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To cite this article: Rustam Haydarov, Saumya Anand, Bram Frouws, Brigitte Toure, Sam Okiror & Bal Ram Bhui (2016) Evidence-Based Engagement of the Somali Pastoralists of the Horn of Africa in Polio Immunization: Overview of Tracking, Cross-Border, Operations, and Communication Strategies, *Global Health Communication*, 2:1, 11-18, DOI: [10.1080/23762004.2016.1205890](https://doi.org/10.1080/23762004.2016.1205890)

To link to this article: <http://dx.doi.org/10.1080/23762004.2016.1205890>



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Published online: 26 Jul 2016.



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Evidence-Based Engagement of the Somali Pastoralists of the Horn of Africa in Polio Immunization: Overview of Tracking, Cross-Border, Operations, and Communication Strategies

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Building on the experience of the 2013–2014 wild poliovirus outbreak in the Horn of Africa, this study examines applied strategies that helped to engage pastoralists of the Somali cluster (Somalia, Somali Region of Ethiopia, and North-East Kenya) in supplementary immunization activities. Aimed at being applicable to other public health interventions, the study synthesizes knowledge about Somali pastoralism in the Horn of Africa and explains the approaches used for tracking nomadic groups and creating dialogue, as well as building trust to enable better vaccination opportunities for pastoralist children. Interventions across the three countries included creating a network of informants and influencers, engagement with clan leaders, mapping of water points and livestock markets, forming a partnership with an animal vaccination program, cross-border coordination, and establishment of permanent transit vaccination points. The proportion of children who had never been vaccinated against polio in the overall incidence of children reported with nonpolio acute flaccid paralysis in Somalia was used as an outcome measure before and after the interventions. Results demonstrate that the proportion of these zero-dose children was reduced from 44.6% to 19.5% between 2014 and 2015. Researchers discuss viability of pastoralist-focused approaches, as well as challenges associated with them, including the high-cost per child reached, lack of disaggregated epidemiological and social data for nomads, and a need to create special tools and strategies. This research provides practical recommendations to public health practitioners who are facing the challenge of reaching pastoralist populations with health services.

Pastoralism is a key characteristic of the Horn of Africa. In total (including Uganda), it is estimated that approximately 20 million pastoralists live in the region (Ginetti & Franck, 2014). Pastoralists create significant migration flows; they move seasonally, often crossing porous borders in search of water, grazing lands, better livelihoods or simply safer environments (Anand, 2014). However, nomadic migration is not the only form of large scale population movement in the region.

Migration and population displacement caused by push factors contributes to complex mixed migration and population patterns in the Horn of Africa in a fast changing humanitarian context. People in the region are displaced for numerous reasons that push them to move, including conflict and violence; persecution; repression; abuse of human rights;

environmental conditions such as water scarcity, food insecurity, drought, environmental degradation, famine and natural disasters; and poverty and the failure of economic development to secure viable livelihoods (Zetter, 2014). The Horn of Africa region is one of the major refugee producing and hosting regions in the world. As of late 2015, there were close to 2 million internally displaced people (Internal Displacement Monitoring Centre, 2015). Nomadic pastoralists, although mobile by nature, can also become displaced due to conflict and natural reasons, such as droughts, and become so-called *pastoralist internally displaced people* (Sheekh, Atta-Asamoah, & Sharamo, 2012).

Delivering even basic health services, such as immunization, to these mobile groups presents a significant challenge for the governments of the countries, humanitarian agencies, and nongovernmental organizations. While catering to internally displaced people and refugees may be relatively less difficult in the structured and organized setting of a camp, providing the same health services to numerous nomadic groups scattered across the region, whether pastoralist internally displaced people or nomads following established patterns of movement, is a much more challenging task. There are logistical challenges, such as the availability of mobile cold chains, transport, creating community awareness of and

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demand for health services. Also, there are health service gaps. For example, aside from the Food and Agriculture Organization's animal health program, very few targeted interventions in the Horn of Africa engage such hard-to-reach populations systematically.

