Bulletin of Earthquake Engineering
https://doi.org/10.1007/s10518-024-01867-3

S.I. : FEBRUARY 6, 2023, KAHRAMANMARAŞ-TÜRKIYE EARTHQUAKES

Emergency response, and community impact after February 6, 2023 Kahramanmaraş Pazarcık and Elbistan Earthquakes: reconnaissance findings and observations on affected region in Türkiye

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Received: 13 August 2023 / Accepted: 11 January 2024

Abstract
Türkiye has a long history of devastating earthquakes, and on February 6, 2023, the region experienced two major earthquakes with magnitudes of 7.7 and 7.6, striking Pazarcık and Elbistan, Kahramanmaraş, respectively, on the East Anatolian Fault Zone. These earthquakes resulted in significant loss of life and property, impacting multiple cities across 11 cities, and leaving a lasting impact on the country. The 2023 Kahramanmaraş Earthquakes rank among the deadliest and most damaging earthquakes in Türkiye, alongside the historical significance of the 1939 Erzincan Earthquake and the 1999 Marmara Earthquake. Despite reforms following the 1999 Marmara Earthquake in disaster policy and preparedness, the scale of damage from the February 6 earthquakes has been shocking, necessitating further insights and lessons for future earthquake management. This paper presents the outcomes of immediate response efforts organized after the 2023 Kahramanmaraş earthquakes to elucidate emergency response activities and their impacts on communities, considering the substantial size and severity of the damages. The study focuses on evaluating the emergency response provided within the first 24 h, 3 days, and 2 weeks after the earthquakes, aiming to promptly identify the nature and effectiveness of these responses, as well as the conditions that hindered their efficacy. By shedding light on the specific experiences and challenges faced during these crucial timeframes, the research aims to offer valuable insights and lessons learned. These findings contribute to improved preparedness strategies and more efficient emergency response measures needed in responding to future disaster scenarios. Ultimately, this study provides a useful resource for all stakeholders involved in emergency response and disaster management, offering valuable guidance to enhance resilience and preparedness in the face of seismic hazards.

Keywords Emergency response · Relief · Shelter · Health services · Community impact

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Published online: 07 February 2024

1 Introduction[1]

Türkiye has a history of experiencing devastating earthquakes, with 269 recorded between 1900 and 2023, resulting in significant loss of lives and economic damage (Strategy and Budget Office of the Presidency of the Republic of Türkiye 2023). The 2023 Kahramanmaraş (Pazarcık and Elbistan) Earthquakes (Mw: 7.8, 50,783 dead) rank at the top in terms of casualties and severity, followed by the 1939 Erzincan Earthquake (Mw: 7.8, 32,962 dead) and the 1999 Marmara (İzmit) Earthquake (Mw: 7.6, 17,127 dead) (Web Archive 2009; EM-DAT 2023; AFAD 2023d; Strategy and Budget Office of the Presidency of the Republic of Türkiye 2023).

In response to these devastating earthquakes, Türkiye's first disaster management system was published after the 1939 Erzincan Earthquake (Gürsoy et al. 2013; AFAD 2019). In a similar fashion, the 1999 Marmara Earthquake (which in many respects is considered a milestone in the country's earthquake history) incensed the introduction of significant reforms in Türkiye's disaster policy and preparedness. In hindsight, these reforms were necessitated as a result of the extensive impact of the Marmara earthquake on densely populated areas. To this end, the government of Türkiye introduced 'Compulsory Earthquake Insurance' (DASK), which can be deemed a reformist regulation enabling citizens to lead their lives in secure homes by covering the financial losses resulting from such incidents. Another major shift is the establishment of The Disaster and Emergency Management Presidency, called AFAD in 2009 as a coordinating institution in the disaster risk management of Türkiye (AFAD 2019). It is also significant to note that Türkiye's Sendai Mid-term Report (2022) very recently highlighted that national level risk reduction plan and local risk reductions plans, which were completed in 2022, have identified actions to be taken, alongside the responsible actors in various sectors before any event occurs. However, there was an urgent need to integrate preventive measures to be implemented as soon as possible in order to reduce the disaster risks (AFAD 2022b). Despite these reforms including local risk reduction plans of provinces across Türkiye (AFAD 2022c), the scale of damage from the 2023 Kahramanmaraş earthquakes has profoundly shocked both the disaster-stricken region and the entire country, underscoring the necessity of learning further lessons for future earthquakes.

On February 6, 2023, at 4:17 am, a major earthquake (Mw = 7.4, later corrected as 7.7) struck the Pazarcık district in the city of Kahramanmaraş; it was strongly felt by numerous surrounding cities. Strikingly, 9 h later on the same day, the Kahramanmaraş Elbistan district was struck by another earthquake of Mw = 7.6, causing additional extensive damages. The affected cities were announced in a series of updates by AFAD (2023a). Initially, Hatay, Osmaniye, Gaziantep, Şanlıurfa, Diyarbakır, Malatya, and Adana were among the cities published by AFAD. Later on, Adıyaman and Kilis were added to the list of affected cities at 10:00 am and 14:20 pm on the same day. On April 3, 2023, the cities of Bingöl, Kayseri, Mardin, Tunceli, Niğde, and Batman were also included in the list, according to the official declaration issued by AFAD due to the identification of several damages. The earthquake triggered an immediate response,

[1] This paper is prepared based on the preliminary reconnaissance report with the compilation of first and secondary data regarding the efforts on "Emergency Response and Community Impact" after the 2023 Kahramanmaraş Earthquakes on February 6 2023. The summarized version of the findings was published and shared as one chapter of a larger reconnaissance report prepared by national and international collaboration among many voluntary scientists (Şenol Balaban et al. 2023).

Fig. 1 Disaster risk and crisis management cycle (adapted from Wilhite 2000)

with numerous search and rescue teams mobilized and dispatched to the affected area. At 5:45 am, within the scope of Türkiye's Disaster Response Plan (hereafter TAMP), the earthquake's level was declared by the Ministry of Interior as Level 4 (see Table 2 for what each level entails). The implication of this declaration led to meetings with the Ministry of Foreign Affairs and the solicitation of international assistance through the Emergency Response Coordination Center (ERCC).

This paper has been prepared based on the preliminary data collected from the initial earthquake on February 6 until February 14, 2023. However, some parts regarding rescue and response and sheltering activities, which were observed in the following days after 2 weeks were also added. Since the extent of the whole destroyed area is enormous, the data about the stricken area's current state and actual situation were gathered and presented within a limited time. It is well established in the literature (see Fig. 1), that hazards need to be assessed and risks mitigated in order to have as little damage as was observed. In essence, in the event of a disaster, necessary actions relating to emergency response and recovery activities are to be taken in a timely manner. In other words, the first 24 and 72 h are critical time periods for search and rescue groups, while the first 2 weeks are necessary for emergency sheltering and relief activities.

The objective of this paper is to provide a comprehensive overview of the emergency response and community impact based on preliminary data collected within the first: 24 h, 3 days, and 2 weeks following the initial earthquake on February 6, 2023. The study's methodology involved on-site visits and the examination of relevant information published by government representatives and various supplementary sources. The subsequent sections will cover, first, the situation of emergency response, immediately after the earthquake through the smooth transition to recovery activities; this features themes such as—coordination, immediate rescue and response, critical infrastructure, health services, sheltering response, psychosocial support, and community impact. The final section highlighted reports published in international media, and the paper concludes with the lessons learned. During the publication preparations and revision period, recent official data and reports are included and used to show the long-term impacts of the earthquake after the recovery period.

Table 1 Affected population and demographic structure by 11 cities. *Source*: TURKSTAT (2022), T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı Building Damage Statistics (2023a, 2023b)

City (alphabetical order)	Population	Household size	Population density	Syrian population	Other foreign population	Total number of collapsed buildings as of 23.2.2023
Adana	2.274.106	3.40	163	250.679	15.899	18
Adıyaman	635.169	4.00	90	22.267	1.625	2742
Diyarbakır	1.804.880	4.43	120	21.727	1.657	174
Elazığ	591.497	3.10	70	13.255	4.238	1
Gaziantep	2.154.051	3.97	316	459.751	18.020	2665
Hatay	1.686.043	3.65	289	354.549	5.093	5885
K.Maraş	1.177.436	3.68	82	94.888	4.260	3746
Kilis	147.919	3.46	104	87.408	2.009	289
Malatya	812.580	3.40	69	38.650	4.766	2335
Osmaniye	559.405	3.46	179	31.427	840	232
Şanlıurfa	2.170.110	5.12	116	369.145	10.616	63
TOTAL	14.013.196	–	–	1.743.746	69.023	18,150

2 Emergency response

Before preliminary evaluations on emergency response activities, it is necessary to show the extent of the damages across the affected area covering 11 cities, affecting approximately 14 million people as Table 1 indicates. Together with the Syrian population living in the devastated area, the total affected population reached 15.8 million (TURKSTAT 2022, see Table 1).

