	0	**0**
Khyber Pakhtunkhwa	1,158	11.1	86	13	4	7	**24**
Punjab	3,024	7.4	87	0	2	0	**2**
Balochistan	202	5.3	86	4	3	1	**8**
Sindh	1,026	5.8	90	4	8	5	**17**
FATA	259	15.6	86	8	8	2	**18**

Abbreviation: FATA = Federally Administered Tribal Areas.
* Per 100,000 children aged <15 years.
† Two stool specimens collected at an interval of at least 24 hours within 14 days of paralysis onset and properly shipped to the laboratory.

FIGURE 2. Location of wild poliovirus type 1 (WPV1) cases — Pakistan, January 2015–October 2016



were reported in Bannu [13%] and South Waziristan [13%]). Among the 15 WPV1 cases reported in 2016, 13 (87%) were among children aged <36 months. One (7%) child with polio had never received a dose of OPV, compared with 11 (29%) of 38 WPV1 patients during January–September 2015, and 148 (63%) of 235 reported during the same period in 2014. Based on parental recall, 12 (80%) of the 15 WPV1 patients in 2016 had never received OPV doses from routine immunization services but were vaccinated with OPV only through SIAs.

As of November 1, 2016, eight of the 10 WPV1 cases reported in neighboring Afghanistan have occurred in the border region with Pakistan. Four WPV1 cases were reported in a Southeastern district in Afghanistan's Paktika province, an area with regular bidirectional population movement across the border with Pakistan's South Waziristan, where two cases have been recently detected. Genetic linkages show a close relationship between these cases and the 2016 cases in FATA. Cases in South KP and South FATA in Pakistan were genetically linked to cases detected in Nangarhar, Afghanistan. The four cases in Kunar province, Afghanistan, demonstrate sustained local transmission in Afghanistan in 2016, but are also genetically linked to cases circulating in Pakistan's Peshawar and KP provinces in late 2015.

During 2015, there was a decline in the number of independent WPV1 transmission chains during the high season months of September and October, compared with the same period during the previous year. Chains of WPV1 transmission also decreased during 2016; fewer WPV1 lineages persisted during the 2015–2016 low season, particularly in the areas with endemic transmission, including Peshawar in KP and Karachi in Sindh.

Discussion

During January–September 2016 the number of WPV1 cases detected in Pakistan decreased 61%, and WPV1-positive environmental surveillance samples decreased 50% compared with the same period in 2015. However, WPV1 continues to circulate in the known high-risk areas of Karachi (Sindh Province), Peshawar (KP Province), South Waziristan (FATA Province), and Quetta (Balochistan Province). Outside of these high-risk areas, WPV1 cases have clustered in the northern part of Sindh and southern KP.

The reduction in WPV1 cases in Pakistan follows implementation of a rigorous SIA schedule throughout the country, expansion of community-based vaccination in high-risk areas, and a diligent focus on identifying and vaccinating children missed by previous SIAs. In addition, Rapid Response Units, teams made up of epidemiologists and other public health professionals, have been created in each EOC to investigate and implement mitigation strategies for all WPV1 isolates detected through AFP surveillance and environmental surveillance sampling as well as any gaps identified in AFP surveillance. Although targeted violence and threats toward polio workers have continued, these have been rare occurrences during the current reporting period and have not had a significant impact on the timing and quality of SIAs or WPV1 response efforts.

Genetic sequencing data from AFP and environmental surveillance isolates indicate that areas on the Pakistan-Afghanistan border, particularly between FATA and Eastern Afghanistan and the Quetta area and Southern Afghanistan, continue to account for cross-border transmission. Key challenges in these areas include pockets of persistently lower vaccination coverage and large populations continually moving between the two countries for trade, social visits, seasonal relocation, and specific services (e.g., health care and education). Recently, cross-border movement has increased beyond the usual levels because of resettlement of Afghanistan natives living in Pakistan to their home country and the return of displaced persons from Pakistan to FATA (*7*), posing an additional challenge for eradication measures. Considerable numbers of children in displaced groups are unvaccinated because of inaccessibility and low performance of SIAs. These children are at high risk for poliovirus infection and can contribute to the spread of virus locally and to wide geographic areas on both sides of the border. Effective cross-border coordination through weekly communication between EOCs at the national and regional/provincial level in both countries, synchronization of SIA schedules, coordinated response to newly confirmed WPV1 cases, and sharing of epidemiologic data are critical to counter this cross-border threat.

Summary

What is already known about this topic?

Pakistan, Afghanistan, and Nigeria remain the last three countries worldwide where wild poliovirus type 1 (WPV1) transmission has never been interrupted. During April 2016, the World Health Organization (WHO) coordinated global withdrawal of the type 2 component in oral poliovirus vaccine, replacing it with oral poliovirus vaccine containing only types 1 and 3, after introduction of inactivated poliovirus vaccine.

What is added by this report?

During January-September 2016 WPV1 detected from cases of acute flaccid paralysis (AFP) and environmental surveillance in Pakistan continued to decrease compared with the same period in 2015 and 2014; vaccine-derived poliovirus was detected in two provinces in 2016. Genetic diversity of WPV1 isolates continued to decrease compared with 2015 and 2014. AFP surveillance and stool specimen timeliness at the national and provincial levels have met performance targets. Identifying and reaching unvaccinated children continue to be challenges.

What are the implications for public health practice?

To achieve the goal of zero WPV1 cases in Pakistan, the country must continue aggressive supplementary immunization activities, such as community-based vaccinations, and further strengthen polio surveillance, with particular focus on the cross-border regions, areas where environmental surveillance continues to detect poliovirus, and in vulnerable and low-risk areas where poliovirus has not been detected for some time.

Continued strong leadership by the Prime Minister's Task Force for Polio Eradication, and by EOCs at provincial and national levels, is needed to fully implement and monitor the aims in the 2017 NEAP in all districts (*4*). In particular, further strengthening of the quality of SIAs and AFP surveillance to rapidly detect and effectively respond to detection of poliovirus are needed to interrupt poliovirus transmission in Pakistan.

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[1]Global Immunization Division, Center for Global Health, CDC; [2]World Health Organization, Geneva, Switzerland; [3]Pakistan Ministry of Health, Islamabad, Pakistan; [4]National Emergency Operations Center, Pakistan; [5]Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; [6]Department of Virology, National Institute of Health, Islamabad, Pakistan.

Corresponding author: Christopher H. Hsu, chsu@cdc.gov, 404-639-4526.

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