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Evaluation of Incoming Messages to WhatsApp Communication Network Created by Volunteers in Major Disasters: The Case of Turkey Earthquake

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Brief Report

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Abstract

Objective: This research was conducted in order to assess the 1-week aid needs determined by the health professional who voluntarily served in the WhatsApp communication network during the earthquakes in Kahramanmaraş, Turkey.

Methods: This descriptive retrospective epidemiological study focuses on the 1-week messaging activities of the WhatsApp group created by volunteers after the earthquake in Turkey. During the 7-day period included in the research, a total of 5813 messages were sent. 3472 of these messages were not included in the research for various reasons, and a total of 2341 messages were used for the research.

Results: In all 7 days, it was seen that most of the messages were sent via text message and that voice messages were very few. When the distribution of the needs demanded by the earthquake victims for 7 days was examined, it was seen that there was a significant increase in the needs on the fourth day after the earthquake, and that the highest increase was the need for tents.

Conclusion: While the demands for rescue services increased in the first 2 days, it was determined that the demands for water especially, dry food, and tents increased from the third day onwards. It is suggested that a professional online infrastructure system should be created to enable the transfer of instant scene and need information that can be activated in such disasters.

Disasters and Social Media

An emergency involves 1 patient, a heart attack, stroke etc. A disaster is when the patient demand exceeds resources. Emergency events include natural disasters such as earthquakes, hurricanes, floods, and fires, as well as pandemics; it also covers human-induced or natural disasters such as terrorist attacks, riots, and socio-political movements.[1] In 2023, social media platforms such as X (formerly known as Twitter), Facebook, and WhatsApp™ have become important sources of real-time crisis information in disasters. People can easily reach any region, city, and country with their smart phones during a disaster if the internet, and cellular towers are functioning.

Information and needs at the scene can be quickly disseminated to groups in the entire WhatsApp™ network, with data such as video, image, and voice messages. In disaster scenarios, where such rapid management is required, the use of information systems is potentially a vital asset. Besides disaster operations, it is necessary to collect, consolidate and analyze situational information in real time to aid disaster response. Therefore, communication networks, such as WhatsApp™, can play a vital role in disaster management, method development, and system delivery.[1]

The use of online social media networks by disaster management agencies and professionals can provide searchable and traceable information and notifications to disaster victims.[2] In addition, social media improves communication and connections of local communities (e.g., family, friends, and neighbors). It also provides better access to localized and personalized disaster situation information from social media users in the same community.[3]

This study analyzes the service delivery of the healthcare professionals who volunteered in the WhatsApp™ communication network during the Kahramanmaraş earthquakes in Turkey. The aim of the research was to identify the information shared in the WhatsApp™ group related to the disaster, and to define people's needs. The messages were evaluated in terms of shift, type, categorization, and needs. These data will inform the planning of disaster volunteering efforts and create a more efficient resource allocation for similar incidents in the future.

Background Information

On February 6, 2023, an earthquake with a magnitude of Mw = 7.7 occurred in Pazarcık district of Kahramanmaraş, Turkey. On the same day, at 1:24 PM, another earthquake with a magnitude

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of Mw = 7.6 occurred in Elbistan district of Kahramanmaraş. The total area affected by the earthquakes in the provinces was 108 812 km^2, which is larger than the land area of many countries or close to it. More than 40 000 people lost their lives in the earthquakes, over 100 000 people were injured, and 13.5 million people were affected.[4]

Methods

The population of this descriptive retrospective epidemiological study is comprised of the 1- week messaging activities of the WhatsApp^{TM} group created by volunteers after the earthquake that occurred in Turkey.

