ROLE OF SOCIAL MEDIA IN DISASTER MANAGEMENT

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ABSTRACT

Background: Communication breakdown is one of the major problems that occur during disaster event, despite its importance in disaster management. In recent years, the social media, which has gained its popularity and expanded its function, provides a promising solution in disaster management over traditional communication. This paper aims to determine the role of social media in disaster management cycle and to create a framework for the application.

Materials and Methods: A comprehensive literature search was conducted systematically using PubMed, Google Scholar, Science-direct and Scopus with keywords of role of social media OR social media AND disaster event OR natural disaster. The literature searched was limited to documented natural disaster for the past ten years, open source articles, original article and reported in English language. Primary screening of title and abstract involved 128 articles, from there, 90 articles were excluded. Secondary eligibility screening of the remaining 38 articles, resulted in 14 articles which were then synthesized and reviewed in this manuscript.

Result: A framework was produced pertaining to role of social media according to disaster management cycle. In mitigation phase the role of social media includes incorporation of risk reduction and preventative activities. Further into preparedness phase, social media provides disaster warnings, implement crisis communication activities and signal/detect disaster. Further to response phase, the role includes deliver and analyse news coverage of disaster, provide and receive disaster respond information, send and receive request for assistance and reconnect family members. Finally, in the recovery phase, social media raises donation and awareness, encourage volunteerism and provide/receive information on recovery and rebuilding process. This review highlighted the dynamic and complexity of social media functions in providing better communication approach during disaster management.

Conclusion: Social media certainly has the capacity to become an alternative mode of communication to complement traditional communication during disaster. However, drawbacks from using social media and its implications in disaster management need to be considered as well.

Keywords: *social media; social network, disaster, communication*

1.0 Introduction

Disaster happens unexpectedly albeit it is a natural disaster or a man-made disaster. It cause severe breakdown to a functioned community due to losses that exceed the community's capability to cope (WHO, 2014). More than that, communication that is expected to be stable and operated as it is intended often breakdown during disaster. In the new era where social media has gained its popularity, the technology also has expand its usefulness in many areas including in disaster management. Now, social media is of particular interest in disaster management due to its advantages over the traditional communication.

1.1 Disaster Management Cycle

Disaster management cycle illustrates an ongoing process by which governments, society and relevant stakeholders plan for the aims to reduce or avoid the impact of disasters, react timely and promptly during and immediately following a disaster, and activities to recover after a disaster has occurred (United Nations International Strategy for Disaster Reduction (UNISDR), 2017) The cycle has multiple variations however, the most common version is the four phases of disaster cycle (Global Alliance for Disaster Reduction (GADR), n.d.) (Figure 1). Appropriate actions at all stages in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle.
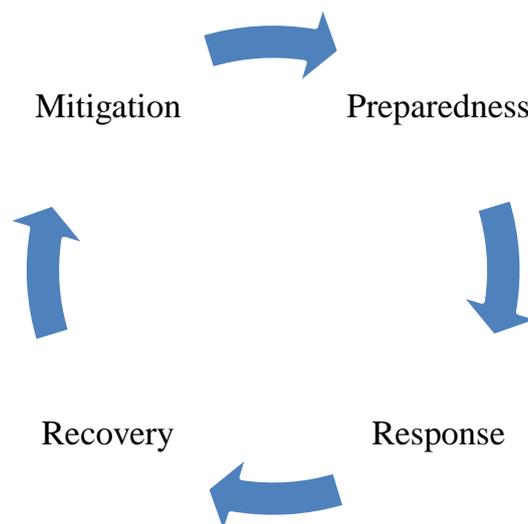
Figure 1: Disaster management cycle

Mitigation stage is activities involved in lessening or minimizing the adverse impacts of a hazardous event or disaster (United Nations International Strategy for Disaster Reduction (UNISDR), 2017). This adverse impacts particularly in natural disaster often cannot be prevented fully, however the severity of it can be lessened substantially through various activities (United Nations International Strategy for Disaster Reduction (UNISDR), 2017). On the other hand, preparedness referred as activities that aims for capacity building needed efficiently when disaster strikes whereby within the context of disaster risk management is related to the ability to quickly and appropriately respond when required and recover from the impacts of current disasters (United Nations International Strategy for Disaster Reduction (UNISDR), 2017). This is based on a sound analysis in disaster risks, early warning systems as well as contingency planning, the stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises (United Nations International Strategy for Disaster Reduction (UNISDR), 2017).

