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The Use of Social Media in Disaster Preparedness: A Special Studies Project

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The Use of Social Media in Disaster Preparedness: A Special Studies Project

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2013

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An abstract of
A thesis submitted to the Faculty of the
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Abstract

The Use of Social Media in Disaster Preparedness: A Special Studies Project

By Amanda Nguyen

The rise of social media as an information and communication technology (ICT) tool has led to growing innovation in public health, especially disaster preparedness and response. The emergence parallels the growth of Web 2.0 applications and mobile-device users worldwide. Social media has been heavily leveraged in disaster response and recovery. Diverse functionalities include attaining situational awareness, crowdsourcing data, crisis mapping, and addressing rumors and misinformation. Yet for disaster preparedness, there remain untapped opportunities.

This special study project focuses on building a body of work on disaster preparedness that does and could (should) exist in the social media landscape. The purpose of this special study project is to create a social media toolkit; designed to explore the benefits, challenges, issues, tensions, and innovations of social media technologies for disaster preparedness and risk reduction. The objectives are to develop a social media communications strategy; create a compendium of blog posts and accompanying social media marketing materials; and design an evaluation framework to monitor and evaluate social media activity and engagement.

The development of the social media toolkit is grounded in best practices for health communication. An exploratory search of organizations and agencies working in disaster preparedness and response, disaster risk reduction, and public health emergencies was conducted to identify influencers, whether individuals or organizations, in these fields. A literature review of published literature and gray literature was also conducted to identify topic areas for content development.

This work offers a justification for the merits of social media in preparedness and response, and calls for the continued exploration of social media to harness its merits and uniqueness as drivers of innovation and growth in disasters and emergencies. The demonstration of leveraged (and the lack thereof) social media during non-disaster times will contribute to the existing body of work of disaster preparedness and response. Future research should evaluate social media platforms to identify which platforms are most effective and valuable to the public for disaster preparedness.

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Chapter 1: Introduction

Introduction and rationale

The rise of social media as an information and communication technology (ICT) tool has led to growing innovation in public health, especially disaster preparedness and response. The emergence parallels the growth of Web 2.0 applications and mobile-device users worldwide. The novelties of social media lie in its interactive, collaborative, and multi-functional nature. These merits have been utilized in disaster response, but not thoroughly explored in disaster preparedness (which leads to little or poor social media presence during the response).

Social media emerged from Web 2.0; introducing social networking applications that cultivate interoperability, sharing, and multi-way communication (Dufty, 2015). In contrast to the Web 1.0 where internet website pages were published in one-way communication, Web 2.0 fosters multi-way creating, sharing, and collaboration of user-generated content (Thackeray, Neiger, Hanson, & McKenzie, 2008). Along with the rise of Web 2.0, the use of mobile devices has grown rapidly. The percentage of Americans owning a smartphone rose from 35% in 2011 to 77% in 2016 (Pew Research Center, 2017). More broadly, almost 95% of Americans own a mobile device of some kind (Pew Research Center, 2017). Globally there are 4.61 billion mobile-device users, projected to increase to 5.07 billion by 2019 (eMarketer & AP, 2015). The emergence of Web 2.0 technology and mobile-device users cultivates the environment for social media to flourish.

Social media consists of "all the devices and platforms that allow users globally to create and share information with each other virtually" (Gupta & Brooks, 2013). Platforms are spaces where users create and share information; devices allow users access to social media. Another unique characteristic of social media activity is the opportunity for users to interact, connect, and

network on social media platforms. Because of its decentralized and collaborative nature, social media offers a rich user experience.

Social media has been employed during disaster response and recovery, but remains underutilized in preparedness (Dufty, 2015). During response and recovery, social media has provided situational awareness and crowdsourced data, disseminated information, and delivered warning messages (Hadi & Fleshler, 2016). Implementing social media strategies prior to a disaster to encourage preparedness is underdeveloped.

The increase of mobile devices and social media suggest a captive audience is present and there are existing communication channels to reach them. This opportunity has been leveraged for disaster response and recovery, but have not been fully explored for disaster preparedness. Social media technologies have enhanced and enabled the communications landscape in public health; but there remain untapped opportunities during each phase of the disaster cycle, like preparedness.

Problem statement

Using social media during emergency response and recovery efforts is growing. Social media has been leveraged during disaster response and recovery efforts as an ICT tool. During a response, it can provide situational awareness, deliver warning messages, communicate risk information, and crowdsource data.

However, social media use during non-disaster times is in its infancy. Social media technologies are underutilized to deliver messages that promote disaster preparedness and risk reduction. The diverse functionalities of social media are not utilized to their potential to deliver health messaging before a disaster. This special study project focuses on building the body of work on disaster preparedness that does and could (should) exist in the social media landscape.

Purpose statement

The purpose of this special study project is to create a social media toolkit; designed to explore the benefits, challenges, issues, tensions, and innovations of social media technologies for disaster preparedness and risk reduction. The objectives are to …

1. develop a social media communications strategy.
2. create a compendium of blog posts and accompanying social media marketing materials.
3. design an evaluation framework to monitor and evaluate social media activity and engagement.

Significance statement

The demonstration of leveraged (and the lack thereof) social media during non-disaster times will contribute to the existing body of work of disaster preparedness and response. More broadly, this work offers a justification for the merits of social media in preparedness and response and calls for the continued exploration of social media and mobile technologies during public health emergencies and disasters.

Definition of terms

Disaster: serious disruption of the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (United Nations International Strategy for Disaster Reduction, 2009).

Disaster resilience: ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic

structures and functions through risk management (United Nations International Strategy for Disaster Reduction, 2009).

Disaster risk reduction: concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (United Nations International Strategy for Disaster Reduction, 2009).

Public health emergency: occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human facilities or incidents or permanent or long-term disability (World Health Organization, 2008).

Social media: all the devices and platforms that allow users globally to virtually create and share information with each other. “Platforms” are the virtual spaces that allow users to come together, and create and share information. “Devices” are the computing technologies that enable users to access the platform (Gupta & Brooks, 2013).

Chapter 2: Literature Review

Within the context of the health events linked to disasters and public health emergencies, social media functionalities and limitations are explored.

Disasters and Public Health Emergencies

A disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (United Nations International Strategy for Disaster Reduction, 2009). There are four phases of a disaster: preparedness; response; recovery; and mitigation (Congressional Research Service, 2012). Disasters can be classified as natural or technological. A natural disaster is caused by naturally-occurring hazards; a technological, or man-made, disaster is caused by a result of human actions or technological failures (United Nations International Strategy for Disaster Reduction, 2009). The number of natural and technological disasters have been increasing since 1950, but reached a peak and then began decreasing around 2000 (Figures 1-2).

A public health emergency is characterized by an occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human facilities or incidents or permanent or long-term disability (World Health Organization, 2008). Recent public health emergencies include the Ebola outbreak 2014 and Zika outbreak in 2016.