Data Source

After the earthquake that took place in Turkey, communication networks were created by volunteers using communication systems such as WhatsApp^{TM}. In this research, the focus was on the WhatsApp^{TM} communication network created by the volunteer health professionals. This is because it served more than a billion users in 2022. In addition, it is 1 of the most popular messaging applications in the world.[5]

Data Collection and Classification

The WhatsApp^{TM} communication network included in the research was established on the day of the earthquake by Emergency Aid and Disaster Management Specialists, Nurses, and Paramedics. A total of 389 volunteers and officials of official institutions in the earthquake area took part in this WhatsApp^{TM} communication network.

The data were obtained from the message logs saved in the WhatsApp^{TM} messaging program. These records included the times of sending messages in the WhatsApp^{TM} messaging program, and the categorization of the information in the message content. The recordings obtained from the messages were divided into 8 categories in total. These categories were determined by the researchers: Organization and management, problems, rescue, and up-to-date information, as well as evacuation, injured information, needs, and information on looting/scamming. After the categories were determined, the researchers examined all the messages written in the WhatsApp group 1 by 1 and added them to the relevant category.

Messaging hours were grouped into day (07:00 AM - 16:59 PM) and night (17:00 PM -06:59 AM). The message data were grouped as 'text messaging, image, video, and voice message.' A total of 5813 messages were included in the research over a 7- day period. Of these messages, 3472 were excluded for various reasons (similar message, confirmation message, messages without a contact number, etc.), and a total of 2341 messages were included in the research.

Messaging was conducted in the local language, Turkish. The fields marked in red in Image 1 contained the contact number of the informer. For example, the content of the message in number 1 stated that there were 4 people under the wreckage, the temperature was noticed with thermal recordings, and that there was also a sound coming from the rubble. Number 2 reported that a family whose house was destroyed needed a tent. Number 3 showed that there was a noise under the rubble again, that the rescue teams were working nonstop, and that the rescuers were very tired and exhausted (Figure 1).

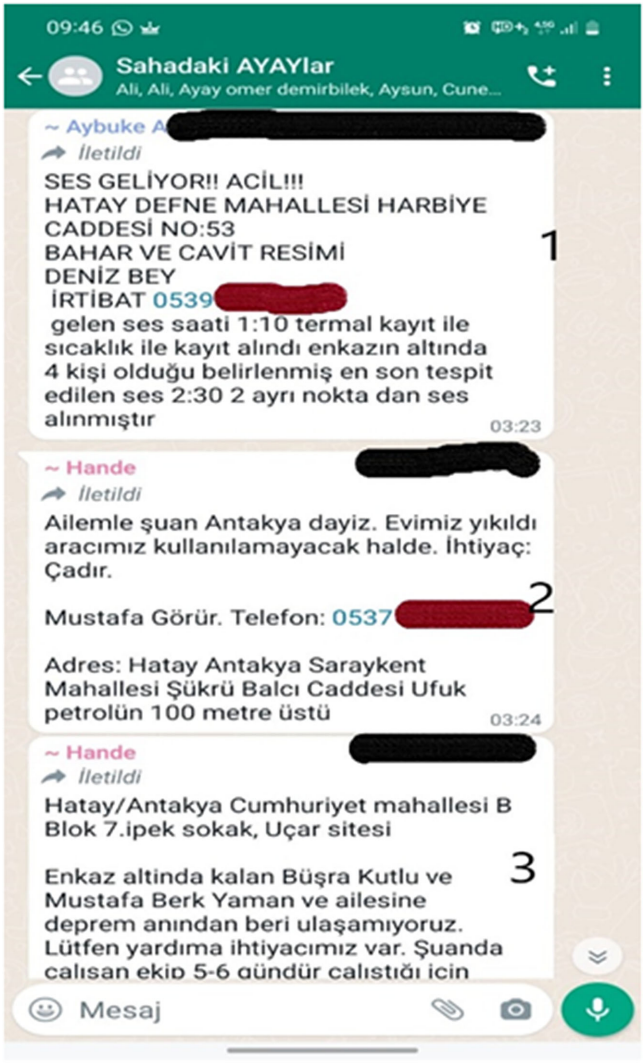

Figure 1. A screenshot of a section of messages in the WhatsApp^{TM} Group.

