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Polio Outbreak Investigation and Response in Somalia, 2013

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Abstract

Background.—For >2 decades, conflicts and recurrent natural disasters have maintained Somalia in a chronic humanitarian crisis. For nearly 5 years, 1 million children <10 years have not had access to lifesaving health services, including vaccination, resulting in the accumulation by 2012 of the largest geographically concentrated cohort of unvaccinated children in the world. This article reviews the epidemiology, risk, and program response to what is now known as the 2013 wild poliovirus (WPV) outbreak in Somalia and highlights the challenges that the program will face in making Somalia free of polio once again.

Methods.—A case of acute flaccid paralysis (AFP) was defined as a child <15 years of age with sudden onset of fever and paralysis. Polio cases were defined as AFP cases with stool specimens positive for WPV.

Results.—From 9 May to 31 December 2013, 189 cases of WPV type 1 (WPV1) were reported from 46 districts of Somalia; 42% were from Banadir region (Mogadishu), 60% were males, and 93% were <5 years of age. All Somalian polio cases belonged to cluster N5A, which is known to have been circulating in northern Nigeria since 2011. In response to the outbreak, 8 supplementary immunization activities were conducted with oral polio vaccine (OPV; trivalent OPV was used initially, followed subsequently by bivalent OPV) targeting various age groups, including children aged <5 years, children aged <10 years, and individuals of any age.

Conclusions.—The current polio outbreak erupted after a polio-free period of >6 years (the last case was reported in March 2007). Somalia interrupted indigenous WPV transmission in 2002, was removed from the list of polioendemic countries a year later, and has since demonstrated its ability to control polio outbreaks resulting from importation. This outbreak reiterates that the threat of large polio outbreaks resulting from WPV importation will remain constant unless polio transmission is interrupted in the remaining polio-endemic countries.

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Keywords

Somalia; poliomyelitis eradication; outbreak; wild poliovirus; horn of Africa

Somalia is one of the poorest and most volatile countries in the world. More than 2 decades of civil unrest have left basic healthcare infrastructure in a state of despair; coverage for basic public health interventions is low, and maternal and child mortality are among the highest in the world [1]. The country is divided into 4 operational zones (North-East, North-West, South, and Central) and subnational entities extending to regions and districts. Persistent insecurity severely restricts access by international humanitarian staff to most areas of South and Central Somalia to provide lifesaving humanitarian interventions.

Despite numerous challenges, the Somalia polio program has demonstrated its ability to successfully implement polio eradication strategies. Indigenous wild poliovirus (WPV) transmission was interrupted in Somalia in 2002, 5 years after the country initiated polio eradication activities. However, an initial polio outbreak resulting from importation of WPV type 1 (WPV1) swept the country from 2005 to 2007 (the last case had an onset date of 25 March 2007), claiming >229 cases of paralytic polio. The current outbreak (in 2013) started in May 2013, when a case of WPV1 was reported from a 32-month-old girl in the Mogadishu area (Hamar Jajab district); the date of paralysis onset was 18 April 2013. The outbreak soon expanded to all of Mogadishu's 16 districts, with secondary spread to other areas of South and Central Somalia. As of 31 December 2013, 189 cases of WPV1 were notified from 46 of 110 districts of the country, mostly from the security compromised areas of South and Central Somalia. With 48% of all polio cases reported globally in 2013, the current polio outbreak in Somalia threatens the World Health Assembly (WHA)–endorsed Polio Eradication and Endgame Strategic Plan 2013–2018 objective of stopping all polio transmission globally by the end of 2014 [2]. This is a strong reminder of the persistent risk of WPV importation and circulation in security-compromised areas of the world as long as polio eradication is not completed.

We describe the 2013 polio outbreak in Somalia (data are current as of 31 December 2013), with emphasis on the epidemiology, risk factors, response activities, and challenges the program will face in making Somalia free of polio once again.