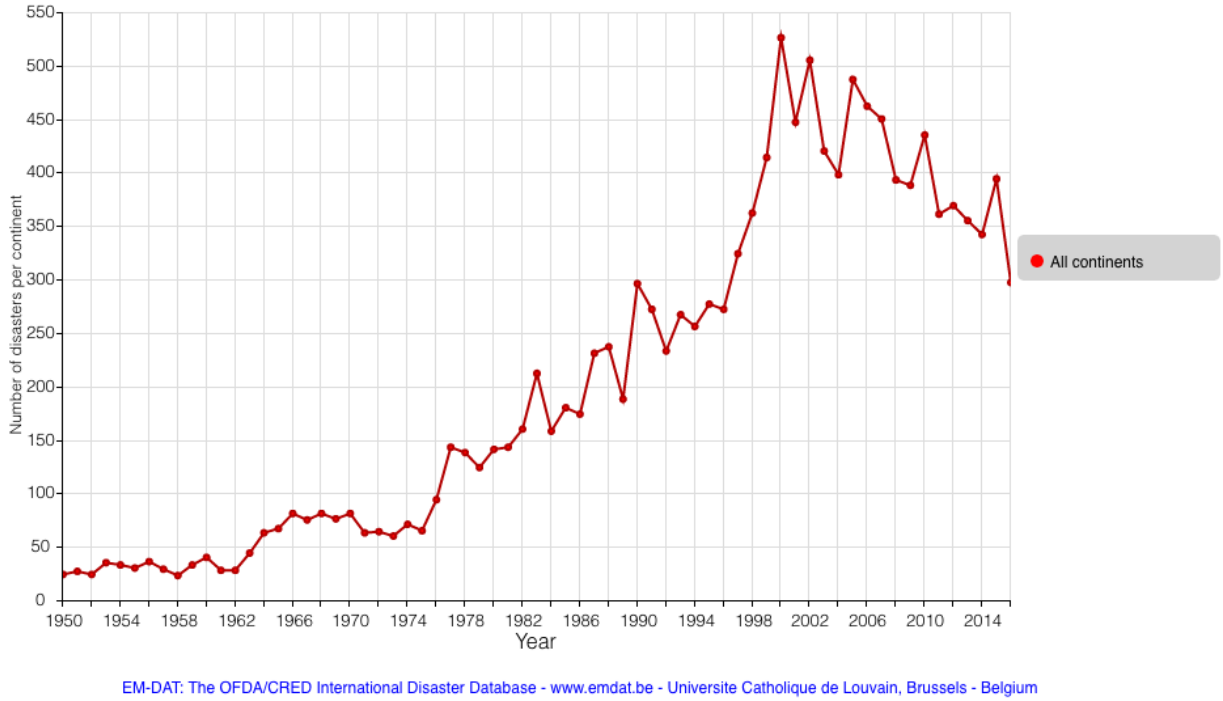

Figure 1: Reported Natural Disasters, 1950 – 2016

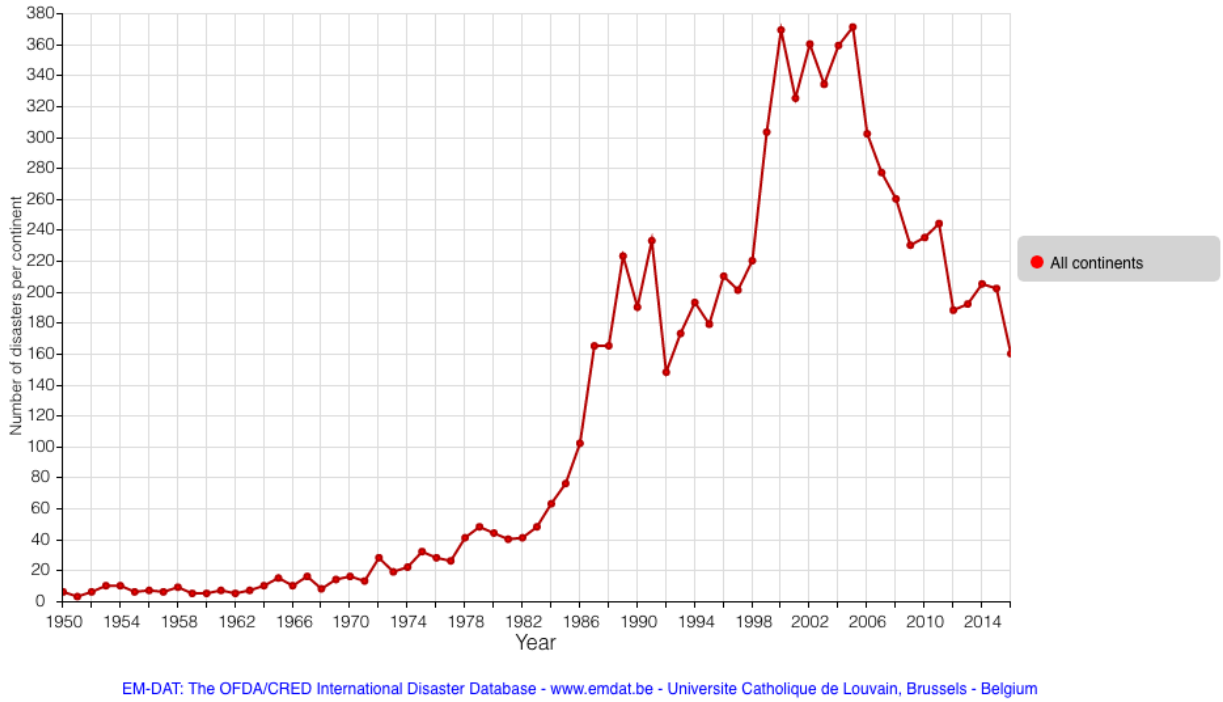

Figure 2: Reported Technological Disasters, 1950 – 2016

Social Media

Social media emerged from the simultaneous growth of Web 2.0 and mobile device use. Because of the decentralized and collaborative nature of social media, social media has revolutionized communication structures from one-way to multidirectional networks. In the United States, trends of social media adoption occur among younger, more educated, higher income, and more urban populations.

From an internet-user perspective, Web 2.0 has two primary components, distinguishing itself from Web 1.0 (Blank & Reisdorf, 2012). Web 2.0 capitalizes on network effects, which is the concept that there is more value in something when more people participate. Secondly, Web 2.0 utilizes platforms, which are virtual spaces where users can create, modify, and share content (Gupta & Brooks, 2013). Blank and Reisdorf further demonstrate that the platform and network effect are closely connected. The platform offers structure for communication on Web 2.0, and the network effect develops when many users find the platform valuable. As more users continue to increasingly create, modify, and share content on a platform deemed valuable, new forms of engagement, communication, and information gathering emerge. Blank and Reisdorf succinctly define Web 2.0 as, "using the Internet to provide platforms through which network effects can emerge."

Mobile device ownership has grown in parallel with the emergence of Web 2.0. From 2011 to 2016, the percentage of Americans owning a smartphone has risen from 35% to 77% (Pew Research Center, 2017). More broadly in the United States, almost 95% of Americans own a mobile device of some kind (Pew Research Center, 2017). Globally there are about 4.61 billion mobile device users, which is projected to increase to 5.07 billion users by 2019 (eMarketer & AP, 2015).

Leveraging the synergy between platforms and network effects on Web 2.0 combined with the rise of mobile device use, social media enters the equation. Social media consists of "all the devices and platforms that allow users globally to create and share information with each other virtually" (Gupta & Brooks, 2013). Platforms are virtual spaces where users can network with each other by creating, modifying, and sharing content. Examples of social media platforms include Facebook, Twitter, Instagram, and LinkedIn. Devices are the piece of the technology, including but not limited to mobile devices, computers, and tablets, that allow the user to access social media platforms.

Social media offers a multidirectional communication landscape by building a communication environment that encourages participation, collaboration, and openness (W.-y. S. Chou, Prestin, Lyons, & Wen, 2013; Eysenbach, 2008; Kreps & Neuhauser, 2010). Because of the interactive communication environment, social media users can simultaneously be content creators and content consumers. Thus, social media can also be characterized as decentralized, networked, and community-driven (Keim & Noji, 2011).

Among the United States adult population, the following demographic trends describe social media users. Pew Research Center analyzed 27 national surveys to examine social media use among the American adult population (2015). Young adults aged 18 – 29 were most likely to use social media; 90% of this age use it. Women use social media (68%) more than men (62%), as do those more highly educated. Roughly 76% of college graduates used social media compared to 54% who have a ≤ high school diploma. Those living in higher-income households were more likely to use social media; 78% living in a household earning at least $75,000 used social media compared 56% of those in a household earning < $30,000. Those living in rural areas have historically been least likely to use social media; 58% of rural residents used social

media compared to 64% of their urban counterparts. Social media adoption was comparable in terms of race and ethnicity; 65% of both whites and Hispanics use social media, and 56% of African-Americans use social media. Age is the greatest predictor of social media usage; however, social media use is not uniformly distributed across age groups (Blank & Reisdorf, 2012; W. Y. Chou, Hunt, Beckjord, Moser, & Hesse, 2009). Overall, 65% of American adults use social media, which has risen dramatically from 7% in 2005 (Pew Research Center, 2015).

Social Media in Disasters and Public Health Emergencies

In disasters and public health emergencies, social media has been used as a knowledge management platform and as a tool for ICT. As a knowledge management platform, social media is used to manage and share information. As an ICT tool, it is used to disseminate information.

Yates and Paquette demonstrate how social media technologies have been utilized to support knowledge management during the aftermath of the 2010 Haiti Earthquake (2011). In response to the earthquake, the U.S. government utilized social media, such as wikis and collaborative workspaces like SharePoint, as mechanisms to share and exchange knowledge. Yates and Paquette posit that the manner in which social media is exchanged resembles how information is exchanged during a disaster response. The information currency of a disaster response is information packaged in "knowledge chunks" – text messages, images, videos, blog posts, and weblinks. This closely resembles how content is shared on social media platforms. As a knowledge management platform, social media is flexible yet has robust knowledge structures to store and share information, which aligns itself well with how knowledge is managed during a disaster. In terms of the response for the Haiti Earthquake, U.S. government agencies used SharePoint to share information between functional staff groups and within a group. As a result, SharePoint dissolved the siloes between functional staff groups and removed the need for formal

liaison structures between staff groups. The implications of this are much broader than the benefits of social media used at an organizational level. Social media cultivated awareness regarding who, what, where, and how to access information, meaning that more complete knowledge can be attained to inform and speed up decision-making cycles during a response.

There are also unique approaches on managing information during public health emergencies, particularly the West African 2014 Ebola outbreak (Hossain, Kam, Kong, Wigand, & Bossomaier, 2016). Hossain, et al. recognize that social media has been identified as a serious knowledge management platform and social media analytics offer value for early disease detection and public health surveillance (PHS). Since the world is becoming increasingly interconnected, a localized problem can propagate quickly and easily become a global problem, if not addressed and contained appropriately. There is a disconnect in the sharing of information from a local setting to the hierarchical system, preventing PHS to be proactive in responding to public health emergencies. Hossain, et al. proposed developing an "open infrastructure for data sharing and access and *ad hoc* locally situated support systems" in the hopes of integrating formal and community-based networks to facilitate information sharing and knowledge management. Social media would be a complementary tool to foster such engagement.

