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Emergency Risk Communication: Lessons Learned from a Rapid Review of Recent Gray Literature on Ebola, Zika, and Yellow Fever

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ABSTRACT

A rapid review of gray literature from 2015 to 2016 was conducted to identify the lessons learned for emergency risk communication from recent outbreaks of Ebola, Zika, and yellow fever. Gray literature databases and key websites were searched and requests for documents were posted to expert networks. A total of 83 documents met inclusion criteria, 68 of which are cited in this report. This article focuses on the 3 questions, out of 12 posed by World Health Organization as part of a Guideline development process, dealing most directly with communicating risk during health emergencies: community engagement, trust building, and social media. Documents were evaluated for credibility using an Authority, Accuracy, Coverage, Objectivity, Date, Significance (AACODS) checklist⁷ and if the document contained a study, a method-specific tool was applied. A rapid content analysis of included sources was undertaken with relevant text either extracted verbatim or summarized and mapped against the questions. A database subset was created for each question and citations were assigned to the subset(s) for which they contained relevant information. Multiple designations per document were common. Database subsets were used to synthesize the results into a coherent narrative.

The gray literature strongly underlines the central importance of local communities. A one-size-fits-all approach does not work. For maximum effectiveness, local communities need to be involved with and own emergency risk communication processes, preferably well before an emergency occurs. Social media can open new avenues for communication, but is not a general panacea and should not be viewed as a replacement for traditional modes of communication. In general, the gray literature indicates movement toward greater recognition of emergency risk communication as a vitally important element of public health.

KEYWORDS

Emergency risk communication; LMIC; review; social media; community engagement; gray literature

Introduction


When an emergency with public health implications occurs, many different tasks demand urgent attention and funding. People may be in need of food, clothing and shelter, safe drinking water, and medical attention. They also need to know how best to avoid risks so further injury, morbidity, and mortality can be minimized. In the wake of the recent Ebola, Zika, and yellow fever outbreaks, emergency risk communication received a high level of attention. Consequently, in December 2016, the World Health Organization (WHO) commissioned a rapid review of recent gray literature evidence (2015–2016), to provide additional underpinning for the development of the first-ever evidence based Guideline on Communicating Risk during public health emergencies. This was intended to provide additional knowledge about building national-level capacity to integrate

effective risk communication practices and structures into healthcare and response systems for public health emergencies.

The principles of systematic reviewing as described by the Cochrane Handbook (<http://training.cochrane.org/handbook>) were adapted to undertake this rapid review: The term public health emergencies included infectious disease outbreaks, natural and human-made disasters and spanned all phases of preparing for, responding to, and recovering from a public health crisis. Twelve questions were initially elaborated and specified according to the Setting, Perspective, Phenomenon of Interest, Comparison, Evaluation (SPICE) framework (see Supplementary Material). They were designed to answer what works for whom in what contexts. This was further extrapolated in order to better understand what happened or what was happening, positive and negative consequences, and lessons learned.

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For the gray literature rapid review, an additional question was formulated: What are the risk communication lessons learned from gray literature reports of recent events and emergencies with public health implications? We were to answer this question in relation to each of the 12 original questions. The original report covering all 12 questions is available online at <http://www.who.int/risk-communication/guidance/process/Final-Report-Rapid-Grey-Lit-Review.pdf?ua=1>. This article focuses on 3 of the 12 questions, the three that most directly relate to risk communication activities:

Q5: What are the best and most generalizable emergency risk communication activities that build trust in health authorities as a source of health protection information among affected communities and other stakeholders?

Q9: What are the best ways to engage communities in emergency risk communication activities to respond to events/contexts?

Q10: What are the best social media channels and practices to promote health protection measures and dispel rumors and misinformation during events and emergencies with public health implications?

Methods

Search strategy

The search was designed to locate recent gray literature sources 'published' in 2015 and 2016. We conducted keyword searches in the online databases greylit.org, worldcat.org, opengrey.eu, evidenceaid.org, and disasterlit.nlm.nih.gov. We also searched the particularly relevant websites, zikacommunicationnetwork.org, the Ebola Response Anthropology Platform (ebola-anthropology.net), and ebolacommunicationnetwork.org. Site searches combined keyword searching and following links.

Keywords were selected based on search terms used for previous reviews and the searcher's reading of the search questions. A detailed breakdown is provided in [Appendix 1](#) (see Supplementary Material).

In addition to the online searching, we contacted the WHO team of experts for document suggestions. They posted an online request for documents from partner and non-partner organizations on various risk communication platforms. A number of experts also submitted documents via email. Submissions were accepted through 31 December 2016. This network of experts proved to be a rich resource, returning higher numbers of documents from more credible sources than were located with other forms of searching. If word scans of retrieved documents revealed keywords in the documents' bibliographies, these bibliographies or provided links were mined for further possibly relevant sources.

Inclusion/exclusion criteria

Retrieved documents were excluded if they were situation assessments, presenting only prevalence-type information, if they did not relate to risk communication, if they did not relate to disasters or emergencies, or if full-text copies could not be obtained. Documents dealing exclusively with active shooter/bomber situations or general refugee issues unrelated to disease outbreaks were also excluded, as were proposed studies or studies in progress. In

addition, documents outside the date limits set for this search were excluded.

General risk communication materials, such as pamphlets, posters, and infographics, were excluded as they do not provide information about their effectiveness or lessons learned. Lack of transparency due to missing methodology information was also grounds for exclusion.