Although severely affected cities are mentioned as listed in Table 1, there were other cities mentioned that have several life and property damages. The Ministry of Environment, Urbanization, and Climate Change of the Republic of Türkiye (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı) has also started damage surveys in 11 cities including Elazığ (Fig. 2).

As shown in the map (Fig. 2), the earthquake's epicenters and ruptures along the "East Anatolian Fault Zone" destroyed settlements causing simultaneous collapse of residential blocks, damages on commercial areas, highways, roads, bridges, ports, airports, state hospitals, natural gas pipelines, and potable water systems as presented in detail by METU - Earthquake Engineering Research Center (2023). According to TAMP (AFAD 2022a), which was activated by the authorities of Türkiye at central and provincial level, search and rescue teams were deployed to the disaster-hit region.

2.1 Coordination

TAMP was updated and issued in 2022 by AFAD (2022a). According to the recent TAMP (AFAD 2022a), coordination activities should be prepared based on the degree of levels, which is determined by the extension of the damages. Table 2 shows the levels and details for the support groups. As a Level-4 emergency was declared in the country

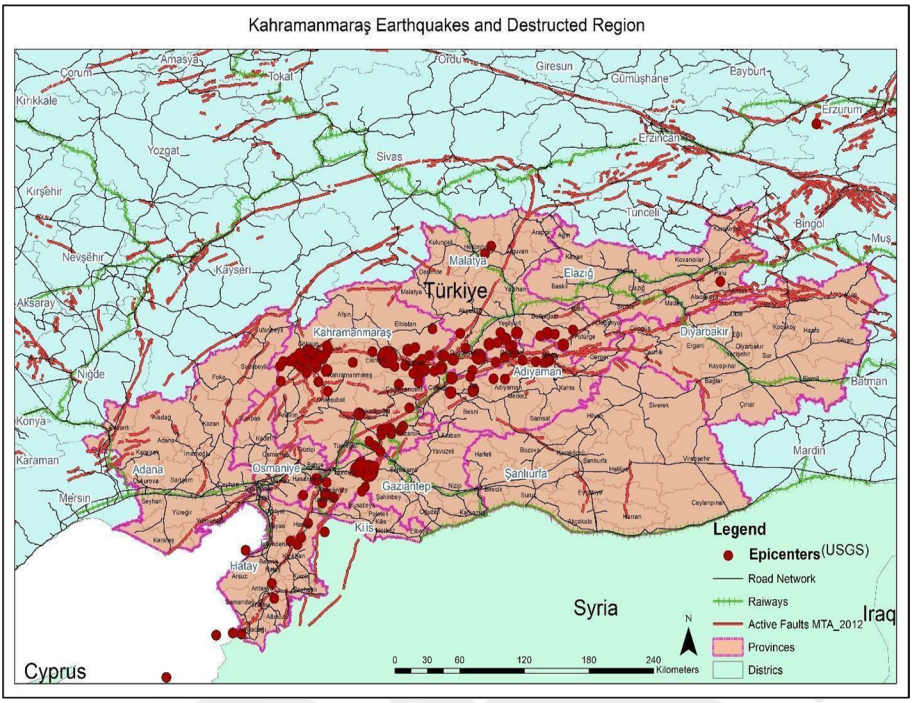


Fig. 2 Affected Areas after Kahramanmaraş Earthquakes on Feb 6, 2023 (map prepared by authors)

according to the 'Level—Impact Scale Table' in consideration of TAMP, a call for international assistance was required to first and foremost, focus on search and rescue support. On February 7, 2023, the President of Türkiye announced a 3-month 'state of emergency' for the 10 provinces affected by these earthquakes (BBC 2023a).

As shown in Table 2, Level 4 requires 1st and 2nd group supporting provinces as well as national and international capacities. However, supporting groups had substantial damages too as can be seen from Table 3. Hence, it was difficult to get supportive help from those provinces by the 1st and the 2nd groups as planned in TAMP. On the other hand, since transportation possibilities were too limited due to the extensive damages on highways, roads, airports and seaports, and railways, accessibility deficiencies created difficulties in transferring supportive search and rescue groups as well as necessary tools, excavators, cranes and emergency water and food from other regions of Türkiye as well as from abroad.

On February 13th, the Minister of Interior of Türkiye, declared that "*The total number of AFAD staff is 7300. It is not possible to manage such a great disaster or any disaster in Türkiye with such a limited number of personnel. AFAD is a coordination institution. The working groups have many stakeholders including search and rescue, subsistence, communication, shelter, health.*" (Soylu 2023). In addition, the minister highlighted that there were approximately 300 thousand employees in the field, who work for immediate rescue and response activities.

The preliminary examinations of TAMP and its applicability on the Kahramanmaraş earthquakes indicate that there is a need for regional preparations and precautions in

Table 2 Level—impact scale table. *Source*: This table is prepared by authors according to the published data in *the TAMP* published by AFAD (2022a)

Severity scale	Levels	Impact	Event type and support scale
Slightly	Level-1	Local capacity is adequate	Provincial AFAD directorate
Moderately	Level-2	Backup needed from supporting provinces	Provincial AFAD directorate + 1st group supporting provinces
Very	Level-3	National support required	1st and 2nd group supporting provinces + National capacity
Extremely	Level-4	International support required	1st and 2nd group supporting provinces + National capacity + International capacity

Table 3 Supporting provinces table (damaged provinces in italic). *Source*: This table is prepared by authors according to the published data in *TAMP* by AFAD (2022a, p.59)

Name of province (if disaster hits)	1st group supporting provinces (regional and neighboring provinces)	2nd group supporting provinces
ADANA	Mersin-*Osmaniye-Kahramanmaraş* *Gaziantep- Kilis- Hatay*—Niğde	Kayseri Konya *Malatya*
ADIYAMAN	Erzincan—Bingöl *Malatya—Elazığ* *Kahramanmaraş-Gaziantep-Şanlıurfa* *Diyarbakır*	Tunceli *Kilis* Kayseri
DIYARBAKIR	*Şanlıurfa*—Mardin—Siirt—Şırnak—Batman *Adıyaman- Malatya Elazığ*—Bingöl—Muş	Bitlis—Erzurum—Tunceli
ELAZIĞ	Erzincan—Tunceli Bingöl—*Malatya Adıyaman—Diyarbakır*	Sivas—Erzurum—*Şanlıurfa*
GAZIANTEP	Mersin *-Osmaniye- Kahramanmaraş—Kilis- Hatay Adıyaman—Şanlıurfa*	Kayseri—*Malatya—Adana*
HATAY	*Adana—Osmaniye- Kahramanmaraş—Gaziantep—Kilis*	*Şanlıurfa*—Kayseri—Mersin
KAHRAMANMARAŞ	Mersin-*Adana-Osmaniye- Gaziantep-Kilis -Hatay -Adıyaman* Sivas *-Malatya*—Kayseri	*Şanlıurfa* -Niğde- *Diyarbakır*
KILIS	*Adana-Osmaniye-Kahramanmaraş Gaziantep- Hatay*	*Şanlıurfa-Malatya* -Mersin
OSMANIYE	*Mersin-Adana-Kahramanmaraş-Gaziantep-Kilis-Hatay*	Kayseri-*Adıyaman-Şanlıurfa*
MALATYA	Erzincan –Tunceli—*Elazığ -Adıyaman Diyarbakır -Kahramanmaraş*-Sivas	*Gaziantep*—Kayseri-Bingöl
ŞANLIURFA	*Diyarbakır-Mardin*-Siirt-Şırnak-Batman *Gaziantep-Adıyaman*	*Elazığ-Kahramanmaraş—Malatya*

the event that such simultaneous and extensive damages might affect neighboring cities. As a result, the earthquake scenarios were prepared with one shock that might affect a closer province, to see if the effects might diminish as the distance from the epicenter increases. For instance, as shown in AFAD-RED[2] map and damage estimations (Fig. 3), based on the scenario as of 2019, most of the damages were assumed to be in Kahramanmaraş if an earthquake happens closer to one of the segments of East Anatolian Fault Zone. However, extensive impacts on the region were observed after the February 6 earthquakes. Hence, TAMP requires revisions considering such worse case scenarios as observed in recent earthquakes in order to have evaluations of possible impacts and preparations not only at the provincial level but also at the regional level in advance.