As an ICT tool, social media platforms are used to disseminate information. Keim and Noji discussed the implications on the organizational structure of disaster response (2011). The rise of social media led to a shift from "unidirectional, official-to-public information broadcasts" to a multidirectional flow of information via social interactions (Keim & Noji, 2011). Social media users simultaneously becoming content creators and content consumers support the democratization of knowledge and information. The integration of social media as an ICT tool with crisis communication models lends to communication models that are transforming to be

scalable, adaptive, decentralized, and multidirectional. The broader implications suggest that more populations can receive pertinent information during a disaster that can protect them from harm and offer life-saving information.

Social Media Adoption in Response and Recovery

Social media has been heavily leveraged in response and recovery activities. Diverse functionalities include attaining situational awareness, crowdsourcing data, crisis mapping, and addressing rumors and misinformation.

Monitoring social media activity for situational awareness after a disaster or emergency is critical to support informed decision-making. Implementing a social media monitoring system to collect pertinent, timely, and accurate information to share with emergency managers can help guide decision-making cycles (Hadi & Fleshler, 2016). Alexander notes that social media offer listening and monitoring functions (Alexander, 2014). The listening function entails assessing social media activity to gauge public opinion and preferences. Collecting such information is the most passive level of engagement. Monitoring an event is done to use the collected information to inform and better manage public perception.

Crowdsourcing data takes advantage of social networks and encourages social media users to contribute data to inform a specific public health outcome. The success of crowdsourcing requires an existing level of social capital and community of users to contribute data (Alexander, 2014). Mehta, Bruns, and Newton explored social media and crowdsourced data as facilitators for trust building between emergency management organizations and the public (2016). Information verification processes and networks of interpersonal trust among users exist on social media platforms. Rather than quickly building trust relationships, emergency organization can tap into these existing processes and trust networks to funnel the

collection and verification of disaster-related data. Leveraging a large and existing user base allows emergency organizations to gather data that may not be feasible under intense time constraints. With a large user base, more data verification processes would occur encouraging reliability and accuracy data. This function of social media lends to more complete data to inform decision-making.

Along a similar vein to crowdsourcing data is crisis mapping, which further advances crowdsourcing by spatial analyses. Crisis mapping offers data pertaining but not limited to accessible roads, fallen power lines and dangerous hazards, shelter locations, and resource distribution sources which can better inform decision-making (Alexander, 2014). Ushahidi is an open-source, free-access crisis mapping platform used during the aftermath of the 2010 Haiti Earthquake. Volunteers provided information about building collapses, medical emergencies, and where people were trapped, which were plotted on a map with GPS coordinates (Mehta et al., 2016). By offering a visual understanding of a disaster, crisis mapping can inform situational awareness.

Because of the decentralized and interactive nature of social media, rumors and misinformation can spread quickly in the absence of credible sources and complete information. Government agencies can employ social media to directly reach the public and address rumors and misinformation. Routine and timely updates from official sources during a response will help manage misinformation, reduce speculation, and build trust (Hadi & Fleshler, 2016). In the absence of doing so, online conversations can perpetuate inaccurate information, mislead public perception, and derail public trust in the government. Using social media as a communication channel to deliver routine and timely updates can address rumors and manage misinformation.

Social Media Adoption in Preparedness and Prevention

Before a disaster occurs, social media has been adopted to deliver warning messages and implement public awareness strategies as part of disaster preparedness and prevention efforts. Disaster warning messages can be disseminated via social media platforms. Disaster organizations such as the Federal Management Agency (FEMA) or the National Weather Service (NWS) have delivered disaster warning messages using social media platforms such as Facebook and Twitter (Houston et al., 2015). Social media also offers the capability for disaster warning messages to be distributed to populations with a device in a specified geographic area. Tailoring such alerts by location allows organizations to target messages to populations located in specific at-risk areas. Samarajiva noted that the capacity to receive and translate hazard detection and monitoring information into credible, accurate, and timely warning messages is essential for effective disaster preparedness (2005). Social media offers the capacity to deliver alerts and warnings with the purpose of detecting disasters.

Dufty examined the adoption of social media in public awareness strategies for disaster preparedness and prevention (2015). In the United States, *Ready* is a national public service campaign aimed to increase the level of basic preparedness by educating and empowering Americans to prepare and respond to natural and technological disasters. The campaign disseminated messages through social media platforms in addition to traditional media outlets (Dufty, 2015). SF72 is an emergency preparedness initiative in San Francisco, California launched by the San Francisco Department of Emergency Management (SFDEM). SF72 leverages existing social networks within the community and encourages community members to begin connecting to resources, partners, and organizations prior to a disaster, so that these connections are already established once a disaster occurs. SF72 offers information on necessary

supplies, a customizable emergency plan, and approaches for citizens to begin establishing connections (San Francisco Department of Emergency Management, 2015).

Limitations of Social Media Use

Challenges of social media use in disasters are privacy invasion, management of misinformation, and training and resources for emergency managers. Emergency managers or personnel who are monitoring social media and developing social media messaging will also need to consider the challenges of reaching marginalized and underserved populations.

Emergency managers will have a large role in mitigating the challenges of social media use. Privacy invasion and unauthorized dissemination of personal information are risks of a web-based system of public mass communication (Alexander, 2014). Emergency managers will have to balance the ethics of whether social media activity lends to a "benign or malign influence on public safety and security" (Alexander, 2014). Managing misinformation will be particularly troublesome considering the sheer volume of information and data on social media platforms. There are also several obstacles implementing social media among emergency managers. External challenges include causes of fear, uncertainty, and doubt; external challenges include staffing and resource, policies, and institutional infrastructure (McCormick, 2016).

One of the limitations of widespread social media use is the ability to reach marginalized and underserved populations. There are inequalities in internet access, mobile technologies, and computer literacy (W.-y. S. Chou et al., 2013). Populations most in need of support and resources may have the least access to social media (Murthy, 2011). Even with the rise of social media, emergency managers will need to ensure that hard-to-reach populations continue to receive disaster-related messaging.

Project Relevance

Social media use in preparedness and prevention is not as diverse or comprehensive compared to response and recovery efforts. Considering the underutilization of social media, this social media toolkit is a demonstration of leveraging social media during non-disaster times. It contributes to the literature reviewed by building the body of work on disaster preparedness and prevention existing in the social media landscape.

Chapter 3: Methods

The methods to develop the social media toolkit are grounded in best practices for health communication.

Communication Strategy Development

Prior to developing content for the DisasterDoc blog, a social media communication strategy was first developed as guidelines. Adapted from the "Health Communicator's Social Media Toolkit" developed by the CDC (Centers for Disease Control and Prevention, 2011), the following components were identified:

- Target audience
- Social media objectives
- Communication needs
- Goal integration
- Message development
- Tone
- Social media tools

The target audience was segmented into primary and secondary audiences. The audiences were identified by examining the beneficiaries of DisasterDoc materials and services. The social media objectives were designed to deliver health messaging to complement the mission of DisasterDoc, which was to "help experts and everyday people better understand disasters so that they can protect themselves, their families and their communities." The audience communication needs were identified by examining research conducted on the uptake of social media tools by emergency managers. Research such as McCormick's assessment of barriers to use and implement social media tools among emergency managers was used to inform audience

communication needs (McCormick, 2016). The goal integration component was developed to demonstrate how the social media objectives complement DisasterDoc's mission and meet the audience communication needs. Message development was crafted to provide key messages based on the audience objectives. The tone of key messages and content as well as social media tools were identified.

Content Development

CDC developed the "CDC's Guide to Writing for Social Media," which offered guidance for creating social media messages in health promotion campaigns and emergency response efforts (Centers for Disease Control and Prevention, 2012). It offered best practices for writing for specific social media channels, and more broadly aimed to tailor messages to encourage audience interaction and engagement. The social media toolkit incorporated these best practices into content development.

After identifying the target audience, social media objectives, and communication needs, a literature review of published literature and gray literature was conducted to identify topic areas for each blog post. An exploratory search of organizations and agencies working in disaster preparedness and response, disaster risk reduction, and public health emergencies was also conducted. These searches were conducted as part of a scan of the social media environment in these fields to identify the influencers, whether individuals or organizations, and to assess what topics are being discussed. This assessment of the blogosphere, as described by CDC, was performed to guide the development of blog content.

Evaluation Framework Development

CDC's Health Communicator's Social Media Toolkit provided guidelines for developing a framework to evaluate social media activities. These were utilized to inform the development of an evaluation framework of social media communication efforts.

The following components of the evaluation framework were identified – inputs, activities, outputs, outcomes, and the communication objective. After identifying these components, indicators were created to measure outputs and outcomes. Monitoring indicators were identified by assessing social media metrics and key performance indicators that have been used to measure social media activity and engagement. Evaluation indicators were guided by the objectives of the social media communications strategy. Approaches for measuring indicators were also identified.