METHODS

Setting and Population

Somalia has a population estimated at 10 million people [3].The country shares land borders with Kenya, Ethiopia, and Djibouti and a sea border with Yemen. Children aged <15 years make up 44% of the total population [3]. Political instability, insecurity, and recurrent natural disasters are major drivers of population movements inside the country; in 2013, an estimated 1.2 million internally displaced persons were reported within the country [4], the majority of whom were in Mogadishu, the capital and most populated city in the country. In addition to the 4 operational zones, Somalia is divided into 19 regions and 110 districts. With a healthcare system entirely destroyed during >2 decades of instability, the country has

some of the lowest health indicators in the world: in 2012, the mortality rate among children aged <5 years was 180 deaths/1000 [1]. The reported national coverage with 3 doses of oral polio vaccine (OPV3) through routine immunization has been historically low and was <50% in 2012 [5].

Acute Flaccid Paralysis (AFP) Surveillance and Case Identification

Cases of polio are identified through the AFP surveillance system. The polio surveillance network in Somalia consists of >190 national surveillance officers located at zonal, regional, and district levels, with technical support from international staff from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). National staff often have access to security-compromised areas of the country where international staffs have limited access. Surveillance officers visit on average 500 reporting sites, distributed across the country, on a weekly basis to actively search for cases of AFP. The surveillance network also extends to communities, through traditional healers, private pharmacies, vaccinators, and village polio volunteers. A case of AFP is defined as a child aged <15 years with sudden onset of fever and paralysis. All AFP cases are investigated and stool samples collected by national polio workers according to AFP surveillance guidelines [6]. For each AFP case, 3 additional stool samples are collected from contacts; an AFP case contact is defined as anyone of similar age to the AFP case who resides in the same household or neighborhood. Stool samples collected from AFP cases and contacts are sent to the Kenya Institute of Medical Research (KEMRI) polio laboratory for virus isolation, typing, and intratypic differentiation, using the WHO standard polio testing procedures [7]. WPV strains isolated by the KEMRI polio laboratory were sent to the Centers for Disease Control and Prevention (Atlanta, GA) or the National Institute for Communicable Diseases (Johannesburg, South Africa) for genetic sequencing. Based on the outcome of the laboratory investigation, AFP cases are classified as either confirmed polio cases or discarded as cases of non–polio-associated AFP. Additional significant potential laboratory outcomes include classification of virus isolates as Sabin-like virus or vaccine-derived poliovirus (VDPV).

Data Collection and Analysis

Demographic, clinical, and laboratory information on AFP and confirmed polio cases are recorded in the AFP surveillance database. Analysis of AFP data is conducted by the program on a regular basis to monitor AFP surveillance performance. The AFP database is shared on a weekly basis with the Polio Eradication Initiative partnership for regional and global reporting. Additional sources of information for this report include supplementary immunization activity (SIA) data, documents such as action plans, and monitoring reports.

As of 31 December 2013, stool samples from 545 AFP cases and 1761 contacts were collected and shipped to the KEMRI polio laboratory for WPV isolation.

Since 2000, the country has exceeded the WHO-established minimum AFP reporting rate of 2 non–polio-associated AFP cases per 100 000 children aged <15 years and has maintained key AFP surveillance indicators above certification standards at the national level [6].

RESULTS

Detection of the 2013 WPV Outbreak

On 9 May 2013, a 32-month-old girl from Hamar Jabjab district in Mogadishu was confirmed as having WPV1 infection by the KEMRI polio referral laboratory in Nairobi. The date of onset of paralysis was on 18 April 2013 (epidemiology week 15). The child and her family reported no history of travel outside Mogadishu prior to onset of paralysis. In addition, 3 close contacts of the index case were confirmed to have asymptomatic WPV1 infection. A detailed case investigation was conducted immediately following the confirmation of the index case.

As of 31 December 2013, 189 polio cases were confirmed from 46 districts of the South and Central zones and 1 district in North-East zone. All WPV1 isolated in Somalia belong to cluster N5A; known to have been circulating in northern Nigeria since 2011.

Initially limited to the capital Mogadishu, the outbreak quickly spread to other districts of the South and Central zones, with an average incidence of 7 cases per week during epidemiology weeks 15–39 (Figure 1). Early in the outbreak (weeks 18–23), Mogadishu experienced intense WPV transmission, with an average incidence of 8 cases per week during the peak period; at the time of writing, the region had accounted for 38% of all reported WPV cases (70 cases). Overall, the WPV incidence decreased over the last 8 weeks to <3 cases per week, from a high of 12 cases per week at the height of the outbreak. No new case was reported from Mogadishu for >25 consecutive weeks. The outbreak also acquired international status; at the time of this report, 14 WPV1 cases had been reported in northeastern Kenya and 9 cases had been reported in eastern Ethiopia, all genetically linked to the WPV1 from Somalia.