2.2 Immediate rescue and response

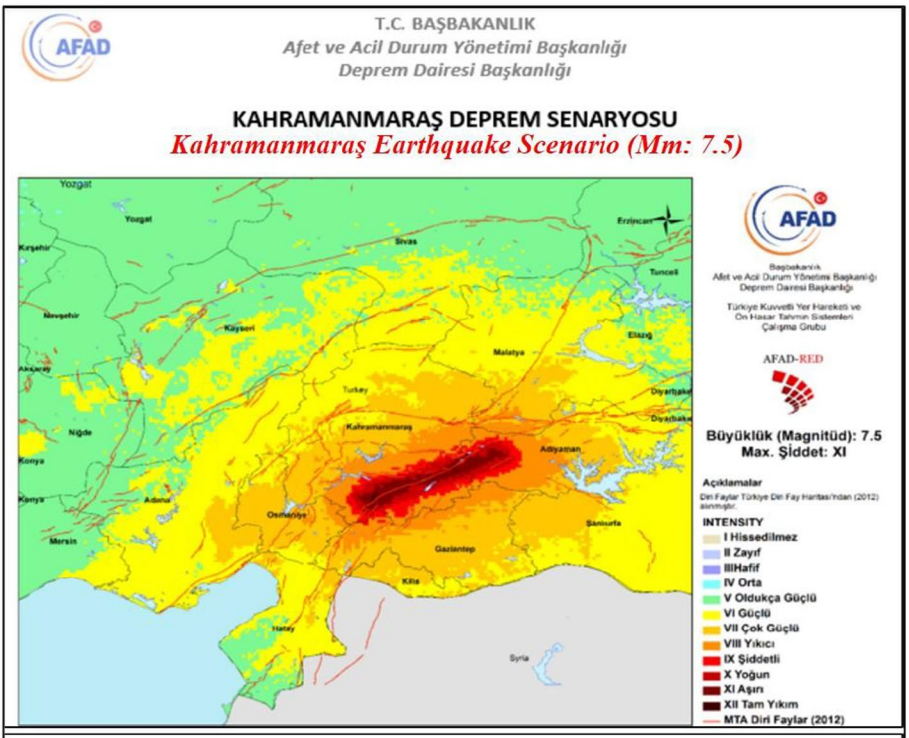
"As soon as the first earthquake hit, immediate rescue and response teams tried to reach the disaster-stricken region. However, time lags and delays occurred due to the aforementioned reasons, such as accessibility issues which arose due to highway damage and street closures resulting from building collapses. Another challenge on the site of collapsed buildings was the scarcity of necessary equipment for rescue operations, including cranes and trucks (Yeni Şafak 2023a, b). To this end, Yeni Şafak (2023a, b) noted that the lack of accessibility inhibited skilled workers, governmental and non-governmental agencies across Türkiye from reaching the operators. In addition to the scarcity of equipment and skilled workers, the immediate rescue and response teams faced difficulties during nighttime due to electricity blackouts. All of these were reported from the disaster hit region.

Figure 4, which was prepared by the authors according to the bulletin of AFAD (2023a), indicates the trends of activities and casualties during the emergency response stage. It can be observed from the presented graph that emergency services including search and rescue teams, subsistence and medical aid were provided to the disaster-stricken region within the first 24 h but not for all cities simultaneously. As shown in Fig. 4, the evacuation of earthquake survivors started approximately 72 h after the initial jolt. Disaster survivors were then transferred to dormitories and accommodation facilities on the fourth day in the predetermined cities outside of the disaster region. From the first day of the earthquakes until 2 weeks after the first earthquake, the regional sums of emergency response services and casualties have been declared in official announcements by AFAD (2023a); however, it was difficult to find provincial statistics which are necessary to analyze local deficiencies in a timely manner.

As a result, a total of 29,622 search and rescue personnel, consisting of AFAD, Police Search and Rescue (PAK), Gendarmerie Search and Rescue (JAK), Gendarmerie Special Operations (JÖAK), Coast Guard, Natural Disasters Search and Rescue (DAK), Güven Timi,[3] Fire Brigade, Rescue teams from NGOs, etc. and international search and rescue personnel, worked in the region. As a result of the meetings with the Ministry of Foreign Affairs, the number of search and rescue personnel from other countries was declared as 6479 (AFAD 2023a).

[2] AFAD-RED is "Rapid Earthquake Damage and Loss Estimation Software" established in 2010–2015 and currently used for estimations (Nurlu 2019).

[3] 'Güven Timi' (Trust Teams) is a police group responsible for maintaining security and public order in various situations under the Police Department of Türkiye.



Estimated Damages and Death Toll Statistics (by provinces)
Tahmini Hasar ve Can Kaybı İstatistikleri (İl Bazında)

Provinces	Total # of Buildings (bldg.)	Slight Damage (# of bldg.)	Moderate Damage (# of bldg.)	Heavy Damage (# of bldg.)	Collapsed (# of bldg.)	Affected Population	Outpatient treatment (# of people)	Slightly Injured (# of people)	Seriously Injured (# of people)	Death Toll	Temporary Shelter Need (# of people)
Kahramanmaraş	**213065**	**23558**	**24502**	**41902**	**40520**	**1087976**	**62195**	**23025**	**14883**	**7925**	**318459**
Adıyaman	104028	13372	11846	13955	13086	572002	19796	7294	4731	2511	98779
Gaziantep	263175	41219	32125	21642	1652	1931836	5021	1848	728	371	84631
Osmaniye	126026	19011	14003	8372	445	520774	1049	363	125	58	18992
Malatya	113240	13002	7754	3780	219	695742	589	197	60	25	10655
Şanlıurfa	144672	14485	7824	3106	78	809680	327	96	15	3	7645
Adana	207963	18309	8695	2633	25	989825	262	67	3	0	5826
Elazığ	86	6	3	0	0	144	0	0	0	0	0
Hatay	88532	8910	4544	1479	15	398875	152	39	4	0	3446
Kayseri	1053	87	38	8	0	912	0	0	0	0	3
Sivas	286	23	10	3	0	777	0	0	0	0	3
Kilis	29906	3461	1934	718	2	130369	54	10	0	0	1562
TOTAL AMOUNT	**1292032**	**155443**	**113278**	**97598**	**56042**	**7138912**	**89445**	**32939**	**20549**	**10893**	**550001**

Fig. 3 AFAD-RED Kahramanmaraş Earthquake Scenario (Mw:7.5) (upper image) and Estimated Damages (lower image) (adapted from Nurlu 2019)