Disaster response is mainly focused on immediate and short-term needs in order to save lives, reduce health impacts, ensure public safety and meet the basic needs of the people affected (United Nations International Strategy for Disaster Reduction (UNISDR), 2017). Whilst recovery, is the activities of restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community (United Nations International Strategy for Disaster Reduction (UNISDR), 2017). The application of the disaster management cycle will help the government in planning and anticipating the future disaster by appropriately allocate its resources efficiently and effectively.

When disaster strikes, communication plays a pivotal role during disaster management whereby the United Nations Office for Disaster Risk Reduction (UNISDR) has emphasized the important aspect in disaster risk reduction is to strengthen emergency communications for disaster prevention and mitigation (United Nations Office for Disaster Risk Reduction (UNISDR), 2013). Although effective designed of communication system can functions as disaster prevention and lessen the impact, it's also may be worsen due to the effects of disaster (Abedin, Babar, & Abbasi, 2015). In addition, the impact of disaster often caused impairment of communication and information structure which leads to damage of information availability and disruption of information flow (Abedin et al., 2015). Consequently, this lead to breakdown in surveillance, rescue activities and response system to identify earliest possible any departure from the usual or normally-observed frequency or phenomenon in a geographical area that will help to mitigate the actual impact of disaster (WHO, 2014). Thus, communication failure is claims to be one of the main problems during disaster management particularly during response, when it is paramount to operate properly as expected and stable in executing its standard operating procedures and emergency response plans (Abedin et al., 2015).

1.2 Social Media

In the past decade, advancement in telecommunication technologies and networks have given a promising solution toward this challenges. The dynamic nature of this technology,linked people via the widespread use of mobile devices and networking technology in a community (Abedin et al., 2015). Evidence has proven that social media has the potential in enhancing the consistent and timely transmission of valuable information throughout the disaster management life cycle which help to establish a disaster resilient community (Abedin et al., 2015; Tylor & Howell, 2012; Bradley, McFarland, & Clarke, 2014; Jaeger et al., 2007; Sutton, League, Sellnow, & Sellnow, 2015; Martín, Li, & Cutter, 2017; Yates & Paquette, 2011; Chatfield & Brajawidagda, 2013; Arthur, Boulton, Shotton, & Williams, 2018; Huang, Chan, & Hyder, 2010).

Social media (also referred to as social networking or Web 2.0) is a broad term from various web-based platforms and services that allow users to develop public or semi-public profiles and/or content, and to connect with other users' profiles and/or content (Boyd and Ellison, 2008; Blank and Reisdorf, 2012; Houston et al., 2015). It is convenience due to its wide accessibility by a variety of computing devices, including desktop or laptop computers, smartphones, and tablets. In addition the number of individuals accessing social media via mobile computing devices (such as smartphones and tablets) is increasing in trend (Houston et al., 2015; Statista, 2018).

Social media has expands to many areas, including the sphere of disasters (Houston et al., 2015). As compared to the traditional communications (newspaper and television), social media is believed to be superior and advantageous in disaster communication (Houston et al., 2015). Key characteristics of social media that has greater capacity, dependability, interactivity, low-cost, easy-to-use, scalable, mobile, reliable, fast network, multiple ways of communication, , and GIS (geographic information systems) capacity and visualisation tools asserts an ideal communication strategies during disaster (Houston et al., 2015; Jaeger, Shneiderman, et al., 2007; Mills, Chen, Lee, & Raghav Rao, 2009).

Greater scale, convenience and affordable are keys characteristics of social media that can be used to provide disaster warnings and inform communities about the crisis or hazard. In addition, continuous networking and stay connected in one of the social media functions help to signal and detect disaster quickly and allow the people to response accordingly and timely. In tandem to its interactivity and multiple ways of communication, this allow manipulation of social media in assisting during rescue of people in disaster aftermath and coordination of response team. Hence, the objective of this study is to determine the role of social media in the disaster management cycle and to create a framework for the application.

2.0 Materials and Methods

2.1 Data sources

A systematic approach to retrieve relevant literature for our research question on 'What is the role or function of social media in disaster management?' was conducted through comprehensive literature search using electronic databases such as PubMed, Google Scholar, Science-direct and Scopus. The articles reported for the past 10 years were searched with the terms: "role of social media", "Social media", "disaster event" or "natural disaster". These exact phrases were combined by Boolean operator "and". The literature search was limited to open source articles and in English language.