In the scenario of the 2013–2014 polio outbreak, where the virus spread and sustained circulation in the pastoralist areas of Puntland and the Somali region of Ethiopia, reaching pastoralists with immunization became a most urgent imperative. Polio eradication partners in the Horn of Africa accepted the challenge and rolled out a comprehensive vaccination program that engaged nomadic populations across the region. The accumulated knowledge and evidence from this engagement merits documentation and wider dissemination among public health professionals and scholars.

Pastoralism in the Somali Cluster

Classification

Pastoralism is a means of livelihood for the majority of people living in the drylands of northern Kenya, southern Ethiopia, and southern and central Somalia. Pastoralist communities in the Horn of Africa are very diverse and differ in religion, culture, and in the form of pastoralism practiced. Some keep cattle, others keep camels, and a few communities keep both, often combined with keeping small stock such as goats and sheep (Livingstone, 2005). In Somalia and the Somali region of Ethiopia, the Borana and Somali are the main pastoralist groups (Anand, 2014), whereas overall Somali pastoralists can be further divided into numerous other clans and subclans (Anand, 2014; Overseas Development Institute, 2010).

Seasonality and Mobility

Although not all pastoralists are nomadic, mobility is an inherent part of the pastoralist existence, given that they move livestock depending on availability of resources, including water and pasture (Oxfam International, 2008). The United Nations Population Fund (UNFPA, 2014) estimates the number of nomads in Somalia at 3,186,965 or 25.9% of the population. Under normal circumstances, mobility is dependent on water sources and grazing land (Anand, 2014) and movement patterns are seasonal and regular (Carr-Hill & Ondijo, 2011). In Somalia, for example, herds are concentrated around water sources during the *Jilaal* (the dry season from January to March), but are driven to pastures deep in the interior during the *Gu* (the rainy season from April to June) (Schelling, 2013). External circumstances and increased pressures on pastoralists, such as climate hazards, prolonged drought, violence and conflict, can lead to irregular movement patterns and even involuntary displacement of pastoralists, potentially further fuelling conflict and displacement due to competition over scarce resources (Anand, 2014; Schrepfer & Caterina, 2014). Nomadic pastoralists also frequently move from one country to another. Because of the

number of people engaged in varying, dynamic, cross-border and both seasonal and irregular movement patterns in the Horn of Africa, conventional (health) service delivery and communication becomes a challenge (Frouws, 2014).

Clan Hierarchy as a Social Structure

According to Lewis (as cited in Hinds, 2013), the Somali social system is characterized by hierarchical clan units, which are the governing body of most nomads (Dolo Command Post, 2014). According to Gundel (2006), traditional leaders, almost exclusively older men, are perceived as the most legitimate leaders by their clan members. They are the prime force for stability and continuity in terms of regulating access to pastures, water, and conflict resolution between clans (Gundel, 2006) and decide when and where the community should move (Pastoralist Forum Ethiopia, International Institute of Rural Reconstruction, and The Development Fund, 2010). Traditional and clan leaders therefore know exactly where people are and where they are migrating to (Dolo Command Post, 2014).

Communication

Communication among Somali pastoralists in the Horn of Africa is primarily through word of mouth and oral communication is appreciated above all other forms of communication (Academy for Peace and Development, 2002). A significant number of Somali pastoralists are illiterate, with the 2000–2006 adult literacy rate standing at 37.8% (United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2006). News is usually passed orally by traveling relatives, which fits the nomadic pastoralist way of life given the historically limited availability of contemporary communication or media channels. The traditional Somali lifestyle is a continuous quest for news, whether from near or far, and nomads need certain essential information on war, peace, good pasture or drought. Radio is widely considered to be the most powerful medium of mass communication in the Somali society (Academy for Peace and Development, 2002). In a study carried out in 2011 by Carr-Hill and Ondijo (2011), 35% of households in Somalia confirmed ownership of radios, while 60% of men, 43% of women, and 15% of children said they listen to the radio regularly (Carr-Hill & Ondijo, 2011). Given the well-functioning mobile network infrastructure in Somalia (Schelling, 2013), cell phones are also increasingly common among pastoralists and used, for example, to share information about livestock market prices (Tack, 2012), weather, remittances, pasture availability, and water sources (Schelling, 2013).

