Use of SMS-Based Platforms for Health Communication and Monitoring in the Context of Polio Outbreak Response

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Project Overview
This project used SMS-based platforms with three main aims: (i) increase awareness on polio and the link between polio and sanitation, (ii) educate and engage the affected communities, and (iii) support monitoring of polio campaign interventions. The research was designed to: (i) better understand the various SMS-based platforms used in the Somalia polio outbreak response, (ii) assess the appropriateness of various approaches in health communication and monitoring, (iii) review the effectiveness of different SMS platforms using independent monitoring, and (iv) discuss the challenges and opportunities in using the platforms in the compromised security context.

Polio Outbreak in Somalia
In 2013-2014, Somalia experienced a large wild poliovirus (WPV) outbreak that paralysed 199 children and young adults. The response by three Ministries of Health (North West, North East, and South Central Zones), the World Health Organization (WHO), and the United Nations Children’s Fund (UNICEF) to the outbreak was swift and aggressive, involving 36 polio campaigns which vaccinated 2.3 million children under the age of five several times over two years. These efforts successfully resulted in a drop in cases from 194 during 2013 to five in 2014, which were concentrated in the Mudug region of Puntland. All five cases occurred in nomadic-pastoralist families residing in villages outside known large settlements. These villages are described as accessible technically by WHO/UNICEF but in fact are difficult to reach due to remoteness and/or security challenges. Only one of the five cases had received the age-appropriate dose of oral polio vaccine (OPV), and that child was vaccinated during a visit to a neighbouring village. Immediate aggressive supplementary immunisation activity (SIA) plans were implemented in order to stop this new focus of transmission. The last 2014 polio case had its onset on 11 August and, as of the writing of this paper, this remains the last identified case.

The security situation in large parts of Somalia, especially the South Central Zone (SCZ) including Mogadishu, remains volatile and adversely impacts health care delivery to Somali women and children. Armed conflict and clan clashes hamper humanitarian access in many parts of the country. In Mogadishu and most parts of the SCZ, insecurity severely curtails essential movement of aid workers for lifesaving activities. Polio programme activities which require high-quality and timely SIAs have been hampered considerably, while the routine immunisation programme is weak, resulting in very low coverage 34% for DPT3 and 29% for measles (UNICEF 2014). The June 2015 WHO/UNICEF Somalia polio outbreak assessment concluded that:

In spite of significant challenges, the team has demonstrated its ability to deliver a diverse mix of innovative strategies which reached and mobilized both the broad population and higher risk groups (WHO/UNICEF, 2015).

A number of new strategies have been implemented in response to the outbreak, which include:
• Establishing a social mobilisation network, with 3,616 mobilisers trained and reporting on activities;
• Implementing enhanced strategies to reach security-affected and nomadic populations, including mapping of sites where nomad and migrant populations stay as well as sensitisation of 303 nomadic elders in Puntland;
• Producing and airing an 18-part interactive radio serial drama in partnership with BBC Media Action called Dhibcaha Nolosha (Drops for Life), with integrated messaging on polio, respiratory infection, and other health issues [For more information, see: https://www.comminit.com/polio/content/dhibcaha-nolosha-drops-life-can-radio-improve-effectiveness-polio-vaccination-campaigns];
• Establishing an efficient vaccine logistics system through pre-positioning of vaccines in hubs;
• Overcoming challenges such as ‘last-mile’ issues requiring the establishment of cold chains for newly accessible areas in the SCZ; and
• Improving vaccine management, with all levels reporting vaccine utilisation data.

Although a comprehensive evaluation of the impact of these strategies has not yet been conducted, preliminary data indicate a reduction in refusal rates, with evidence that high-risk groups, particularly in Puntland, are now more accepting of immunisation services and more likely to be immunised during SIAs (WHO/UNICEF, 2015).

Despite significant investments in both routine and house-to-house campaign-based immunisation, security challenges make it difficult for house-to-house mobilisation in several areas, especially among scattered households in rural areas, districts that are inaccessible due to insurgency, coastal regions where piracy is an issue, and amongst nomadic groups. Similarly, the monitoring of vaccination and social mobilisation in these areas is difficult because of the lack of roads and insecurity.

Given these challenges and the fact that mobile phones were used widely in otherwise inaccessible areas, a mobile-phone-based technology was introduced as an alternative to house-to-house mobilisation which required interpersonal interaction on each doorstep. This innovation provided a dual advantage, as it minimised the risk to personnel and also provided real-time monitoring (RTM).