Chapter 4: Results

Social Media Toolkit

The social media toolkit (SMT) includes a social media communications strategy, a compendium of blog posts and accompanying social media marketing materials, and an evaluation framework. The following is an overview of each blog post:

- *Building Resiliency*: The concept of resiliency in disaster management is introduced and the shift in resiliency from an outcome-oriented approach to a process-oriented approach is explored. The nuances between community resilience and health resilience are examined.
- *The Road to Sendai Part I*: Early global frameworks for framing policies and discussions regarding disaster risk management are outlined. The Hyogo Framework for Action: Building the Resilience of Nations and Communities to Disasters is introduced, and the emerging themes and context contributing to the framework are addressed. The expected outcome, priorities for action, challenges, and implications of the Hyogo Framework are discussed.
- *The Road to Sendai Part II*: The Sendai Framework for Disaster Risk Reduction is the successor to the Hyogo Framework. The scope, expected outcome, priorities, limitations, and significance of the Sendai Framework are outlined.
- *The Road to Sendai Part III*: The tensions and impediments of disaster risk reduction are: (1) recognizing the human role in disasters, and (2) developing effective initiatives that hinge on the triad of disaster risk reduction, climate change, and sustainable development.

- *Social Media Innovation in Disaster Response*: From the 2010 Haiti Earthquake to the Hurricane Sandy in 2012, the field of disaster response witnessed the diversification of social media use. During the earthquake, social media was used for information dissemination, public mobilization, and knowledge management. During Hurricane Sandy, social media broadened to include standardization of social media platforms across city agencies and departments, rumor control, and crowdsourced information.

Table 1 displays the social media marketing materials to be disseminated on Facebook and Twitter for each blog post.

An evaluation framework, provided in the SMT, identifies the following components: inputs, activities, outputs, outcomes, and the communication objective. Tools and approaches for data collection to measure monitoring and evaluation indicators are addressed.

Implementation

Implementing this SMT has yet to take place. The steps to implement the toolkit will involve publishing blogs on the DisasterDoc website and social media marketing posts on Facebook and Twitter. Web analytic tools such as Google Analytics and Clicky Web Analytics can track social media activity of published content. Evaluating communication efforts comprise of developing data collection instruments for baseline/endline surveys and key informant interviews.

Table 1: Sample Facebook and Twitter Posts

Blog Post	Sample Facebook Posts	Sample Twitter Posts
Building Resiliency	Community resiliency looks at how a community recovers and returns to a state of normalcy after a disaster, but what does health resiliency look like during a disaster? Unlike community resilience where communities can build back better, people cannot necessarily do the same with their health. We need to think creatively about how to build health resiliency before a disaster strikes. #buildresiliency http://bit.ly/example	How can we think creatively to build resiliency to be better prepared for disasters? #buildresiliency http://bit.ly/example
	The concept of resiliency is gaining traction in disaster management. There's a brighter spotlight shining on how people and communities affected by disasters can recover from disasters. Effective strategies to build resiliency call on the collaboration of diverse sectors. #buildresiliency http://bit.ly/example	We want to build resilience in communities and health before a disaster. Is building resilience an outcome or a process? #buildresiliency http://bit.ly/example
The Road to Sendai Part I	The Hyogo Framework was a meaningful effort in developing a global set of guidelines for reducing disaster risk and addressing vulnerability to disasters and natural hazards. How will the post-Hyogo framework address the challenges of its predecessor? #roadtosendai http://bit.ly/example	How have previous global frameworks for disaster risk reduction worked across diverse sectors? #roadtosendai http://bit.ly/example
	As global frameworks evolve, the Road to Sendai calls for the integration of disaster risk management, health, and sustainable development. #roadtosendai http://bit.ly/example	How have conversations about disaster risk reduction shifted over time? #roadtosendai http://bit.ly/example
The Road to Sendai Part II	The Sendai Framework for Disaster Risk Reduction broadens its scope to include man-made disasters and environmental,	Disaster risk reduction should be included in talks about sustainable development and

	technological, and biological hazards. It's inclusive of health implications and diverse sectors affected by disasters, drawing clear references to health, development, and climate change. #roadtosendai http://bit.ly/example	climate change #roadtosendai http://bit.ly/example
	The Sendai Framework makes significant strides in providing an improved global instrument for addressing disaster risk. It calls for strengthening disaster preparedness to support stronger recovery, rehabilitation, and reconstruction of communities after a disaster. #roadtosendai http://bit.ly/example	Sendai Framework draws clear references to health, development, and climate change #roadtosendai http://bit.ly/example
The Road to Sendai Part III	Disasters are no longer solely unpredictable and unpreventable events. We need to recognize the human role in disasters and address the human-influenced drivers of disaster risk. #roadtosendai http://bit.ly/example	Effective policies for disaster risk reduction shouldn't operate in friction with development #roadtosendai http://bit.ly/example
	Effective policies for disaster risk reduction shouldn't operate in friction with development and should also take into account climate change concerns. Neglecting the effects of climate change can hamper progress in sustainable development and worsen the risks and impacts of disasters. #roadtosendai http://bit.ly/example	Successful disaster risk reduction calls for collaboration across diverse sectors and technical disciplines #roadtosendai http://bit.ly/example
Social Media Innovation in Disaster Response	Within the two-year span between the Haiti Earthquake and Hurricane Sandy, the presence of social media in disaster response strengthened; and it's here to stay. Social media has evolved from a communication channel to a space for supporting people affected by disasters. What will future innovations of social media bring to disaster response? #innovatesocialmedia http://bit.ly/example	From the Haiti Earthquake to Hurricane Sandy, what is the future of social media in disaster response? #innovatesocialmedia http://bit.ly/example

	During a disaster, social media has diverse functions – disseminating information, mobilizing the public, managing misinformation, and crowdsourcing data. People are no longer solely the recipients of information, but they are also contributing data to support disaster response efforts. What do you think is next for social media use in disasters? #innovatesocialmedia http://bit.ly/example	Since 2010, we've seen the diversification of social media use in disasters. What do you think is next? #innovatesocialmedia http://bit.ly/example

Chapter 5: Discussion

This thesis develops a social media toolkit (SMT) that includes content exploring the benefits, challenges, issues, tensions, and innovations of social media technologies for disaster preparedness and risk reduction. The toolkit is composed of a social media communications strategy, a compendium of blog posts, accompanying social media marketing materials, and an evaluation framework.

The benefits of social media lie in the functionalities of knowledge management, ICT, crowdsourcing, and rumor control. A challenge is the support for training staff and acquiring resources to employ social media technologies thoroughly and effectively. Emerging issues affecting the uptake of social media by public health agencies are in-house capacity to integrate social media into communication and preparedness strategies, leadership support and encouragement of social media, and legal and security concerns regarding liability and privacy issues (Rubin, Bouri, Jolani, & Minton, 2014).

Tensions arise from the necessity for organizational planning and infrastructure to fully harness the potential of social media since its use in disasters remains largely *ad hoc* (Bruns, Burgess, Crawford, & Shaw, 2012; Houston et al., 2015). The absence of a communication infrastructure presents an opportunity for the standardization of social media practices and the development of social media protocols. Innovations in social media lie in its intrinsic characteristics – collaborative and decentralized communication fostering user engagement on social media platforms. Taking advantage of these characteristics can advance the use of social media technologies for disasters and emergencies.

Limitations

A limitation of the SMT is that it does not guarantee audiences will utilize the information. Building the body of knowledge on disaster preparedness and risk reduction does not ensure that audiences will take actions to protect themselves and their families during a disaster. It can be difficult to persuade people to take actions to prepare for an event that has yet to occur.

Additionally, the use of social media platforms such as Facebook and Twitter to promote disaster preparedness materials may not foster social media engagement. In particular, disaster risk reduction may appear as a technical and unfamiliar subject to general audiences. Disaster response efforts also tend to receive more attention because the public can "see" activities being done. This work can be perceived as enticing with greater appeal for this type of work to be covered by traditional media and social media outlets. Social media engagement in the form of "likes" and "shares" are more likely to emerge from response efforts.

The SMT has yet to be evaluated using the evaluation framework. A limitation of the evaluation framework is the feasibility of accurately measuring the outcome and determining whether the communication goal has been achieved. Developing instruments to collect these data through key informant interviews and baseline and endline surveys will require trained personnel and time. Collecting and analyzing these data to determine the uptake in preparedness activities will also require sufficient resources. This process is timely and the data can become outdated or irrelevant in informing subsequent social media preparedness initiatives.

Another limitation of social media evaluation is the absence of standardized evaluation frameworks and processes considering the growing use of these technologies (Dufty, 2015). The social media environment is continually changing, so evaluation frameworks should take this

into account. To accurately capture the effectiveness of social media, evaluating social media activity across all phases of the disaster cycle is pertinent.

Public Health Implications

The deliverable aims to serve as an addition to the body of work in disaster preparedness and risk reduction existing on social media. Blogs in particular are an underutilized social media platform in the disaster-related public health issues. There are active blogging communities in areas of public health such as cancer support groups, vaccinations, and maternal and child health. Yet these types of communities are lacking in the broader fields of disasters and public health emergencies.

Strengthening social media in disaster preparedness has wider implications beyond disaster management. Social media supports situational awareness and decision-making to prevent infectious outbreaks and public health emergencies (Hossain et al., 2016). Considering how the world is becoming increasingly interdependent, localized problems if not appropriately and timely addressed can quickly become global problems. Employing social media technologies as information and communication platforms to inform decision-making processes can lessen disaster impacts and potentially prevent public health emergencies.