Polio Outbreak in The Horn of Africa

Epidemiology

There have been several wild poliovirus (WPV) outbreaks in the Horn of Africa since 2001. The outbreaks occurred as a result of importations facilitated by the low routine

immunization coverage, large numbers of susceptible nonimmune populations, and high population movement across the borders (World Health Organization [WHO], 2013).

The most recent outbreak in the Horn of Africa started in the Banadir Region of Somalia in April 2013, following the importation of type 1 WPV (WPV1) from West Africa (WHO, 2013). Within weeks, the outbreak spread to other areas of Somalia and to the neighboring Garissa county of Kenya, home to the Dadaab refugee camps, hosting more than 332,000 Somali refugees (United Nations High Commissioner for Refugees, 2015). The first case in Ethiopia was detected in July 2013 in the Dollo zone of the Somali region, across the border with Somalia. All cases were genetically linked to the initial polio case in Banadir, suggesting sustained and widespread circulation of WPV1 in the Horn of Africa (WHO, 2014a).

A total of 217 cases were confirmed in 2013: 194 in Somalia, 14 in Kenya, and 9 in Ethiopia. Among the general population, the outbreak was brought under control relatively quickly, however, the six cases confirmed in 2014 were all in pastoralist children (WHO, 2014b), one in Ethiopia and five in Somalia. Stopping the outbreak within the pastoralist population therefore became an absolute priority for the program. The last case of WPV in the region was detected in the Hobyo district of Puntland, Somalia, in August of 2014, which is also the last known WPV case in Africa (WHO, 2015).

Response

The Global Polio Eradication Initiative supported the governments of the affected countries to mount an aggressive response to the WPV outbreak with repeated supplementary immunization activities. These were special polio campaigns, targeting children under 5 years of age, although in some circumstances, as in Somalia and the Dadaab refugee camps in Kenya, children up to 15 years of age were immunized and in others, the entire adult population was covered. By August 2014, there had been 55 polio campaigns conducted in Djibouti, Ethiopia, Kenya, Somalia, South Sudan, Sudan, Uganda, and Yemen, immunizing 160,518,166 children and 14,225,389 adults (United Nations Children's Fund [UNICEF], 2014a). In 2014 and 2015, mass vaccination campaigns continued with a sharpened focus on the hard-to-reach and pastoralist populations, where, in several instances, besides the polio vaccine, measles vaccination and vitamin A supplementation were provided as part of the health services to pastoralist communities (Kamadjeu et al., 2015).

Role of Pastoralist Groups in Virus Transmission

Paralyzed children and adults during the Horn of Africa outbreak were of different origin, hailing from urban and rural areas, refugee and internally displaced person communities, as well as pastoralist settlements. The rapid spread and progression of the poliovirus across the three countries indicated the infected population was highly mobile (WHO, 2014a).

Furthermore, all five WPV1 cases in Somalia during 2014 occurred in remote areas of the Mudug region among nomadic-pastoralist families. The single case in the Somali region of Ethiopia was also of nomadic origin, detected close to the Mudug region of Somalia. Four of the cases in Somalia had not received any dose of polio vaccine, while one of them had only received one single dose (WHO, 2015). The affected age group comprised of children under 9 years of age, as well as one 29 year old adult who died. This epidemiological scenario suggested significant immunity gaps in the pastoralist population. Thus, the polio outbreak response became increasingly focused on building immunity among people of various age groups (up to 15 years of age) among hard to reach groups and especially nomadic pastoralist families, where all the cases in 2014 were found.

Engaging With Pastoralists

Health Services and Health-Seeking Behaviour

According to the Centers for Disease Control and Prevention, access is one of the main challenges with regard to health care provision to nomadic pastoralists. Health care providers often do not know how to locate these groups, since grazing areas can be far from towns and villages, and frequent movement makes it difficult to plan outreach activities to reach nomadic pastoralists. Pastoralists themselves may not know where to locate or how to access services in areas which are new to them (Centers for Disease Control and Prevention [CDC], 2012). Many pastoralists tend to prefer traditional health care providers over modern medical practitioners, as health facilities are perceived less favorably because they are too far away, lack the necessary services and equipment, and services are not adapted to a mobile lifestyle (International Organization for Migration, 2011).