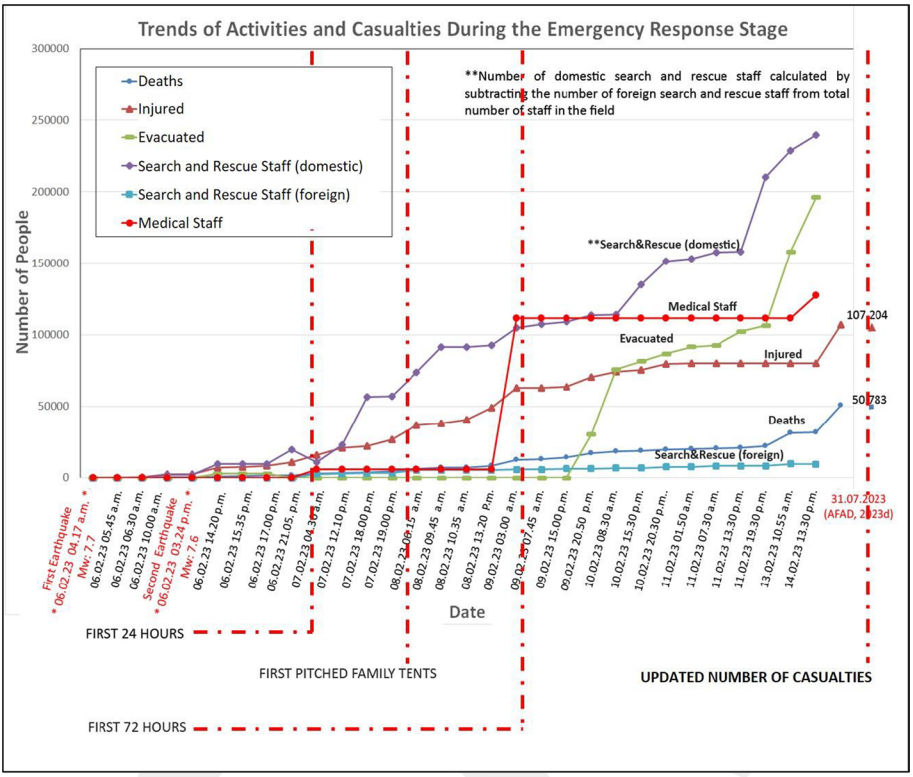


Fig. 4 Map Trends of activities and casualties between February 6 to 14, 2023. (*Source*: AFAD 2023a as of 14.02.2023 13:30 (GMT + 3) (drawn and updated by the authors recent casualties as of October 31 2023)

2.3 Critical infrastructure

On February 6 at 10:00 am, according to the first information received from the sources of Disaster Energy Group (AFAD 2023a, b, c, d), natural gas could not be supplied to Hatay/Hassa and Kırıkhan regions (AFAD 2023a). Petroleum Pipeline Corporation (BOTAŞ) stopped crude oil flow as a precaution (AFAD 2023a). As another precautionary measure, gas was cut from the entrance to natural gas power plants of Gaziantep, Nurdağı and Islahiye districts. 27 centers, including Osmaniye Bahçe-Düziçi, Kahramanmaraş city center, Malatya; Akçadağ, Doğanşehir and Doğanyol regions, could not be supplied with electricity (AFAD 2023a). Despite the fact that winter conditions are usually freezing cold in the disaster-stricken area/region, for about 3–4 days, heating options were not possible. The following days, partial provision of electricity for some local areas was possible but still, the heating problem was critical, as such, most people had to set fires outside for heating and keeping warm.

It was not possible to be certain about the actual reasons and effects of earthquakes on critical infrastructure at the initial days; however, it is claimed that those power shortages could have been disrupted by fault rupture due to the intersection of such gas and electrical infrastructure network lines with fault ruptures (see Milliner 2023 in Fig. 5; Huvaj et al. 2023).

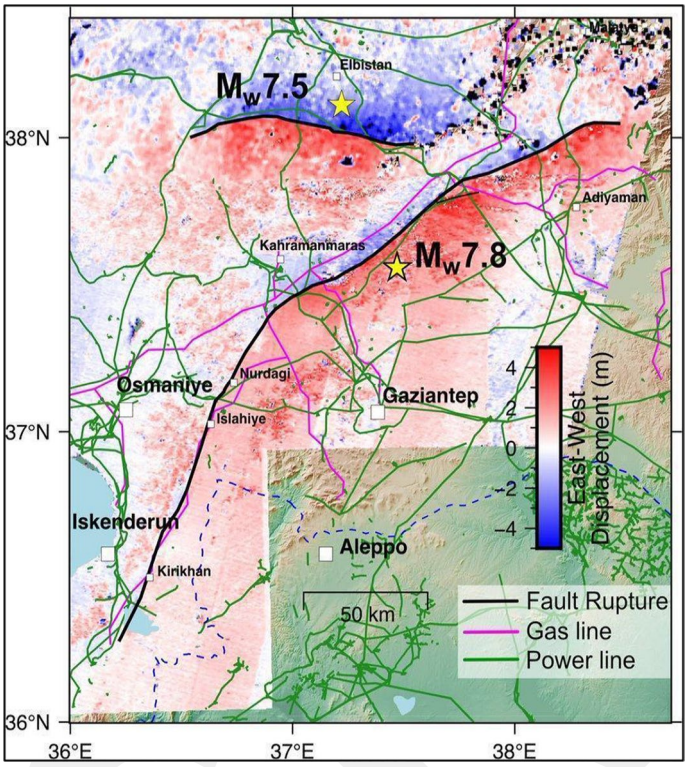


Fig. 5 Possible effects on critical infrastructure due to fault rupture (Milliner 2023)

Another critical infrastructure affected by the earthquakes is the potable water system (Huvaj et al. 2023). Disaster-stricken areas had no water supply for drinking and cleaning purposes due to the damages to lines of potable water infrastructure. Water tankers supported those cities, but the risk of a hygienic and or an epidemic breakout was quite high. Based on the observation from the site visit, it was evident that one of the most essential requirements for the region was portable toilets (Fig. 5).

Although industrial facilities cannot be fully considered as a part of the critical infrastructure, the impact of earthquakes on industrial activities is also a necessary issue that affects the critical infrastructure. A detailed examination of the industrial facilities affected by earthquakes following these events can be found in Sagbas et al. (2023).

2.4 Health services

Health services during the emergency response stage after Kahramanmaraş earthquakes have been observed from the field and presented in this part by the help of official announcements of the Ministry of Health since the first hit on February 6, 2023. Just after the initial earthquake, the Hatay Education and Research Hospital suffered severe damage, while the Hatay Antakya State Hospital, the A Block of the İskenderun State Hospital collapsed, and the Kahramanmaraş State Hospital became unusable. The injured patients in these hospitals were transferred to the city hospitals in

Mersin and Adana, both of which survived the earthquake without any damage. The Malatya Women and Children's Hospital, the Malatya Battalgazi State Hospital, the Gaziantep Inayet Topçu Hospital, the Kahramanmaraş Necip Fazıl City Hospital, the Kahramanmaraş Sütçü İmam University Medical Faculty Hospital, the Kahramanmaraş Elbistan State Hospital, the Hatay Dörtyol State Hospital, the Elazığ Fethi Sekin City Hospital, and the Hatay Samandağ State Hospital, which had just opened four days before the earthquake, were not affected and could continue their services (TATD 2023; Yılmaz et al. 2023).

The failure of electric and internet-dependent systems such as registration, identification, and legal notification, and the lack of alternative systems prepared for such situations caused problems in the identification of the injured, the recording of those transferred, the follow-up of unaccompanied children, and the identification of the dead. While patient examination and care were accelerated in emergency services equipped with ultrasound (USG) machines, the need to transport patients for imaging in emergencies without USG devices was a negative factor which ultimately caused overcrowding. At the end of the second day, it was observed that the newly assigned healthcare workers had reached their stations, but most of them faced problems in finding shelter, heating, toilet, clean water, and food. The majority of the national health teams arriving in the disaster area were unable to operate autonomously without external equipment, medical and personal materials, and rations. It was observed that the equipment and resources brought by the teams were exhausted early due to intense demand.

Emergency plans for hospitals were not implemented, officials were unfamiliar with their duties, and there was no inventory of necessary equipment and materials. Harsh winter conditions compounded these issues. The inability to refill depleted medical resources due to transportation problems brought patient care problems to the forefront on the second day (Yılmaz 2023). Electricity, lighting, heating, communication, and transportation problems could still not be solved. Voluntary and assigned healthcare personnel could only start to provide support to the region at the end of the second day.

Starting from the second day of the earthquake, problems such as diabetic ketoacidosis, seizures, or hypertension developed due to chronic patients' inability to access their routine treatment and medications. Oral medications that those patients use were not available in the inventory of the Emergency Departments. Thus, to solve this challenge, the Turkish Pharmacists Association began establishing pharmacies and distributing those drugs for free 43 h after the first hit (TEB 2023).

By the third day, a total of 2101 ambulances, 296 UMKE vehicles, 5 air ambulances, 7 helicopter ambulances, and 14,429 emergency health personnel, including local and dispatched teams, were serving in the disaster area (TATD 2023). The number of field hospitals and emergency response units in the region had reached 77, and significant amounts of medical supplies and drugs were delivered via 3 planes, 1 helicopter, 15 ambulances, and 200 vehicle loads. From the third day, most systems started to function, transportation and referral options diversified, and communication and transportation problems were mostly resolved, although occasional issues persisted (Özel et al. 2023; TATD 2023). Therefore, it is logical to recommend that the health system deposit enough resources to serve independently for at least 48 h.