Recommendations

Since the SMT has yet to be evaluated, one recommendation is to use web analytic tools such as Google Analytics to measure social media and engagement. Reach is a measurement of how content is disseminated across social media platforms, which can be captured by how many clicks a post receives. Engagement is measured by the number of times a post is liked, shared, or commented on. Another recommendation to strengthen the toolkit is to reach out to leading experts and professionals to initiate a discussion of their experiences in disaster preparedness and

risk reduction. Gathering their direct perspectives and challenges they faced will be valuable in guiding the development of future content.

Future research should evaluate social media platforms to identify which platforms are most effective and valuable to the public in disaster preparedness. One consideration is to measure the effectiveness of social media in increasing the uptake of preparedness activities. Gathering this data will help determine if such communication materials increased perceived self-efficacy in the event of a disaster or emergency.

Conclusion

This thesis demonstrates employing social media technologies to advance the field of preparedness and response. Disasters and public health emergencies offer ideal environments for social media to assert its value. The broader implications of the toolkit call for the continued exploration of social media to harness its merits and uniqueness as drivers of innovation and growth in disasters and emergencies.

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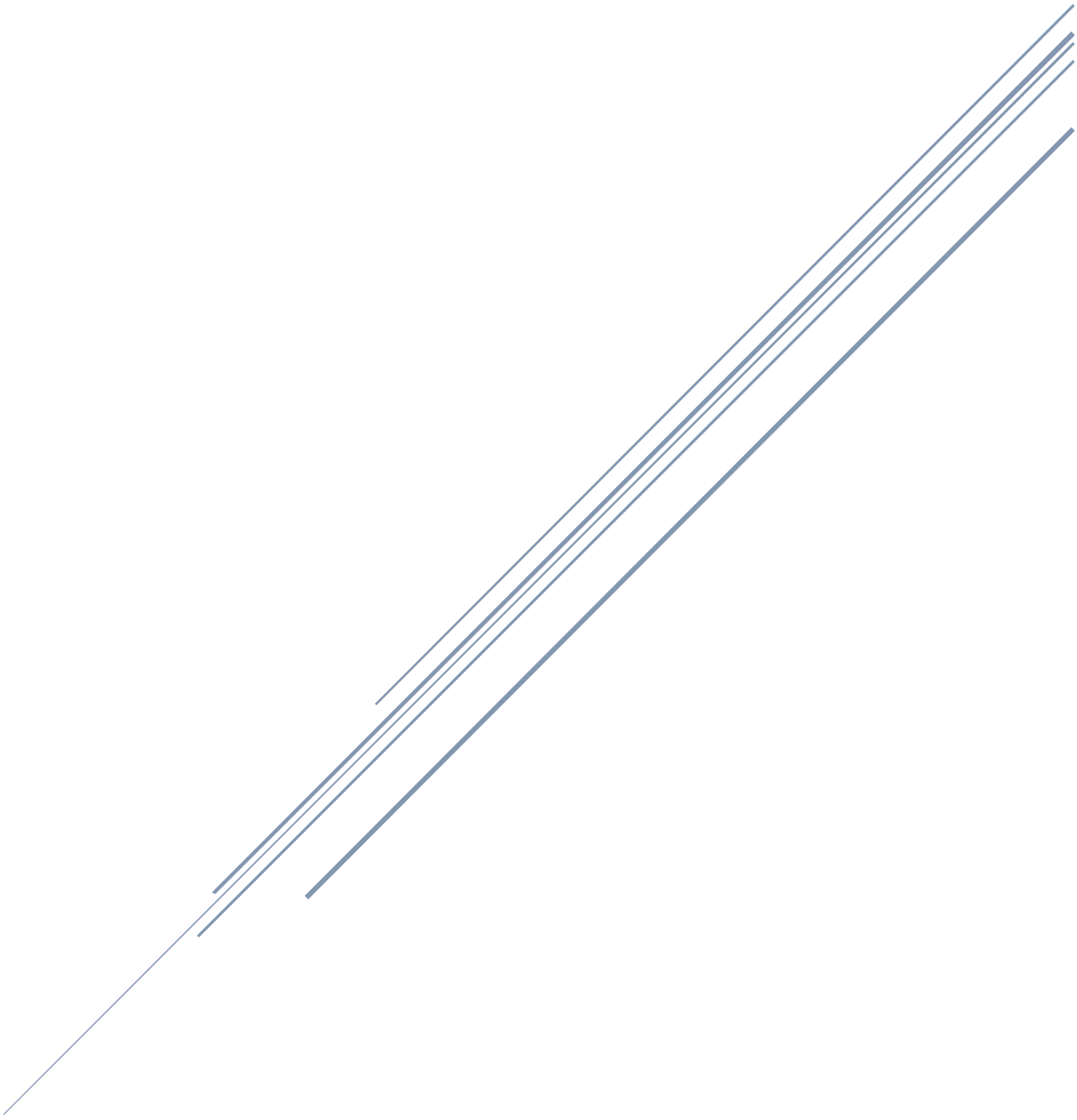
Appendix: Social Media Toolkit

LEVERAGING SOCIAL MEDIA FOR DISASTER PREPAREDNESS



www.disasterdoc.org

Table of Contents

Introduction

Social media has been leveraged in disaster response and recovery efforts; however, social media use during non-disaster times is still in its infancy. Social media technologies are underutilized to deliver messages promoting disaster preparedness and risk reduction.

The overarching goal of the social media toolkit is to explore the benefits, challenges, tensions, and innovations of social media technologies for disaster preparedness and risk reduction. This work focuses on building the body of work on disaster preparedness that does and could (should) exist in the social media landscape.

The aims of the toolkit are to develop a social media communications strategy, create a compendium of blog posts and accompanying social media marketing materials, and design an evaluation framework to monitor and evaluate social media reach and engagement.

More broadly, this work offers a justification for the merits of social media in disaster preparedness and calls for the continued exploration of social media and mobile technologies during disasters and public health emergencies.

DisasterDoc social media platforms

Blog
www.disasterdoc.org/blog

Facebook
www.facebook.com/DisasterDocLLC

Twitter
www.twitter.com/disasterdr

LinkedIn
www.linkedin.com/in/disasterdoc/

Social Media Communications Strategy

DisasterDoc

I. Background

DisasterDoc is a consultancy and education firm based in Atlanta, GA founded by Mark Keim. DisasterDoc aims to help people understand disasters, so that they can protect themselves and others. Through consulting and education services, DisasterDoc works to help experts and everyday people better understand disasters so that they can protect themselves, their families, and their communities.

II. Target audience

The primary audience of DisasterDoc includes experts and professionals working in disaster management such as disaster medicine practitioners and emergency managers. The secondary audience includes stakeholders, partners, and those who are affected during a disaster or emergency. Examples include community-based organizations, local health departments, and disaster-affected communities.

III. Social Media Objectives

The purpose of DisasterDoc is to help experts and everyday people better understand disasters so that they can protect themselves, their families, and their communities. The objective of the DisasterDoc blog is to deliver health messaging that people can act upon to reduce their exposure to disasters, to reduce vulnerability during a disaster, and to increase capacity to respond and be resilient when a disaster occurs.

III. Audience communication needs

There is a need to provide complete and timely information to disaster management experts and professionals, stakeholders, partners, and communities, so they can make the best decisions to protect themselves, their families, and their communities when a disaster occurs.

IV. Goal Integration

The social media objectives support DisasterDoc's mission by delivering critical information to DisasterDoc's target audiences to guide and inform decision-making processes during a disaster or emergency.

IV. Message development

Blogs will reach different segments of DisasterDoc's target audiences. A literature review of published literature and gray literature will be conducted to identify topic areas for each blog post. An exploratory search of organizations and agencies working in disaster

preparedness and response, disaster risk reduction, and public health emergencies will also be conducted. These searches are part of a scan of the social media environment in these fields to identify influencers, whether individuals or organizations, and to assess what topics are being discussed.

V. Tone

The tone of DisasterDoc messaging is informative and educational.

VI. Social media tools

The DisasterDoc website will serve as the platform to publish the blog series. Facebook, Twitter, and LinkedIn will serve as channels to promote each blog post and engage with audiences.

Adapted from CDC's "The Health Communicator's Social Media Toolkit"
https://www.cdc.gov/healthcommunication/ToolsTemplates/SocialMediaToolkit_BM.pdf

BLOG CONTENT

Building Resiliency

Sample Facebook posts:
Community resiliency looks at how a community recovers and returns to a state of normalcy after a disaster, but what does health resiliency look like during a disaster? Unlike community resilience where communities can build back better, people cannot necessarily do the same with their health. We need to think creatively about how to build health resiliency before a disaster strikes. #buildresiliency http://bit.ly/example

The concept of resiliency is gaining traction in disaster management. There's a brighter spotlight shining on how people and communities affected by disasters can recover from disasters. Effective strategies to build resiliency call on the collaboration of diverse sectors. #buildresiliency http://bit.ly/example

Sample Twitter posts:
How can we think creatively to build resiliency to be better prepared for disasters? #buildresiliency http://bit.ly/example

We want to build resilience in communities and health before a disaster. Is building resilience an outcome or a process? #buildresiliency http://bit.ly/example

The concept of resiliency has been gaining traction in disaster management. There is a brighter spotlight shining on what disaster-affected communities can do for themselves and how to best offer support. Perhaps, resilience will be leading disaster preparedness efforts into the future.