Particular barriers to service delivery are mistrust between health service providers and pastoralists, not considering pastoralists' health priorities, and preference for traditional medicines and treatments by pastoralists (Schelling, Weibel, & Bonfoh, 2008). Pastoralists do have experience though with modern (Western) medicine and vaccinations and will visit health facilities and consult physicians if information on successful interventions, rather than poor performance at health facilities, spreads along their trusted communication networks (Schelling et al., 2008). The CDC (2012) reported that because pastoralists also have had contact with modern medicine for many decades through veterinary services, they do recognize and highly value the importance of immunizations for their livestock. However, some local experts believe that pastoralists accept animal vaccination because of other veterinary services provided along with immunization, such as veterinary treatment of sick animals (Anand, 2014). Veterinary health providers are therefore trusted and respected by pastoralist communities and provide important links between human health providers and pastoralists (CDC, 2012).

According to Mazzilli and Davis (2009), women held more decision-making power over their children's health in agro-pastoral groups in Somalia (those that rely both on crop-growing and animals), while fathers dominate such decisions in nomadic pastoral groups, especially with regard to accessing modern or western healthcare. Nevertheless, in some pastoral communities, women are better informed on available healthcare services and vaccines than men, because they have more contacts with nonpastoralists in the villages when selling milk (Schelling et al., 2008).

Strategies

Polio eradication partners in the Horn of Africa led a series of research projects (Anand, 2014; Mixed-Migration and Mobile Population Studies in Somalia, Ethiopia, Kenya, South Sudan, and Uganda, UNICEF 2014–2015) that informed the development of special strategies to reach pastoralists in the region. In sum, engagement with pastoralist populations required a thorough understanding of (a) their classification (e.g., nomadic-pastoralists, agro-pastoralists) and power structures; (b) the spatial and temporal dimensions of their movement patterns; (c) their beliefs and values; (d) how to establish trust through respectful dialogue; and (e) the services that they found most relevant. On the basis of this deeper knowledge of the Somali pastoralists in the Horn of Africa, polio eradication partners rolled out the following strategies, which are subsequently synthesized.

Nomadic Tracking

Knowing the exact location of nomadic settlements for the purpose of including them into vaccination campaigns is imperative. However, tracking settlements that move seasonally is not an easy task and requires dedicated resources. A three-pronged strategy was used to track nomadic communities: (a) enlisting already known pastoralist groups through local government and partners engaged in animal vaccination, (b) establishment of an extensive network of informants at community level that will stay in contact and engage with clan elders, and last (c) cross-notification of the enlisted nomadic groups once they move to a new place, where program stakeholders at district level inform each other of arriving and departing groups. In 2015, there were 3,323 social mobilizers and 153 district and regional communication managers contributing to tracking pastoralist movement and engaging with clans in Somalia.

Planning and Inclusion of Pastoralist Settlements

Integrating pastoralist populations in campaign planning requires adaptation of conventional and well-established approaches. *Microplans*, which are essential tools for organizing vaccination campaigns and include social maps to guide vaccinators and social mobilizers to every household, often omitted pastoralist settlements rendering them invisible to the program. Thus, if pastoralist settlements were missed during a vaccination campaign, this was not accounted for

and had no effect on the reported campaign coverage, simply because pastoralists were not planned for. This fault in planning methodology was corrected with a microplan validation exercise that included pastoralists into the planning scope. More than 200 new settlements were identified and planned for in Somalia in 2014. Similarly, in the vast pastoralist area of the Somali region of Ethiopia, there was a 675% increase: from 240 to 1,620 identified new pastoralist settlements. Reaching pastoralists meant properly including them in the microplans. More than 30% of nomadic children were missed in 2014, which was reduced to less than 20% in 2015, following the revision of microplans.