In the interest of efficiency and focusing on the most credible sources, video footage of conference proceedings was not reviewed, nor were blogs, courses, educational videos, or television or radio spots. As PowerPoint presentations are not considered gray literature, they were generally excluded. Exceptions were made in rare instances where the presentations were basically written papers, simply placed in PowerPoint, rather than in typical document formats. This same rule was applied to toolkits, checklists, fact sheets, and secondary sources. Guidelines were also excluded, as a review of them had recently been completed, making their inclusion redundant.

To be included, documents needed to fall within the search date limits, relate to emergency risk communication, and contribute to lessons learned.

Search outcome

As presented in [Figure 1](#), a total of 4,635 documents were scanned, of which 83 met inclusion criteria and 68 were cited in the report. Documents included but not cited were documents which provided background information potentially of interest to the search process, but which did not directly pertain to the search questions. Please note that the total number of documents scanned represents the total number of results returned by the various searches. Many of these overlapped, with the same document appearing in the results for multiple searches. As such, this number does not represent individual, discrete documents. Furthermore, although exact numbers of results returned were provided by most databases, many websites did not provide the total number of results listed. In addition, although documents from the team of experts were provided in spreadsheet form from which a total number could be derived, many of the cells in this spreadsheet contained multiple documents. For these reasons, the total number of documents scanned is an estimate.

Appraising study quality or the credibility of evidence sources

Each document was evaluated for credibility using an Authority, Accuracy, Coverage, Objectivity, Date, Significance (AACODS) checklist. If the document contained a study, a method-specific tool was applied, such as the Critical Appraisal Skills Programme (CASP) Qualitative Study checklist.

An AACODS category was considered a yes if most of the questions within it were answered with yes. Sources with two

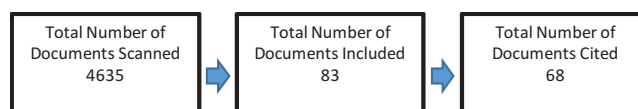


Figure 1. Documents consulted.

Table 1. Document appraisal tools.

Authority, Accuracy, Coverage, Objectivity, Date, Significance (AACODS) - https://dspace.flinders.edu.au/jspui/bitstream/2328/3326/4/AACODS_Checklist.pdf
Critical Appraisal Skills Programme (CASP) - http://docs.wixstatic.com/ugd/dded87_25658615020e427da194a325e7773d42.pdf
Modified BMJ Questionnaire Appraisal Tool – see Supplementary Material
Mixed Methods Appraisal Tool (MMAT) - http://mixedmethodsappraisaltoolpublic.pbworks.com/w/page/24607821/FrontPage

or fewer yeses were considered low credibility. Those with three or four yeses were rated moderate, and those with five or six, high credibility.

Since most documents identified in the search were not studies per se, but reports or evaluations or other types of materials, very few reported on methodology, limits, or data collection. Credibility evaluation therefore focused primarily on authority.

Documents were assigned high credibility only if they stemmed from authoritative sources (authors or organizations) and included proof of interaction with the literature (bibliography, endnotes, or footnotes). If only one or the other of these were present, documents were assigned moderate credibility. Documents with neither were assigned low credibility.

Table 1 presents online links where a copy of the AACODS, CASP, and other tools can be found.

Data extraction and synthesis

A rapid content analysis of included sources was undertaken with relevant portions either extracted verbatim or summarized and mapped against the questions. A database subset was created for each question and citations were assigned to the subset(s) for which they contained relevant information. Multiple designations per document were common. Once all documents had been sorted in this way, the database subsets were used to synthesize the results into a coherent narrative.

Findings

Of the 83 documents included in this review, eight reported collection and analysis of primary data such as cross-sectional surveys. Of these, two were appraised as having serious methodological concerns, three had moderate concerns, two had minimal concerns, and one raised no concerns. Four documents presented questionnaire results, the other four contained mixed-method studies. The other documents reported situation analyses or evaluations drawing on analyzed data from internal organizational or external published sources.

The number and credibility of document sources varied by each question: 17 documents addressed question five, 11 from high, and 6 from moderately credible sources. For question nine, 67 documents were identified as relevant, 30 from high credibility sources, 36 from moderate, and 1 from low. The low credibility source was retained, as it represented opinions of those working on the frontlines of the Ebola outbreak, and as such was considered worth noting, even if it was not well documented. Finally, for question 10, of the 20 documents reviewed, 2 were from low credibility sources, 8 from moderate, and 10 from high. In common with gray literature reports, few sources reported any methods or references to support the analysis. A list of documents and

their appraisals can be found in Appendix 2 (see Supplementary Material).

Building trust and community engagement

Since one of the most important steps toward building trust is community engagement, and greater trust fosters community engagement, findings for these two questions are presented together. In general, gray literature findings related to these questions fall into two categories: things that encourage trust and community engagement and things that hinder them. We start with encouraging factors.

Begin well

In order to build trust and engage the community, it is important to begin well, and that before the beginning of a crisis. A number of documents noted the importance of beginning communication processes early (Adams et al., 2016; United Kingdom House of Commons International Development Committee, 2016; United Nations Children's Fund (UNICEF), 2015a). Connection with community entities should be established and relationships of trust developed before a crisis, so that these networks of allies may be activated should an emergency occur (Schoch-Spana et al., 2016; Turner, Shaikh, & Rimal, 2016; World Health Organization, 2015e). When an emergency happens, the response should build on these existing relationships (Global Communities Partners for Good, ND; Modarres, 2015; World Health Organization, 2015e), including recognizing and further developing existing local organization (Institute of Development Studies (IDS), ND; Oosterhoff, 2015). Communication needs to acknowledge a crisis immediately and be open about uncertainties (Savoia & Viswanath, 2015). But there is more to beginning well than just timing.