This systematic review included all types of review on microblogs usage (Twitter, Facebook, Instagram, Pluck, Flickr, Whatsapp etc) in recent event of natural disaster. Exclusion criteria include article involving non-microblogs platform (web-based media), non-natural hazard disaster (man-made) and disease outbreak. The reviewers screened the citations identified by the search strategy. Full text review was done by two reviewers (Abdul Mueez A.S., and Mardiana O.1) to establish the eligibility of the article. Information details was extracted from the list of included studies, which include the publication (author, title and year of publication), type of hazard, year of hazard, country affected, role of social media and stage of disaster management were collected and collated. Any disagreement among the reviewers were resolved by consensus.

A total of 128 articles were identified by the electronic search strategy after duplicate were removed. Ninety articles were further removed after reviewing the title and abstract. A further thirty eight articles were retrieved and screened for eligibility. For secondary screening, a total of 24 articles who met the inclusion and exclusion criteria were reviewed and only 14 articles were included in systematic review after full articles reviewed. Figure 2.1 showed prisma flow diagram of literature search for "Role of Social Media in Disaster Management".
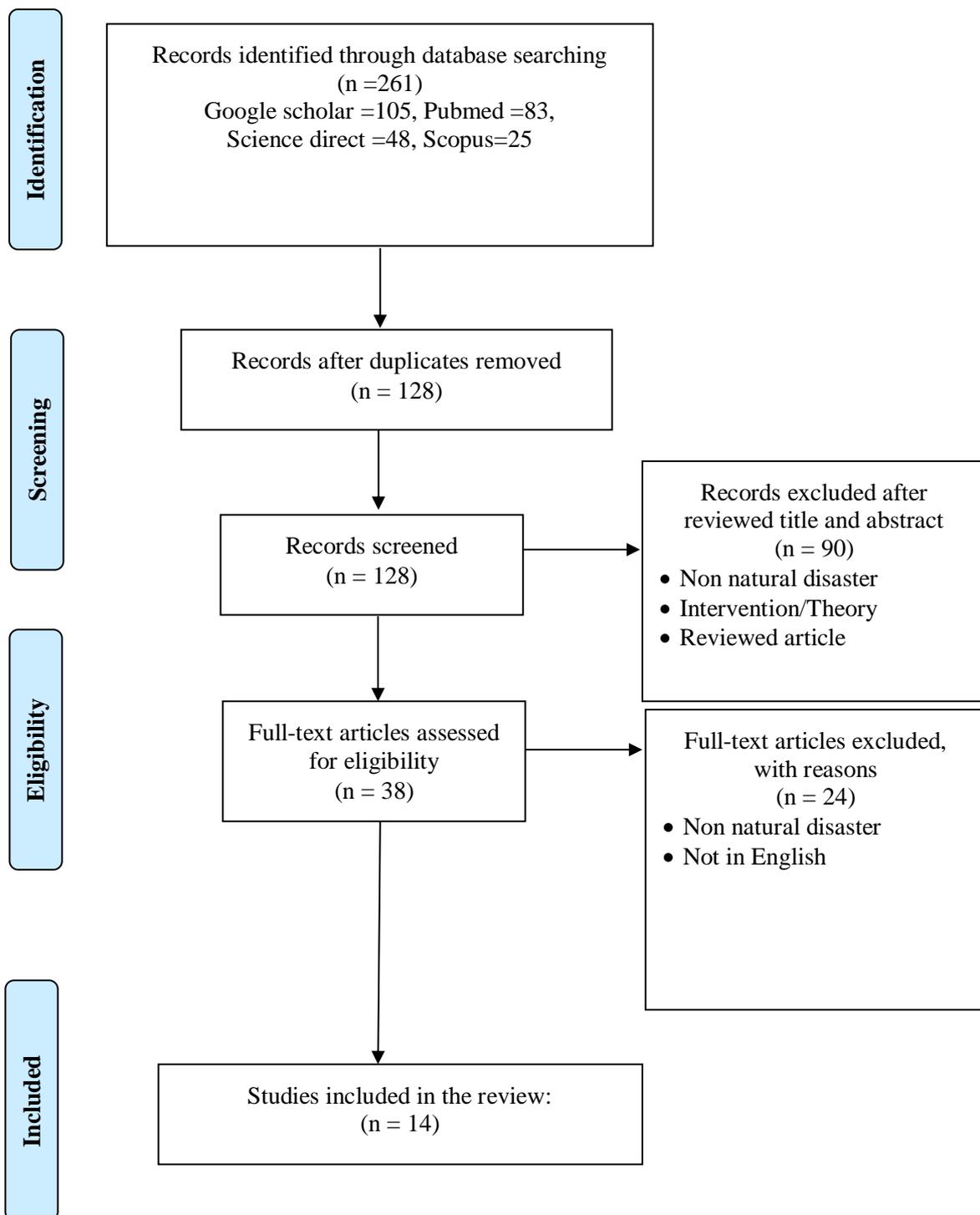
Figure 2.1: Prisma flow diagram of literature research for role of social media in disaster management