Engagement of Clan Leaders

Clan leaders are the prime audience for successful engagement with pastoralists. Global Polio Eradication Initiative partners leveraged the trust nomadic pastoralists held for the Food and Agriculture Organization (FAO)'s animal health project and engaged with more than 2,000 pastoralist clan elders to seek support in immunization of pastoralist children. Being careful not to undermine the established trust that the FAO project had built with clan elders, polio partners developed a special communication protocol that guided each first contact with the clan leaders. Ministry of Health local representatives made the first contact and informed clan leaders about the polio outbreak and available vaccination opportunities. The relation was then transferred over to a dedicated network of social mobilizers and field staff from the same locality, who were trained in interpersonal communication methods. Between 2014 and 2015, contacts had been made with 868 clan leaders in Somaliland, 303 in Puntland, and 935 in the South Central Zone with the aim to create better vaccination opportunities for pastoralist children (UNICEF, 2015).

Cross-Border Collaboration

As pastoralists rarely recognize international borders, coordinating the response between countries became a major priority. Perceived availability of better services on the other side of the border such as schools, health centers, water points, and markets could trigger localized irregular or unexpected migration flows. This meant that cross-border coordination had to happen at the local level and especially at major crossing points where the majority of such migration occurred.

For example, one polio partner, the Core Group Polio Project, had built strong relationships with local nongovernmental organizations and has been using those relations to create and support cross-border health committees along the frontiers of Ethiopia, Kenya, Somalia, South Sudan, and Uganda. These committees, comprising local health officials, security and immigration personnel, and nongovernmental organization partners, were tasked with coordination and helping to synchronize approaches to campaign planning. Thirty nine cross-border meetings were held in the region, resulting in better understanding of the migration flows and

better micro planning along the border areas, leading to validation of information, establishment of vaccination sites at crossing points, and common approaches to branding and communication messaging (UNICEF, 2014a).

Mapping of Water Points and Livestock Markets

Numerous water points and the livestock markets were mapped across the Horn of Africa as an important entry point into pastoralist communities. In Somalia, out of 4,192 identified water points, 2,442 are consistently used by nomads. Similarly, there are 56 major livestock markets where pastoralists congregate on a weekly basis. A thorough understanding of livestock market dynamics was therefore established in the Somali region of Ethiopia by polio eradication partners. On the basis of this knowledge, activities were developed that included engagements with the *Dilaah* (broker) and *Mallaal* (assistant broker), who are in charge of trade and market related information, such as prevailing livestock prices, which are sent to the most remote pastoralist communities (UNICEF, 2014b). Educational activities were also conducted at these sites aimed at creating awareness and health opportunities for pastoralist children.

Pastoralist-Focused Communication Products

There were few printed communication products specifically for Somali pastoralists of the Horn of Africa because of their predominantly oral communication culture. Nonetheless, in Ethiopia, Kenya, and Somalia, health education kits and pictorial aids were produced about polio, routine immunization, and other preventive health behaviors. The products featured traditional Somali settings, including camels, livestock, and pastoralist housing to be culturally appropriate. Similarly, radio content related to ongoing polio programs also included pastoralist topics of interest to draw more pastoralist audiences. Tarpaulins, which pastoralists traditionally use to weatherproof their mobile houses, were branded with polio vaccination imagery and distributed as promotional items.

Joint Human-Animal Vaccination Campaigns

Leveraging the FAO's biannual animal vaccination campaign, the government and the partners organized integrated human and animal vaccination campaigns in five pastoralist districts of Puntland, Somalia. Over a period of 30 days in the second half of 2014, 20 social mobilizers and vaccination teams, accompanied by local community elders, traveled to administer polio and measles doses to pastoralist children, using animal vaccination campaigns as a vehicle to deliver health services. Children received 26,393 polio and 23,099 measles doses; of these children 34% were immunized against polio for the first time ever (Kamadjeu et al., 2015). In one of the districts, Bari, 46% of children had not had a single dose of polio vaccine, demonstrating the relevance of the intervention for creating immunity among pastoralist groups (Kamadjeu et al., 2015).