As of February 12, 2023, a total of 21,631 patients rescued from the rubble were transferred to cities outside the region, 1174 by air vehicles, 20,130 by land ambulances, and 327 by sea vehicles (TATD 2023, T.C. Sağlık Bakanlığı, 2023a). As of February 14, 2023, 105,505 earthquake victims were rescued from the rubble as injured, and the number of casualties was announced as 35,418. It was reported that the number of public and private

search and rescue personnel working in the region was 35,249, while 9456 of them were international aid teams' personnel (T.C. Sağlık Bakanlığı, 2023b).

2.5 Sheltering response: emergency shelters and temporary houses

The 2023 earthquakes in Kahramanmaraş affected and continue to affect 11 densely populated cities in Southeast Türkiye. By March 1, 2023, 1,971,589 people had to abandon their residences and leave their hometowns temporarily or permanently (AFAD 2023a). As of March 7, 2023, the Ministry of Environment, Urbanisation and Climate Change announced that approximately 233,000 buildings in these 11 cities have either been heavily damaged or collapsed (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı 2023c); as a result, there is a need for widespread housing for the earthquake victims. Thousands of people have been accommodated in governmental buildings, public buildings, or houses of a friend or a family member. Besides sports halls, educational buildings, and other governmental buildings, dormitories have opened their doors to the earthquake victims with the capacity of 850,000 beds in 81 cities (AFAD 2023b).

Considering the need for widespread housing and harsh climatic conditions, approximately 10 h after the first earthquake, AFAD (2023a) indicated that 19,772 living tents had been sent to the earthquake region. Almost 24 h after the first jolt, AFAD announced that 41,504 family tents, 557 containers, and 747 tents (with an area of 112 m^2) had been sent to the earthquake-affected region (AFAD 2023a). On 8 February 2023, AFAD (2023a) reported the establishment of 50,818 family tents to accommodate earthquake victims in 10 densely populated cities. On 13 February 13, 2023, AFAD (2023a) announced that the number of established family tents reached 155,379. The latest updates as of 2 March 2023 by AFAD (2023a) show that the number of established tents reached 360,167. One of the types of emergency sheltering settlements, 'tent cities', have been established in 332 different locations of these 11 cities (AFAD 2023a). In addition, the construction of container settlements continued in 189 different locations of 10 cities (AFAD 2023a). As of March 1, 2023, 1,915,687 people have been accommodated in the above-mentioned emergency or temporary sheltering or housing alternatives in or out of the earthquake-affected region (AFAD 2023a). As of July 31, 2023, the formal tent settlements were officially closed, and it was reported that more than 500,000 people were residing in container settlements (AFAD 2023d).

To illustrate the pace of the establishment of emergency shelters, Fig. 6 summarizes the data obtained from the AFAD Press Bulletin (AFAD 2023a).

To provide information on emergency and temporary housing in detail, the data obtained from AFAD's Twitter account (AFAD 2023b) were examined and a site visit was conducted in emergency and temporary settlements in 5 earthquake-affected cities almost two weeks after the first jolt. On 8 February 2023, AFAD (2023b) established tents on the field of "12 Şubat Stadium" in Kahramanmaraş. However, the video published by AFAD (2023b) on Twitter and HGM Atlas (2023) shows that tents were located without a settlement plan, which indicates a planning problem (Fig. 7). Per the site visit done by the authors on 25 February 2023 to the 12 Şubat Stadium, it was observed that people who were responsible for the settlements were trying to reorder the settlement plan according to the minimum distance dimensions between the tents to avoid fire.

As an urgent sheltering response for one of the most affected cities, Hatay, AFAD (2023b) established a tent settlement on the carparks of the Hatay Stadium and the Sports Hall of Hatay Centre by February 9th, 2023. On 11 February 2023, AFAD,

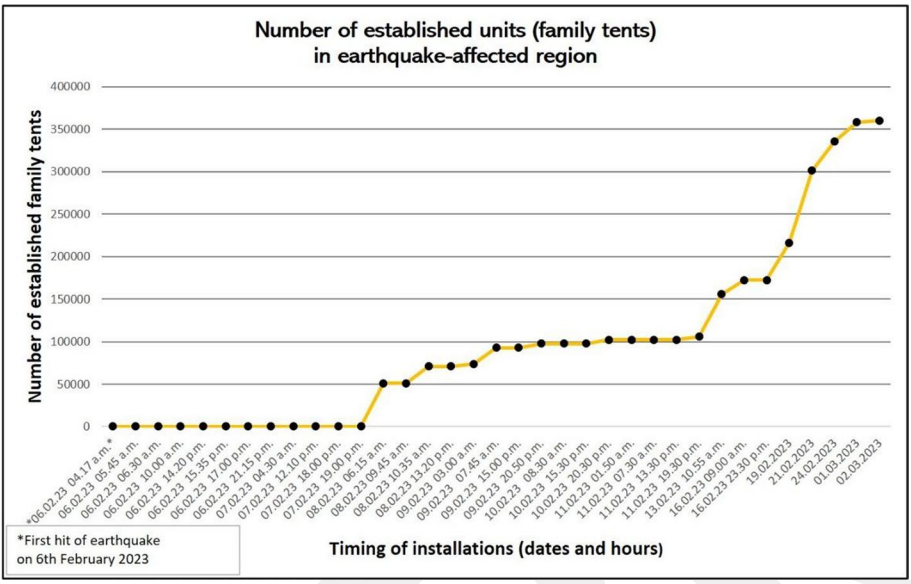


Fig. 6 Number of established units (family tents) in earthquake region. *Source*: Drawn by the authors according to the published data by AFAD (2023a)

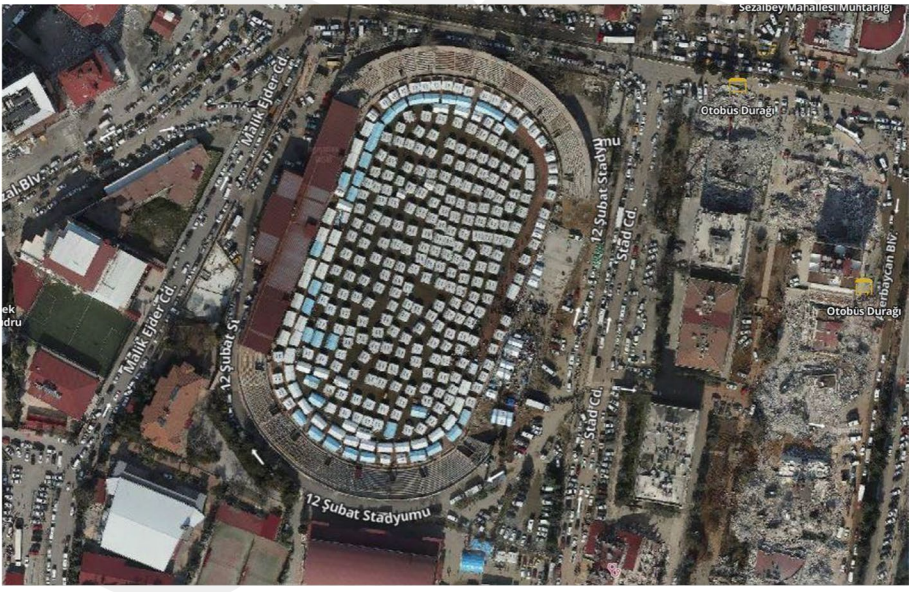


Fig. 7 Established tents on the field of 12 Şubat Stadium in Kahramanmaraş (HGM Atlas 2023)

together with several institutions, NGOs, and organizations, established tent settlements in İskenderun, Hatay (AFAD 2023b). Besides, during the site visit, the authors observed that by February 20, 2023, cruise ships, such as the ship of Mediterranean Shipping

Fig. 8 Left: Temporary houses constructed by TOKİ in Nurdağı, Gaziantep; Right: Better Shelter Settlement in Hassa, Hatay (photographed by Nil Akdede and Özay Özaydın)

Company (MSC), had started to welcome earthquake-affected people for temporary accommodation at İskenderun Harbor. During the visit, it was observed that the elderly people were given priority to shelter there.