As a result of the outbreak, surveillance activities were strengthened throughout the country. Active search for AFP cases through the extensive network of polio officers was intensified at reporting sites and within the communities, resulting in a marked improvement of the key AFP surveillance indicators at all levels.

Characteristics of WPV Cases

The average age of WPV cases was 2.6 years (range, 2 months to 27 years); 175 of the 189 cases (93%) notified at the time of this report were <5 years of age. One WPV case was >15 years of age. The occurrence of WPV in a 27-year-old adult was notable in this outbreak but remained an isolated occurrence. The majority of cases were male (60%). The immunity profile of cases clearly indicated that failure to be vaccinated was the major risk for WPV infection in this outbreak; 55% of all WPV cases had never received OPV (so called 0-dose individuals), and almost 80% were undervaccinated (ie, they had received ≤3 doses of OPV).

WPV and District Accessibility for SIAs

For >4 years, an estimated 1 million children aged <10 years could not be reached with OPV in some districts of South and Central Somalia because of the ban imposed on immunization by some local antigovernment elements. Of the 109 districts listed in the AFP database,

27 are currently completely inaccessible for SIAs, while 12 are partially accessible (SIAs can be conducted in limited localities within the districts; Figure 2). Analysis of the WPV incidence by district accessibility status (Figure 2) shows a progressive extension of the outbreak from accessible to inaccessible or partially accessible districts; 38% of the 113 cases reported in the first 3 months of the outbreak were from accessible districts, mostly in the Banadir region (Mogadishu); 0.7% of the 71 cases reported during months 4–6 of the outbreak were from accessible districts.

Outbreak Response

The first immunization response using trivalent OPV and targeting 360 000 children <5 years of age in the 16 districts of Mogadishu and in 1 district of Lower Shabelle (Afgoi district) was conducted within a week of notification of the index case. A 6-month emergency response plan was finalized within 2 weeks of notification of the first WPV case. The 6-month emergency response plan focused on the known and most effective strategies to control this importation-related outbreak, notably strong surveillance, large-scale polio SIAs with OPV implemented as soon as possible after notification of the first case and continued on a large scale, and targeted SIAs using bivalent OPV until the outbreak was stopped.

Immunization Response—To rapidly build high population immunity and to reduce the risk of spread of the virus, the 6-month emergency response plan adopted a flexible approach for the selection geographic size and target age group for SIA rounds. The capacity to rapidly respond with SIAs or subnational campaigns should any currently inaccessible area become accessible for immunization activities was also factored into the emergency response plan. Overall, 8 rounds of polio SIAs (one of which used trivalent OPV) were conducted in all accessible districts of Somalia, targeting between 3 million and 8.5 million persons from various age groups (children aged <5 years, children aged <10 years, and individuals of all ages). To account for mobile and displaced populations, close to 300 special transit vaccination posts, each functioning as a cordon sanitaire, were established at main transit points within accessible areas, reaching on average 74 000 persons per week.

For the first time in >5 years, independent monitoring (IM) of SIAs was reintroduced and progressively expanded from 16 districts during initial activities to 49 districts at the time of this report. The independent monitoring teams assessed, through finger marking, the vaccination status of 8811–34 330 children aged <5 years from 16 to 49 districts of Somalia. Overall, the coverage varied from 72% to 82%. The main reasons for missing children were unavailability of the child or parent and team performance issues (eg, teams did not revisit houses or houses were not visited). Overall, 77% of the households were aware of the campaign. Review of independent monitoring findings (data not shown) confirmed an increase in the number of children reached during successive SIA rounds in the majority of districts.

Coordination—Polio control and coordination rooms were established in Nairobi and Mogadishu to improve the efficiency of outbreak response operations. The control rooms improved the overall coordination of the outbreak response operation across partner organizations by maximizing communication, reducing bottlenecks, and streamlining

reporting activities. Situation reports on the outbreak were shared with partners on a weekly basis through polio control rooms.