One study noted that medical anthropological assessment should be used at the beginning of a response, so that messages and responses can be shaped accordingly (Allie, Colebunders, De Clerck, & Gabaldon, 2016). This assessment should include listening to complaints and taking into account the customs and cultures of all involved groups (Anoko, ND; Schoch-Spana et al., 2016).

How and with whom emergency risk communication starts also plays an important role in beginning well. The public should be considered an ally to partner with (Schoch-Spana et al., 2016; Turner et al., 2016). An essential beginning step is to discuss the situation with community leaders and members and to conduct an initial assessment. This helps identify the best communication channels to use and any barriers or potential problems, as well as potential solutions (De Roeck, 2016; Institute of Development Studies (IDS), ND).

Go local

Overwhelmingly the gray literature found that engaging communities should play a central role in emergency responses. Not only is community engagement key to building trust, but as reports about the West African Ebola outbreak noted, local efforts played the most important role in turning the Ebola tide (International Federation of Red Cross and Red Crescent Societies (IFRC), 2015; International Rescue Committee (IRC), 2016b), because the turning point was reached before the full-blown response was operational (International Rescue Committee (IRC), 2016b).

Table 2. Community engagement methods*.

Engagement method	Number of documents
Engage local leadership and key people	31
Tailor interventions for population, gender, circumstances, language	26
Use locals as mobilisers	16
Community creates own interventions	15
Engage local groups	15
Listening & two-way communication	15
Use local media	12
On-going monitoring & evaluation (feedback)	11
Use anthropological assessments	10
Start communication early	8
Use visual aids, role plays & story telling	6
Community conducts own outbreak analysis	3
Decisions made at local level	3

*A detailed breakdown of sources is provided in [Appendix 3](#), see Supplementary Material.

The gray literature examined in this quick review found a number of methods which improve community engagement, the most common of which are listed in [Table 2](#). In the table, each engagement method is followed by the number of documents which mentioned this method as improving engagement success. Essentially, these lessons learned could be summarized in two words: Go local. The literature found that communities responded best when as much as possible was done locally – involving local people, respecting local culture, language and circumstances, and listening to local concerns and opinions – all this on an on-going basis. Local media should also be used (Adams et al., 2016; World Health Organization, 2015c).

Involve local leaders and groups

Local leaders play vital roles in building trust and engaging the community. Involving local leadership was listed by 31 documents as an important step toward community engagement. Programs were found to have greatest effect when led by local leaders in both Ebola response efforts (Hird & Linton, 2016), and in polio eradication programs (Bristol & Millard, 2016). Using local people as mobilisers and engaging local groups were also seen as important, with 15 documents each mentioning this as helping gain access to communities and to successful uptake of behavior changes. Further detail about which people and groups to involve is provided in [Table 3](#).

The group of people listed most as important to involve were religious leaders, followed by traditional leaders, other local authorities or leaders, and women or women's groups. Targeting women particularly, not only for epidemic response efforts, but for health improvement in general, has proven

Table 3. People and groups to engage*.

People to involve	Number of documents
Religious leaders	18
Traditional leaders, chiefs, elders	16
Other local authorities or leaders	11
Women & Women's groups	11
Health Workers	10
Youth groups	9
Traditional healers	7
Others (hunters, taxis, market groups, hospitality industry)	5
Survivors	4

*A detailed breakdown of sources is provided in [Appendix 4](#), see Supplementary Material.

very effective (Independent Monitoring Board of the Global Polio Eradication Initiative, 2015; United Nations Children's Fund (UNICEF), 2015b). One report stated that engaging women is critical to changing behavior. It likened Ebola to a fire and women to water, noting that water puts out the fire (World Health Organization, ND). Health workers; youth groups; traditional healers and other groups, such as hunters (likely singled out due to concerns about bushmeat, although sources did not specify this), taxi drivers, market groups and those involved with hospitality businesses (restaurants, bars, hotels) were also found to be important inroads into communities. Using locals as mobilizers also proved effective, although Quinn emphasized that not all local people fill this role equally well, and those chosen should be selected based on their understanding of local culture and for being trusted by the local community (Quinn, 2016).

Why going local works was explained in part by a study reported by Bastide. Although written about communications experts trained for deployment by WHO to emergency situations (Emergency Communications Networks or ECN), Bastide's study shed light on why certain types of interventions build trust. One thing these networks succeeded at is growing trust. Bastide noted that this trust came from shared experience. People have trained intensively together or have already worked together, so they shared common experiences, which built bonds and generated complicity trust. Sharing a base of technical skills, norms and values fostered recognition trust. The study further noted that complicity trust is deeper and stronger than recognition trust, because it is emotional and involves intimate experience of those trusted (Bastide, Nass, Jenni, & Burton-Jeangros, 2015). Local populations come with ready-made complicity and recognition trust. They share both experiences and a common set of life skills, norms, and values.

Tailor interventions

The second most frequently mentioned method for improving community engagement was tailoring, discussed by 26 documents. Communities need to be allowed to differ from each other (Oxfam International, 2015b). Tailoring interventions for gender, language, local cultural nuances, and circumstances improves communities' engagement and uptake. Ideally communities should assess the situation themselves and craft their own messages, with regular monitoring and feedback to allow for further adjustments. A number of sources noted that response efforts were most effective when they were owned and driven by local communities and local leadership (Jones, Loewenson, Shakpeh, Kun, & Milsom, 2016; Oosterhoff, Mokuwa, & Wilkinson, ND; Oxfam International, 2015b; United Nations General Assembly, 2016; United Nations Global Ebola Response, 2015a, 2015b). Participatory decision making and focusing on the strengths of local populations were also important (International Rescue Committee (IRC), 2016b), as were acknowledging fears and concerns, and conveying compassion and a sense of self-efficacy (Schoch-Spana et al., 2016; Turner et al., 2016; United Nations General Assembly, 2016; Wilkinson, 2016; World Health Organization, 2015b). The importance of tailoring in general was noted by an additional five documents (Adams et al., 2016; Korkoyah Jr & Wreh, 2015; United States

Environmental Protection Agency (EPA), 2015; World Health Organization, 2015c; World Vision, 2016).