In addition to the newly-established or ongoing construction of emergency and temporary sheltering settlements in city and district centers, AFAD coordinates the tent supply for rural areas in earthquake-affected regions (AFAD 2023b). Besides shelter supplies by AFAD, numerous NGOs, companies, and the international community in a wave of humanitarian solidarity announced the transfer and consequent setting up of tents and/or containers for the victims of the Kahramanmaraş earthquakes (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı 2023b).

Other than tent settlements, one of the first container settlements was constructed in Malatya, at Technopark, İnönü University, Malatya (AFAD 2023b; Anadolu Ajansı, 2023b). Almost two weeks after the first jolt, the authors visited the emergency and temporary settlements established by different municipalities all around Türkiye. It was thus observed that tens of container settlements had been set up in different district and city centers. For example, see Fig. 8-left, municipalities (İstanbul Metropolitan Municipality, İzmir Metropolitan Municipality, Kocaeli Metropolitan Municipality, Gemlik Municipality, Beylikdüzü Municipality) and government agencies (Housing Development Administration of the Republic of Türkiye (TOKİ) (Fig. 8-left). In a similar vein, with the approval of AFAD and the responsible governors, companies (ASELSAN, Rönesans Holding) and non-profit organizations (Better Shelter) established tents and/or containers for the earthquake victims (Fig. 8-right). In addition to these, as shelter supply by a foreign country, Qatar started to ship container houses which have been specially configured for the World Cup 2022 Organization to Türkiye for earthquake victims (Yeni Şafak 2023b).

In addition to the provided emergency and temporary units, although an official announcement by the government could not be reached, several media sources (Anadolu Ajansı, 2023a; Haberler 2023) published that 21 settlements provided for Syrians under temporary protection in 10 cities had opened their doors for the earthquake victims. However, the authors observed, during the site visit to Sarıçam Container Settlement, that only Syrian earthquake-affected people, who are currently living in Türkiye, preferred to be accommodated in these settlements, in contrast to Turkish citizens.

While the recovery period continues with providing emergency and temporary settlements, President Erdoğan announced that the Ministry of Environment, Urbanization, and Climate Change will construct permanent housing with a maximum of 5 stories within a year (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı 2023b; En Son Haber 2023).

To summarize, based on AFAD reports (2023a), tents were provided almost 50 h after the first earthquake, it can be concluded that earthquake victims spent the first two nights either in their cars, on the streets, in assembly areas, or in open-air marketplaces. Furthermore, several sources including, TMMOB (2023b, 2023c, 2023a), have emphasized that the number of tents is insufficient considering the size of the affected group and the established tents are inadequate to protect against sub-zero temperatures. Consequently, during the first 2 weeks, the lack of shelter can be pointed out as one of the most pressing issues following the 2023 earthquakes in Kahramanmaraş.

Another significant issue related to sheltering after the earthquakes is the secondary disaster risk in the emergency and temporary settlements, such as tsunamis and fires. For instance, the tsunami in the Gulf of İskenderun caused one of the tent settlements to become uninhabitable following the aftershocks due to the inappropriate site selection. Another secondary disaster observed in emergency settlements was fire, according to interviews in the emergency settlements in Osmaniye and Hatay due to the inappropriate minimum distance dimension between the tents.

By considering the process and the issues faced in the emergency and temporary shelter settlements implemented after the February 6, 2023, Kahramanmaraş earthquakes, the Chamber of City Planners (Şehir Plancıları Odası 2023) and Turkish Medical Association (Türk Tabipleri Birliği 2023) published reports emphasizing the guidelines for these settlements based on their area of expertise. Hence, the guidelines in the Sphere Handbook (Sphere Association 2018), which is a handbook centered around humanitarian action, can be recommended to configure or reconfigure emergency and temporary settlements in response to the earthquakes and to overcome the issues encountered.

2.6 Psycho-social support

Immediately after the two earthquakes, the Ministry of Family and Social Services dispatched psychosocial support personnel to affected provinces. A mobile social service center truck and service vehicles were sent to Hatay, Kahramanmaraş, Osmaniye, and Malatya (Railly News 2023). In the AFAD Press Bulletin released on February 13th, it has been stated that, as of February 11th 19:30 (GMT + 3), 2174 officers and 327 vehicles were sent to the region to provide psychosocial support (AFAD 2023c). Support was provided to a total of 110,650 people (99,916 in the earthquake-hit zone and 10,734 outside the affected provinces).

The Ministry of National Education (MEB 2023a) announced a Psychosocial Support Action Plan on February 10th, 2023. The plan included presentations, booklets, and brochures for children, families, and teachers about the psychological impact of earthquakes, grief, psychological first aid, and psychosocial support in addition to psychoeducational programs for teachers and employee support programs.

On February 13th, 2023, the Turkish Red Crescent (Türk Kızılay 2023) released a statement that 53 psychosocial support teams (including psychologists, psychological counselors, social workers, and guidance specialists) have begun providing psychological first aid to earthquake survivors. Over 5000 mental health professionals volunteered to provide psychological support to survivors in affected provinces. In addition, The Turkish Red Crescent set up psychosocial support tents in coordination with the Ministry of Family and Social Services and the Ministry of Health.

In the earthquake-hit zones, the need for psychosocial support services was huge and immediate (World Health Organization [WHO], 2023). Nevertheless, despite intensive

efforts, since eleven provinces were heavily affected by the quakes and the coverage area is quite extensive, planning psychosocial support services in those provinces continue to pose challenges for support teams and coordinators. Furthermore, due to extensive devastation, the psychosocial workers, the medical staff, search and rescue teams and the media reporters were themselves traumatized and needed support services too.

2.7 Community impact

The impact of the devastating earthquakes on the community following the first week can be addressed mainly with respect to earthquake response in relation to various decisions and activities bearing on education, rescue and relief efforts, and communication. This impact is elaborated with its main highlights in the following parts as they have implications for supporting the psychosocial needs of people affected in the region.

Concerning education, initially a "suspension until further notice" decision was announced by the Ministry of National Education (MEB; 2023a) and Council of Higher Education (YÖK; 2023a, 2023b) in the immediate aftermath of the earthquakes. Later a press release by YÖK on February 11th (YÖK, 2023c; preceded by the Presidency statement on a live TV broadcast) announced that the 2022–2023 spring semester was to be completed with distance education in all higher education institutions and that the residence halls were to be used for accommodation of earthquake survivors. On the same day, MEB (2023b) announced that education for primary, secondary, and high schools in the affected cities would be suspended until March 1st (to be followed by specific decisions for each district and school) and that education in other cities would continue on February 20th, 2023. However, the distance education decision for universities was objected by many education stakeholders, asking that face-to-face education for university students start as soon as possible (e.g., Bianet 2023; NTV 2023; TMMOB 2023c). The main reasons for this objection focused on views that distance education would hamper psychosocial recovery and that alternatives other than residence halls (such as hotels and guest houses) should be considered for accommodating earthquake survivors.

Concerning rescue and relief efforts, field observations based on official evaluation reports (TMMOB 2023b, 2023c) as well as media (including both individual social media accounts and news platforms of press channels) have revealed that the affected areas were reached late, with search and rescue teams and aid starting to arrive only after about 2 days following the earthquakes and that lack of coordination hampered rescue and relief efforts. Particularly, there have been many reports that teams in the field were not able to start their search and rescue activities upon arriving to their assigned areas, as they had to wait for official permission from AFAD (TMMOB 2023c). This indicated that a timely and efficient decision-making was lacking in the field (TMMOB 2023c). Within this post-quake immediate context where people in the affected areas were experiencing lack of and/or late arrival of aid, the statements of officials on the success of immediate earthquake response (e.g., president of the Turkish Red Crescent said that there was no place that the rescuers could not reach (Al-Monitor 2023; T24, 2023)) contradicted with the observed lack of timely and efficient decision-making. Unfortunately, this contradiction created frustration and anger among those in the affected areas waiting for the rescue teams to save their families in the rubbles of their homes. Their frustration and anger increased as they were waiting in the extremely cold weather outside their homes and the probability of reaching their family members alive decreased as time passed by, while they waited for the rescuers to come. Furthermore, lack of coordination seemed to have negatively affected the

involvement of non-governmental organizations (NGOs) and other solidarity networks in rescue and aid efforts (TMMOB 2023c).

