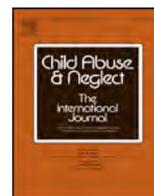




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Research article

Community-based surveillance to monitor trends in unaccompanied and separated children in eastern DRC[☆]

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ABSTRACT

Children who are separated from their families and usual caregivers in emergencies face a multitude of risks. The humanitarian community lacks methods to systematically capture changes in the frequency and nature of such separations over time. A mobile phone-based community surveillance system was piloted in the Democratic Republic of the Congo. The goal was to identify new cases of unaccompanied and separated children on a weekly basis. Over an 11-week period, community focal points reported 62 cases of separation across 10 communities. The majority of children had been under the care of their parents prior to separation. More than half of the children were unaccompanied, meaning that they were living without an adult relative or customary caregiver. The pilot results suggest that implementing a mobile phone-based surveillance system in a humanitarian setting may be feasible and cost-effective and fills a critical gap in the measurement of separated and unaccompanied children in emergencies. A longer pilot to better understand how the system performs over time is recommended.

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Background

Children who are separated from their parents or usual caregivers in natural disasters and conflict-related emergencies face a multitude of risks. Compared to children who are not separated, such children have higher levels of food insecurity and violence, are more likely to be exploited for labor and sex, and have an increased risk of recruitment and abduction by armed groups (Kifle, 2002; Machel, 1996; Mushingeh et al., 2002; United Nations High Commissioner for Refugees, 2007). Separation can also have devastating social and psychological impacts on children, including increased levels of stress and anxiety (Ajdukovic & Ajdukovic, 1983; Freud & Burlingham, 1943; Garbarino & Kostelny, 1996). Identifying interim care for unaccompanied and separated children (UASC) and carrying out family tracing and reunification activities (FTR) are therefore amongst the first protective interventions that humanitarian actors provide in an emergency (Boothby et al., 2012).

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While there are guidelines and minimum standards for organizations to follow in establishing services for UASC ([Child Protection Working Group, 2012b](#)), there are currently no standard assessment methods to monitor trends of separation or to systematically track changing characteristics of separated children over the course of the emergency. The current “rule of thumb” suggests that practitioners and policymakers should estimate that during emergencies, 3–5% of displaced children are likely to be separated or unaccompanied, but this number has never been validated in any context ([Ressler, Boothby, & Steinbock, 1988](#)). The Child Protection Rapid Assessment (CPRA) toolkit can offer a qualitative snapshot of separation at a single point in time, but it does not generate quantitative and longitudinal insights ([Ager, Blake, Stark, & Daniel, 2011](#); [Child Protection Working Group, 2012a](#)). Program records are restricted to the subset of separated children who are receiving services and therefore do not offer a complete picture of what is happening in an area. Program data also tends to be fragmented across different organizations with inconsistent information systems.

The lack of comprehensive, dynamic data on UASC in emergencies makes it difficult to generate adequate and timely funding, implement appropriate programs for affected populations, adapt programs to the changing needs of UASC, and influence policies relating to separation. Thus, there is an urgent need for methods that can better capture changes in the frequency and nature of separations over time. Based on this measurement gap, an interagency group of researchers and practitioners have come together through the “Measuring Separation in Emergencies Project” to develop and apply feasible and cost-effective methodological approaches that are capable of measuring separation patterns in an emergency setting. This manuscript presents the findings from the first pilot of a community-based surveillance system in Democratic Republic of Congo (DRC).

Community-Based Surveillance Systems

Community-based surveillance refers to the ongoing and systematic collection of data at the community level, often using community members themselves as informants. Such systems have been used in resource-poor settings, including emergencies, to actively collect information and monitor trends on a broad range of topics including nutrition, polio, maternal health, malaria drug resistance, and all-cause mortality ([Boothby & Stark, 2011](#); [Bowden, Braker, Checchi, & Wong, 2012](#); [Caleo et al., 2012](#); [Cox et al., 2014](#); [Current, Bisrat, Coates, & Altman, 2013](#); [Rosales, Galindo, & Flores, 2010](#)). Community-based surveillance systems encourage communities to engage in a given issue, and can fill gaps in passive, facility-based detection in places where health and social service centers do not adequately capture this information ([Downs & Perry, 2007](#); [Lucas, Greeley, & Roelen, 2013](#); [Oum, Chandramohan, & Cairncross, 2005](#)). Additionally, community members are often willing to report on their surroundings for free or minimal compensation so the costs of gathering information are lower than with many other systems.