3.0 Result

Result gathered from these articles were group in Table 1 under subheadings authors, title, event of natural disaster, country affected, year of natural disaster, type of social media used in disaster event, purpose of social media used in disaster event and stage of social media used in the disaster event.. The roles of social media were divided according to phase of disaster management cycle and discussed in the next paragraph.

Table 1: Summary of Included Articles and Reports for Role of Social Media in Disaster Management

No	Author	Country	Year	Hazard	Types of Social Media Used	Stage of Disaster Management	Purposes
1.	(Chavez, Repas, Stefaniak, & Stefaniak, 2010)	County of Fort Bend, US	2009	H1N1	-Facebook -Twitter -Blogs	Mitigation and Preparedness	**Incorporation of risk reduction activities and preventive activities** Fort Bend County Office of Emergency Management's (OEM) used social media to inform the County's H1N1 Community Mitigation Strategies, conducted notices about the County's 2009 Emergency Preparedness Workshops, tips on flu prevention, notices about where to get H1N1 vaccinations, clinic closures, and advice about when to go to the emergency room for H1N1. **Provide disaster warnings and implement communication crisis activities** Tweeting and posting on their Facebook wall, OEM gave its social media followers all kinds of information about the disease

No.	Author	Location	Year	Disaster	Social Media	Phase	Role
							including the symptoms, number of cases and where to seek for treatment
2.	(Chavez et al., 2010)	Moorehead, Minnesota, US	2009-2010	Red River Flood	-Facebook -Twitter	Preparedness	**Provide disaster warnings and implement communication crisis activities** Local authorities use social media for press conferences, inform regarding road closures, flooding alerts, state of emergency declarations, and updates about the eight flood zones and any flood zone meetings. In addition, Moorhead local authority has also asked volunteers from the community and students from Minnesota State College at Moorhead and Concordia University to help with sand bagging flood prone areas.
3.	(Vieweg, 2010)	North America	2009	Oklahoma Grassfire and Red River flood	-Twitter	Preparedness, response and recovery	**Provide disaster warnings and implement communication crisis activities** Tweets include specific information about warnings, evacuations and road conditions and their locations to enhance situational awareness. In "realtime" during disaster, authorities used geo-location information to provide relative lengths of different disaster stages.

							Provide and receive disaster response information Situational updates from tweeted responses contributed to understanding the emergency situation and what response efforts are needed reference to specific locations. The informational needs during the impact result in increased use of geo-location information in emergency-related tweets for examples provides detail on structural damage and injury. **Send and receive requests for help or assistance** The use of geolocation information and referencing locations were used in tweeted information for response efforts to specific locations in reaching individuals. **Provide and receive information about recovery and rebuilding** During the recovery stage, information about disaster location(s) has impinged upon the built environment whereby resources need to be directed via geo-location.

| 4. | (Akemi, T.C. and Uuf, B., 2013) | Indonesia | 2010-2012 | Tsunami and Earthquake | -Twitter | Preparedness | **Provide disaster warnings and implement communication crisis activities** Demonstrated as a viable complement to Indonesia's Ina TEWS -a comprehensive disaster information management system for governments, by informing the public and creating public value through its communication speed, reach and information quality. |
| 5. | (Acar & Muraki, 2011b) | Japan | 2011 | Great Tohoku Earthquake | -Twitter | Preparedness and Response | **Provide disaster warnings and implement crisis communication activities** Local authorities sent a number of warning tweets that were posted during the day of the disaster **Send and receive requests for help or assistance** Social media is reported to be generally more reliable in disaster situations, hence requests for help post disaster may be communicated via social media **Deliver and analyse news coverage of the disaster** People constantly reported what was happening to them and what was happening in their environment during the earthquake |

