



Short Paper: How Do People Choose a Means for Communication in Disaster Situations?

Surveys After the Great East Japan Earthquake and the Kumamoto Earthquake

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Abstract. In disaster situations, people try to communicate with acquaintances for a variety of reasons. In general, they try to immediately communicate with family or important friends to confirm their safety. To understand the damage situation, they may try to communicate with neighbors whom they don't often communicate with in daily life. This paper introduces the results of surveys of people who experienced the Great East Japan Earthquake, 2011 and the Kumamoto Earthquake, 2016 in Japan to discover what communication modalities were used and why they were chosen.

Keywords: Disaster · Communication modality · Information grasp · Survey

1 Introduction

In daily life, people communicate with acquaintances in a wide variety of relationships such as family, friends, and colleagues. Indeed, there are many kinds of friends. For example, they may be old friends whom they have not contacted in a long time or those they contact often in daily life. Mothers of young children often join a community based on their child's associations. After a disaster, they may talk to others in an evacuation center. Disasters are fortunately rare but after a disaster it is important to communicate with many kinds of people since the type of information needed is unusual. This paper introduces the results of surveys of people who experienced the Great East Japan Earthquake, 2011 and the Kumamoto Earthquake, 2016 in Japan to discover what communication modalities were used and why they were chosen.

2 Related Work

To grasp information in disaster situations, people use many kinds of communication modalities such as face-to-face, telephone, email, SNS(texting), etc. SNS is one of most effective modalities. For example, Twitter can be used as a post-disaster modality by security extension [4]. Nagar's work [6] analyzed the spread of disaster information by social media. Busa's work [2] discussed trust-building through social media

communications in disaster management. Wohn compared face-to-face and computer-mediated communication in terms of social support [8], but did not focus on disaster situations. Shklovski showed that ICT use could find communities in disaster situations [7].

In this study, we elucidate the information needed and communication targets in disaster situations. To that end, we surveyed people who experienced the Great East Japan Earthquake, 2011 and the Kumamoto Earthquake, 2016 in Japan.

3 Information Needed in Disaster Situations

In disaster situations, it is important to grasp “information”. A report on the Great East Japan Earthquake in 2011 noted that 78.5% of evacuees carried their own mobile devices, and at train stations in urban areas, many tried to get disaster information from digital signage displays.

The need to acquire information in disaster situations has three goals. First, people try to obtain information about the safety of family and friends. In this case, they have two psychological desires; one of which is that they want to know their family or friends are alive as soon as possible, and other is that they want to lower their anxiety by the act of communicating with someone special.

Second, they try to grasp information about the disaster. After an earthquake, they want to know its magnitude, areas affected by the disaster, damage to roads or buildings, suspension of public transportation, etc.

Third, they try to obtain information to maintain their life. After safety confirmation, they start thinking of lifelines such as electricity, water, and food. Announcements from the city office about food supplies are critical in stabilizing their emotions. In most cases, these bits of information are acquired by communicating with somebody.

A related work [1] extracted five behaviors in disaster situations. However, as we focus on information, the three goals above are our key concerns.

4 Questionnaire Survey

We conducted a web questionnaire survey to determine how people chose what means of communication in disaster situations. The subjects were 150 people who experienced the Great East Japan Earthquake, 2011 and another 150 from the Kumamoto Earthquake, 2016 in Japan. The affected area of the Great East Japan Earthquake covered many prefectures. In this survey, we determined the affected area as the three prefectures of Miyagi, Iwate, and Fukushima. These three were most heavily damaged prefectures. The earthquake disconnected the Internet in many areas by destroying facilities and/or flow control of the public communication network.

We selected the 300 subjects (in their 20’s to 60’s) from a database of a web survey company. The survey was conducted from Feb. 24 to 27, 2017. Note that the survey was part of many questionnaires and the question given to the subjects was “What means did you use for communication to obtain information in the disaster situation?” Multiple responses were accepted.

We set eight communication targets to obtain information: family, neighbors, colleagues, old friends, local town communities, new friends at a shelter, mother/father communities of elementary school, and those of kindergarten. The communication modalities targeted in this survey were face-to-face, telephone, email and SNS. The telephone category includes both mobile and fixed phone. The email category includes both mobile and PC email. The SNS category includes many texting applications such as Facebook messenger, etc.