Permanent Transit Vaccination Points

Responding to massive population movement in the region, by August 2014, 611 permanent transit vaccination points had been established in the Horn of Africa to capture children on the move; in sum, 592,548 were vaccinated at these sites (UNICEF, 2014a). However, these children were from an overall mixed-migration flow, and it is not possible to disaggregate how many of them were pastoralists. Nonetheless, 300 of these transit points were located in Somalia with many of them located at the crossing points used by various mobile populations and it stands to reason that many of them were pastoralists.

Method

Researchers analyzed the polio vaccination status of nomadic children in Somalia by comparing the number of received polio doses before and after special interventions to reach and engage pastoralists.

Nonpolio AFP Rate

The nonpolio acute-flaccid paralysis (AFP) rate is the incidence of acute-flaccid paralysis caused by diseases other than poliomyelitis; it is one of the main indicators of sensitivity of poliovirus surveillance. The expected occurrence of nonpolio AFP in a given population is two or more children younger than 15 years of age per 100,000 population (WHO, 2003). Because AFP incidence is random in a given population, the vaccination status of children diagnosed with AFP is used as a proxy measure of vaccination coverage in a given population. Thus, a high proportion of children with AFP that have not been vaccinated against polio is considered indicative of poor performance of routine immunization and/or supplementary immunization programs. Nonpolio or polio AFP cases that reported no dose of oral polio vaccine are commonly referred to as *zero dose*¹ among polio eradication practitioners. In other words, these are the children who have never been immunized with oral polio vaccine. The polio eradication program uses oral polio vaccine during supplementary immunization activities; therefore, the number of doses of oral polio vaccine in a given child is one of the key performance measurements in the program. At least three doses of oral polio vaccine and one dose at birth is recommended by the World Health Organization to create sufficient population immunity against the poliovirus (WHO, n.d.).

Data Analysis

The nonpolio AFP surveillance database for 2014–2015 was obtained from WHO Somalia for a secondary analysis. Out of all records of children diagnosed with AFP in the period of January 2014 to June 2015 ($N = 502$), we selected records of nomadic children with AFP ($n = 138$) for analysis of their oral polio vaccine status in three time intervals. The data for rural and urban children, which are the other two categories in the database, were deliberately excluded from the review.

Selected data on nomadic children were analyzed in three 6-month time series: (a) January 2014–June 2014, (b) July 2014–December 2014, and (c) January 2015–June 2015. The first interval was used as a benchmark, given that the specific pastoralist-focused interventions were developed and rolled out in the middle of 2014 and later (second and third time series in the analysis). Thus, by comparing the number of doses of oral polio vaccine that children received in these three time series, we were able to determine change in the proportion of unvaccinated children among nomads.

Results

A comparative analysis of polio vaccination status of non-polio AFP cases in the nomadic group demonstrated a decrease in the proportion of unimmunized children—from 44.6% ($n = 25$) in the preintervention period (January 2014–June 2014) to 19.5% ($n = 9$) in the postintervention period (January 2015–June 2015). Similarly, the proportion of children who received between three and four oral polio vaccine doses increased from 12.5% to 21.7% between the two intervention periods. In the intermediate period of July 2014–December 2014, there was only an increase in the proportion of children who received one or two doses of oral polio vaccine from 16.1% to 19.4%, and children who received more than five doses from 26.8% to 52.8% (Figure 1). There was also an increase in the proportion of unimmunized children, which may be explained by the introduction of tracking of nomadic groups that was initiated in the same period, possibly leading to identification of new, previously not known groups. However, there is no way to either substantiate or refute this as the AFP data is collected independently of nomadic group tracking.

Discussion

The results suggest that polio vaccination status of nomadic children substantially improved after the rollout of special strategies focused on pastoralists. This holds true for both: children who have never been immunized against polio, and children who had received three to four doses of oral polio vaccine. The decrease in the proportion of zero-dose children between the two periods indicates a closing immunity gap and confirmation of the relevance of special strategies. Although direct causality is difficult to establish, we conclude that in the absence of other polio vaccination services available to pastoralists in the region, it is highly plausible that this effect can be attributed to the interventions. Therefore, we conclude that the investments into pastoralist-focused strategies produced the desired epidemiological outcomes.