Tailoring must also take into account communities' histories. Attention must be paid to political realities, both historic and current. Political realities shape the landscape of relations between power structures and communities, including issues of mistrust (Miller, d'Harcourt, Kim, & Coffee, 2016). The West African Ebola outbreak illustrated this.

In Guinea, Liberia, and Sierra Leone, the three countries most strongly hit by the Ebola outbreak, population segments displayed strong mistrust of government and outsiders. Their political realities played crucial roles in this situation (Miller et al., 2016): All three recently experienced devastating civil wars. All three displayed ethnic diversity, with tensions between ruling parties and groups not in power. Other factors contributing to mistrust included the legacy of colonialism, attempts to eliminate traditional religion, lack of local representation in government, and the necessity of frequently having to bribe authorities on a regular basis. This lack of trust gave rise to vicious rumors (government plots to market human organs or eliminate minority populations) and hampered response efforts in general (Anoko, ND; Assessment Capacities Project (ACAPS), 2015a; 2015b; Balde, 2016). Progress toward halting the outbreak became possible only once these realities were acknowledged and addressed. Transparency (University of Minnesota, 2015) and involvement of trusted local leaders were imperative (Miller et al., 2016; Wilkinson, 2016).

Continual two-way communication

Communities should be involved in developing and tailoring interventions, not only at the beginning of a response, but throughout the entire response. According to the literature, once initial messages were disseminated, it was important to monitor their effectiveness and adjust them as necessary. One option for this was to use barrier analysis, comparing those who had adopted behavior changes with those who had not, to help elucidate barriers to change, uncover perceived positive and negative consequences of behavior changes, and fine tune messages accordingly (Davis & Srinivasan, 2016). Social mobilizers could be used in this process. They could listen for misinformation and rumors, which could then be addressed swiftly (De Roeck, 2016; Turner et al., 2016; World Health Organization, 2015f). Two documents noted that the process of listening to the community, taking their concerns seriously and adapting messages accordingly should continue throughout the emergency (Schoch-Spana et al., 2016; Turner et al., 2016).

An example of all three processes, involving local groups and leaders, tailoring and maintaining two-way communication, was provided by the Community Led Ebola Management and Eradication (CLEME) approach. CLEME started with an assessment of the situation, community mapping, collecting information about caring for the sick and the dead and a walk-through of the community. As a community, interventions were decided upon, tailored for specific groups, and implemented. Contextual analysis, follow-up visits, and feedback shaped intervention adjustments on an on-going basis. Ebola and other health education was then to be integrated into all community programs to prevent future outbreaks (ACF International, 2015). A similar

approach was also found to be effective in relation to other epidemics, such as HIV, tuberculosis, and viral hepatitis (World Health Organization, 2015a).

Barriers to community engagement

The gray literature identified several barriers to community engagement. Top-down communication, stereotyping, and paternalism broke down trust, created fear and alienated communities whose support was critical to a successful response (DuBois, Wake, Sturridge, & Bennett, 2015). Use of force or trying to force change was also counterproductive (Gautier, 2016; Gautier, Hounbedji, Uwamaliya, Jeanne, & Megan, ND; Global Communities Partners for Good, ND; Medecins Sans Frontieres, 2016). Political pressure undermined transparency and trust, as did measures of force, such as placing over a million people under quarantine, or state-enforced cremation (Assessment Capacities Project (ACAPS), 2015b; Medecins Sans Frontieres, 2016; Savoia & Viswanath, 2015).

Another barrier to successful community engagement and uptake of prevention messages was the failure to distinguish evidence-based messages (avoid contact with bodily fluids of infected and dead) from uncertain messages (refrain from eating bush meat). Initial messages warning people not to eat bush meat stimulated mistrust, as local populations recognized that this did not explain Ebola transmission (Balde, 2016; Richards, Amara, Mokuwa, Mokuwa, & Suluku, 2015a, 2015b). This was compounded by the apparent unwillingness of those issuing health messages to admit and explain this error (Richards et al., 2015a). Lack of message coordination further confused the issue (Wilkinson, 2016).

If messages change over time, the reasons for the changes must be explained and puzzling elements clarified (Richards et al., 2015a; Schoch-Spana et al., 2016). Communications need to be candid, open, and honest and uncertainties need to be acknowledged (Schoch-Spana et al., 2016; Turner et al., 2016). Clear distinction should be made between messages that are evidence based, and those that are less certain (Wilkinson, 2016). Messages should be coordinated (Wilkinson, 2016) and communicate confidence while allowing for improved knowledge and changing circumstances (Schoch-Spana et al., 2016; Turner et al., 2016). Their effectiveness should be continually monitored so they may be improved and adapted as needed (World Health Organization, ND).