Communication and Social Mobilization—The intense nature of the immunization response (1 round of SIAs every 3–4 weeks), variation by SIA round in the age group targeted, vaccination of adults in some rounds, and the ban on immunization by antigovernment groups required innovative communication approaches to respond to this outbreak. An outbreak communication plan was developed to address these challenges. The plan focused on 5 main strategies: advocacy, mass media/promotion, community engagement/social mobilization, behavior change/participatory communication, and capacity building. As a consequence of intensified communication and social mobilization activities, the adherence of the Somali population to polio activities has been secured. A high level of awareness and a low level of OPV refusal were reported during SIAs (unpublished data, 2013).

DISCUSSION

As of 31 December 2013, 189 cases of WPV1 have been reported in Somalia, the first outbreak after a polio-free period of >6 years.

The current polio outbreak in Somalia threatens the WHA-endorsed objective of stopping all polio transmission globally by the end of 2014 [2]. The outbreak also highlights the susceptibility of security-compromised countries with weak healthcare systems and low population immunity to WPV importation and sustained transmission as long as polio eradication is not completed.

At the beginning of the current outbreak, WPV outbreak risk assessments conducted using existing polio risk assessment methodson a regular basis by the program [8–10]placed Somalia at its worst immunity profile within the last 5 years. The risk of WPV importation in Somalia is compounded by several factors: (1) for >4 years, an estimated half million children aged <5 years residing in 39 districts of South and Central Somalia have not been reached with large-scale immunization because of a ban on immunization activities imposed by antigovernment elements; (2) provision of routine immunization services is suboptimal as a result of >2 decades of civil unrest; and (3) persistent insecurity in most parts of the country limits the ability of polio officers to access key locations to support, monitor, or evaluate the implementation of SIAs and other polio eradication activities.

The detection of circulating VDPV (cVDPV) from 2008 to 2013, mostly in South and Central zones of Somalia, signaled a permissive environment, ripe for WPV importation and circulation. Considering this context, the current outbreak did not come as a surprise; in fact, an explosive and protracted outbreak was the most likely scenario predicted in the case of WPV importation. The rapid expansion of the outbreak nationally to other districts and internationally to Kenya and Ethiopia confirmed this original fear.

Three months into the course of the outbreak, an outbreak response assessment was conducted to evaluate whether the quality and adequacy of outbreak response activities were sufficient to interrupt polio transmission within 6 months of detection of the first

case, as per WHA-established standards. The findings of the assessment included several observations: the initial response to the outbreak was fast and aggressive; initial investigation and activation of local response were done within 72 hours of index case confirmation; and the first round of the SIA response was implemented within 5 days of notification of the index case in Banadir, well within the WHA Resolution 59.1 outbreak response requirements in polio-free countries [2]. This initial response was followed by intensive rounds of SIAs at 3–4-week intervals, targeting various age groups, including adults, in all accessible districts of Somalia. The outbreak response was facilitated by the commitment and support of local governments, United Nations agencies, local communities, and partner organizations, including nongovernmental organizations, and the adequate and timely availability of logistical and financial resources.

A marked reduction of the incidence of WPV in accessible districts, particularly in Banadir, the epicenter of the outbreak, where no case has been reported for >25 consecutive weeks, indicates a positive impact of the outbreak response activities. The focus of the outbreak has shifted to inaccessible areas of the country. The recent detection of 2 WPV1 cases in North-East zone confirms the persistent risk of reimportation to poliofree areas of the country.

The current accessibility situation in Somalia, notably, the limitation in the movement of polio staff in inaccessible districts, the inability of international staff to access most parts of the country for key monitoring activities, and the logistical challenges sometimes associated with shipment of stool samples from the field to the polio reference laboratory, all continue to impact the detection of WPV in inaccessible and remote places of South and Central Somalia.

In summary, the 2013 Somalia polio outbreak demonstrates the fragility of the achievements of the polio eradication initiative and is a potent reminder of the urgent need to complete polio eradication. The inability to mount an appropriate outbreak response in inaccessible districts poses a threat to the control of the outbreak, with the risk of continued exportation of WPV from inaccessible to accessible districts. Countries facing similar challenges or falling into instability, with rapid deterioration of healthcare systems and immunization service delivery, become at high risk of WPV reintroduction and sustained transmission, which will further delay the noble objective of timely eradication of polio. Somalia has demonstrated its ability to effectively control polio outbreaks in the past and has made significant progress in the control of the current outbreak; adherence to high-quality polio eradication strategies, consistent support of polio eradication partners, persistent research and implementation of innovative strategies to address the large population immunity gap, and a hope of improvement of the political situation in the country will be key determinants of their success.

