THE IMPACT OF THE 30^{TH} OCTOBER EARTHQUAKE ON THE COVID-19 PANDEMIC IN IZMIR AND ITS VICINITY

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ABSTRACT

THE IMPACT OF THE 30^{TH} OCTOBER EARTHQUAKE ON THE COVID-19 PANDEMIC IN IZMIR AND ITS VICINITY

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This paper focuses on the effect of the 30^{th} October Earthquake in Izmir on the number of COVID-19 cases. There have been many measures to implement social distancing and mask mandates in and around the city. However, earthquakes coinciding with a pandemic prevent their effective practice, thus increasing the proliferation of the virus. Earthquakes and other disasters make it difficult to deal with pandemics. Studies indicate that cities need to be more prepared for earthquakes to be better able to handle pandemics. The Izmir earthquake on the 30^{th} October 2020 was one of the best examples of this. This research is based on a survey design and the analysis of the survey data. The survey results were analyzed on SPSS. Survey results show the earthquake has an aggravating effect on the COVID-19 pandemic. COVID-19 pandemic is not the last pandemic in the world, so this study aims to be an example of multi-hazards scenario to cope with multiple disasters.

Keywords: COVID-19, Disaster, Earthquake, Pandemic

ÖZ

30 EKİM DEPREMİNİN İZMİR VE ÇEVRESİNDE COVİD-19 PANDEMİSİNE ETKİSİ

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Bu çalışma 30 Ekim İzmir Depremi'nin COVID-19 vaka sayısı üzerindeki etkisini araştırmaktadır. COVID-19 pandemisinin tanınmasıyla şehir içinde ve çevresinde sosyal mesafe ve maske kurallarının uygulanması için birçok önlem alınmıştır. Ancak, pandemi ile aynı zamana denk gelen depremler, bunların etkili bir şekilde uygulanmasını engellemekte ve dolayısıyla virüsün yayılmasını artırmaktadır. Depremler ve diğer afetler pandemilerle baş etmeyi zorlaştırıyor. Araştırmalar Pandemilerle daha iyi başa çıkabilmek için şehirlerin depremlere daha hazırlıklı olması gerektiğini göstermekte. 30 Ekim'de yaşanan İzmir depremi bunun en iyi örneklerinden olmuştur. Bu çalışma, anket tasarımı kullanılarak oluşturulmuş. Anket verileri SPSS programı üzerinde analiz edilmiştir. Anket sonuçları, depremin COVID-19 salgını üzerinde ağırlaştırıcı bir etkisi olduğunu gösteriyor. COVID-19 pandemisi dünyadaki son pandemi değildir, bu nedenle bu çalışma birden fazla afetle başa çıkmak için çoklu tehlike senaryosuna bir örnek olmayı amaçlamaktadır.

Anahtar Kelimeler: Afet, COVID-19, Deprem, Pandemi

To My Dear Mother Gülruh Aru

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LIST OF ABBREVIATIONS

AFAD	Ministry of Interior Disaster and Emergency Management Authority (T.C. İçişleri Bakanlığı Afet ve Acil Durum Yönetimi Başkanlığı (AFAD))
NGO	Non-Governmental Organisation (Sivil Toplum Kuruluşu)
JAK	Gendarmerie Search and Rescue Battalion Command (Jandarma Arama Kurtarma)
TMA	Turkish Medical Association (Türk Tabipleri Birliği)
FHC	Family Health Center (Aile Sağlığı Merkezi)
CHC	Community Health Center (Toplum Sağlığı Merkezi)
HES	Hayat Eve Sığar (Life Fits Into Home) (HES Code is a personal code implemented by the Turkish Ministry of Health)
TURKSTAT	Turkish Statistical Institute (Türkiye İstatistik Kurumu (TÜİK))
ARI	Acute Respiratory Infection
MTA	General Directorate of Mineral Research and Exploration of Turkey
SDGs	Sustainable Development Goals
Freq	Frequency
Pct	Percentage
Sta	Standardized