Mobile Phone-Based Community Surveillance

In recent years, the ubiquity of mobile phones and cellular networks in areas that were previously isolated has led to the incorporation of mobile phone technology into community-based surveillance systems ([Kindade & Verclas, 2008](#)). In mobile phone-based community surveillance, informants use phones to report data to a central database, often via text messages. Compared to traditional paper-based community surveillance, the use of mobile phones for community surveillance has led to improved data flow, reduced time for data collection, fewer data entry errors, and reduced transmission costs ([Lucas et al., 2013](#)). Mobile phone-based community surveillance is particularly well-suited for emergencies, where the research team's ability to safely access certain areas can rapidly change. Thus, in these settings, mobile phone-based community surveillance is often the only way to get uninterrupted information. Successful mobile phone-based community surveillance systems have been documented in emergencies around the world, including after the Sichuan earthquake in China, and during continued conflict in the eastern DRC ([van der Windt & Humphreys, 2014](#); [Yang, Yang, Luo, & Gong, 2009](#)). To our knowledge, before this project, mobile phone-based community-surveillance had never been used to monitor UASC in an emergency.

Methods

Overview

Researchers from Columbia University, on behalf of an interagency advisory panel coordinated by Save the Children, piloted a mobile phone-based community surveillance system in eastern DRC. The goal was to assess the feasibility of using this system to identify new cases of UASC in the study area. A child was defined as any person under the age of 18 ([UNICEF, 1989](#)). UASC were defined per the definitions in the Inter-agency Guiding Principles on Unaccompanied and Separated Children ([International Committee of the Red Cross, 2004](#)). Separated children were defined as children who have been separated from both parents, or from their previous legal or customary primary caregiver, but not necessarily from other relatives. Separated children may therefore include children under the care of other adult family members. Unaccompanied children were defined as children who have been separated from both parents and other relatives and are not being cared for by any adult who, by law or custom, is responsible for doing so. In operationalizing the concepts of both separation and unaccompaniment, a minimum of 24 h of separation was stipulated as the inclusion criteria ([International Committee of the Red Cross, 2004](#)).

Each selected community chose three focal points to serve as information sources for their villages. These focal points were provided with training, cell phones and weekly phone credit to facilitate their work. Every focal point was responsible for submitting pre-defined codes whenever a separation occurred within a household in their designated monitoring zone. Data collection lasted for 11 weeks, from August to October 2014.

Study Context

The surveillance system was piloted in 10 villages in the Nyiragongo territory in North Kivu, DRC. North Kivu is a region in eastern DRC that has been affected by armed conflict for more than two decades. Children in the region are regularly separated from their families due to violence, displacement, poverty and recruitment to the armed forces. In each village where the system was piloted, the village chief and the community consented to participate after the researchers held a public discussion about the program goals and answered questions from the community.

In implementing the system, the research team partnered with Programme d'Appui a la Lutte Contre la Misere (PAMI), a local non-governmental organization that has been working on FTR activities in Eastern DRC for over six years. PAMI field agents followed up each reported case of a separated child and offered appropriate social services, regardless of whether or not the case fit inclusion criteria for the study. Services offered included finding interim care for separated children, providing economic support for households caring for separated children, and, when possible, reunifying separated children with families and caretakers. Due to insecurity in many parts of North Kivu, the 10 participating villages were randomly selected for participation from a list of accessible villages in PAMI's operational area in Nyiragongo territory. All 10 villages that were initially selected successfully participated in the surveillance system.

