

A Comprehensive Health Economic Analysis of the 2023 Turkey Earthquake

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Report from the Field

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Abbreviations:

G20, Group of 20; GDP, Gross Domestic Product; EU, European Union; PDNA, Post-disaster Needs Assessment; SME, Small and Medium Enterprise; TERRA, Türkiye Earthquakes Recovery and Reconstruction Assessment; UNDP, United Nations Development Programme; WHO, World Health Organization

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Abstract

Earthquakes can have long-term devastating health and economic effects. On February 6, 2023, Kahramanmaraş, located in Southern Turkey, was hit by 7.7 and 7.6 magnitude earthquakes, which affected 11 cities and about 15 million people. The World Health Organization (WHO) announced a Grade 3 Emergency, requiring a major response because the health care delivery system was degraded and the health care supply chain disrupted. It is important to be prepared to implement policy actions immediately in such unpredictable events. This paper provides an overview of the economic and health status of the earthquake-affected area and the policy implications of the earthquakes to identify their effects and the region's needs. The lessons learned can provide suggestions to strengthen disaster response mechanisms. The paper, which reports one of the leading studies on the 2023 earthquake, also contributes to the relatively limited health economics literature on the issue by taking a multidisciplinary approach. The results demonstrate that economic responses and health responses to an earthquake are inextricably linked.

Key Points:

- Earthquakes can undoubtedly have many devastating impacts, particularly regarding health and the economy.
- Health-related response policies to disasters like earthquakes are not sufficient to minimize losses.
- Although a large body of literature investigates earthquakes regarding policy suggestions, a limited number of interdisciplinary studies exists.

On February 6, 2023, Southern Turkey was struck by 2 earthquakes of magnitudes 7.7. and 7.6. Parliamentary approval was then given to declare a state of emergency in 10 cities in the region (Adana, Gaziantep, Sanliurfa, Diyarbakir, Hatay, Kahramanmaraş, Malatya, Adiyaman, Osmaniye, and Kilis). Elazığ was added to the list on February 15. Although earthquakes are unpredictable, effective health policy responses supported by economic and financial policies can help reduce the loss of life. In 2013, the Turkish Government declared its National Earthquake Strategy and Action Plan 2012–2023 (UDSEP-2023).¹

This study is one of the pioneering interdisciplinary studies covering health and economic sciences that address earthquakes, and the first to focus on the February 2023 earthquakes in Turkey. The study aims to provide outlines the economic and health characteristics of the earthquake area as situation analysis, identify policy implications, and suggest various types of policy in the light of health and economic data (see [appendix](#)) regarding the affected cities.

Analysis of the Affected Cities and the Effects of the Earthquake

Health Analysis

In responding to earthquakes, the health characteristics of both the affected area and the whole country are key to the policies. According to Turkey's official data producer, the Turkish Statistical Institute (TUIK), as of 2022 there were 209 hospitals, 39 381 hospital beds, 3301 hospital beds per 100 000 people, and 18.7 physicians per 1000 people. The total number of health care professionals, including medical residents, general practitioners, medical residents, dentists, nurses, midwives, pharmacists, and other health care professionals, was 105 487. Of the affected cities, Adana is the most developed and populous. In terms of population density, Adana and Gaziantep have the most hospitals, at 32 each. Adana has 7412 hospital beds, 328 hospital beds per 100 000 people, and 19 756 health care professionals. Despite being a smaller city, Kilis has the most physicians per 1000 people.² Regarding the effects of the earthquake, the Turkish Medical Association reported that, as of February 28, 25 hospitals in the affected cities were unusable, destroyed, or heavily damaged, 25 hospitals were partially or slightly damaged, while 448 health workers had lost their lives.³

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Economic Analysis

The 2 earthquakes have had a significant impact on the economy. Turkey is a Group of 20 (G20) country with a gross domestic product (GDP) of 819 billion USD in 2021.⁴ According to the Turkish Statistical Institute (2023), 16 million people live in the affected cities, or approximately 16.5% of the country's population. Until the earthquakes struck, the affected provinces accounted for about 9% of the national GDP, 8.5% of total export volume, and 11% of total employment.⁵

The affected provinces are dominated by agriculture-based industry, accounting for 14.3% of the country's economic activity. The region also has the largest area of the country in terms of irrigated farmland and irrigation plans. The most fertile soils are found in Gaziantep and Adana Provinces. The affected region accounts for about one-fifth of the country's crop production. In addition to this, Sanliurfa provides about one-fifth of national seed production, whereas Diyarbakir is the most important organized livestock area.²

The effects of the earthquake can be summarized as follows:

- Cost of rebuilding infrastructure (~66.1 billion USD)
- Increased unemployment
- Loss of fixed capital
- Decreased tax revenues
- Increased income per capita gap due to decreased purchasing power parity (PPP)
- Increased current account deficit to GDP ratio (~1%)⁶
- Increased balance of payment deficit to GDP ratio (~2%)⁶

Overall, Turkey's economic growth expectations were downgraded by ~0.5% due to an estimated reduction in the country's aggregate supply level following the earthquake.⁶

Discussion of Policy Responses

Economic Policy Responses

Economic policy responses are based on expansionary monetary and fiscal policies, which should mitigate the impact of the earthquake in the short run. Hence, Turkey's government initiated the following policy responses following the 2023 earthquake:

- Fiscal policy: An additional tax of 10% on some discounts and exceptions and 5% on some discounts and exceptions were included in the 2022 corporate tax return to be paid in 2 installments.⁷ Those affected in the earthquake zone (11 affected cities) were exempted.⁶
- Financial sector: The Banking Regulation and Supervision Agency announced that individual loan debts, installments, additional accounts, and credit card debts were postponed in the earthquake-affected provinces for 6 months (until August 31, 2023) without the customer's request. In addition, the delay of customers' loan payments by banks and non-bank financial institutions was not limited to loan maturity. Finally, additional regulations were also announced as policy responses.⁸
- Other discounts, exemptions, and incentive items: Discounts were announced in research and development, investment subsidies (including a reduction in corporate tax), dividend earnings, free zone earnings, and so on.⁸

Given that agriculture is essential provides the basic needs of human life, direct and indirect fund flows, such as subsidies,

incentives, entrepreneur support loans, small and medium enterprise (SME) support packages, and tax reductions were implemented to support agricultural production. In general, expansionary monetary and fiscal policy tools are needed for restructuring the economy following a disaster.

Health Economic Policy Responses

As of February 18, 2023, the Ministry of Health declared the following main policy responses to the earthquake⁹:

- Disaster Coordination Center was established by the Ministry of Interior, to organize the responses in Hatay, which was a particularly heavily affected city.
- In total, 114 emergency response units, 94 health centers, 906 family health centers and mobile health units were established by the Ministry of Health in the disaster area. Village health services were provided by mobile health units.
- Twenty-five field hospitals, called *Sahara hospitals*, were set up with the coordination of the Ministry of Health and foreign representatives in the grounds of destroyed or heavily damaged hospitals, or inside their undamaged part. Health service provision was thus maintained in tents and Sahara hospitals. These hospitals are described in the following:
 - After intensive patient referrals, capacity was doubled, and excess patients (approximately 51 000) were transferred to surrounding provinces for medical care.
 - With 74 000 health personnel and 47 000 other personnel, the total number of personnel of the Ministry of Health in the region reached 140 000. Of these, 13 000 are physicians serving in earthquake units in the disaster area.
 - Regarding international aid, 88 countries provided support through sending more than 10 000 experts, including medical personnel, rescue workers, disaster experts, and search dogs to help rescue efforts in Turkey.
 - Clean water and hygienic solutions were provided to prevent infectious disease epidemics.

Conclusion and Discussion

On February 6, 2023, 2 large earthquakes, magnitudes 7.7 and 7.6, occurred in the southern region of Turkey. These earthquakes have resulted in widespread damage across 11 cities and around 15 million people. As of February 19, 2023, a total of 246 billion USD in capital stock is estimated in the disaster area. The most extensive damage to infrastructure was estimated at 34.2 billion USD, equivalent to 4% of the country's GDP in 2021.¹⁰ However, the recovery cost of the earthquakes is estimated as twice larger with the effect of economic disruptions. The Government of Turkey has published the Türkiye Earthquakes Recovery and Reconstruction Assessment (TERRA) and a Post-disaster Needs Assessment (PDNA) collaborated with the United Nations Development Programme (UNDP) and the World Bank, along with the European Union (EU).¹¹

Regarding policy suggestions, a limited number of existing literatures proposed an interdisciplinary infrastructure. Future studies in this area may therefore provide useful information for both researchers and policymakers.

In conclusion, earthquakes can undoubtedly have many devastating impacts, particularly regarding health and the economy. Economic policies and organizational preparedness

are key to an effective medical response. Therefore, governments should prioritize disaster plans and the allocation of financial resources as well.

Data availability statement. All the data are available and free to access and/or online. The main data sources for the health-economic policy responses are the Turkish Statistical Institute (TUIK) and the Price Water House Coopers, PWC.

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Competing interests. The author declares no conflicts of interest.

Ethical standard. Ethical approval for this type of study is not required by our institute.

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Appendix

Table 1. Health and economic statistics for the affected cities

	Adana	G.Antep	Sanliurfa	Diyarbakir	Hatay	K.Maras	Malatya	Adiyaman	Elazig	Osmaniye	Kilis	Total
Health statistics												
Hospital	32	32	19	28	25	18	18	12	13	10	2	209
Hospital beds	7412	6435	4074	4797	4417	2996	2972	1405	3160	1348	365	39 381
Total hospital beds (per 100 000)	328	306	246	269	266	256	369	222	537	246	256	~300
Health care professionals	19 756	14 771	11 376	13 245	11 854	8936	8379	4998	6297	4259	1616	105 487
Total physicians (per 1000)	2.1	1.5	1.2	1.7	1.6	1.5	2.1	1.6	1.9	1.3	2.2	1.7
Economic statistics												Total share (%)
Population (%)	2.7	2.5	2.5	2.1	2.0	1.4	1.0	0.7	0.7	0.7	0.2	~16.5%
GDP (%)	1.8	1.9	0.7	0.8	1.3	0.8	0.5	0.3	0.4	0.4	0.1	~9%
Export (%)	1.3	4.3	0.1	0.2	1.5	0.6	0.2	0	0.2	0.2	0	~8.6%
Employment (%)	2.1	2.2	0.4	1.1	1.2	0.7	1.1	0.4	0.5	0.1	1.1	~11%
Number of firms (%)	2.2	1.8	0.4	0.9	1.3	0.7	0.8	0.4	0.5	0.1	0.9	~10%

Source: TUIK (2023), PWC (2023).