CHAPTER 1

INTRODUCTION

Disaster is a nature, technology or human-induced event that causes physical, economic and social losses for all or certain segments of the society, stops or interrupts normal life and human activities, and the coping capacity of the affected society is not sufficient [33].Throughout the history, humankind faced and still has been facing many disasters such as wars, natural hazards (e.g earthquakes, floods etc.) and illnesses. Most recent case in this regard is COVID-19 pandemic the world currently faces and fights against. Furthermore, number of occurring earthquakes has been increased more than 10 times for the past decades. These two disasters recently combined in Izmir, a metropolitan and the third most populous city in Turkey. Both Turkey's and it's major city Izmir's geographical location is earthquakes prone, also pandemics and epidemics do not seem to end. Thus, the research related to the relationship between these two phenomena is essential. This study is an example to open a path for further researches in this area. The thesis focuses on the relationship between the effects of disasters and illnesses, particularly the earthquake that took place in the city of Izmir in Turkey on the 30^{th} October 2020 during COVID-19 pandemic. Furthermore,this study also demonstrates the importance of sustainable development goals (SDGs).The size of the event, population density and distance from the residential area, underdevelopment determine the extent of the disaster. However, population growth rate, rapid and uncontrolled construction in areas where disaster risk is high, industrialization, destruction of forests, ignorance and lack of education and insensitivity of society increase the severity of the disaster. In this framework, the impact of disasters is mostly shaped by the right or wrong development of human-induced activities [33]. All of these are directly related to SDGs of countries. In this context, countries should also attach importance to their SDGs for multi-hazards scenarios, taking into account the COVID-19 pandemic will not be the last. With Izmir case, it has been seen that SDGs will gain even more importance from now on.

COVID-19 pandemic is declared as a pandemic on the 11^{th} March 2020 by World Health Organization (WHO). While the pandemic was rapidly advancing in Turkey as well as in the world, a severe earthquake occurred in Izmir on the 30^{th} October 2020. The pandemic and the earthquake together caused the city suffered from multiple hazards. The earthquake jeopardized the continuation of various measures taken due to the COVID-19 pandemic. It is known the COVID-19 mostly spreads by respiratory and physical contact however, the

earthquake did not allow the people to keep their social distance . The 30^{th} October Izmir Earthquake was a devastating earthquake, resulting in many deaths, injuries, damages and loss of buildings. In the regions where the devastating effects of the earthquake could be seen, large crowds formed especially by search and rescue teams, first aid teams and people who lost their relatives and homes. Due to the panic and the crowd people could not follow the pandemic rules. Many people lost their homes or could not stay there because of the damage and fear of earthquake recurrence. While some stayed at temporary shelters, others had to stay together with their friends or relatives. Hospitals and health centers were also damaged and caused COVID-19 patients to interact with other people after the earthquake. The severity and destructiveness of the earthquake made people forget about the pandemic and social distancing rules. Under these conditions, the increase in COVID-19 cases in Izmir and its surroundings compared to the pre-earthquake is considered an inevitable result. Various literatures also can be found concluding that disasters lead to rise ongoing diseases especially communicable ones.

As there are no proper city based published data, this thesis searches how the 30^{th} October Izmir Earthquake affected the COVID-19 pandemic in this region using an online survey applied in the city. The acquired data then are analyzed by using SPSS program. The survey results already give a clear idea of the possible effects of the earthquake on COVID-19 cases in Izmir.