6.	(Bossu, Laurin, Mazet-Roux, Roussel, & Steed, 2015)	Nepal	2015	Ghorka Earthquake	-Twitter -Facebook -LastQuake	Preparedness	**Provide disaster warnings and implement crisis communication activities** Disaster warnings were disseminated and propagated via LastQuake, Twitter and Facebook from the official disaster organisation or government or users' testimonies. **Signal and detect disasters** During the earthquake in Nepal 2015, Last Quake offering rapid information on felt and damaging earthquakes by collecting testimonies within a few tens of minutes of a felt-earthquake occurrence from its users. This gave the two-way and real-time communication channels.
7.	(Aisha, Wok, Manaf, & Ismail, 2015)	Malaysia	2014	Flood	-WhatsApp -Twitter -Facebook	Response	**Receive and deliver news coverage of the disaster** It was used vigorously during the flood period, and used specifically for information sharing during the flood period. The users also followed politicians/celebrities newsfeeds to get information on the disaster.

8.	(Yates & Paquette, 2011)	Haiti, US	2010	Haiti Earthquake	-MediaWiki -SharePoint	Response	**Provide and receive disaster response information** US government agencies employed social media technologies such as wikis and collaborative workspaces as the main knowledge sharing mechanisms. Social media used in knowledge sharing, reuse, and decision-making, and how knowledge was effectively (and at times ineffectively) maintained in these systems during disaster management in Haiti earthquake.
9.	(Martín et al., 2017)	South-eastern, US	2016	Hurricane Matthew	-Twitter	Response	**Provide and receive disaster response information** Using Twitter data, spatiotemporal variability can be determined by leveraging geotagged tweets to assess the evacuation responses of residents. The approach involves the retrieval of tweets from the Twitter Stream, the creation and filtering of different datasets, and the statistical and spatial processing and treatment to extract, plot and map the results.
10.	(Sutton et al., 2015)	Colorado, US	2013	Boulder Floods	-Twitter	Response	**Provide disaster warnings and implement crisis communication activities** Terse health-related warning messages sent by public safety agencies over Twitter

						provide information about the hazard event, its impact, and actionable instructions for self-protection.
11.	(Jung, J. And Moro, M., 2011)	Japan	2011	Great Eastern Japan Earthquake	-Twitter	Response and Recovery	**Multilevel functionalities of social media in disaster management** 　i.　Communicating with others to check the safety of each other (micro level); 　ii.　Group-level communications for organisations local communities, and local media (meso level); 　iii.　Distribution channels for the mass media (macro level); 　iv.　Information sharing and gathering (cross level); and 　v.　Direct communication channels between individuals and the macro-level mass media, the government, and the public (cross level).
12.	(Leysia, P. 2008)	Southern California, US	2007	Southern California Wildfire	-Flickr -Twitter	Response and Recovery	**(Re)connect community member** To learn critical information about the fire in particular if their areas affected and reconnect with family members and community.
13.	(Kongthon,Haru echaiyasak, Pailai, &	Northern, Northeastern	2012	Flood	-Twitter	Respond and Recovery	**Deliver and analyse news coverage of the disaster**

Kongyoung, 2014)	and Central Thailand					Information related to the flood such as water levels, traffic conditions and road conditions in certain areas. In addition, emergency warnings from authorities advising citizens to evacuate areas, seek shelter or take other protective measures are also included. **Raise donation, encourage volunteerism and develop awareness of an event** This category includes support announcements such as free parking availability, free emergency survival kits distribution and free consulting services for home repair. **Send and receive requests for help or assistance** This category includes messages requesting any types of assistance; such as food, water, medical supplies, volunteers or transportation. **Provide and receive disaster response information** This category included general inquiries related to the flood and flood relief such as inquiries for telephone numbers of relevant authorities, regarding the current situation

						in specific locations and about flood damage compensation.
14.	(Huang et al., 2010)	Taiwan	2009	typhoon	-Twitter -Facebook	Respond and Recovery	**Provide and receive disaster response information** By using microblogging to compile data, local emergency medical system workers had successfully rescued 14 trapped people by the second day of typhoon Morakoot. **Send and receive requests for help or assistance** In addition to these examples, Web 2.0 social networking also serves as a platform in resource gathering, logistics allocation and the distribution of relief supplies. **Deliver and analyse news coverage of the disaster** Providing rapid and direct information during emergencies and understanding the severity and breadth of major disasters

4.0 Discussion

4.1 Role of Social Media in Disaster Management

Framework on Role of social media in disaster management can be summarised according to table 2. The discussion will focus on listed role of social media used according to four stages of disaster management cycle which are mitigation, preparedness, response and recovery.