Statistical Analysis

The content of the messages obtained from WhatsApp^{TM} were matched specifically to the instant message groups mentioned above and given in the form of frequencies and percentages. In addition, the change of instant messaging categories according to days was defined as numbers and percentages.

The contents of the instant messages within the above-defined date range were compiled under the themes of organization and management, problems, rescue, and up-to-date information, as well as evacuation, injured information, needs, and information on looting/scamming.

Ethical Dimension of the Study

As all materials were obtained from anonymous open-source data, ethical approval was not necessary. While the messages were evaluated, the sender of the message was not considered. Only message content was examined.

Results

From Table 1, it can be deduced that most of the messages were sent via Short Message Service and that some of them were sent as

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Table 1. Distribution of message contents by some characteristics

		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7	
	Variables	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Shift	Day	198	46.05	213	51.20	180	41.00	283	49.48	135	55.79	93	58.1	59	71.95
	Night	232	53.95	203	48.80	259	59.00	289	50.52	107	44.21	67	41.9	23	28.05
Message Type	SMS	405	94.19	381	91.59	412	93.85	534	93.36	208	85.95	137	85.6	65	79.27
	Video	5	1.16	11	2.64	8	1.82	7	1.22	7	2.89	2	1.3	2	2.44
	Image	18	4.19	23	5.53	16	3.64	28	4.90	22	9.09	19	11.9	11	13.41
	Voice Message	2	0.47	1	0.24	3	0.68	3	0.52	5	2.07	2	1.3	4	4.88
Categories	1. Organization and Management	85	19.77	71	17.07	85	19.36	99	17.31	57	23.55	29	18.1	14	17.07
	2. Problems	43	10.00	3	0.72	5	1.14	2	0.35	0	0.00	0	0.0	0	0.00
	3. Rescue	166	38.60	157	37.74	106	24.15	112	19.58	39	16.12	29	18.1	9	10.98
	4. Up-to-date Information	66	15.35	61	14.66	40	9.11	58	10.14	21	8.68	19	11.9	16	19.51
	5. Evacuation	11	2.56	18	4.33	29	6.61	29	5.07	9	3.72	6	3.8	4	4.88
	6. Injured Information	25	5.81	6	1.44	4	0.91	4	0.70	7	2.89	2	1.3	2	2.44
	7. Needs	34	7.91	100	24.04	165	37.59	250	43.71	104	42.98	75	46.9	37	45.12
	8. Information on looting and scamming	0	0.00	0	0	5	1.14	18	3.15	5	2.07	0	0	0	0
	Total	430	100.0	416	100	439	100.0	572	100.0	242	100.0	160	100.0	82	100.0

Needs	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Water	9	26.47	14	14.00	26	15.76	28	11.20	3	2.88	9	12.00	3	8.11
Dry food	9	26.47	18	18.00	29	17.58	38	15.20	18	17.31	13	17.33	9	24.32
Tent	8	23.53	30	30.00	49	29.70	83	33.20	40	38.46	27	36.00	11	29.73
Medical equipment	5	14.71	6	6.00	5	3.03	10	4.00	7	6.73	1	1.33	3	8.11
Clothes	2	5.88	4	4.00	13	7.88	23	9.20	8	7.69	8	10.67	5	13.51
Fuel-oil	1	2.94	2	2.00	9	5.45	3	1.20	2	1.92	1	1.33	0	0.00
Space Heater	0	0.00	24	24.00	13	7.88	45	18.00	19	18.27	14	18.67	3	8.11
Baby supplies	0	0.00	1	1.00	19	11.52	16	6.40	7	6.73	2	2.67	3	8.11
Shroud	0	0.00	1	1.00	2	1.21	4	1.60	0	0.00	0	0.00	0	0.00
Total	34	100.0	100	100.0	165	100.0	250	100.0	104	100.0	75	100.0	37	100.0

voice messages on all 7 days. When the most requested categories are examined according to the days, the "rescue" category was the most demanded category in the first 2 days and the "needs" category was the most demanded category in the following days. When the distribution of the need demands according to days was examined, the highest number of need messages was received on the fourth day (n = 250). On the first day, the most demand was water and dry food, while tents were the most demanded need from the second day onwards (Table 1).