5 Results

We introduce the survey results here. Figures 1 and 2 show the survey results of subjects who experienced the Great East Japan Earthquake and the Kumamoto Earthquake, respectively. Figure 3 displays the total results for both subject groups.

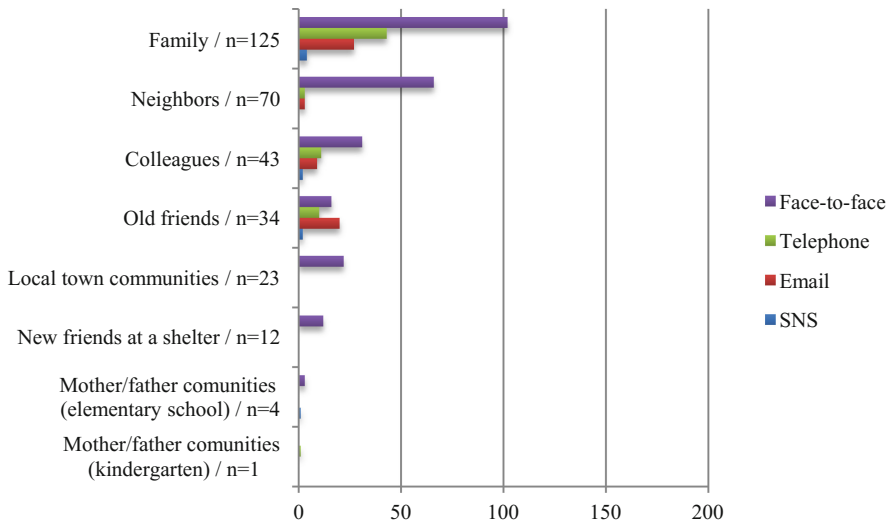


Fig. 1. Survey results of subjects who experienced the Great East Japan Earthquake.

As seen in Fig. 3, regarding communication with family (n = 249), they predominantly used face-to-face (193, 77.5%). This result shows their psychological desire to seek relief in seeing people face-to-face, not online. They also used the telephone (108, 43.4%), email (52, 20.9%) and SNS (36, 14.5%). These communication channels, if working, permit the rapid confirmation of family safety.

Regarding communication with neighbors (n = 139), they used face-to-face (133, 95.7%). Regarding communication among mother/father communities based on children, they communicated face-to-face (5, 71.4%) and SNS (3, 42.9%); note that the number of answers was small (n = 7). The reason for these results is that they are neighbors in the same elementary school area and that those who have children are familiar with SNS.

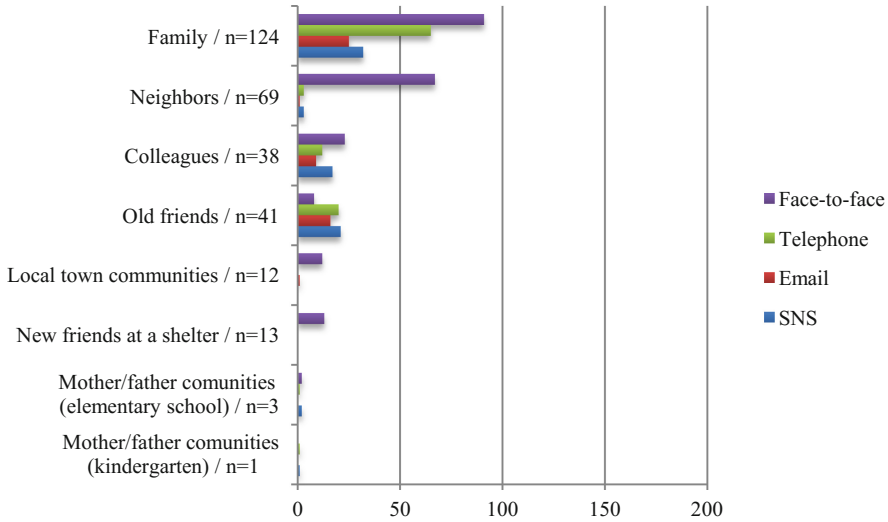


Fig. 2. Survey results of subjects who experienced the Kumamoto Earthquake.