Focal Point Selection Process

Prior to selecting focal points in each village, the research team visited the chief and presented him with an overview of the proposed project. If the chief consented to participate in the project, he then facilitated a community meeting in a central location so that the research team could present and explain the project to the wider public. Community members were encouraged to ask questions during this forum. After the program had been presented and all questions had been answered, the community was asked to provide verbal consent to participate. All communities visited by the research team agreed to participate.

In each village, three focal points were chosen. One focal point was chosen from each of the following three groups, with the stipulation that at least one representative be a woman: (1) the village chief, (2) a representative of a youth group, a women's group, or a RECOPE ("RECOPEs" are village-level child welfare committees that are facilitated by international NGOs), and (3) a member elected by the community. The reason for selection of three focal points with distinct profiles was to determine whether differences in reporting patterns could be observed based on the role of the focal point in the community or the mechanism of selection. The village chief was always asked to participate as a focal point, respecting his central role in the community as well as the fact that chiefs are usually very knowledgeable about who enters and leaves the village. The community selected the other two focal points at the community meeting. Communities were allowed to determine themselves how to best select the other two focal points. In one village, consensus did not emerge during the community meeting, so four focal points were permitted, resulting in a total of 31 focal points across the 10 villages.

Once identified, the focal points were responsible for reporting within a defined geographic area of approximately 100–150 houses in their community. The research team constructed village maps, and then divided the maps in half with households equally distributed. The research team then randomly selected a section. This process of sub-division and random selection was repeated until an area of 100–150 houses was selected. Focal points were responsible for the cluster of houses within the final selected area. All focal points in a given village were responsible for reporting on the same area. Researchers walked around borders of this reporting area with the focal points and stressed to them that they should only report on cases occurring within these boundaries.

Training

All 31 focal points attended a two-day training workshop led by the research team. The purpose of the workshop was to provide in-depth training on case definitions and reporting procedures, as well as conduct hands-on supervised practice with case scenarios. In addition, 'Urgent Action' protocols and forms were introduced for situations in which focal points might encounter a child or children in immediate need of protection. There was discussion about possible ways to learn of cases in their communities (e.g., active visits to community members' households, reports from neighbors), but focal points were not required to adhere to any specific method for identifying cases. Focal points within the same village were informed that collaboration was allowed, but not obligatory. At the end of the workshop, focal points received a detailed instruction guide that summarized the reporting process in either French or Kiswahili (depending on their preference). Data collection officially started the day after the training workshop. To ensure compliance with protocols and discuss any issues that arose during implementation, a refresher training was held during Week 8 of the project.

Reporting Protocol

When a focal point learned about a new case of separation in their reporting zone, s/he would text a series of numeric codes to a central program phone. This six-component code provided the following information about each separated child: (1) age (exact or approximate), (2) sex, (3) whether the child arrived in the community or departed from the community, (4) whether the child is separated or unaccompanied; (5) reason(s) for the separation; and (6) current caretaker(s). Focal points were required to submit a distinct string of code for every separated child, even if multiple children were separated by the same incident or came from the same caretakers. Multiple reasons for separation were permitted for each child who was reported. In adherence to study protocol and to preserve anonymity, no unique identifiers (e.g., name, date of birth, national identification card number) were collected.

If focal points did not encounter any cases of separation in a given week, they were required to text “0000” on Fridays so that their continued engagement could be assured. If focal points had a problem and needed to talk to someone from the research team, they were instructed to text “9999” at any time. Any message that adhered to the basic study protocol, including case reports, reports of no new cases (0000), and requests for follow-up calls (9999), was considered a “correct message.” Focal points who sent at least one correct message to the central program phone each week were considered in compliance with the study protocol.

A Project Coordinator was hired locally to respond to texts from focal points and help verify reported cases. For all reported cases, the Project Coordinator followed up with the focal point to determine whether the case was an unintentional or intentional separation. Separations were categorized as unintentional when the initial caregivers did not plan for their child to become separated from them and intentional when the separation was part of a deliberate decision-making process on the part of the caregivers.