Some types of apparently community-led activities may also pose barriers to successful community engagement. Gautier noted that despite engagement with local leaders, refraining from shaking hands and respecting safe burial practices remained a challenge (Gautier, 2016; Gautier et al., ND). One could question whether this was due to the intervention still being top-down in that training was provided to community health workers (CHWs) and local leaders, rather than allowing the community to conduct its own assessment and devise their own solutions and protection measures. One report noted that the age (young) of the sensitizers may have negatively impacted the uptake of messages (Gautier et al., ND). It is unclear whether initial training was provided to both CHWs and local leaders together, or if training was provided primarily to (young) CHWs, and only through them to

community leaders. If the latter, this could have represented a continued failure to acknowledge, respect, and work with local leadership.

Barriers to successful engagement and uptake of prevention measures may find their root in a quite different source. Both Gautier reports noted that lack of resources (gloves, boots, financing) hindered implementation of safe burial practices. Both stated that more focus should have been placed on the practicalities of implementation (Gautier, 2016; Gautier et al., ND). Oxfam also noted the need for sanitation supplies, such as bleach, gloves, and boots (Oxfam International, 2015a), and Y Care noted that lack of funding impeded early response (Y Care International, 2016). These reports highlight that the success of behavior change communication can be confounded by lack of resources. This does not necessarily mean the communication has been ineffective.

The less-settled ways of urban areas can make community engagement more difficult than in rural communities. One report noted that the absence of traditional community structures and organizations in urban areas made the work there more challenging (International Rescue Committee (IRC), 2016b). Richards fine-tuned this observation, noting that in rural communities, villagers had “face-to-face social knowledge” of Ebola – they could name everyone who had died or survived and trace the pattern. This and villagers “mutual accountability” helped them understand the necessity of safe practices in regard to the sick and dead. This knowledge and accountability were absent in urban areas where all were “strangers” (Richards, 2015).

Finally, the tone of communication with communities also mattered. When health workers “talked down” to community members, community members did not wish to interact with them and therefore avoided them and the health care facilities. Use of respectful speech by health workers and providing tours of health care facilities helped reduce fear and enabled improved engagement with communities (International Rescue Committee (IRC), 2016a). Other reports also emphasized the importance of treating people respectfully (Oosterhoff et al., ND; World Health Organization, 2015e, 2015g). This respect should include respect for their opinions (Sugg, 2016).

Modes of engagement

As far as specific forms of engagement were concerned, radio was identified as a particularly effective means of accessing communities (Assessment Capacities Project (ACAPS), 2015a, 2015b; Liberia Ministry of Health, 2015; Modarres, 2015; Y Care International, 2016), although De Roeck noted that if specific, limited groups are the target audience, broadcast media may not be the best choice for communication (De Roeck, 2016). House-to-house visits (Assessment Capacities Project (ACAPS), 2015b; Gautier, 2016; Gautier et al., ND; Global Communities Partners for Good, ND; United Nations Global Ebola Response, 2015a; World Health Organization, 2015d; Y Care International, 2016) and religious gatherings (Assessment Capacities Project (ACAPS), 2015b) were also found to be effective. Some reports found that door-to-door visits worked best, followed by the use of drama and dance

(Gautier, 2016; Gautier et al., ND). One should note, however, that modes of communication vary by location and population. What works best for one population may work poorly for another, as the discussion about social media shows.

Social media

The gray literature covered in this rapid review offered little information about the best social media channels and practices for risk communication. Of the 20 documents included as potentially relevant, only 2 (Stalcup, 2016; Sugg, 2016) provided numbers, and even these numbers did not really indicate effectiveness. Other documents described uses of social media, but judging their effectiveness was difficult (Rubyan-Ling, 2015), as they took place in the context of a number of other simultaneous interventions. What these documents can do, is point the direction, showing what these new media forms may be able to do.

That social media are being used is an accepted reality. During the Ebola outbreak, MSF’s online resources and social media saw an upswing of use, as did their blogs and Facebook pages (Peremans, 2016). WhatsApp showed use around Freetown in Sierra Leone (Sustersic, 2015). In New York City, social media were used to counter rumors when Dr. Craig Spencer tested positive for Ebola (McKay, 2015), and one study found that 87% of doctors in Brazil use WhatsApp to communicate with patients, one of the highest rates of such use in the world (Stalcup, 2016). In West Africa, chat apps, especially WhatsApp, were considered better than SMS because they cost less. WhatsApp also proved useful in tracking rumors (Wilkinson, 2016). Other new useful media tools included RapidPro and SMS systems (United Nations Children’s Fund (UNICEF), 2015b). In addition, social media are being used increasingly to monitor what the public is saying about public health issues (Savoia & Viswanath, 2015).

SMS or text messaging was used successfully to track and combat rumors and to communicate with quarantined areas during the Ebola outbreak (Assessment Capacities Project (ACAPS), 2015a, 2015b; Turner et al., 2016). In addition, a collaborative effort between BBC and WhatsApp enabled messages from WHO, UNICEF, and the CDC to be channeled directly to 20 thousand subscribers, most of whom were in West Africa. The Sierra Leonean version of this channel had 15 thousand subscribers by the end of the outbreak (Sugg, 2016). SMS was also used for real-time monitoring (Francia, 2015). Nigeria used mobile phones to disseminate Ebola messages (Kamai-Yanni, 2015), and the government of Sierra Leone chose WhatsApp as one of its official response channels (Rubyan-Ling, 2015).

One innovative feature of social media use during the West African Ebola outbreak was the way it enabled the Sierra Leonean diaspora to play a role in in-country social mobilization. Sierra Leoneans living abroad used Skype, Facebook, and WhatsApp, plus their in-country connections’ smart-phone-enabled Internet access to share information about the outbreak. Facebook discussion groups were also created and used. Although at least initially, some members of the diaspora circulated rumors over social media, some also did their best to communicate accurate messages. Later on, members of the diaspora who were in health professions used social media to mobilize their in-country family,

professional, business, and political connections (Rubyan-Ling, 2015).