The United Nations International Strategy for Disaster Reduction (UNISDR) is a global leader in disaster risk reduction efforts and has defined resiliency as, "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management" [1].

There have been many iterations of resiliency definitions and the purpose here is not to debate such definitions, but rather explore what resiliency looks like during a disaster.

Resilience – an outcome or a process?
One area of discussion about resiliency is whether it is an outcome or a process. When looking at UNISDR's definition, we see that resiliency is the ability of a community to recover from a disaster. Discussing the ability of the system to return to its state of normalcy after a disaster

suggests that achieving resiliency is reaching the outcome of recovering from a disaster. Yet resiliency as an outcome perpetuates traditional practices of disaster management, which is one of reaction [2].

As disaster management practices progress, there is a trend for more proactive strategies to lessen the impacts of disasters. Paralleling this trend, there's a gradual refinement in how resilience is conceptualized from an outcome-oriented to a process-oriented approach [3].

Returning to the UNISDR's definition, resiliency also describes how a community resists, absorbs, accommodates, adapts to, transforms, and recovers from a disaster. These processes emphasize the human element in resiliency (Manyena, 2006). People are called upon to be responsible and take action – develop a disaster plan, create a 72-hour kit, create an emergency contact list, and essentially take ownership of the safety and protection of themselves and their family during a disaster.

From this perspective, disaster resilience initiatives should strengthen a community's ability to resist, absorb, accommodate, adapt to, transform, and recover from disasters.

Health resiliency

Community resiliency examines how a community recovers and returns to a state of normalcy after a disaster, but what does health resiliency look like during a disaster?

People who are physically and mentally healthy are more likely to be resilient during a disaster [4]. Compared to community resilience where communities can build back better, people cannot necessarily do the same with their health.

The Mandala Model of Health and Wellness illustrates the dynamic interactions of health determinants in an environment of economic and sociocultural influences [5]. Along with considering health determinants, we also need to consider the process of disease outcomes.

After the onset of disease, bodily functions or structures can become impaired suggesting signs and symptoms of disease [6]. An impairment can, but not always lead to disability, where there is a restriction in ability to perform a function. Disability also can, but not always lead to handicap. Handicap occurs when an impairment limits or prevents the fulfillment of social roles. Disability and handicap are consequences of disease that may become further complicated during a disaster.

Considering the process and consequences of disease, health resilience has another layer of complexity because unlike communities that can recover and build back better, this cannot necessarily happen with human health.

A call for resiliency

There is no single sector that encapsulates resiliency. Building resiliency involves all dimensions of society. There are opportunities to build resiliency in other sectors such as, but not limited to, urban planning, health systems, economic development, and community engagement.

Moving forward, thinking creatively about how to integrate resilience in initiatives and policies beyond disaster management is critical in reducing impacts and health outcomes of disasters.

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The Road to Sendai – Part I

Sample Facebook posts

The Hyogo Framework was a meaningful effort in developing a global set of guidelines for reducing disaster risk and addressing vulnerability to disasters and natural hazards. How will the post-Hyogo framework address the challenges of its predecessor? #roadtosendai http://bit.ly/example

As global frameworks evolve, the Road to Sendai calls for the integration of disaster risk management, health, and sustainable development. #roadtosendai http://bit.ly/example

Sample Twitter posts

How have previous global frameworks for disaster risk reduction worked across diverse sectors? #roadtosendai http://bit.ly/example

How have conversations about disaster risk reduction shifted over time? #roadtosendai http://bit.ly/example

The Road to Sendai is a three-part blog series exploring the movement of governance in disaster risk reduction and the triad of disaster risk reduction, climate change, and sustainable development.

Conversations surrounding disaster risk and hazards have been ongoing for some time. The discussion, which initially viewed disaster risk management through an environmental science lens, is shifting towards a multi-sectoral discussion of disaster risk reduction as critical for sustainable development. This shift can be seen through the variety of international policies, guidelines, and action plans developed to address disaster risk.

Agenda 21 was the product of the Earth Summit, also known as the United Nations Conference on Environment and Development, in 1992. It called for the integration of environment and development concerns on a global scale as the world was transitioning into the 21st century [1]. Under one of Agenda 21's broad themes of protecting and promoting human health, the reduction of health risks from environmental pollution and hazards was identified as a priority action.

Two years later in 1994, the Yokohama Strategy for a Safer World emerged from the first World Conference on Disaster Risk Reduction recognizing the need for disaster prevention and preparedness measures in sustainable development [2]. The Yokohama Strategy emphasized the

close linkages between disaster losses and environmental degradation, articulated in Agenda 21, and highlighted how the absence of disaster risk reduction is a hindrance to development.

Following the Yokohama Strategy were several summits and conferences producing policies to manage disaster-related health risks ranging from:

- the Barbados Program of Action translating Agenda 21 into a program of action for small island developing states in 1994;
- the creation of the United Nations International Strategy for Disaster Reduction (UNISDR) in 2002;
- the Johannesburg Plan of Implementation in 2002 recognizing an integrated and multi-hazard approach to disaster management as essential to move forward into the 21st century;
- and the Declaration of the Pacific Health Summit in 2004 with intentions to strengthen existing public health and medical systems for disaster mitigation, preparedness, response and recovery capacities.

In light of these summits, conferences, and policies, the trend of disaster management measures is moving towards the integration of diverse sectors lending itself well to sustainable development.

Hyogo Framework

UNISDR's Hyogo Framework for Action emerged in 2005 during the 2nd World Conference on Disaster Reduction. The framework called for the "substantial reduction of disaster losses, in the lives and in the social, economic and environmental assets of communities and countries" [1].

The Hyogo Framework is a meaningful effort in developing a global set of guidelines for reducing disaster risk and addressing vulnerability to disasters and natural hazards, placing communities and nations at the forefront for building disaster resilience. However, the framework takes on a top-down approach, and since the framework is UN and donor-driven, policies flow through formal institutional processes. Although its creation gathers input from various stakeholders, decisions are still made at the top, not according to local agendas [3, 4]. UNISDR is in a difficult position since it can advocate best practices and encourage nations to meet the targets of the Hyogo Framework, but faces limitations in regulating or enforcing them.

Hyogo Framework: Priorities for Action

The framework's five priorities for action, although relevant and appropriate, faced several challenges. The challenges associated with each priority highlight broader issues within disaster risk reduction [5].

1. Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation.
Something omitted from the Hyogo Framework is the ability of UNISDR to persuade governments with low resources to prioritize disaster management initiatives at local levels. More broadly, this raises the issue of how to build the capacity of local communities to respond appropriately to disasters.

2. Identify, assess, and monitor disaster risks and enhance early warning.
For risk information and early warning, hard science to inform risk assessments, hazard mapping, and early warning is prioritized over social sciences. There is value in offering social support for indigenous communities to interpret and translate risk information, so that it's relevant and context-specific for their communities.

3. Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.
Education is a gateway to build a culture of resilience. However, there are limitations in how education can facilitate a meaningful understanding of disaster risk reduction. There are different types of learning for different audiences, which isn't addressed by the Hyogo Framework. With an understanding that the framework is not designed to develop curricula, it also doesn't offer suggestions on how to best educate audiences on disaster risk reduction. More importantly, the Hyogo Framework falls short of harnessing local, community-level knowledge about disasters.

4. Reduce the underlying risk factors.
Disaster risk reduction should be present in all policies to reduce risk factors. Yet, this priority seems to be a black box of all policies that need to be implemented to reduce human-influenced drivers of risk such as poor land use management, environmental degradation, and inappropriate or lack of building codes.

5. Strengthen disaster preparedness for effective response at all levels.
Preparedness and response are inherently connected. Effective preparedness measures can inform and strengthen response activities. Yet, this relies on the implementation of the previous priorities.

Post-Hyogo Framework
Shortly after the development of the Hyogo Framework, the Mauritius Strategy of Implementation emerged as an outcome of the Barbados Program of Action during the same year [6]. It recognized the need for a preventive approach towards natural disasters and called for the integration of risk management in development policies and programs.

Additionally, the United Nations Conference on Sustainable Development in 2012, also known as Rio+20, looked towards how to take action on addressing the social and environmental determinants of health, disaster risk reduction measures, and resilience building strategies in the lens of sustainable development [7].

These global instruments demonstrate a movement leaning towards the integration of disaster risk management, health, and sustainable development.

The Hyogo Framework was a cornerstone for disaster risk reduction, placing communities and nations at the forefront. In light of challenges, the UNISDR successor to the Hyogo Framework should ensure that communities and civil society are truly at the center of disaster risk reduction strategies [3]. Disaster preparedness and response activities begin at the community level, so offering grassroots strategies for local communities to carry out the guidelines of future frameworks will be useful. The culmination of successes and challenges of global policies and frameworks have important implications moving forward.