Table 2: Framework on Role of Social Media in Disaster Management

Disaster stage	Stage of Disaster Management	Role of Social Media	Implication in Practice
Pre-Disaster	**Mitigation**	Incorporation of risk reduction activities and preventive activities	**Risk Reduction**
Pre-Disaster	**Preparedness**	Provide disaster warnings and implement crisis communication activities	**Risk Reduction** **Early Warning**
		Signal and detect disasters	
Disaster	**Response**	Deliver and analyse news coverage of the disaster	**Information Dissemination**
		Provide and receive disaster response information	
		Send and receive requests for help or assistance	
		(Re)connect community members	
Post-Disaster	**Recovery**	Raise donation, encourage volunteerism and develop awareness of an event	**Information Dissemination**
		Provide and receive information about (and discuss) recovery, and rebuilding	**Community Empowerment**

4.2 Mitigation

Mitigation phase refers to the systematic efforts taken to reduce disaster risks by examining and managing the causal factors of disasters, including reducing exposure to hazards, reducing the vulnerability of people and property and increased preparedness for disaster events (United Nations Office for Disaster Risk Reduction (UNISDR), 2013). Opportunities that can be manipulated from social media include its ability to build community resilience by enabling members of a community to establish communication networks prior to an emergency (Anson, Watson, Wadhwa, & Metz, 2017).

4.2.1 Incorporation of risk reduction activities and preventive activities

In the mitigation stage, social media can be helpful as a complement in mitigation strategies by incorporating it for risk and prevention activities (Chavez et al., 2010). The Fort Bend County Office of Emergency Management's (OEM) social media use started with the H1N1 virus in

2009. The Center for Disease Control (CDC) reported that there were 159 confirmed H1N1 cases in Fort Bend County, and by the end of the summer there were hundreds of suspected cases. During this event, the OEM used social media to inform public about the County's H1N1 Community Mitigation Strategies, conducted notices about the County's 2009 Emergency Preparedness Workshops, tips on flu prevention via video blog, notices about where to get H1N1 vaccinations, clinic closures, and advice about when to go to the emergency room for H1N1. In addition, they also provided the Red Cross's Flu Checklist, the CDC's Guidelines for Treating Pregnant Women and Children Infected with H1N1 (Chavez et al., 2010).

4.3 Preparedness

Social media is increasingly being recognised as a tool that can be used for communicating information particularly during preparedness phase. Many stakeholders have utilised social media to its full potential particularly on how to prepare, engaging citizens in preparedness activities and to share preparedness information. The increasing use of social media by public authorities and humanitarian organisations preparing for and responding to disasters generates vast quantities of information (Anson et al., 2017).

4.3.1 Provide disaster warnings and implement crisis communication activities

Prior to the event of disaster, warnings can be disseminated and received via social media (Martín et al., 2017; Yates & Paquette, 2011; Chavez et al., 2010; Chatfield & Brajawidagda, 2013; Acar and Muraki, 2011; Bossu et al., 2015). Information pertaining to disaster warnings were spread through social medias by the disaster organizations (such as InaTEWS) and local authorities (such as in County of Fort Bend, US and Moorehead, Minneseto, US) to inform the public of the disaster. Even though the public did not follow the account, the information was still being propagated through reposting and retweeting of other individual accounts which consequently lead to the widespread of information.

4.3.2 Signal and detect disasters

On the other hand, social media is also useful in signalling and detecting disasters (Bossu et al., 2015). During the Ghorka earthquake that strikes Nepal in 2011, LastQuake used share eyewitnesses' testimonies and observations from the microblogging site Twitter, web-browser add-ons, and a smartphone application (Android and iOS). This flash sourced detections are typically within less than 2 minutes of earthquake occurrence and preceded by seismic detection in the vast majority of cases and, possibly, associated tsunami alerts. These individuals reports were mapped and later published to public (Bossu et al., 2015).