Limitations

The findings of this study should be considered in the context of the following issues. Since this research analyzes a study conducted voluntarily by health professionals from different occupational groups, there is no institutional representation. Since the research data were analyzed retrospectively, the total time spent between the problem and the solution could not be calculated. In addition, since only 1 WhatsApp™ group was evaluated, it is impossible to generalize the study's findings. WhatsApp™ is 1 of many programs and there were many WhatsApp™ groups involving many different response agencies. The limitation is that the information from the many other programs and many other WhatsApp™ groups were not evaluated. This potentially limited the breadth and depth of potential messages transmitted.

Discussion

Disaster management is the sequence of actions designed to prevent or reduce injuries, deaths, and damage resulting from a disaster, and to facilitate recovery from such an event. This process consists of 4 sequential phases that occur during the life cycle of a disaster. In the mitigation phase, actions are taken to prevent the onset of the disaster or to mitigate its effects. The preparation phase aims to shorten response time by obtaining and holding needed supplies early. In the response phase, disaster response plans are activated, and relief supplies are mobilized. The final steps of emergency response occur in the recovery phase.[6] This study aimed to show what kind of needs are demanded in the response phase of a real earthquake disaster and to reveal the first 7- day needs curve especially for sheltered victims. In this way, it is thought that this research will be a roadmap for the logistics of needs in future disasters.

After the Kahramanmaraş earthquake, 1 out of every 10 messages sent to the volunteer WhatsApp™ group of the health professionals on the first day included problems such as

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reaching the rubble site, rescuing people, and communicating with people under the rubble. With the contribution of the volunteers working in many state and non-governmental organizations to the disaster area on the second day, these problems decreased considerably. It is well known that major natural disasters such as earthquakes, typhoons, tsunamis, and volcanic eruptions, can often cause the communication infrastructure to be shut down. Many types of communication equipment can be affected by power outages and destruction of communication lines.[2] The reason why there were so many problems on the first day may be that there were simultaneous trauma and destruction in 10 provinces, erosion of the roads and airways going to the earthquake area, and that there was a second earthquake with a magnitude of 7.6, which occurred 9 hours after the first earthquake.[4] The increase in the destruction of the communication infrastructure with the second earthquake may have negatively affected the telephone and communication networks in the region. For this reason, messages sent via WhatsApp™ may have reached the recipients late. In addition, many people who wanted to reach their relatives in the earthquake area were constantly calling the region by phone. This is similar to situations where there is a high volume of calls being processed by a landline or mobile phone switchboard; traffic control equipment identifies this and a computer system automatically regulates and limits the number of calls that can be made.[7]

In this study, search and rescue messages showed a decreasing trend, especially after the fifth day. Instead of such requests, messages such as accommodation and clothing support were included in the WhatsApp™ messages. According to Macintyre et al., some international rescue teams adhere to a "rule of 4" in which it is assumed that trapped people can survive 4 minutes without air, 4 days without water, and 4 weeks without food.[8]

It was noted that messages about looting and scamming started on the third day and ended on the same day. According to Sepúlveda and Ormeno, the reasons of looting and scamming are explained as: (1) a reaction of individuals to material deprivation caused by the shock, and (2) a reaction to the lack of law enforcement in the days following the earthquake.[9] In addition, most goods sold by grocery stores have little individual value but are necessary to meet daily consumption needs. Market looters are expected to act primarily with the motive of reducing consumption. After the earthquake, many highways in the region were broken, and it was difficult to reach humanitarian aid. For this reason, local people may have tried to meet their daily consumption needs by looting.