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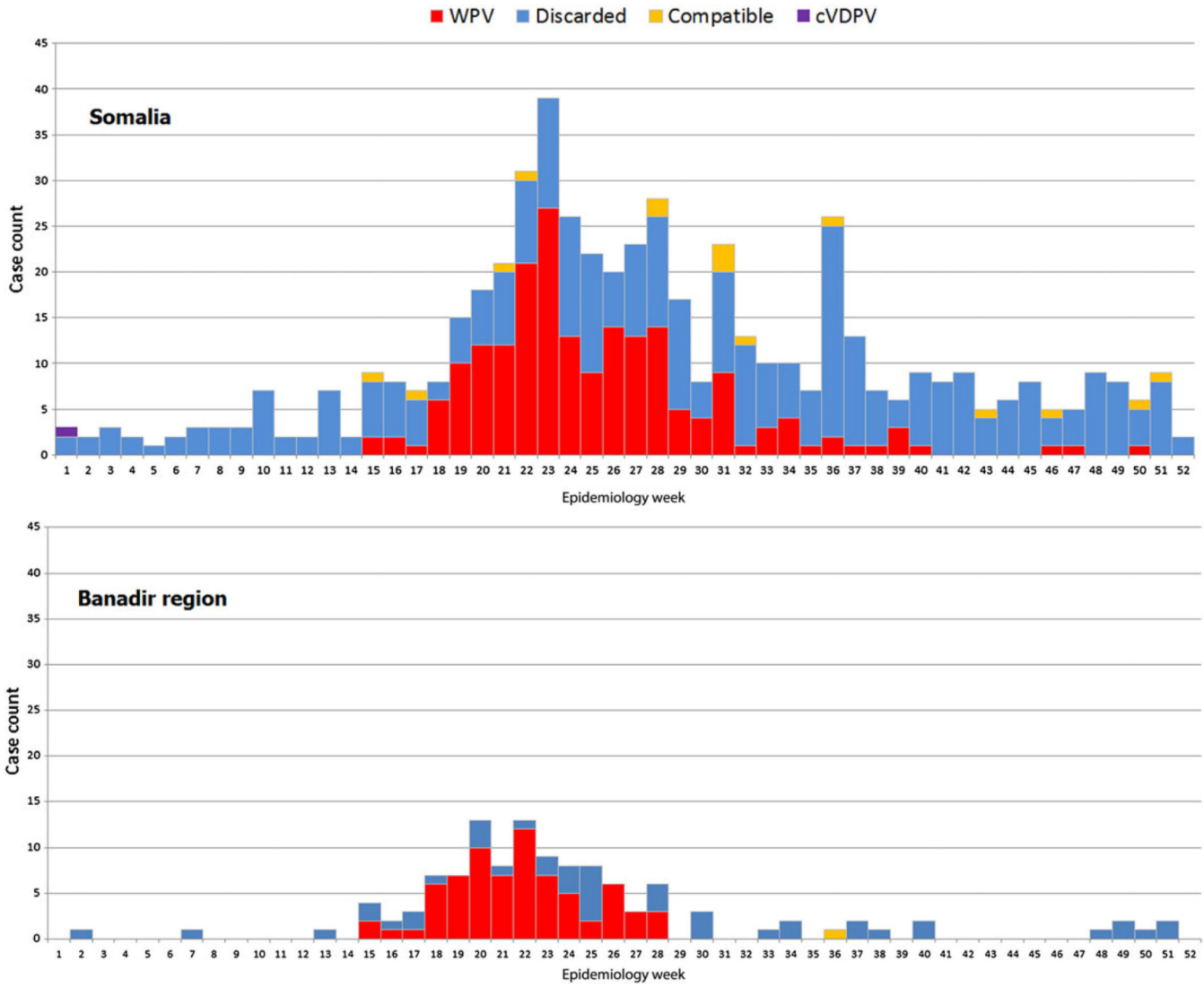

Figure 1.