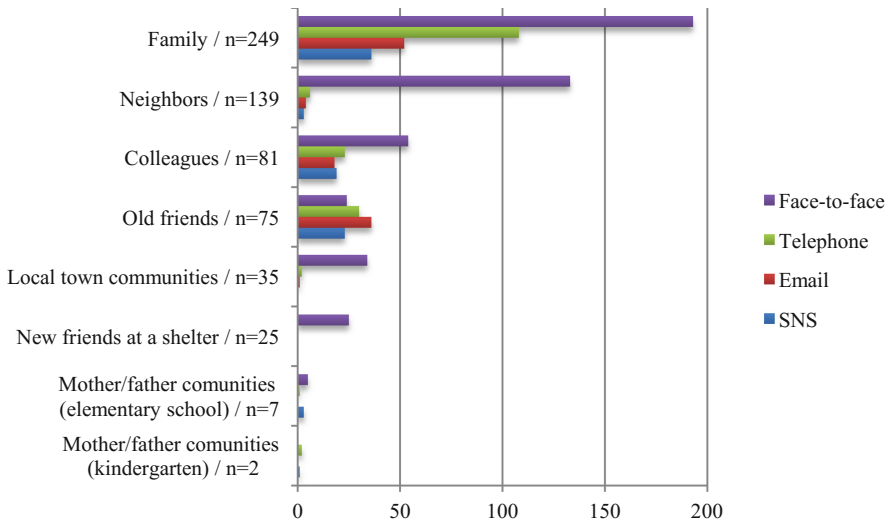


Fig. 3. Total results of the two subject groups.

On the other hand, regarding communication with old friends ($n = 75$), they used email (36, 48.0%), telephone (30, 40.0%), face-to-face (24, 32.0%) and SNS (23, 30.7%). These are because old friends do not necessarily live in the same area. Regarding communication with colleagues ($n = 81$), they used face-to-face (54, 66.7%), telephone (23, 28.4%), email (18, 22.2%), and SNS (19, 23.5%).

6 Discussion

One interesting finding from the survey is that parents who have children in the same elementary school used the community network established by those parents. As the parent community network is wider than the neighbor network, they can obtain valuable information that cannot be obtained from neighbors.

For example, they could discover that a supermarket in the next town is open while the one in their home town is closed. Moreover, they can obtain information valuable for parents having children since the parent network is constructed among parents with a common focus on children. For example, they may obtain information as to which roads are safe for the children to use to go to school. Information needed in disaster situations is strongly focused on family safety. Parents with small children try to grasp common information from parent communities.

Figure 4 is a comparison of SNS use between the Great East Japan Earthquake and the Kumamoto Earthquake. The result is that more people used SNS after the Kumamoto Earthquake. This is because SNS applications were not widely used in Japan when the Great East Japan Earthquake occurred, 2011 (See the 2017 WHITE PAPER Information and Communications in Japan [9]).

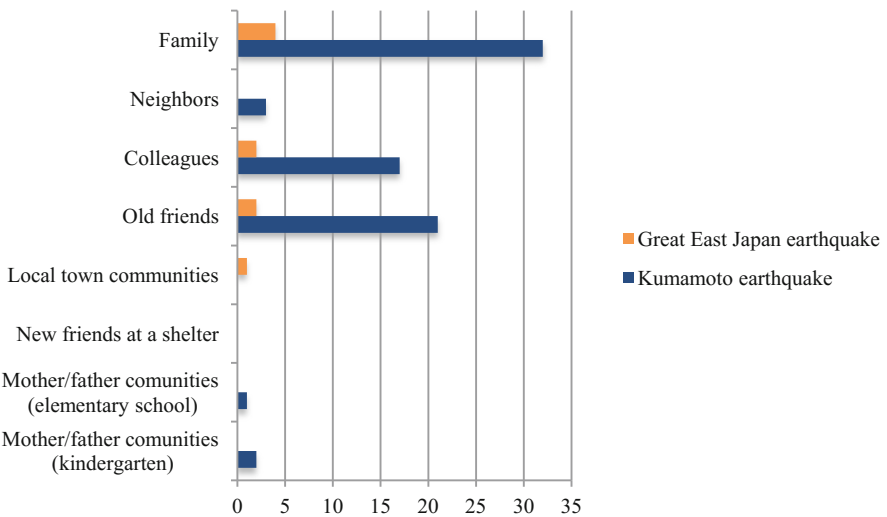


Fig. 4. A comparison between the Great East Japan Earthquake and the Kumamoto Earthquake regarding the use of SNS.