Data Retrieval and Verification

All text messages were sent to a central smartphone that was connected to FrontlineSMS, a free, open-source software that enables automatic transmission of the coded text messages to a special web-based inbox. This set-up allowed project and research staff to remotely retrieve and monitor reports from villages.

Every time a case report was received via the FrontlineSMS system, the Project Coordinator made a phone call to the focal point who submitted the report. The purpose of the call was to verify that the case was valid (e.g., it was a new case of separation, it occurred within the focal point’s defined monitoring zone, the codes were entered correctly). If any inconsistencies were identified (e.g., a separated child was incorrectly coded as an unaccompanied child), errors were logged and focal points were required to resend corrected reports. Similar case reports from the same community were investigated and duplicates were removed once they were verified as such by the Project Coordinator.

Supervision Visits and Final Evaluation

The Project Coordinator visited all villages several weeks into the project to learn about the experiences of the focal points, to confirm a sample of cases and to examine data discrepancies, especially between reports from focal points in the same village. During these supervision visits, the Project Coordinator met with each focal point individually to complete a standardized assessment form and also convene a collective discussion with all the focal points in a given village. The feedback received during these meetings was used to improve and strengthen the surveillance reporting process.

At the close of the project, all focal points from all villages were invited to a final meeting. Individual exit interviews and written assessments were conducted with each focal point in attendance.

Results

Primary Findings

Over the 11 weeks that the pilot ran, 62 unique, verified cases of separation were reported. In other words, across the 10 communities, an average of 5.64 separations were reported each week, with a range of 1–17 cases per week (see Fig. 1). With the exception of Week 8 (29 September–5 October), the numbers of separated children were roughly evenly distributed over the pilot period.

Given the hypothesized differences in the characteristics of separated children who arrived in the village compared to separated children who departed from the village, the results were disaggregated accordingly. The basic characteristics of the separated, arriving children are presented in Table 1. It was not possible to draw meaningful conclusions about the characteristics of departing children from the small sample that was reported ($n = 4$), so the characteristics of these children are not presented.

The reported cases of arrived UASC consisted of a slightly larger number of male children, compared to female children. Most children were between 5 and 14 years of age, though some younger and older children were identified. The majority of children had been under the care of their parents prior to the separation.

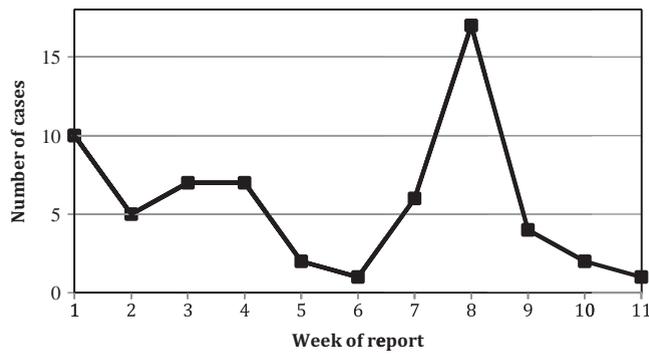


Fig. 1. Number of verified case reports by week (all cases).

Table 1
 Characteristics of UASC arrivals (n = 58).

	N	%
Sex		
Male	33	56.90%
Female	25	43.10%
Age		
0–4 years old	10	17.24%
5–9 years old	20	34.48%
10–14 years old	20	34.48%
15–17 years old	8	13.79%
Reasons for separation		
Death or disappearance of parents/family	25	43.10%
Marriage of parent or guardian	9	15.52%
Running away/escape	9	15.52%
Poverty	5	8.62%
Recruitment/trafficking	2	3.45%
Other	5	8.62%
Work	2	3.45%
Conflict	2	3.45%
Illness	1	1.72%
Missing	7	12.07%
Status		
Separated	28	48.28%
Unaccompanied	30	51.72%
Current caretaker		
No relationship	25	43.10%
Grandparent	14	24.14%
Other children	6	10.34%
Aunt/uncle	5	8.62%
Adult sibling	3	5.17%
Family, unspecified	1	1.72%
Missing	4	6.90%
Former caretaker		
Parent	34	58.62%
Aunt/uncle	5	8.62%
No one	4	6.90%
Sibling	3	5.17%
Missing	12	20.69%
Intention		
Intentional	16	27.59%
Unintentional	33	56.90%
Missing	9	15.52%