Security Context and Inaccessible Areas – Communication Challenges

Somalia has been affected by war for over 20 years, leaving some areas inaccessible to polio immunisation campaigns for extended periods of time. Forty districts in South and Central Somalia have been partially or completely inaccessible since 2010. To enable effective planning, the stakeholders involved in responding to the polio outbreak defined inaccessible areas as areas where house-to-house vaccination could not take place due to occupation by non-state actors. An estimated one million children under 10 years of age reside in these districts, making
Somalia the host of the largest pool of geographically concentrated unvaccinated children in the world (WHO/UNICEF, 2013).

**Accessibility map as of June 2013**

This environment of war and insecurity has meant that community social mobilisers and polio vaccinators cannot move from house to house to mobilise caregivers or vaccinate.
children. This has proven to be one of the main challenges for the polio programme, and such a large number of un- or under-vaccinated children poses an obvious risk for the re-emergence of the polio virus.

Finding ways to communicate with these 40 districts can help increase OPV coverage rates, but direct communication interventions are extremely difficult. A major programme focus has focused on identifying appropriate channels to deliver mobilisation and vaccination awareness messages encouraging them to visit the nearest health facility. Two communication channels were identified: radio - through a partnership with BBC Media Action - which broadcasts programmes on BBC Somalia with wide coverage in most of the regions across Somalia, and SMS platforms in conjunction with mobile health (mHealth) in partnership with Oxfam GB. UNICEF utilised both channels for its communication interventions, but this paper focuses on the use of SMS for RTM and provision of health education.

The SMS platform for health education provided health education on polio and its link to water and sanitation (polio is spread through the faecal-oral route) through an interactive combination of questions and messages. RTM, on the other hand, was used to monitor interventions in areas which were inaccessible by UNICEF staff. RTM is done through the “RapidPro platform to reduce programmatic, operational and reputational risks while improving the delivery and quality of services through enhanced end-use monitoring of supplies, real-time tracking of key indicators, and two-way communication with beneficiaries. RapidPro is an open-source SMS-based (text message) platform that manages data collection, complex workflows, and group coordination using basic mobile phones.” (Somalia RTM Strategy, 2014).

Creating an Enabling Environment

The partnership with Oxfam GB supported the conducting of interactive health education sessions through the m-Link SMS platform to demonstrate the link between polio, water, and sanitation through distribution of appropriate water, sanitation, and hygiene (WASH) non-food items (NFIs), which include supplies such as soap, jerrican oral rehydration salt (ORS), etc., in addition to health education messages. m-Link is an integrated SMS and mobile phone voucher (m-Voucher) platform that uses an interactive mobile phone application to engage communities. It is cloud-hosted and does not require any installations to be done on phones. It has proven to be a cost-effective mechanism to increase reach and access that is easy and cheap to scale, since it uses the mobile phones that people already have. While still requiring some changes, it is an approach that has potential for scaling up (UNICEF, 2015).

The main objectives of the intervention/partnership were to: (i) reach at least 1,000,000 children and women with health education messages on polio and WASH, (ii) increase their knowledge of the relationship between polio and safe hygiene practices, and (iii) distribute 50,000 WASH NFI supplies to vulnerable beneficiaries (Oxfam, 2015).
Oxfam partnered with Hijira, a community-based organisation in the SCZ of Somalia to support the mobilisation of communities and registration of phone numbers of community members who were willing to participate in the SMS campaign.

The SMS-based Platforms

Interactive SMS
The interactive SMS was based on the mLink platform, which had a short code set up so there was no cost to the community members to send and receive messages. As a result, mobile credit was not a barrier, as these costs were absorbed by the project. The interactive SMS campaign was conducted over a six-month period and had two parallel components. The first component was an interactive health education session on polio prevention and sanitation and hygiene. The education sessions focused on community-based faecal-oral disease preventive behaviours, including hand washing and the components of a how to keep water safe from contamination as well as basic messages on polio and vaccination.

This component included a 3-day interactive SMS-based session where questions were sent to all community members who had been registered by the Hijira frontline workers through a door-to-door registration exercise. Each participant was asked to respond to the question sent out, and every correct answer prompted them to proceed to the next question. If a question was answered incorrectly, the correct answer would be provided, and then the participant would be asked to move to the next question (Oxfam, 2015). This component was designed to reach 100,000 people in 17 districts that included 16 districts in Mogadishu as well as the Afgooye district in lower Shabelle, with an estimated indirect reach of 1 million people. This estimate is based on a feasibility study connected to a previous project which revealed that in Somalia on average 10 people share the benefit of information delivered to one phone (Oxfam, 2015).