However, challenges associated with greater focus on pastoralists include significantly higher cost per child reached; substantial time, human, and financial resources required for tracking and engaging with nomadic groups; limited epidemiological and social data that disaggregate pastoralists as a group; and lack of other programs (except in the animal vaccination sector), which means that interventions are often a first point of contact for nomadic groups with health services. Last, scaling-up programs for pastoralists truly requires a *paradigm shift* in organizational culture and thinking, where considerable dedication, resources, and political will are necessary to operationalize this equity agenda. Although the know-how is available, these requirements could represent a larger challenge in availing better development opportunities for pastoralist populations.

In our research, we attempted to (a) synthesize an existing body of knowledge on Somali pastoralism in the Horn of

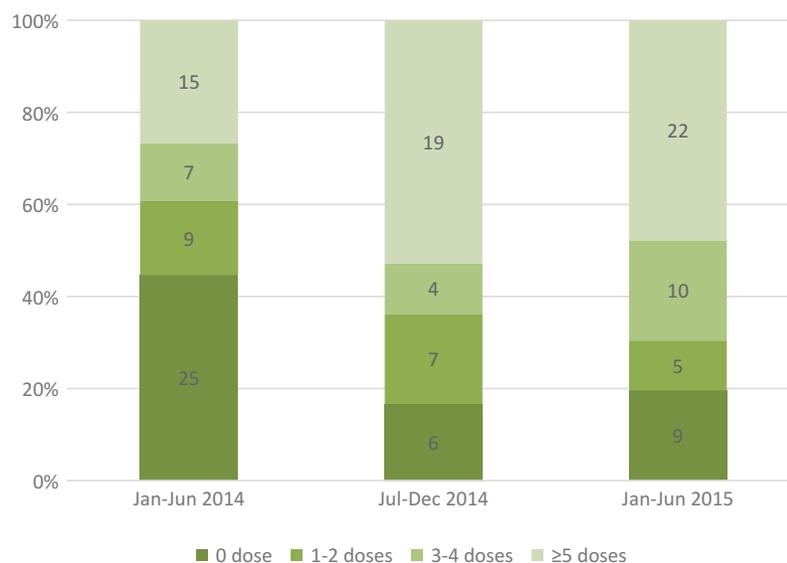


Figure 1. Polio vaccination status of non-polio AFP cases in the nomadic children category.

Africa, (b) summarize special strategies for engagement with pastoralists and providing them with services, (c) generate evidence to demonstrate impact of these interventions, and (d) discuss challenges in reaching and engaging pastoralists. We hope that our research and the applied strategies we used will be of interest to the broader public health community challenged with the task of engaging and serving pastoralist populations.

Limitations

We recognize the limitations of this research. This study should not be treated as a field experiment. Rather, in this article, we attempted to synthesize practical approaches and measure potential effect on reaching pastoralists with immunization using a proxy indicator. Direct attribution of each of the applied interventions to the achieved epidemiological outcome cannot be precisely established.

For greater validity, we wished to have conducted a similar analysis for Ethiopia and Kenya. However, given that the overwhelming majority of polio cases among pastoralists occurred in Somalia, disaggregation of AFP surveillance data that included nomads as a separate category was only introduced in Somalia. There is also little historical data available to demonstrate sustained trend. Further longitudinal analysis of AFP data across a longer time period would provide more evidence.

Acknowledgments

The authors honor the lives of Payenda Gul Abed and Brenda Kyeyune, the polio colleagues of UNICEF Somalia who lost their lives on April 20, 2015, in a terrorist attack on U.N. staff in Garowe, Somalia. Their contribution to stopping the WPV1 outbreak will always be remembered. The authors also recognize thousands of vaccinators, social mobilizers, and community leaders that are working selflessly every day in the most difficult context of the Horn of Africa, protecting children from the paralyzing disease.

Funding

This research project was supported by Communication Initiative—a project of the U.S. Agency for International Development.

Note

1. This term is not to be confused with the administration of oral polio vaccine at birth commonly referred to as the zero dose.

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