One of the most striking findings was the high number of unaccompanied children. More than half the reported cases were unaccompanied (n = 30). Specifically, 43.10% of the arrivals (n = 25) were under the care of someone with whom they had no family relationship and another 10.34% of the children did not have an adult caregiver at all, but instead lived with other children (n = 6). Grandparents were also caring for a sizable proportion of the children (n = 14, 24.14%), with a few children under the care of aunts or uncles (n = 5, 8.62%), adult siblings (n = 3, 5.17%) or other family members (n = 1, 1.72%).

In analyzing the circumstances surrounding the separations, twice as many cases were considered unintentional separations compared to intentional separations (33 versus 16). In addition, there were nine cases of separation where intent was not known. Death or disappearance of parents or family members was by far the most common reason for separation

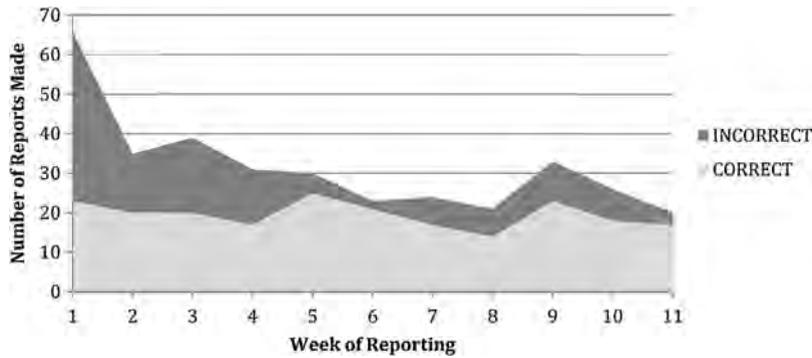


Fig. 2. Number of SMS messages received, by week (all messages).

Note: Correct messages were those that adhered to the basic study protocol and included case reports, reports of no new cases (0000), and requests for follow-up calls. Incorrect messages were coding errors or cases that did not meeting the definition of UASC or the defined timeframe of the pilot.

($n = 25, 43.10\%$), followed by running away or escape ($n = 9, 15.52\%$), marriage of a parent or guardian ($n = 9, 15.52\%$) and poverty ($n = 5, 8.62\%$). Note that these figures represent the percentage of children for whom a given reason was cited. In some cases, there were multiple reasons contributing to the separation.

System Performance

The system operated for the full 11 weeks of funding, with at least one message sent to the central phone each week. Of the 31 focal points, 18 (58.06%) sent a correctly standardized message to the central project phone each week. All 62 verified cases of separation came from these 18 focal points who correctly followed the study protocol on a weekly basis. By the fifth week of the project, most messages that were received did adhere to protocol (see Fig. 2).

All 31 focal points were analyzed to determine whether there were certain characteristics which predicted strong adherence to protocol. The probability of sending a correctly standardized message to the central phone each week was highest amongst those focal points who were elected by their communities, compared to focal points who were chiefs or youth or women’s group representatives (RR = 2.18, 95% CI: 1.17–4.06). The probability of correct and consistent reporting was also slightly higher for male focal points, compared to female focal points, regardless of mechanism of selection, but this result was not statistically significant (RR = 1.22, 95% CI: 0.57–2.62). A similarly non-significant association was observed for correct and consistent reporting amongst focal points who were younger than 35 years of age, compared with focal points who were 35 or older (RR = 1.16, 95% CI: 0.61–2.19). Correct and consistent reporting did not vary by village.