The communication potential of social media was perhaps best illustrated by Brazil, where phone use has overtaken television as the main form of media consumption. For good or ill, traditional media and social media are now equal partners in Brazil's media world (Stalcup, 2016).

But the news about social media was not all positive. One report listed social media as sources of Zika-related rumors, as well as a place for ministries of health and other public health bodies to post messages (Health Communication Capacity Collaborative, 2016). This was also true for Ebola (Rubyan-Ling, 2015). And social media's apparent success in urban Sierra Leone should be balanced against the observation that most mobile phone use was concentrated in larger urban areas. Rural areas remained relatively isolated from social media's effects (Rubyan-Ling, 2015).

In addition, documents found that social media suffer from a credibility issue. Although in the United States, most people received Zika information via TV, radio, social media, and blogs, the CDC and family doctors were considered the most credible sources (University of Chicago National Research Center & The March of Dimes, 2016).

Another challenge posed by social media was the difficulty in controlling messages. Once on the loose in cyberspace, video clips or other messages took on cyclical lives of their own, peaking, dying down, then resurfacing. This held true for rumors, as well as official messages (Stalcup, 2016).

Nor did social media necessarily represent the best solution. One study found that people who used conventional media or government sources for their health information were more likely to be knowledgeable about Zika than were those who relied on friends, family or social media for health information (Abramson & Piltch-Loeb, 2016). Another stated that despite the current trend of wanting technology to provide nearly magical solutions to problems, Ebola was a problem that was solved by "brute force", meaning the physical labor of sanitation work and the human contact of social mobilization. It found that, "No form of engagement was more effective than face-to-face discussion, and there are no technological short-cuts for safe burial and body management. This was not a crisis solved by new technologies and innovations, but by an enormous amount of human and other resources" (Global Communities Partners for Good, ND).

These detractors, rather than showing that social media should not be pursued, serve instead as a reminder that conventional media still play a dominant role in most health communication situations. One report expressed this well, advising that the concept of media be expanded to include social media (Schoch-Spana et al., 2016). When it comes to getting messages out, both conventional and social media should be used, rather than just one or the other.

Limitations

The rapid review of gray literature sources for evidence to underpin the risk communications guideline was limited by three things: language, access, and time. Although no documents were excluded based on language, nevertheless language limited this search. Databases and websites were searched using search terms in English, something which biases results in favor of English-

language texts. The search was also constrained by time limits. Gray literature encompasses vast quantities of material. In view of this, the decision was made to allot a fixed amount of time to the search and to focus on the most promising and richest sources. Lastly, the search was restricted to publicly available databases (free access).

Conclusion

Although yielding only sparse results in terms of studies and hard data, the rapid review of gray literature provided a wealth of contextualizing information, particularly in relation to community engagement, trust-building, and use of social media. In general, findings from the gray literature mirror those of the systematic reviews conducted as part of the risk communication guideline development process (Eckert et al., 2016; Novak et al., 2016; Sopory et al., 2017). The primary difference is that while these reviews found little to no evidence from Africa, the majority of the gray literature was based on African experiences, and as such, provided an additional perspective and helped fill a gap in the evidence.

The gray literature showed that going local plays a central role in effective emergency communication, from engaging with and building on local leadership and organizational structures, to using local staff, communication patterns, networks and languages, to tailoring interventions for local communities. From initial assessment to intervention evaluation and feedback, the more that is controlled and executed by the local community, the greater the intervention's uptake and impact will be. In addition, although varying from place to place, the importance of including social media in emergency risk communication strategies is growing. Finally, the gray literature indicates movement toward greater recognition emergency risk communication as a vitally important element of public health.

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Appendix 1 Emergency risk communication gray literature rapid review: Search terms and results by database

The tables below present keyword search terms used and results returned by database.

GreyLit.org

Keyword	Results returned	Included
Risk communication	9	0
Disaster	64	8
Social media	9	0
Uncertainty	5	0
Communication fund*	21	1
Communication finance*	7	1
Ebola	70	49
Advocacy	17	0
Budget	22	0 new (1 redundant)
Catastrophe communication	1	0
Catastrophe	6	0
Communication	94	4 new (many redundant)
Cell phone	2	0
Civil defense	8	3 (2 from bibliographies)
Communicating uncertain*	0	
Communication plan	18	0 new (some redundant)
Community acceptance	1	0 new (redundant)
Community compliance	0	
Community engagement	42	1
Community motivation	4	0 new (1 redundant)
Community participation	32	0 new (1 redundant)
Computer mediated communication	0	
Credibility	0	
Crisis	34	0 new (redundant)
Crises	8	0 new (redundant)
Cyclone	1	1
Disaster plan	17	1 new (redundant)
Disaster preparedness	48	4 new, some links, redundant
Disaster	64	0 new (redundant)
Disease outbreak	39	0 new (redundant)
Earthquake	1	0
Electronic communication	2	0
Emergency	116	4 new (redundant)
Emergency communication	39	0 new (redundant)
Emergency management	17	0 new (redundant)
Emergency planning	30	0 new (redundant)
Emergency preparedness	54	0 new (redundant)
Epidemic	34	0 new (redundant)
Facebook	0	
Financing	48	0 new (redundant)
Flood	1	0
Risk communication funding	4	1
Communication funding	21	0 new (redundant)
Mobilization funding	5	0 new (redundant)
Awareness funding	3	0
Preparedness funding	45	0 new (redundant)
Funding	241	0 new (redundant)
Governance	138	2 new (redundant)
Government	138	0 new (redundant)
Hazard communication	2	0 new (redundant)
Hazard	6	0 new (redundant)
Health alert	1	0 new (redundant)
Health announc*	4	0
Health authorities	38	0 new (redundant)
Health campaign	14	0 new (redundant)
Health communication	85	0 new (redundant)
Health protection info*	25	0 new (redundant)
Health recommendations	64	0 new (redundant)
Human influenza	72	0 new (redundant)
Hurricane	1	0
Information dissemination	0	
Interpersonal communication	0	
Journalism	41	0 new (redundant)
Mass media	5	0
Media	24	1 new (redundant)
Medical information	47	1 new (redundant)
Messages	7	0

(Continued)

(Continued).