In Chapter 2 there is a brief summary of some studies which agree disasters causing further spread of the ongoing diseases. The relationship between pandemic and earthquake is not a common situation in history. However, examples of disasters that have previously occurred during epidemics and infectious diseases are often included in the literature. It is seen in the literature given in Chapter 2 that while geological disasters do not cause biological disasters such as pandemics and epidemics by bringing the disease-causing virus, they have a direct effect on the spread of the existing disease. COVID-19 Pandemic and the 30^{th} October 2020 Izmir Earthquake are plainly explained in Chapter 3. The details of the earthquake, the COVID-19 situation in Izmir during the earthquake, the situation of the buildings and the destroyed area in the city after the earthquake are clearly explained in this section. Based on the information in this section, it is possible to have a lot of ideas about how the earthquake affected the pandemic in the city. Methodology of the thesis is defined in Chapter 4. In this section, information is given about how the survey was prepared, how it was applied, and how the distribution of the survey was followed. In Chapter 5, the findings from the analysis of the survey are given. The questions asked in the survey and their results are detailed in this section. Chapter 6 is the conclusion part of the thesis. In this section, the information given in the other sections is tried to be summarized.

CHAPTER 2

LITERATURE REVIEW

A vast amount of literature searches for the relation between disasters and epidemics caused by communicable diseases and acute respiratory infections (ARIs). According to WHO, due to the chaos after a disaster, it is likely to happen the spread of communicable diseases. Furthermore, WHO identifies ARI as a disease related to crowding. Most studies show disasters do not directly lead to an epidemic or pandemic, but they can cause an outbreak by accelerating the ongoing illnesses such as influenza, pneumonia, malaria, cholera and so on. When it is considered that the COVID-19 virus causes respiratory infections, it is likely that the 30^{th} October 2020 Earthquake accelerated the pandemic in Izmir. This hypothesis can be supported by findings below.

Mark C. Quigley et al. [31] investigate the relation between the COVID-19 pandemic and natural hazards by using epidemiological forecast models for some selected countries (US, China, Australia, Bangladesh). A multi-hazard scenario is defined as the occurrence of two or more dangerous events (for example, an earthquake during COVID-19). As a result of their research which uses quantitative and qualitative assessments, natural risks are likely to coincide and influence epidemiological characteristics of the COVID-19 pandemic. As an example, on the 12^{th} January 2010 a 7.0 magnitude earthquake hit Haiti and the public sanitation system was damaged. A human-transmitted cholera outbreak began to spread across the country nine months later, although there had been no reported cases in Haiti before 2010. Another example is 22^{nd} March 2020 Zagreb earthquake. In some parts of the city, power, water, and heat were lost, and approximately 250 homes were severely damaged. Due to the loss of their homes, an estimated 59 persons required to live in temporary shelters. Even though the Croatian earthquake is not a catastrophic disaster, it does provide a good viewpoint on compound risks. For a short time after a disaster, social barriers can break down. The danger of COVID-19 transmission clearly rose in the days following the earthquake in Zagreb. Within the COVID-19 incubation time range, the daily rate of cases appears to have increased after the earthquake.

Another related research of Vitor Silva et al. [35] search for a correlation between the seismic events and variations in infection rates of COVID-19. The study data are collected from the countries like Turkey, Iran and Croatia that are recently hit by earthquakes to evaluate if the earthquakes have an impact on COVID-19 cases. According to the paper, epidemic outbreaks