The second component focused on the distribution of NFIs, which included home-based ORS, household water treatment, and soap for hand washing, all of which are key to polio prevention. Distribution of NFIs was implemented through a token redemption system which was sent to participants who had completed the health education sessions. Specifically, communities received a token code (mVoucher) on their phones which could be redeemed at selected prequalified traders for specified NFI items. Once the code was redeemed, an automatic notification was sent to the system which immediately enrolled the recipient in the second set of education messages pertaining to the NFI items - e.g., how to treat water using water purification tablets, how to mix ORS, etc. The total target for the NFI component was 50,000 vulnerable households of the 100,000 who were reached through the health education sessions. A total of 5,000 NFI packages were distributed through the mVoucher method and 45,000 NFI packages for the conventional method (Oxfam, 2015).
RTM² Using SMS (North East and North West Zones)
RTM was another platform that was piloted in the North East and North West Zones of Somalia, where three SMS questions were sent to 1,123 community mobilisers (196 in Somaliland and 927 in Puntland) on the last day of the polio campaign held in February 2015. The community mobilisers spread out to mobilise the 270 households in their respective communities. The main aim of this pilot was to assess the proportion of community members who respond to SMS questions as well as those responding with correct answers. Responses were meant to be sent within 48 hours of receiving the questions. The following questions were sent out (in Somali dialect):

1. SMS 1. Dear xyz, Did the polio vaccination team visit your settlement during the previous 1 week? Please respond with Y or N.
2. SMS 2. How many children missed vaccination?
3. SMS 3. How many children were missed due to caregiver’s refusal?

Responses generated from the questions were used to feed back into the campaign, enabling identification of areas where a vaccination team had not visited or children who had not been vaccinated, for example.

Measuring Effectiveness
The evaluation methodology for the interactive SMS campaign had three core components: stakeholder interviews, FGDs, and a qualitative household survey with a random population in the districts where the project was implemented. Four FGDs including women, men, youth, and traders were held in Mogadishu (Oxfam, 2015); each FGD comprised 10 participants. A household survey was also carried out via enumerators with 425 participants selected from 17 districts – the sample size in each district was proportional to its overall population. Participants were randomly selected irrespective of their participation in the project. In total, there were 41.9% men and 58.1% women respondents. All participants were from the host community. Evaluation leads were also obtained from an internal midterm baseline review that had been conducted in September 2014 (Oxfam, 2015). Information was also extrapolated from metrics within the mLink platform database (Oxfam, 2015). Stakeholder interviews were also conducted (Oxfam, 2015).

Results
Findings from the evaluation showed that the total number of phone users reached by the campaign was 104,358 - exceeding the target of 100,000. Of the phone users reached, a total of 89,760 (86%) completed the health education sessions (Oxfam, 2015). This proportion was significantly higher than the project target of 75%. From past phases of the project, it had been

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1. https://rapidpro.io
established that about 10 people share one phone, and the practice of sharing information was affirmed in the focus groups (Oxfam, 2013). If this is the assumption, it means that the total number of potential beneficiaries reached by the interactive SMS is 897,600. However, it is not possible to confirm that all participants reached through the project went on to share the information, so this is only potential indirect reach (Oxfam, 2013).

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Total numbers per session</th>
<th>Total for both sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polio campaign - Existing registrations - 2013</td>
<td>Polio campaign - New registrations - 2014</td>
<td>Total number of participating beneficiaries for both campaigns</td>
</tr>
<tr>
<td>Number of participating beneficiaries</td>
<td>Completion rate % of total registered</td>
<td>Number of participating beneficiaries</td>
</tr>
<tr>
<td>Introductio n</td>
<td>11,223</td>
<td>93,135</td>
</tr>
<tr>
<td>What polio is/is not</td>
<td>10,345</td>
<td>92.2</td>
</tr>
<tr>
<td>How to prevent/ control</td>
<td>10,095</td>
<td>89.9</td>
</tr>
</tbody>
</table>

Based on the self-reported household survey, results showed that 99.8% were aware of the polio outbreak, revealing a high level of basic knowledge (Oxfam, 2015).

While baseline data showed that people previously thought polio was airborne, 99.8% respondents were able to link polio to water and sanitation at the end of the project (Oxfam, 2015).