This was accompanied by various negative discourses of politicians that compared and criticized different institutions (local vs. central government bodies; government vs. NGOs, etc.) in terms of their earthquake response for rescue and aid efforts. For instance, the president of the far-right nationalist political party in Türkiye (Nationalist Movement Party) criticized some NGOs and social media platforms (BBC 2023b), which worked vigorously for aid organization as well as confirmation and communication of denunciations of people trapped in debris. Such discourses observed in the post-quake communication of public officials were viewed as weakening the efficiency of efforts to unite in solidarity in the face of the massive devastating earthquakes.

As further related to communication, earthquake response was observed to be negatively affected by the restriction of social media use for dissemination and organization of rescue and relief activities. After the earthquake, there were interruptions and disruptions in infrastructure, and this hampered the streaming of communication of both affected citizens and field workers in the earthquake region during the critical time for rescue and aid operation. The government's restriction of access to Twitter (Netblocks 2023; Reuters 2023) was criticized because Twitter served as the primary source for communicating the needs of people during the immediate post-quake response phase for those under the rubble to share their locations with relevant bodies. This restriction thus limited communication required to save people from the rubble whilst identifying their needs in the affected area. Another point related to communication concerned post-quake discourses of officials and media that portrayed the devastating event as the catastrophe of the century due to its high magnitude and that it was not possible to be prepared for this kind of an inevitable and powerful earthquake (e.g., Teyit 2023) and attributing it to fate (e.g., BirGün, 2023). Such discourse seemed to undervalue the importance of risk mitigation efforts especially for the regulation and implementation of seismic building codes in the affected region where a great majority of the buildings collapsed or were seriously damaged. Communication in the immediate post-quake period was further challenged by the religious practice that took place on the night of the earthquake day. Specifically, at a time when many people were still under the rubble waiting to be rescued, absentee funeral prayer was offered in all the mosques all over the country for all the people who died in the earthquakes (Habertürk 2023; TGRT Haber 2023). Though religion overall could be considered as a source of social support for many, the timing of this funeral prayer was questioned as it could hamper psychological efforts at instilling hope among earthquake victims for staying alive and being rescued in the post-quake period.

Overall, it can be said that the emergency response decisions and activities following the earthquakes did not consider the psychosocial needs of the affected people in the region at a desired level. This seemed to have worsened the negative impact of the earthquakes on the community, which would thus require future research and investigation.

3 Highlight of international media coverage on response

Widespread criticisms were levied against the emergency response activities and efforts of the Turkish authorities in the wake of the earthquakes. The criticisms summarized in this part were curated from published news reports and articles by international news agencies such as the BBC, CNN, the Guardian, and Reuters to mention only a few. In the early days

of the response and recovery efforts/activities, the media coverage featured criticisms about the "Delayed Search and Rescue' efforts of the concerned agencies/departments. Following that, the media coverage dwelled on issues such as regional politics, polarized politics, rhetoric from the state and the presidency, security, and unrest in some parts of the affected cities. Table 4 presents a summary of the news from February 6 until February 13 at the mentioned news agencies.

Considering the international media coverage on response in the first week after the first jolt, the following observations are highlighted:

- The damage to infrastructure significantly impacted relief and rescue operations.
- Political decisions influenced the effectiveness of emergency response following earthquakes.
- The contributions, including relief and rescue, food, sheltering, and health, from cities all across Türkiye were noteworthy.
- The involvement of numerous countries and international organizations demonstrated solidarity in the aftermath of disasters.
- The government took measures to address criticism regarding their decisions and management through actions like interventions and arrests.
- There were times when the area experienced an insecure environment, leading to the suspension of relief and rescue operations.

4 Major findings and conclusion

The 2023 Kahramanmaraş earthquakes resulted in significant loss of life, extensive damage to buildings and municipal infrastructure, and had severe psychosocial impacts on more than 10 million people. As of July 31, 2023, AFAD (2023d), reported that "50,783" people lost their lives and "107,204" people were injured in the disaster hit region. In addition to that, following the survey carried out by the Ministry of Urbanization, Environment and Climate Change, the total number of "Collapsed", "Urgently Demolished", "Heavily Damaged" buildings were identified as "262,506" buildings ("675,899" independent units) in 18 provinces across the country (see Fig. 9) (AFAD 2023d).

It was also declared by the official report (published in March 2023) of the Strategy and Budget Office of the Presidency of the Republic of Türkiye that "the most prominent component of the burden imposed by the earthquake on the Turkish economy is the damage in housing units by 54.9% (1073.9 billion TRY; 56.9 billion USD). The second largest damage is the destruction of public infrastructure and damage to public service buildings (242.5 billion TRY; 12.9 billion USD). As such, it is estimated that the total financial burden of the earthquake disaster for the country is 2 trillion TRY (103.6 billion USD), which is equal to 9% of GDP forecast for 2023." Hence, it would take years to build back cities and regions with the economic and social ties required for the future development of the country.

There are still doubts on the major reasons behind such devastating losses and extensive impacts of earthquakes on the disaster hit region such that long-term investigation and empirical studies are needed in order to find out major reasons behind such extensive damages. Some researchers believe there are various damages that the particular mechanism and/or scale of the earthquakes might affect. Others believe that areas with populations living on extensive weak grounds possessed high amounts of vulnerable building stock that

Table 4 Major reported highlights on emergency response activities. *Sources*: Prepared by the authors according to the published data by CNN; The Guardian; BBC; Reuters

Day	Response activity	Details	News sources
February 6–7	Searching for survivors	the request of international help through the Emergency Response Coordination Centre (ERCC), the European Union's humanitarian program by AFAD	CNN (2023a)
		the announcement of the deployment of nearly 1000 search and rescue volunteers from İstanbul to the earthquake zone by the Governor of Istanbul Ali Yerlikaya	CNN (2023a)
	Relief and rescue	the declaration of earthquake victims, as to the lack of rescue teams in several areas in Gaziantep during the critical first 12 h	The Guardian (2023a)
		the lack of timely response to several villages in the earthquake-affected area	BBC (2023a, b, c)
		the revolt of earthquake victims in the earthquake zone due to the poor relief and rescue response	The Guardian (2023a)
		raising voices against the government due to the military being out of emergency planning resulting in a delay in the start of rescue and search operations	BBC (2023a, b, c)
	Government efforts/ rhetoric/statements	the announcement of 'the state of emergency' in 10 earthquake-affected provinces for three months by the President Recep Tayyip Erdoğan	BBC (2023a)
		the struggle of search and rescue teams until day two or day three due to the damaged roads although the initial hours and days were critical	BBC (2023a, b, c)
		temporary shutdown of Twitter (now X) by the government even though it was being used as a platform to reach people under rubbles	BBC (2023a, b, c)
		the detaining of a political scientist for criticizing the emergency response in Turkey, interpreted by the police as spreading misinformation	BBC (2023a, b, c)
February 8	Risk mapping	mapping damage to the extent possible from satellites	NASA earth Observatory (2023)
	NASA earth observatory	use of satellites to track increased landslide risks, power outages, and weather that could pose challenges to response efforts	NASA earth Observatory (2023)
	Searching for survivors	the announcement by Turkish Vice President, Fuat Oktay, when the number of people pulled from the debris in Türkiye reached 8000	The Guardian (2023a)
		the announcement by an officer of AFAD, as the number of search-and-rescue personnel deployed to the earthquake zone reached approximately 24,400	The Guardian (2023a)
	Relief and rescue	the announcement by Turkish Vice President, Fuat Oktay, as the number of people sheltered in governmental buildings, hotels, shopping malls, stadiums, mosques and community centers reached 380,000	The Guardian (2023a)

Table 4 (continued)