Keyword	Results returned	Included
Mitigation	18	0 new (redundant)
Mobile	15	0 new (redundant)
Motivation	9	0 new (redundant)
Multimedia	0	
Natural disasters	4	0
News media	3	0
New media	8	0 new (redundant)
News	47	0 new (redundant)
Organizational communication	0	
Outbreak	43	0 new (redundant)
Pandemic	25	0 new (redundant)
Preparedness	59	0 new (redundant)
Public awareness	8	0
Public notice	2	0
Public participation	41	0 new (redundant)
Risk communication	9	0 new (redundant)
Risk management	16	0 new (redundant)
Risk reduction behavior	1	0
Risk	106	0 new (redundant)
Public health	380	0 new (redundant)
Public information	140	0 new (redundant)
Safety	139	0 new (redundant)
SMS	0	
Social media	9	0
Spokesperson/people	0	
Staff capacity	2	0 new (redundant)
Staff development	9	0
Staff retention	0	
Telecommunications media	0	
Text message	0	
Texting	5	0
Threat	32	0 new (redundant)
Timing	121	0 new (redundant)
Trust	75	0 new (redundant)
Tweet	0	
Twitter	1	0
Warning	5	0 new (redundant)
Zika	21	0 new (redundant)

Worldcat.org

Advocacy	470	(first 50 nothing relevant)
Education 58		0
Sociology 10		0
Medicine 7		0
Political science 7		0
Hlth prof/pub hlth 2		0
Comm. Disease 1		0
Awareness	3028	(first 100 nothing relevant)
Education 232		0
Medicine 94		0
Sociology 51		1
Psychology 28		0
Political science 7		0
Anthropology 5		0
Hlth prof/pub hlth 3		0
Biological science 2		0
Med by discipline 1		0
Ebola	107	2

Opengrey.eu

Advocacy	0
Awareness	0
Budget	0
Catastrophe communication	0
Cell phone	0
Ebola	0
Civil defense	0
Communicating uncertainties	0
Communication	0

Note: Searches yielded results only up through 2012. I have asked Tomas if Opengrey stopped updating at that point, because if so, this would place it outside our scope in terms of time (2015-2016).

Evidenceaid.org

Advocacy	2	0
Awareness	0	
Budget	0	
Catastrophe	In	● 1 potentially relevant study in process
communication	process	● Links to other sites that might have relevant documents

Note: Evidenceaid does not list the total number of retrieved documents. It also breaks them up into different categories. This makes presenting a total number of hits difficult. For this reason, it has been omitted.

Disasterlit.nlm.nih.gov

Ebola communication	40	7
Zika communication	5	1
Zika risk communication	35	0
Risk communication	35	0
Risk communication AND Ebola	5	0

Appendix 2 Emergency risk communication gray literature rapid review document appraisal summary

Author	AACODS - Source Credibility				CASP - Qualitative Evaluation			Modified BMJ Questionnaire - Methodological Concern				MMAT - Methodological Concern			
	Low	Moderate	High		Low	Moderate	High	No Concern	Minimal Concern	Moderate Concern	Serious Concern	No Concern	Minimal Concern	Moderate Concern	Serious Concern
Abramson, D & Piltch-Loeb, R		x									x				
ACF International		x													
Adams, V, et al		x													
Allie, M-P, et al			x												
Anoko, JN		x													
Assessment Capacities Project (ACAPS) (2015a))			x												
Assessment Capacities Project (ACAPS) (2015b))			x												
Balde, A			x												
Bastide, L			x												
Bristol, N & Millard, C		x													
Davis, T & Srinivasan, A			x												
De Roock, D			x												
DuBois, M, et al			x												
Francia, M		x													
Gautier, L			x												
Gautier, L, et al			x												
Global Communities Partners for Good Health Communication Capacity Collaborative		x													
Hird, T & Linton, S			x												
Independent Monitoring Board of the Global Polio Eradication Initiative			x												
Institute of Development Studies (IDS)		x													
International Federation of Red Cross and Red Crescent Societies (IFRC)		x													
International Rescue Committee (IRC) (2016a))		x												x	
International Rescue Committee (IRC) (2016b))		x													
Jones, T, et al		x												x	
Kamai-Yanni, M		x													
Korkoyah Jr, DT & Wreh, F			x												
Liberia Ministry of Health			x												
McKay, J			x												
Medecins Sans Frontieres (MSF)	x														
Miller, L, et al		x													
Modarres, N (limited lit interaction)		x													
Oosterhoff, P			x												
Oosterhoff, P, et al			x												
Oxfam International (2015a)		x													
Oxfam International (2015b)		x													
Peremans, M (sources not provided)		x													

(Continued)