According to the household survey, 74.6% knew the causes of polio, 78.4% the signs and symptoms, and almost 99% the prevention actions (mLink, 2014). 31.1% reported having their children vaccinated after receiving polio information by phone (mLink, 2014). However, all the data above are self-reported, and there were other channels of communication on polio during the campaigns, making it difficult to attribute all the knowledge increase or the decision to vaccinate to the SMS project (Oxfam, 2015).
Mass Messaging – Independent Monitoring
Independent monitoring carried out by WHO revealed that about 86% of the monitored population was aware of the campaign from a variety of sources. These sources included radio, TV, mosque announcements, health staff, social mobilisers/megaphones, and women and youth group activities. The data for campaigns in February, March, June and August 2015 are included in the table below.

<table>
<thead>
<tr>
<th>Polio Campaigns in 2015</th>
<th>Radio</th>
<th>TV</th>
<th>Health Staff/ Vaccinators</th>
<th>Women/ Youth group activities</th>
<th>Community mobilisers/ Megaphones</th>
<th>Mosque Announcements /Religious</th>
<th>SMS/ Mobile</th>
<th>Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb</td>
<td>1,044</td>
<td>872</td>
<td>3,193</td>
<td>121</td>
<td>7,028</td>
<td>119</td>
<td>201</td>
<td>12,578</td>
</tr>
<tr>
<td>Mar</td>
<td>1,957</td>
<td>1,034</td>
<td>6,581</td>
<td>101</td>
<td>8,699</td>
<td>105</td>
<td>397</td>
<td>18,874</td>
</tr>
<tr>
<td>Jun</td>
<td>3,438</td>
<td>864</td>
<td>5,726</td>
<td>0</td>
<td>6,483</td>
<td>148</td>
<td>382</td>
<td>17,041</td>
</tr>
<tr>
<td>Aug</td>
<td>2,026</td>
<td>282</td>
<td>5,658</td>
<td>353</td>
<td>6,124</td>
<td>153</td>
<td>161</td>
<td>14,757</td>
</tr>
<tr>
<td>Total</td>
<td>8,465</td>
<td>3,052</td>
<td>21,158</td>
<td>575</td>
<td>28,334</td>
<td>525</td>
<td>1,141</td>
<td>63,250</td>
</tr>
<tr>
<td>%</td>
<td>13%</td>
<td>5%</td>
<td>33%</td>
<td>1%</td>
<td>45%</td>
<td>1%</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>

Out of the 63,250 sources of information quoted by respondents (a respondent could quote more than one), 1,141 responses - 2% - were SMS/mobile, corresponding to the 862,947 SMSs sent out.

RTM
With regard to RTM, 78 community mobilisers from Somaliland and 278 community mobilisers from Puntland responded to the SMS questions, indicating a 32% response rate. These community mobilisers were mostly from the larger settlements and urban areas. Of all the responses, 98% were correct. Six respondents did so incorrectly with text other than the required Yes/No and numbers that could not be deciphered by the server.

<table>
<thead>
<tr>
<th>RTM</th>
<th># Community mobilisers to whom SMS questions sent</th>
<th># Community mobilisers who responded</th>
<th># Community mobilisers who responded correctly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somaliland (NWZ)</td>
<td>196</td>
<td>78 (40%)</td>
<td>76 (39%)</td>
</tr>
<tr>
<td>Puntland (NEZ)</td>
<td>927</td>
<td>278 (30%)</td>
<td>274 (29.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>1,123</td>
<td>356 (32%)</td>
<td>350 (31%)</td>
</tr>
</tbody>
</table>
Challenges and Opportunities in Using the Platforms

Somalia is largely an oral society, meaning that people are accustomed to communicating orally or verbally – news commonly spreads through word of mouth, and people want to talk and listen. Texting is therefore not common as an interactive communication approach, and it requires a behaviour shift. For example, FGD participants mentioned they would like messages from elders and workshops for internally displaced persons (IDPs) (Oxfam, 2015). This is also confirmed in the Harvard knowledge, attitude, and practice (KAP) study conducted in Somalia, where the preferred mode of communication was through health workers, neighbours, and community and religious leaders (Harvard, 2014). This demonstrates the need for complementary approaches to ensure that messages are communicated clearly (Oxfam, 2015).

With regard to uptake of the technology, some FGD respondents reported being illiterate and busy with competing priorities. This made it difficult for them to participate in the sessions. However, some did have the messages read to them by a literate child, friend, or neighbour, and those who were busy were able to revert to the messages during their free time.