On the first day, nutritional needs, such as water and dry food, came to the fore, and in the following days, this situation was replaced by the need for shelter. This is compatible with Maslow's hierarchy of needs.[10] While physiological needs increased on the first day, the need for safe shelter arose from the second day. Physiological needs were also at the forefront in other types of disasters. However, the destruction caused by the earthquakes to houses, as well as the fear of entering them because of the possibility of aftershocks, highlighted the requirement for shelter in the region.

In addition, a serious need for medical supplies arose on the first day, but this need decreased from the second day. Two main reasons were observed for the increase in the need for medical supplies. First, the high number of hospitals destroyed during the earthquake affected health care. Second, hypothermia, especially in children and the elderly, may have triggered infections due to cold weather conditions.

Conclusions

The demands for water, dry food, and tents increased from the third day onwards, while the demands for rescue increased in the first 2 days of the study. However, it should be noted that this study was conducted only with recovery members in a WhatsApp group. It is advised to establish professional online infrastructure and communication network systems that can be activated in such disasters, to transfer instant scene and need information, to receive voluntary health professional support in this research with assignments on a legal basis. Additionally, potentially improving elements of disaster response to reduce patient morbidity and mortality.

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Authors' contributions. İÇ: Substantial contributions to conception and design, acquisition of data, or analysis,and interpretation of data. AT: Drafting the article or revising it critically for important intellectual content. CÇ: Final approval of the version to be published.

Competing interests. The authors declare that there is no conflict of interest.

References

1. **Anglano C.** Forensic analysis of WhatsApp Messenger on android smartphones. *Digit Investig.* 2014;11:201-213. doi: 10.1016/j.diin.2014.04.003
2. **Zhang C, Fan C, Yao W, *et al.*** Social media for intelligent public information and warning in disasters: an interdisciplinary review. *Int J Info Manag.* 2019;49:190-207. doi: 10.1016/j.ijinfomgt.2019.04.004
3. **Resnyansky L.** Social media, disaster studies, and human communication. *IEEE Tech Soc Magazine.* 2015;33(1):54-65. doi: 10.1109/MTS.2014.2301857
4. **Disaster and Emergency Management Department**. *Earthquake report.* https://deprem.afad.gov.tr/assets/pdf/Kahramanmaras%20%20Depremleri_%20On%20Degerlendirme%20Raporu.pdf. Accessed February 14, 2023.
5. **Akyıldız M, Büyük K.** Determining user response to the changes in Whatsapp's data sharing policies by pairwise comparison method. *J Digit Tech Educ.* 2022;1(1):10-25. doi: 10.5281/zenodo.6647591
6. **Duran S, Ergun Ö, Keskinocak P, *et al.*** Humanitarian logistics: advanced purchasing and pre-positioning of relief items. *Handbook of Global Logistics: Transportation İn İnternational Supply Chains.* BookBinder JH eds. Springer; 2013:447-462.
7. **Yamamura H, Kaneda K, Mizobata Y.** Communication problems after the great East Japan earthquake of 2011. *Disaster Med Public Health Prep.* 2014;8(4):293-296. doi: 10.1017/dmp.2014.49
8. **Macintyre AG, Barbera JA, Smith ER.** Surviving collapsed structure entrapment after earthquakes: a "time-to-rescue" analysis. *Prehosp Disaster Med.* 2006;21 (1):4-17. doi: 10.1017/S1049023X00003253
9. **Sepúlveda F, Ormeno H.** Consumption insurance vs. criminal know how: looting after the 2010 Chile earthquake. Published 2011. https://economia.uniandes.edu.co/sites/default/files/imagenes/eventos/33-Sepulveda.pdf
10. **Maslow A, Lewis KJ.** Maslow's hierarchy of needs. *Salenger Incorporated*; 1987;14(17): 987-990.