Focal points learned about new cases through a variety of approaches, though the most commonly reported were active visits to community members’ households, reports from other community members, observation of new or missing children, and overhearing local conversations. Some focal points also obtained information by asking questions to children, making announcements at church, enlisting additional volunteers, attending village security meetings, and exchanging information with authority figures. Given the uniquely personal identification style that each focal point cultivated, often using their own combination of techniques, it was not possible to meaningfully analyze the relative effectiveness of the different methods. Reporting rates were likely influenced by a host of uncontrolled factors, including hours of work per week (2–42 h, self-reported) and unmeasured community-level factors.

Overall, most focal points did not think their findings fully captured all cases of separation in their communities. When asked to assess the likelihood that they learned about all new cases of UASC in their villages, on average, focal points rated the likelihood as 6.2 out of 10 (where 10 is most likely to learn about all new cases).

While it was not possible to formally assess the comprehensiveness of the surveillance system, it was possible to assess the epidemiologic sensitivity of reported cases using data from PAMI’s programmatic follow-up. For each new case of separation that was reported, an FTR field agent was assigned to collect further information and begin the process of strengthening the child’s current care situation, locating the child’s family, or finding a temporary care arrangement. Sensitivity was calculated as:

$$\frac{\text{\# of cases verified by the Project Coordinator and confirmed by FTR field agents}}{\text{\# of cases verified by the Project Coordinator}}$$

Out of 62 cases verified by the Project Coordinator, 56 cases were also confirmed by the FTR field agents, yielding a sensitivity of 90.32%.

Because the system may not always have a devoted Project Coordinator to follow up each report, the sensitivity of the system without this role was also examined. The system received a total of 114 coded reports of separation prior to Project Coordinator screening and verification. If sensitivity is calculated from the total number of coded reports sent to the system, sensitivity drops to 49.12% (56 verified cases/114 total reports). Most reports that were excluded by the Project Coordinator were children that either were not separated or unaccompanied by the UN definitions, or had been separated

from their caregivers prior to the timeline of the project. Additionally, some children who traveled to other cities to visit family members were mistaken as separated children until the Project Coordinator asked the focal point to more thoroughly probe the situation. There were also a few duplicate case reports that the Project Coordinator identified and excluded manually.

Satisfaction with Focal Point Role

Twenty-nine out of 31 focal points participated in an evaluation at the end of the project. On average, focal points rated their roles as moderately difficult (5.4 on a scale of 1–10, where 10 is the most difficult). Ten out of 29 focal points said they had some security concerns related to their roles, primarily because the community was jealous of their perceived financial benefits. Half of all focal points who participated in the evaluation were very happy with their roles and thought that their communities appreciated them. The relationship between focal points' subjective assessment of their experiences and their probability of correct and consistent reporting was not statistically significant.

Discussion

This pilot project suggests that it is feasible to set up a community-based surveillance system that can provide continuous, real-time information about trends and basic characteristics of unaccompanied and separated children in a humanitarian setting. The majority of focal points and community members were pleased with the system, noting its importance in finding and supporting UASC in their communities. Additionally, the implementing organization found the system very useful for identifying UASC and expanding appropriate services to these children.

Strengths

An important strength of the system was that it was a relatively low-cost method to obtain traditionally hard-to-measure information around unaccompaniment and separation. The 11-week surveillance system cost approximately one third as much as performing a household survey in the same area at a single point in time. Once established, the operating costs were limited to costs associated with site visits, reimbursement for text messages, and the salary of a single Project Coordinator.

In addition, the ability to establish and run this program in North Kivu demonstrates that a mobile phone-based reporting system is possible even in a very difficult environment. Mobile phone infrastructure is still relatively underdeveloped in eastern Congo, with unreliable signals in many villages and frequent interruptions in service. Despite these limitations, there were no known focal points who had any difficulty sending or receiving a text message, and no focal points mentioned the cell network as a challenge to reporting.

Another strength of the system was its direct linkage to FTR activities. Participating communities saw tangible results related to the data collection and felt the system served a purpose beyond research. Focal points valued their own role in facilitating reunifications and service provision that benefited children and families. In an environment such as North Kivu where skepticism toward NGO work can be a serious barrier to data collection, these advantages should not be underestimated.