For the RTM, respondents did not appreciate having to pay for SMS, leading some of them to drop out of the programme. Charges can therefore be a hindrance to using the SMS platforms.

Another challenge, as mentioned above, was the drop out or lack of completion of sessions. While nearly all who received the SMSs said they appreciated the health education messages as indicated in the findings (with 95.5% completing the questions), some still did not find it incentive enough to complete the sessions. One of the suggested ways of overcoming dropouts was to give an incentive in terms of airtime refund. However, this incentive presents its own sustainability challenges, though it is worth further study to see if an airtime incentive would be a prohibitive cost.

Discussion

The purpose of this paper was to highlight key lessons that would add to the discourse on the relevancy, efficiency, effectiveness, and scalability of mobile-phone-based health promotion projects, especially for insecure environments like Somalia.

Overall, the SMS approach did reach a large number of people in a short time compared to conventional methods like interpersonal communication, which in this case would have increased security risks for the community mobilisers.

The evaluation findings support the notion that mobile penetration is high, and the infrastructure to support the use of mobile phones in health promotion is available. The findings also indicate that there is considerable sharing of both phones and SMS messages within communities, though further investigation is needed to determine the impact of this on health behaviour. Mobile penetration in Somalia at the end of 2014 as reported by Research and Markets was 54% (Research
and Markets, 2015). What this means to organisations intending to start similar projects is that the infrastructure is already in existence, and this significantly reduces the start-up costs.

However, in regard to the costing for the SMS, the partners paid the telephone companies the cost for sending and receiving messages for the users after setting up a short code. However the short code increased the SMS cost to 4 times the cost of an average SMS. UNICEF and Oxfam negotiated with the telephone company, Hormuud, to bring down the SMS cost to $0.001/SMS. Each beneficiary required 70 messages to complete all the interactive sessions, at a total cost of $0.70 (including cost of SMS reply). Each redemption of mVoucher required 4 SMS, and each trader was reimbursed $1/package through eCash (mobile money in Somalia).

The use of SMS does have an important role to play in terms of preferences and in emergency situations. Respondents in the FDGs reported that they prefer receiving messages via mobile phones as compared to radio. Women said that “[Mobile is] more flexible than other methods like radio or magazines. We prefer mobile from the radio.” Some said “We don’t have radios to listen to - we are IDPs. If we have radios, we do not have time to listen to the radio because we seek the basic needs.” (Oxfam, 2015)

The ability for SMS to reach communities in inaccessible areas for both health education and monitoring of implementation is an added advantage above other communication channels. The platforms were therefore appropriate given the circumstances. However, it should be noted that use of SMS platforms needs to be combined with use of other channels.

Future programmes may need to factor in literacy issues and consider the behaviours of societies that are predominantly oral. Most of the hard-to-reach populations are illiterate, and there is a need to come up with innovations in voice messaging or texts using drawings or illustrations to ensure that messages are well understood. There is need to explore other mobile phone applications, such as voice and video, to increase channels for sending messages.

There were some challenges with the message design for the health education component. During the FGDs, both male and female mentioned that the main complaint was that the messages were too long. On multiple occasions, the project was referenced as “too heavy” in terms of the number of messages being sent and received, with some of the interactive campaigns involving up to 70 steps. Despite the high completion rates, this shortening of messages should be taken into account, as it leads to fatigue and can contribute to dropout of participants.

In terms of the distribution of NFIs to the participants who completed the health education, there were complaints that the distances to the NFI traders and distributors was long, so some people did not pick up the items. “From the household survey, 41.2% received NFI mVoucher invite via SMS but of those 175 people, 71.4% didn’t pick the NFI mVoucher. A total of 44.8% of those who did not collect items claimed ‘Distance to distribution centre’ as the reason and 16.8% said they were ‘too busy’” (Oxfam, 2015). The supply component of the project should ensure that there are distributors at least in every district so the distances are shorter.

When evaluating initiatives using mobile phones, it is important to recognise that technology is a small part of the solution. Technology alone can neither be blamed for failure nor be fully credited for
success, but it may facilitate activities to complement the way in which people receive, use, and access information (Oxfam, 2015).

In conclusion, mobile phones and other wireless technologies are becoming increasingly important in health promotion projects, especially in areas that are hard to reach or inaccessible due to conflict. The infrastructure and technology are already in existence, thus considerably reducing the start-up burdens. More investment is required in terms of community involvement and sensitisation, capacity building of the partners involved, partnership strengthening, and stakeholder engagement.

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