Weekly incidence of wild poliovirus (WPV) infection in Somalia and Banadir (Mogadishu) during epidemiology weeks 1–52 in 2013. Abbreviations: AFP, acute flaccid paralysis; cVDPV, circulating vaccine-derived poliovirus.

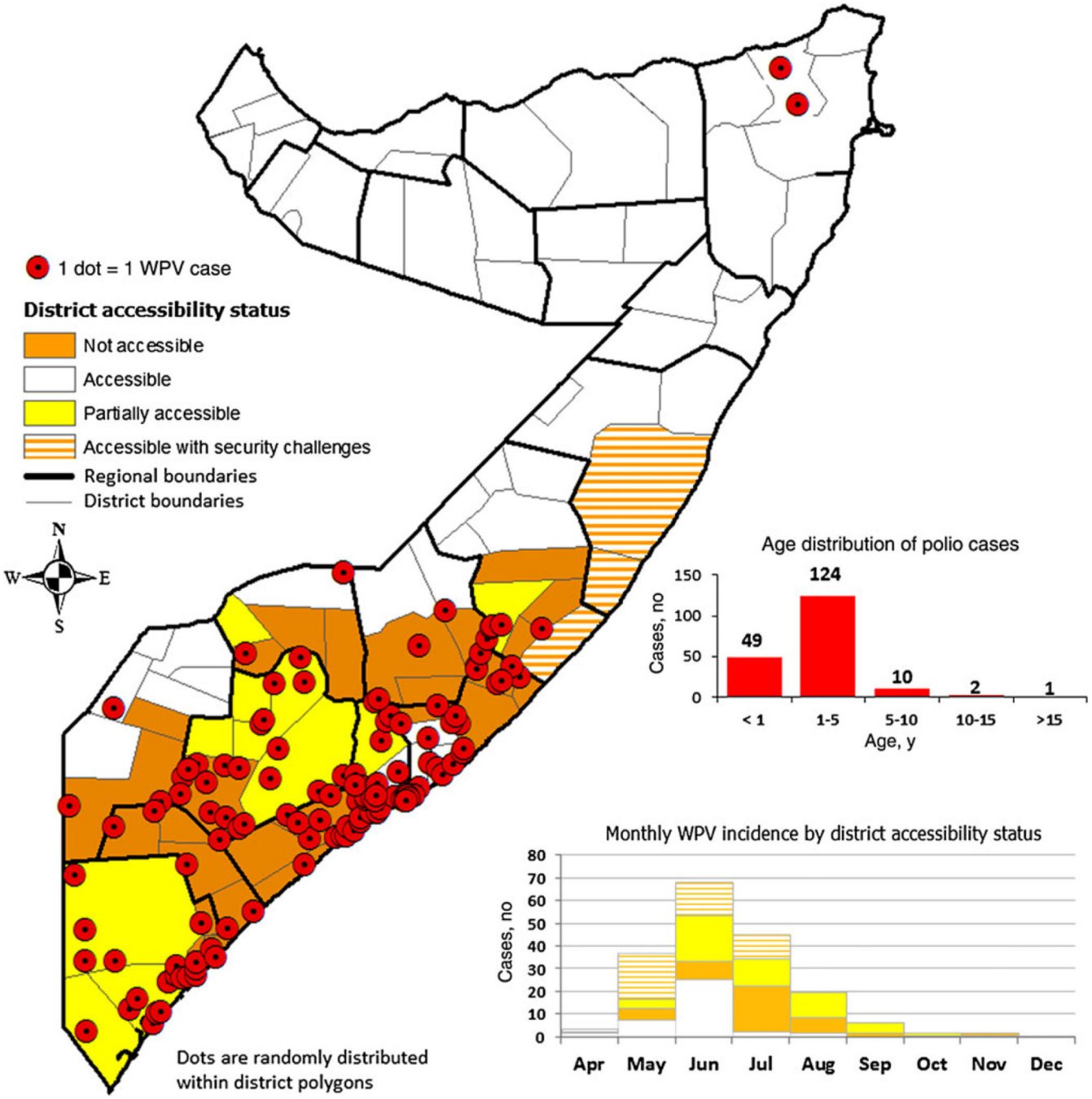

Figure 2.

Geographical distribution of wild poliovirus (WPV) infections and district accessibility status in Somalia during epidemiology weeks 1–52 in 2013.