4.4 Response

Effective communication continues during and after a disaster, coordinated response effort is crucial in limiting secondary morbidity and mortality cause by disaster (Bradley et al., 2014) as part of disaster risk communication and disaster risk reduction, communication between organization and multiple stakeholder has to be early, updated and frequent. Continuous communication between stakeholders will prevent panic, decrease anxiety among public and implementation of orderly response plan (Bradley et al., 2014). Because of the rapid unpredictable nature of disaster event, a lot of time people often learn of natural occurrences

faster than the authorities can release explanations. This led the community to incomplete information. Inefficiency of the information cause misleading direction and uncoordinated response among authorities (Gultom & Joyce, 2014). Meanwhile, people can counteract the information gap provided by authorities using alternative information source such as social media information sharing. Roles of social media during response phase are discussed next.

4.4.1 Deliver and analyse news coverage of the disaster

Coverage of the disaster event from a news or mass media maybe differ from which experienced by those who's been affected. Social media may be used by citizens who are able to document and share information about events as they unfold, even in the absence of professional news organisations and journalists (Meikle, 2012). Overlapping information shared between citizen, organisation, and journalist reports of a disaster on social media certainly increase the understanding and provide a clear magnitude of disaster impact. It also set a direction and priority for authorities to conduct response measures. In comparison to traditional media, web based social media technologies are characterised by greater capacity, dependability, interactivity, each of which may be expedient for disaster communication (Jaeger, Fleischmann, et al., 2007). Therefore, the important point is to understand the nature of disasters and generate understanding, information gather from the understanding can be used in identifying public health problems. Thus, collection, interpretation and dissemination of accurate and timely data from affected areas become priority during and after the disasters (Huang et al., 2010) . Thus, social media may act as primary channels orienting people to official sources of information and amplifying these information to a broader audience (Tylor & Howell, 2012) and therefore, is a significant tools in facilitating information delivery and broaden the reach of traditional news coverage (Gultom & Joyce, 2014).

4.2 Provide and receive disaster response information

Most of the article about social media during natural disasters has highlighted on its role as a news source. Certainly this is invaluable with instantaneous information available across multiple devices, critical with power outages shutting down TV stations and landlines (Velev, Zlateva, & Zlateva, 2012). People need information and direction, not only in the wake of a disaster but also to be sure that they are prepared in advance. During Thailand's big flood in 2010, twitter messages was used to update situational information related to the flood such as water levels, traffic conditions and road conditions in certain areas. In addition, emergency warnings from authorities advising citizens to evacuate areas, seek shelter or take other protective measures are also included (Kongthon et al., 2014). In 2009, during typhoon Marakoot disaster in Taiwan, usage of twitter and other social media platforms has enabled citizens to shared information about current location and the latest situation damage cause by severe rainfall and landslide. This information were then used by the local governmentsfor response to be coordinate (Huang et al., 2010). Two-way communication using social media platform between people affected by disaster and authorities means that information about situational magnitude can be disseminated *vice-versa*, facilitating the authorities and victims to update their understanding on current situation, response needed and providing assurance and comfort to the victims.

4.4.3 Send and receive requests for help or assistance

During disaster rapid decision making had to be made by victim, often victim is left in the situation whereby they were not properly prepared if evacuation is needed. In most of the cases victims will onlyconsider things that they can carry such as easy to hold, hand held communication device like smartphone (Aisha et al., 2015). As land communication may be interrupted in the event of disaster, having smartphone offers some advantage in communicating with the authority or rescuer for assistance. For instance, when traditional emergency reporting systems in Taiwan were overloaded during typhoon Marakoot in 2010, people turn into web base microblogging twitter sharing information such as damage sustained and assistance needed and sharing their location for evacuation. By using microblogging to compile data, local emergency medical system workers had successfully rescued 14 trapped people by the second day of typhoon Marakoot (Huang et al., 2010). A study done post Tohuku Earthquake 2011, assessing usage of twitter for crisis communication showed one of the twit wrote:

"Thirty people are stuck at Ozaki shrine. It seems the roads are shut down. Anybody, please call police and fire department". (Acar & Muraki, 2011a)

Clearly social media was used as medium to communicate for help. Hence, it is important to consider that social media and other similar tools run on two-way communication which helps victims and professional emergency responders to communicate and share timely and important information directly with those in urgent need.