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The Road to Sendai – Part II

Sample Facebook posts

The Sendai Framework for Disaster Risk Reduction broadens its scope to include man-made disasters and environmental, technological, and biological hazards. It's inclusive of health implications and diverse sectors affected by disasters, drawing clear references to health, development, and climate change. #roadtosendai http://bit.ly/example

The Sendai Framework makes significant strides in providing an improved global instrument for addressing disaster risk. It calls for strengthening disaster preparedness to support stronger recovery, rehabilitation, and reconstruction of communities after a disaster. #roadtosendai http://bit.ly/example

Sample Twitter posts

Disaster risk reduction should be included in talks about sustainable development and climate change #roadtosendai http://bit.ly/example

Sendai Framework draws clear references to health, development, and climate change #roadtosendai http://bit.ly/example

The Road to Sendai is a three-part blog series exploring the movement of governance in disaster risk reduction and the triad of disaster risk reduction, climate change, and sustainable development.

In 2015, the Third UN World Conference on Disaster Risk Reduction took place in Sendai, Japan. The outcome of the five-day conference is a new global instrument to manage disaster risk – the Sendai Framework for Disaster Risk Reduction 2015-2030.

The Sendai Framework strives to "substantially reduce disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities and countries" [1] . The framework's scope broadens to include man-made disasters and environmental, technological, and biological hazards. It's also inclusive of health implications and diverse sectors affected by disasters, drawing clear references to health, development, and climate change [2].

The Sendai Framework sets four priorities to guide action within and across sectors at local, national, and global levels [1]:

1. Understand disaster risk.
An understanding of disaster risk includes all dimensions of vulnerability, exposure, characteristics of disaster hazards, and the environment.

2. Strengthen disaster risk governance to manage disaster risk.
Disaster risk reduction strategies should be present in diverse sectors and policies. This coordination requires stronger governance at local, national, regional, and global levels to ensure that disaster risk is integrated in public policies and regulations.

3. Invest in disaster risk reduction for resilience.
Resilience is an investment, not a cost. Resilient people and communities are drivers of innovation and growth. The absence of investment in resilience building initiatives worsens the consequences of disasters, undermining social and economic development.

4. Enhance disaster preparedness for effective response, and to Build Back Better in recovery, rehabilitation, and reconstruction.
Strengthening disaster preparedness supports stronger recovery, rehabilitation, and reconstruction of communities after a disaster. These phases are optimal environments to integrate Build Back Better approaches in disaster risk reduction policies.

While the Sendai Framework does make strides in a post-Hyogo era, it still faces some limitations [3]:

- The Sendai Framework is limited in offering financial support or resources for developing countries. Developing countries are disproportionately affected during disasters since they are more vulnerable and have minimal means to carry out disaster risk reduction strategies.

- The framework does little in addressing nations affected by human conflict. Conflict-affected nations experience heightened disaster risk – displaced populations are more exposed to hazards and face increased vulnerability [4]. These intersections of human conflict and disaster risk are neglected in the Sendai Framework.

- Although the interconnectedness between disaster risk reduction and sustainable development are recognized, the Sendai Framework lacks coherence with the Sustainable Development Goals. The Sendai Framework could strengthen its posture in global community by developing explicit policy connections to the Sustainable Development Goals.

The Sendai Framework isn't perfect, but it does make significant strides in providing an improved global instrument for addressing disaster risk. It takes a posture that disaster risk reduction should not be insulated from cross-cutting discussions in sustainable development and climate change [5]. Time will reveal whether the Sendai Framework proves to be a pivotal force in global discourses.

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The Road to Sendai – Part III

Sample Facebook posts

Disasters are no longer solely unpredictable and unpreventable events. We need to recognize the human role in disasters and address the human-influenced drivers of disaster risk. #roadtosendai http://bit.ly/example

Effective policies for disaster risk reduction shouldn't operate in friction with development and should also take into account climate change concerns. Neglecting the effects of climate change can hamper progress in sustainable development and worsen the risks and impacts of disasters. #roadtosendai http://bit.ly/example

Sample Twitter posts

Effective policies for disaster risk reduction shouldn't operate in friction with development #roadtosendai http://bit.ly/example

Successful disaster risk reduction calls for collaboration across diverse sectors and technical disciplines #roadtosendai http://bit.ly/example

The Road to Sendai is a three-part blog series exploring the movement of governance in disaster risk reduction and the triad of disaster risk reduction, climate change, and sustainable development.

The larger purpose of developing global frameworks for disaster risk reduction is to offer a vision to reduce disaster losses and risk and to provide pathways for reaching that vision. Research in disaster risk reduction has shown that it's not the hazard that determines a disaster, but rather the vulnerability, exposure, and capacity of a community to respond to and recover from its effects [1]. The field has shifted away from a purely hazard response towards the assessment of population vulnerabilities and risks. Social determinants of risk help frame discussions and guide global policies to reduce risk and lessen impacts and losses due to disasters.

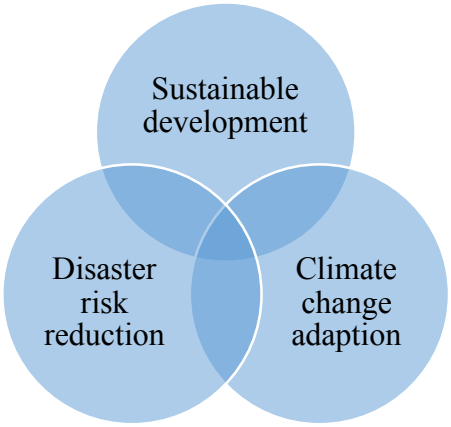
In reflecting on global instruments like the Hyogo Framework and the Sendai Framework, there are important tensions and challenges to discuss within disaster risk reduction – the human role in disasters and the triad of disaster risk reduction, climate change, and sustainable development.

Human role in disasters

Disasters are no longer solely unpredictable and unpreventable events. Consider land degradation

reducing agricultural productivity, forest depletion causing downstream flooding, the construction of housing on unstable land worsening the impacts of landslides, and poor land use contributing to long drought seasons. Accepting the human role in contributing to disasters is critical in mitigating the consequences of disasters and preventing future disasters [2]. Recognizing human-influenced drivers of disaster risk should guide the development of future disaster risk reduction strategies.

Triad of disaster risk reduction, climate change, and sustainable development



Rather than achieving a benchmark or target, sustainable development lies in developing processes and innovations to continue to meet human needs without undermining the integrity of natural systems. In parallel, disaster risk reduction is also not necessarily an outcome, but processes that increase the capacity of people and communities to be resilient in the event of a disaster. Continuing to experience immense disaster losses will hinder development gains, so risk reduction initiatives and sustainable development practices should complement one another.

Effective policies for disaster risk reduction shouldn't operate in friction with development and should also take into account climate change concerns. Neglecting the effects of climate change can hamper progress in sustainable development and further exacerbate risk and impacts of disasters. Ideally, disaster risk reduction should seamlessly integrate sustainable development and climate change.

Looking forward

Nobody can deny the impact of disasters on human life, productivity, economic development, and health. There are recurring calls for global frameworks to articulate connections between disaster risk reduction, climate change adaptation, and sustainable development and introduce multi-sectoral strategies when discussing how to reduce disaster losses and risk.

Effective disaster risk reduction initiatives rely on collaboration across diverse sectors and technical disciplines. Successful global frameworks should articulate activities and coordination necessary for successful collaboration. Moving forward, this can help inform future global instruments and help countries make meaningful strides towards a common global commitment towards reducing the consequences of disasters.

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Social Media Innovation in Disaster Response

Sample Facebook posts

Within the two-year span between the Haiti Earthquake and Hurricane Sandy, the presence of social media in disaster response strengthened; and it's here to stay. Social media has evolved from a communication channel to a space for supporting people affected by disasters. What will future innovations of social media bring to disaster response? #innovatesocialmedia http://bit.ly/example

During a disaster, social media has diverse functions – disseminating information, mobilizing the public, managing misinformation, and crowdsourcing data. People are no longer solely the recipients of information, but they are also contributing data to support disaster response efforts. What do you think is next for social media use in disasters? #innovatesocialmedia http://bit.ly/example

Sample Twitter posts

From the Haiti Earthquake to Hurricane Sandy, what is the future of social media in disaster response? #innovatesocialmedia http://bit.ly/example

Since 2010, we've seen the diversification of social media use in disasters. What do you think is next? #innovatesocialmedia http://bit.ly/example

Social media harnesses mobile and web-based technologies to create interactive platforms where individuals can create, share, and modify user-generated content [1]. These platforms are virtual spaces where people create and share information as well as connect and network with others. The decentralized and collaborative nature of social media contribute to significant developments in the information and communication landscape [2].

With communication being a critical function during any kind of disaster, there are interesting implications in how social media can be leveraged for disaster response. The emerging use of social media after the Haiti Earthquake in 2010 marked a shift in disaster response. Later in 2012, social media was widely used in the disaster preparedness and response efforts to Hurricane Sandy.

Social media platforms like Facebook and Twitter offer collaborative and interactive environments for people to communicate with one another. On social media, knowledge, created in bite-sized chunks, is seamlessly shared and modified sparking conversations and discussions.