Day	Response activity	Details	News sources
		the announcement by the Ministry of Transport and Infrastructure, that trains were being used to shelter 3400 earthquake victims	The Guardian (2023a)
		expressing discontents against the government due to the slow and inadequate response by authorities	The Guardian (2023a)
		sheltering nearly 100 people in the lounge of Gaziantep Airport, where it is commonly used to welcome Turkish politicians and celebrities	The Guardian (2023a)
February 9	Relief and rescue	the launch of "immediate cash assistance" from the Disaster Response Emergency Fund by the International Federation of Red Cross and Red Crescent Societies (IFRC) to contribute to the response in Türkiye and Syria	CNN (2023b)
		the announcement by the Minister of Foreign Affairs, Mevlüt Çavuşoğlu, of aid provided to Türkiye by 95 countries and 16 international organizations after the earthquakes	CNNTURK (2023)
		the announcement by AFAD, the evacuation of at least 28,044 people out of Kahramanmaraş, with at least 23,437 people evacuated by air and 4607 by road and rail	CNN (2023c)
February 10	Aid efforts	the announcement by President Erdoğan, that more than 141,000 rescue personnel are working in 10 earthquake-affected provinces in Türkiye	CNN (2023d)
		the announcement by President Erdoğan, that mobile kitchens were established by Turkish institutions and organizations to provide hot meals not only for the earthquake victims but also for the relief teams	CNN (2023d)
		the announcement by President Erdoğan, that 100 billion Turkish Liras ($5,309,405.33) will initially be provided by the emergency fund of AFAD, and each household, whose homes have collapsed, moderately or severely damaged, will have the opportunity to receive 15,000 Turkish Liras ($796.51)	CNN (2023d)
February 11	Relief and rescue	the declaration by Germany, as they suspended rescue and relief work in Türkiye due to security concerns	The Guardian (2023b)
		the declaration by Austrian Forces Disaster Relief Unit (AFDRU), that the Austrian Army suspended rescue and relief work in Türkiye due to "increasingly difficult security situation"	The Guardian (2023b)
		the search and rescue teams of ISAR Germany and TSW's declaration of work suspension in Hatay due to clashes between different groups until AFAD deemed the situation to be safe	The Guardian (2023b)

Table 4 (continued)

Day	Response activity	Details	News sources
	Relief and recovery	the preparation of a ferry boat at Yenikapı Port in İstanbul to shelter 1200 earthquake victims as a floating village—serving showers, kitchen, and education facilities	CNN (2023e)
	Aid (relief and recovery)	the reopening of the border crossing between Armenia and Turkey, after 35 years, to allow aid through	Reuters (2023)
February 12	Recovery	the discharge of more than 2000 earthquake victims from hospitals in Istanbul after their treatments	CNN (2023f)
	Relief	the declaration that the tie between the military being excluded from emergency planning and the inadequate response activities is directly related to the politics of Erdoğan's government	BBC (2023a, b, c)
February 13	Recovery	the declaration by the Ministry of Health, that there are at least 19,300 earthquake victims in hospitals all around Türkiye	CNN (2023g)
		the declaration by the Ministry of Health, as 3636 earthquake victims are in intensive care units, and at least 8851 individuals had to have surgery, while some of them have already been discharged	CNN (2023g)

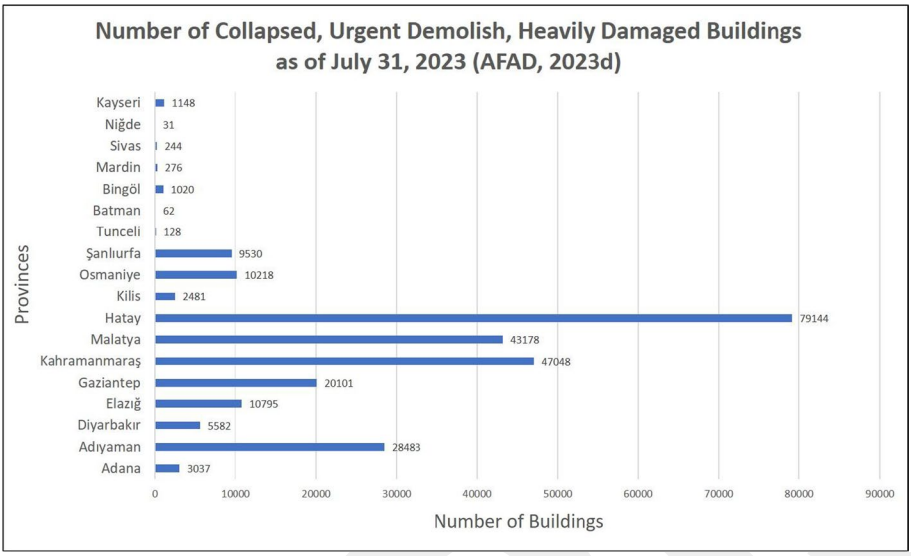


Fig. 9 Number of Collapsed, Urgently Demolished, Heavily Damaged Buildings among provinces (prepared by authors according to the published data by AFAD 2023d)

were severely damaged. Whatever the major reasons that led to such simultaneous extensive amounts of building, critical infrastructure and transportation losses, the emergency response activities that have been planned and somehow exercised couldn't be processed as expected since that much simultaneous and extensive damages of worst-case scenario were not estimated. Although several scenarios were developed and estimations indicated possible losses at specific areas in local risk reduction plans (İRAPs) at each province as of 2022, there were a few actions implemented complying with those risk reduction plans (AFAD 2022d).

The data obtained through on-site visits and examination of relevant information highlight some missing or less focused issues that require emphasis in the emergency response of Türkiye. These devastating earthquakes serve as a crucial warning to the authorities of Türkiye, particularly in regions like Marmara including İstanbul, with its high population density of 16 million people, which is expected to face a devastating earthquake in the near future. The failures observed in the emergency response after the earthquakes underscore the urgent need to adopt and promote appropriate risk reduction policies. Also, national emergency response strategies should be thoroughly revised, considering the lessons learnt and the presented issues especially after such large earthquakes.

There are studies with claims about the seismic gaps in several locations across the country. One of such studies was on the Eastern Anatolian Fault which occurred on February 6, 2023. There were also studies that estimated the possible damages and outlined the needed preparations based on the scenarios. Despite these studies, it is evident that the actual impacts of the earthquakes brought with some lessons for policy makers. For example, it is necessary to have worst-case scenarios generated and extended to other regions where seismic gaps exist so that emergency and response plans are made accordingly.

Another lesson is the preparation of national (TAMP) and local response plans which should be revised to consider regional settings in coordination and preparedness activities. These plans must also be updated regularly based on the improvements of national and

local risk reduction activities. In accordance with local risk reduction plan actions, those response plans need to be revised and updated based on the implementation of risk reduction actions like strengthening major transportation lines and nodes (like airports, highways etc.…), critical lifelines, major public structures like schools and hospitals and so on. Some critical facilities like hospitals, fire stations, schools, and sports halls were also not strong enough to serve as emergency facilities after the earthquake, and this further exacerbated the loss of human lives.

Another issue during such large impact disasters has to do with the activities of search and rescue groups as well as emergency medical staff. These groups coming from outside of the disaster-hit region, lacked the necessary tools like excavators as well as basic services like electricity and heating to save disaster victims.

Although search and rescue groups and emergency medical staff were dispatched to some parts of the disaster region in 72 h, they had some issues about finding necessary tools like excavators as well as basic services like electricity and heating for saving disaster victims as well as proper working and living conditions for first responders.

On emergency sheltering, although many residents managed to evacuate and found a place to stay outside the disaster-hit region, the need for shelters was still huge. In Türkiye, the preparations for emergency sheltering largely depend on tent housing for the emergency period, which is then transferred into temporary container-type sheltering camps. Although several public open spaces were used for tent housing in cities of disaster-hit areas, these tents were not enough. Not only that, there were issues about some locations of the tent housing camps, some of which were flooded due to rainfalls. There were also fire instances observed. The established tents were unable to protect against winter temperatures in the region. In the earthquake-hit zones, the need for psychosocial support was huge and immediate, it was observed however that the psychosocial workers, the medical staff, the search and rescue teams and the media reporters, supposedly tasked to provide this support, were themselves also traumatized and needed support services too.

In conclusion, the 2023 Kahramanmaraş earthquakes have provided valuable insights that necessitate a proactive and holistic approach to disaster risk management. By implementing the aforementioned recommendations and addressing the identified gaps, Türkiye could better prepare for future seismic events and safeguard the well-being of its citizens.

Acknowledgements We would like to acknowledge the funding provided for the fieldwork by The Scientific and Technological Research Institution of Türkiye (TÜBİTAK) "1002-C Natural Disasters-Focused Fieldwork Emergency Support Program (Doğal Afetler Odaklı Saha Çalışması Acil Destek Programı)". We all are also thankful for the first responders and supporters at the field during those hard times and conditions.

Author contributions Authors are listed based on their contributions.

Funding Open access funding provided by the Scientific and Technological Research Council of Türkiye (TÜBİTAK).

Declarations

Ethical approval There is no ethical declaration related with the research.

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