Figure 5 is a comparison between the Great East Japan Earthquake and the Kumamoto Earthquake regarding the use of telephones. The result is many people used telephones in both cases. These results show that SNS use is likely to be very common in future disaster situations as well as the telephone. People have a psychological desire to confirm the safety of their family and friends by hearing their voice.

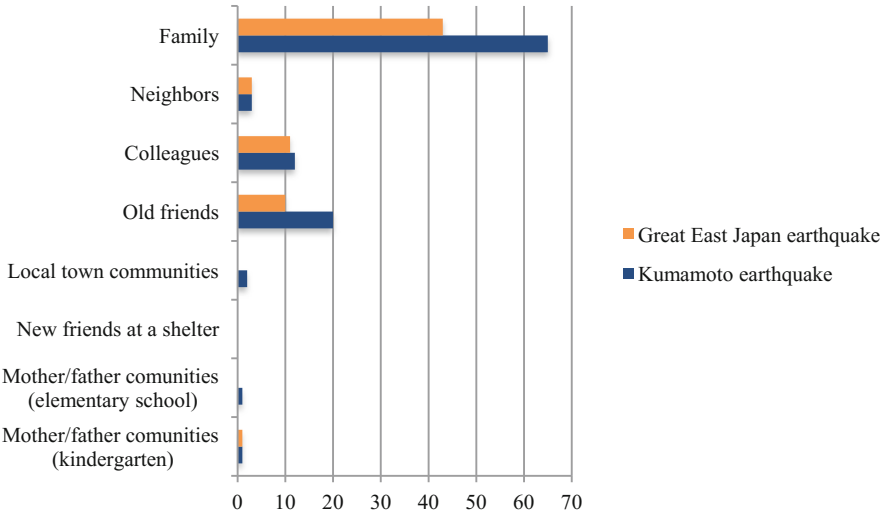


Fig. 5. A comparison between the Great East Japan Earthquake and the Kumamoto Earthquake regarding the use of the telephone.

Regarding information deemed necessary to acquire, an interesting finding from another related interview is that people obtained useful know-how to survive in disaster situations from older people. The elderly have experienced similar disasters in the past and know how to manage the messy situations. Information from those who have experienced a similar situation in the past should be well shared.

7 Contribution to HCI Fields

Our survey results showed that people use a wide variety of communication modality according to the target person and the aim of information acquisition. They also showed that SNS has high likelihood of use in disaster situations. These results will better inform discussions on the framework for a total design of SNS tools and its user experiences. As shown in the use case of parent communities, information needed is strongly related to the geographical conditions. Disaster-biased SNS should have functions to support multi-communities based on its geographical area size and individual aims of information acquisition. Although commercial SNS applications offer multi message thread (any user can create a user group thread), message threads based on communities of geographical areas should be established automatically after a disaster.

Goolsby’s study [3] showed that social media provides the means for creating new communities and for reenergizing old communities. This indicates the possibility of existing communities helping people in disaster-affected areas even if the “old friends” live far from the affected area.

Another important aspect is the need for face-to-face. People want to know that their family or friends are alive as soon as possible. In other words, they try to physically move to an evacuation center, etc. in order to confirm the safety of family or friends. A

technology that targets this need could be effective. A new technology to assist in safety confirmation in disaster situations could utilize the movement of people among centers. One example is the multi-hop type communication technology based on mobile phone; it supports safety confirmation by using the movement of people among evacuation centers [5].

8 Conclusion

In this study, we detailed a survey we conducted on the means for communication actually used in disaster situations. The results showed that people chose a variety of communication modalities according to psychological factors and distance limitations.

Future work includes a framework for designing more comprehensive SNS tools and making the user experience more effective.

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