A word that can characterize the novelties of social media is - engagement. A communication environment evolved to where we can create, share, discuss, and adapt our own content, leading to interesting implications when a disaster occurs.

Haiti Earthquake

In the aftermath of the 2010 Haiti Earthquake, social media was still in its infancy with Twitter being only four years old and Facebook six years old. Nevertheless, social media was used to spread critical information, mobilize the public, and to manage information.

Information dissemination

Many social media users were employing Facebook and Twitter to connect others with information. The immediacy and accessibility of social media led media outlets to use Twitter as a vehicle to share first-person accounts as events unfolded.

Public mobilization

Twitter was a channel for international organizations to make calls-to-action and connect the world to Haiti [3, 4]. Many organizations turned to Twitter as a loudspeaker, encouraging the public to make donations and remain connected to the response efforts.

Knowledge management

During the disaster response phase, information is often exchanged as chunks of knowledge in the format of web links, photos, videos, and text [5]. Similarly, content on social media platforms is also shared as small chunks of information. These parallels allowed for wikis and collaborative workspaces like Microsoft SharePoint to shine during the response efforts of the Haiti Earthquake. SharePoint allowed information to flow freely, rather than moving up the chain of command. Although a seemingly simple technology, it increased the efficiency of the knowledge management system itself and broadened the situational awareness of disaster responders.

Hurricane Sandy

In 2012, social media use was in full force. Before, during, and after the hurricane, social media was embraced as an information and communication technology tool. Many government officials and agencies turned to social media to inform the public and provide updates.

Standardized use of social media platforms

New York City developed a standard communication strategy for social media messages prior to Hurricane Sandy. The goal was for a unified voice delivering the same message across the various city agencies and departments [6] . The document provided direction and tone for all messages, identified a small group of approvers for continuity purposes, and reminded social media managers to disable scheduled tweets. This consistency is important in maintaining

credibility; building trust; and ensuring that messages are relevant, appropriate, and timely during a disaster.

Rumor control

The spread of misinformation is a common challenge of social media. What's interesting about social media is the vast network of people who are also correcting rumors and false information. This phenomenon of self-correction is a unique feature of social media. The Federal Emergency Management Agency (FEMA) offered a more structured form of self-correction by adding a Hurricane Sandy Rumor page to its website. Although currently unavailable, it identified misinformation, provided accurate information side-by-side, and listed additional resources (www.FEMA.gov/hurricane-sandy-rumorcontrol).

Crowdsourced information

Crowdsourcing information takes advantage of social networks by enlisting the services of a vast number of people and encourages people to contribute data for a larger purpose. During Hurricane Sandy, people contributed information about shelter locations, traffic and road conditions, and dangerous hazards, which were then mapped on Google Crisis Maps for situational awareness.

Looking forward

An area that has yet to be tapped into is the partnership of disaster response activities and the sharing economy, which is booming on social media. For example, a potential use of AirBnB is to give home-listers an opportunity to provide temporary housing for displaced populations during a disaster.

Within two years from the Haiti Earthquake to Hurricane Sandy, we've witnessed a diversification of social media use. Social media has evolved from purely a communication channel to a space for supporting people affected by disasters. People are no longer solely the recipients of information, but they are also contributing data to support disaster response efforts.

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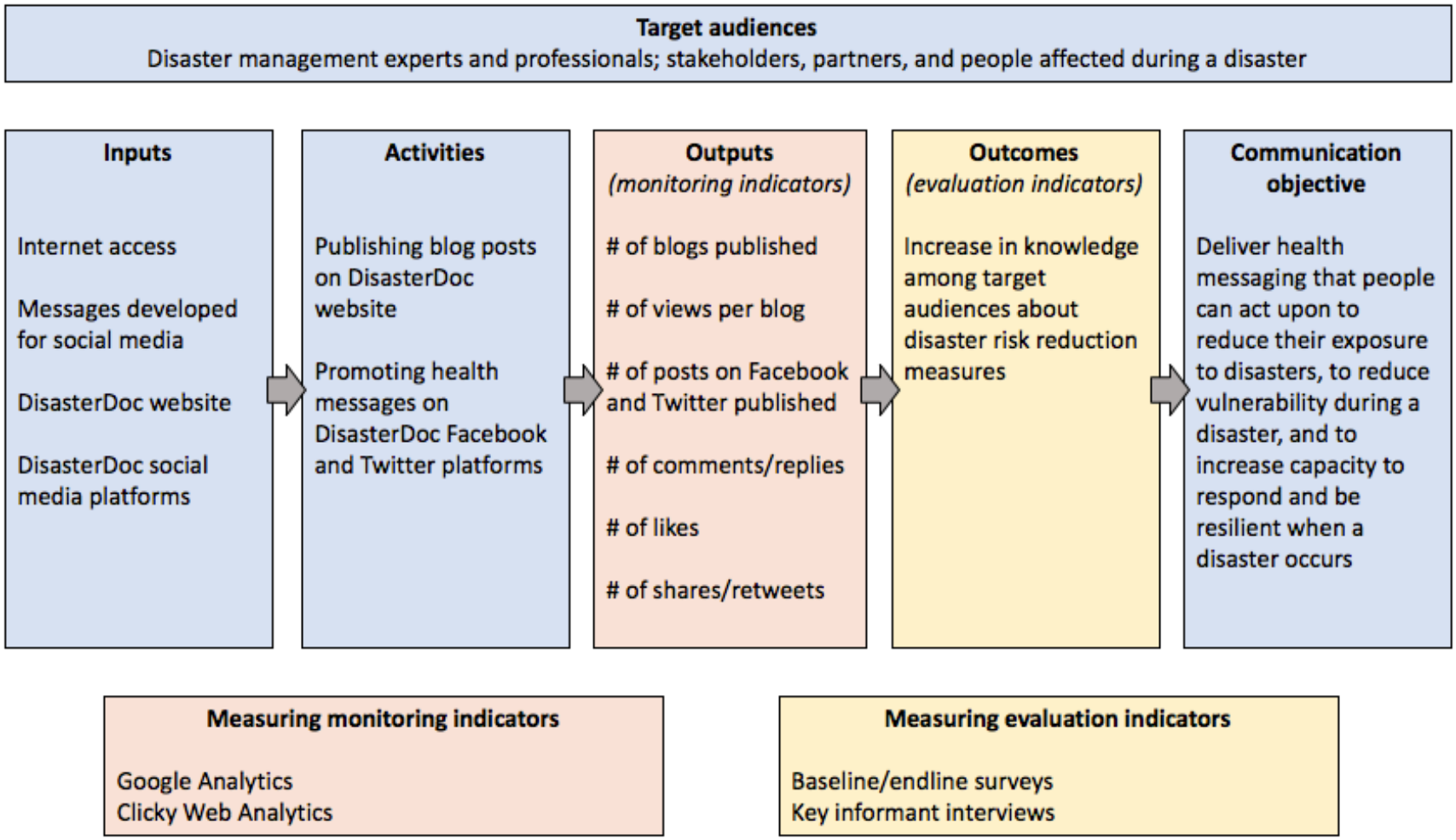
EVALUATION

Evaluation Framework



Evaluation Description

Target audience
The target audiences of DisasterDoc include disaster management experts and professionals as the primary audience; and stakeholders, partners, and people affected during a disaster as the secondary audience.

Inputs
The components that need to be in place for the activities to occur are internet access, messages developed for DisasterDoc social media platforms, DisasterDoc website, and DisasterDoc social media platforms.

Activities
The activities that will be conducted are publishing blog posts on the DisasterDoc website and promoting these messages on Facebook and Twitter.

Outputs
The outputs of the activities are captured through the monitoring indicators. Monitoring indicators include:

- Number of blogs published on DisasterDoc website
    - Number of views per blog
    - Number of comments per blog
- Number of posts published on Facebook
    - Number of Facebook comments
    - Number of Facebook likes
    - Number of Facebook shares
- Number of tweets published on Twitter
    - Number of Twitter replies
    - Number of Twitter likes
    - Number of Twitter retweets

Social media reach examines how content is spread and its range of influence across social media platforms. Social media reach is comprised of indicators measuring the number of published posts and number of views.

Social media engagement extends to how audiences interact with the content. These indicators measure how many likes, comments, or shares a post receives across platforms.

Outcome

The outcome is an increase in knowledge among target audiences about disaster risk reduction measures. This data will be captured through data collection instruments such as surveys and qualitative interview guides.

Communication objective

The inputs, activities, outputs, and outcome all contribute to achieving the overall communication objective – deliver health messaging that people can act upon to reduce their exposure to disasters, to reduce vulnerability during a disaster, and to increase capacity to respond and be resilient when a disaster occurs.

Data collection

Web analytic tools such as Google Analytics and Clicky Web Analytics can collect data captured through the monitoring indicators.

Measuring the evaluation indicator, assessed in the outcome, will involve creating survey instruments to conduct baseline and endline surveys to measure changes in knowledge of disaster risk reduction measures. A qualitative interview guide should also be developed to conduct key informant interviews to gather in-depth data regarding:

- Effectiveness of content across social media platforms
- Preferred social media platforms
- Challenges or barriers in understanding and engaging with the content.