Appendix 3. Community engagement methods summary

	Engage local leader-ship and key people ^a	Tailor interventions to fit population, gender, & circumstances, language	Use locals as mobilisers	Community creates own interventions	Engage local groups ^a	Listening & 2-way communication	Use local media	On-going monitoring & evaluation (feedback)	Use anthropological assessments	Start communication early	Use visual aids, role plays, & story-telling	Decisions made at local level	Community conducts own outbreak analysis
Number of documents	31	26	16	15	15	15	12	11	10	8	6	3	3
ACF (ACF International, 2015)													
Adams (Adams et al., 2016)													
Allie (Allie et al., 2016)													
Anoko (Anoko, ND)													
ACAPS Liberia (Assessment Capacities Project (ACAPS), 2015a)													
ACAPS Sierra Leone (Assessment Capacities Project (ACAPS), 2015b)													
Balde (Balde, 2016)													
Bristol (Bristol & Millard, 2016)													
Davis (Davis & Srinivasan, 2016)													
De Roock (De Roock, 2016)													
Francia (Francia, 2015)													
Gautier Analysis (Gautier, 2016)													
Gautier Preparing (Gautier et al., ND)													
Global Communities (Global Communities)													
Partners for Good, (ND)													
Hird (Hird & Linton, 2016)													
Independent Monitoring Board (Independent Monitoring Board of the Global Polio Eradication Initiative, 2015)													
Institute of Development Studies (Institute of Development Studies (IDS), ND)													
IFRC (International Federation of Red Cross and Red Crescent Societies (IFRC), 2015)													
IRC (International Rescue Committee (IRC, 2016a)													
Korkoyah (Korkoyah & Wreh, 2015)													
Liberia MOH (Liberia Ministry of Health, 2015)													
Medecins Sans Frontieres (Medecins Sans Frontieres, 2016)													
Miller (Miller et al., 2016)													
Modarres (Modarres, 2015)													
Oosterhoff (Oosterhoff, 2015)													
Oosterhoff (Oosterhoff et al., ND)													
Oxfam Ebola is still here (Oxfam International, 2015a)													
Oxfam Prioritising (Oxfam International, 2015b)													
Peremans (Peremans, 2016)													
Quinn (Quinn, 2016)													
Schoch-Spana (Schoch-Spana et al., 2016)													
Sugg (Sugg, 2016)													
Sustersic (Sustersic, 2015)													
Turner (Turner et al., 2016)													

(Continued)

Appendix 3. (Continued).

	Engage local leader-ship and key people ^a	Tailor interventions to fit population, gender, & circumstances, language	Use locals as mobilisers	Community creates own interventions	Engage local groups ^a	Listening & 2-way communication	Use local media	On-going monitoring & evaluation (feedback)	Use anthropological assessments	Start communication early	Use visual aids, role plays, & story-telling	Decisions made at local level	Community conducts own outbreak analysis
UK House of Commons (United Kingdom House of Commons International Development Committee, 2016)													
UNICEF (United Nations Children's Fund (UNICEF), 2015a)													
UNICEF (United Nations Children's Fund (UNICEF), 2015b)													
UN General Assembly (United Nations General Assembly, 2016)													
UN Global Ebola Response (United Nations Global Ebola Response, 2015a)													
UN Global Ebola Response (United Nations Global Ebola Response, 2015b)													
United States EPA (United States Environmental Protection Agency (EPA), 2015)													
University of Minnesota (University of Minnesota, 2015)													
Wilkinson (Wilkinson, 2016)													
WHO Accelerating (World Health Organization, 2015a)													
WHO Ebola Interim Assessment Panel (World Health Organization, 2015b)													
WHO Ebola Virus Disease (World Health Organization, 2015c)													
WHO One Year Into (World Health Organization, 2015d)													
WHO Report of the Ebola Interim (World Health Organization, ND)													
World Vision (World Vision, 2016)													
Y Care (Y Care International, 2016)													

^aSee additional table below for specific leaders and groups to engage.

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Appendix 4 People & groups to engage

	Religious leaders	Traditional leaders, chiefs, elders	Women & Women's groups	Other local authorities or leaders	Health Workers	Youth groups	Traditional healers	Survivors	Others (hunters, taxi, market groups, hospitality industry)
Number of documents	18	16	11	11	10	9	7	4	5
ACF International (ACF International, 2015)									
Allie (Allie et al., 2016)									
Anoko (Anoko, ND)									
ACAPS Liberia (Assessment Capacities Project (ACAPS), 2015a)									
ACAPS Sierra Leone (Assessment Capacities Project (ACAPS), 2015b)									
Davis (Davis & Srinivasan, 2016)									
Gautier Analysis (Gautier, 2016)									
Gautier Preparing (Gautier et al., ND)									
Korkoyah (Korkoyah & Wreh, 2015)									
Modarres (Modarres, 2015)									
Oosterhoff (Oosterhoff et al., ND)									
Oxfam (Oxfam International, 2015a)									
Quinn (Quinn, 2016)									
Schoch-Spana (Schoch-Spana et al., 2016)									
UK House of Commons (United Kingdom House of Commons International Development Committee, 2016)									
UNICEF Battling for zero (United Nations Children's Fund (UNICEF), 2015a)									
UNICEF Hot Spot Busters (United Nations Children's Fund (UNICEF), 2015b)									
UN General Assembly (United Nations General Assembly, 2016)									
UN Global Ebola Response (United Nations Global Ebola Response, 2015a)									
University of Minnesota (University of Minnesota, 2015)									
Wilkinson (Wilkinson, 2016)									
WHO Ebola Virus Disease (World Health Organization, 2015a)									
WHO Emergency Reform (World Health Organization, 2015b)									
WHO Strategic Response Plan (World Health Organization, 2015c)									
WHO Report (World Health Organization, ND)									
World Vision (World Vision, 2016)									
Y Care (Y Care International, 2016)									

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