It is important to note, however, that the surveillance system did not originally intend to include FTR linkages. Linkage to FTR changes the role of surveillance from a measurement activity to a case-finding and response mechanism. While this change in direction might merit replication, it also requires additional resources in terms of finances and trained staff that may not be feasible in other settings. Most importantly, the parameters of the surveillance system should be made explicit at the project's onset so that community expectations are not inflated.

Limitations

The project faced several limitations. First, there was an initial lack of clarity amongst focal points surrounding the inclusion criteria for cases, particularly with regard to the timing of separation and children who were separated through a departure. For example, during the first week of data collection, focal points submitted 97 case reports, but all of these reports referred to separations that had happened before the project period (in some cases, up to two years prior the start date). Thus, all data from the first week of data collection had to be removed from analysis. Even in subsequent weeks, some focal points continued to report cases that preceded the project period, but these cases were recognized during the verification process and were excluded on a case-by-case basis. Regarding the inclusion of departed children (rather than just arrivals), focal points initially misunderstood the case definition and this was not clarified until the refresher training at Week 8. Thus, data collected prior to the refresher training did not capture departures and could not be corrected retrospectively. The data collected after Week 8 was too limited to allow for analysis and interpretation of trends in departures.

Furthermore, the quality and consistency of the data was limited by declining motivation on the part of the focal points. This issue became particularly apparent at the refresher training when many focal points revealed their strategy of reporting "no cases" by default in order to receive their weekly allowance with minimal effort. This problem was directly addressed during the refresher training and case reports increased afterwards. Still, the spike in case reports in the week immediately following the refresher training was fleeting and the next week, the number of reported cases dropped back down to pre-training levels. Furthermore, participation always remained uneven amongst focal points, with some focal points

participating much more actively than others. Surveillance systems operate under the assumption that focal points are seeking out cases according to consistent criteria and steadily participating over the course of the project. As a result of both of limitations named above (confusion regarding inclusion criteria and declining focal point motivation), it was difficult to interpret the reported trends in separations.

In addition, since no unique identifiers were collected, it is possible that a child's departure from one community and arrival in another community were counted as two separate cases. Although age and sex information amongst cases does not indicate this type of scenario occurred in this study, disaggregated reporting of departures and arrivals is important due to the potential for separated children to migrate internally within the study area.

Finally, there were a few technological limitations. Four phones did not work correctly or had battery issues, two phones were stolen, and one female focal point had her phone confiscated by her husband. Cell phone charging costs were also a burden to focal points, though this was resolved by providing a solar-powered charging strip to each village toward the end of the project to thank them for their participation.

Conclusion

The initial purpose of the project was to test the feasibility of establishing a mobile phone-based community surveillance mechanism in an unstable humanitarian crisis. This pilot demonstrated that the cellular infrastructure was adequate and that communities were enthusiastic about participating in a program that helped address a significant problem in North Kivu, DRC. Despite uneven reporting across selected focal points, the system continued for the full 11 weeks of the pilot, providing ongoing information in villages that are difficult for researchers to visit on a regular basis.

This surveillance system fills a critical gap in the measurement of separated and unaccompanied children in emergencies. Additional piloting in different contexts is recommended. Future iterations should focus on allowing data collection to continue for a longer period to better understand how the system performs over time. There is still a much to learn about how to best motivate community focal points to participate consistently and evenly over time and about which focal point and community characteristics are predictive of strong performance. Furthermore, additional work and reflection regarding the advantages and disadvantages of linkages between surveillance and FTR activities is needed.

Overall, the findings from this pilot represent an important step forward in the trend toward improved measurement of vulnerable populations in humanitarian settings. There is growing demand on the part of both donors and practitioners for simple, inexpensive methods that can generate data on an ongoing basis. Such data has the potential to leverage resources, inform program planning, and elevate advocacy for otherwise invisible groups. As illustrated by this manuscript, the availability of mobile phone technology can and should be harnessed to support and expand data-driven responses to crises.

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