4.4.4 Reconnect community members

Social media has the capacity to reconnect community and forging new community connection by means of increasing the feeling of connectedness and building a stronger relationship between community members particularly after an disastrous event (Tylor & Howell, 2012;Rive et al, 2012; Tengku Siti Aishaa, Saodah Wok, A.Manaf, & Ismail, 2015). On broader term disaster brings social connection beyond cultural, religion and believes through social media. The community is united through connection with unknown people and organization with similar goal which is to bring aid to people affected by disaster by any means. Stronger relationship between community members will create 'community resilience' in the future (Patel, Rogers, Amlôt, & Rubin, 2017). Looking at affected people's perspective, social media also serve as a medium for family members to interact with one another especially when family members live in a distance and the traditional media are down. Hence, with contact initiated through social media, family members will be relieve to know that their are safe (Aisha et al., 2015). During California forest fire in 2007, many victims had to evacuate during the disaster event. Through microblog established by local community, peoples reconnect and gathered information about their neighbourhood, and shared post disaster pictures (Palen, Sutton, & Shklovski, 2008).

4.5 Recovery

Recovery phase involves the restoration of normal community activities that were disrupted by disaster impacts, it is a process by which the community achieves the goal of returning to normal routines (Lindell, n.d.) . After disaster recedes to the post-disaster time frame, social media may allow users to continue to stay engaged with efforts related to the disaster and to exchange stories of personal involvement (Chen et al., 2012).

4.5.1 Raise donation, encourage volunteerism and develop awareness of an event

In the event of disaster, responsible officer may encounter barriers and limitations that hinder them from delivering necessary steps describe in disaster cycle management by their own. Aid organisation such as Non-profitable Organization (NPOs) and Non-Government Organisation (NGOs) can help in planning and facilitating humanitarian aid (Mouroner, 2016). Social networking serves as a platform for this organization to disseminate information for resource gathering, logistics allocation and the distribution of relief supplies (Huang et al., 2010) . Volunteering was another activity promoted through social networking services observed during typhoon Morakoot. The social networking services were used to spread the news on volunteering opportunities (Huang et al., 2010).

4.5.2   Provide and receive information about (and discuss) recovery, and rebuilding

This role is quite similar to point 4.4.4 which during recovery phase social media was used as medium among local community members, authorities and non-government organizers in channelling aid and rebuilding community. California forest fire 2007 brings communities to developed local microblog to discuss post disaster communal work for remedial action (Palen et al., 2008). During Thai Flood 2011, twitter and Facebook was used to disseminate support announcement and assistance provided by local government or non-governmental association such as ,free consulting services for home repair and flood damage compensation programme (Kongthon et al., 2014).

5.0 Implications for Practice

Communication is a core component in disaster management. From a practical standpoint social media serve as useful communication tools for public health officers in district disaster management. In mitigation and preparedness phase, risk reduction plans is pivotal to lessen the impact of disaster. Social media can assist risk reduction activities by connecting individuals and organisations to disaster preparedness and mitigation information ahead of an event (Houston et al., 2015). Furthermore, the information can be distribute to affected community or person who actively seek out for information and disseminated to public who are not affected directly. This widen the reach of information, develop capacity building and community resilience.

Another essential component during preparedness phase is, it serve as early warning tools, which is helpful in preparedness phase. Social media has the capability to detect, provide relevant, topical information on environmental conditions so that community can assess levels of risk and make informed decisions to protect themselves and other vulnerable population (Macherera, 2005). Data visualisation on a disaster and individual reports by social media users (also known as crowdsourcing) can be collated, then map to detect a consistent disaster information prior to issue alerts or warning to the public. A public health physician in district can recognize a disaster through the traffic pattern of information in social media and later activating alert and response.

6.0 Conclusion

This framework proved that social media plays a multifunctional role in all disaster phase management, particularly in terms of mass communication and information sharing. A single social media source may be employed by different users for multiple, varying purposes. The spectrum of social media channels allows information to be disseminate and shared without barriers and bypass the problems of bureaucracy, especially in time of disaster. The used of digitize technology to enhance disaster management and promote community resilience were align with Sendai Framework for Disaster Risk Reduction plan which to promote real time access to reliable data and use information and communications technology innovations to enhance measurement tools, collection, analysis and dissemination of data (Nations Office for Disaster Risk Reduction, 2015). Thus, this adopted framework provide stakeholder with opportunity to develop and utilize the full potential of social media as platform of data collection, development and dissemination in all disaster phase management. However, given the ongoing and rapid evolution of social media, future adjustment to the framework can be made as necessary.

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Declaration

Author(s) declare that this article did not contained any conflict of interest.

Authors contribution

Author 1: Literature finding, draft manuscript and manuscript editing
Author 2: Literature finding, draft manuscript and manuscript editing
Author 3: Manuscript review and final editing

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