are common after disasters, especially in areas that have poor sanitary conditions. Disasters can produce an aggregation of the population in relatively confined regions (i.e. crowding), generating ideal conditions for the propagation of communicable diseases like the COVID-19 virus, in addition to potential alterations to ecosystems within the afflicted areas. Rok Civljak et al. [7] tell the 1st COVID-19 case was seen in Croatia on the 25^{th} of February. Later, the cases started to increase and the government took many preventions such as closing schools, working at home, restrictions in public areas etc. Unfortunately, on March 22 Croatia was hit by an earthquake. Buildings, public properties, also hospitals were damaged where, a lot of COVID-19 patients were at. The study tells with the panic of the earthquake in the cold weather, people could not control their social distance and maintain the precautions implemented earlier. Authorities were concerned the earthquake could accelerate the COVID-19 cases. Infectious diseases like COVID-19 can increase combined with disasters like earthquakes . As Roc Civljak et al. [7] concerned in the study the earthquake caused an increase on the COVID-19 cases in Zagreb. Vitor Silva et al. [35] show it by numbers that before Zagreb earthquake with magnitude 5.3 on the 22^{nd} March 2020 there were 87 COVID-19 cases and in 14 days after the earthquake, 337 more cases were reported in Zagreb. Vitor Silva et al. also mention about past earthquakes caused epidemic outbreaks. Some of the examples are plague outbreak due to the earthquake with magnitude 6.3 in Latur (India) in 1993, the cholera outbreak due to Haiti Port au Prince earthquake with magnitude 7.0 in 2010 and the chickenpox outbreak due to the earthquake with magnitude 5.1 in Lorca (Spain) in 2011. To summarize, the study indicates people who stayed homeless due to the earthquakes have less or no defence against infections since they are not able to maintain safety and hygiene conditions. It is not possible to save the social distance because of the temporary housing, and due to the interruption of the supply chain, there may be a lack of protective equipment. In addition, the healthcare system may collapse as the impact of the disasters.

In another paper Kimberley I Shoaf & Steven J Rottman [34] explore the public health effects of disasters and some of the public health principles which can be applied to disaster management. The paper indicates the impact of natural hazards can be considered in four categories:

- Direct impact on the health of the population (deaths and injuries)
- Direct impact on the health care system
- Indirect effects on the population's health
- Indirect effects on the health care system

It mentions disasters directly impact the health of the population resulting in physical trauma, acute disease, and emotional trauma. In addition, disasters may increase the morbidity and mortality associated with chronic diseases and infectious diseases through the impact on the

healthcare system. As all disasters, not every earthquake has the same impact. Its magnitude, closeness to the region of population, the type of the soil of the land, the construction of buildings, time of the day and characteristics and behaviors of the population are the primary factors can affect the impact of an earthquake. Kimberley I Shoaf & Steven J Rottman indicate although it is possible that an outbreak or even an epidemic of infectious disease exists after any disaster, the actual occurrence of such outbreaks has been rare. For an epidemic risk to happen, the disease of concern needs to exist in the population prior to the disaster. Kimberley I Shoaf & Steven J Rottman are advocated by Nathalie Floret et al. [14]. They analyzed medical literature and data from humanitarian agencies and the WHO from 1985 to 2004 if geophysical disasters cause outbreaks. As a result of the study, epidemics are not caused by geophysical disasters as disasters do not import diseases. However, there is a debate that because of the conditions these disasters lead to, ongoing epidemics can be increased. Nevertheless, David M. Lemonick [23] concentrates on epidemics that occur following a disaster such as earthquakes, floods, volcanic eruptions etc. He declares infectious disease epidemics are directly caused by disasters. However, David M. Lemonick [23] agrees with the fact that population displacement and crowding after a disaster are the main detrimental effects of disasters on epidemics since they increase the spread of the disease. As a result, he also summarizes that pre-disaster conditions and post-disaster conditions are the main reason for the spread of the diseases and lead to epidemics.

Paul B Spiegel et al. [36] reviewed complex emergencies and epidemics occurred between 1995 and 2004. They point out an epidemic can be easily controlled under certain conditions and it doesn't become a disaster. However, if it is triggered by external factors such as a disaster or complex emergency, then it can turn into a disaster. Additionally, Isidore K. Kouadio et al. [22] confirm the hypothesis that disasters may cause infectious disease outbreaks or it may increase the ongoing situation. They can lead to change in the environment, in conditions of population and sensitiveness to existing organisms. Isidore K. Kouadio et al. review the disasters from 2000 to 2011. Infectious diseases including diarrheal diseases, ARIs, malaria, leptospirosis, measles, dengue fever, viral hepatitis, typhoid fever, meningitis, as well as tetanus and cutaneous mucormycosis may occur following a disaster like earthquakes, floods, tornados, tsunamis etc. Unplanned and overcrowded shelters, poor water and sanitation conditions, poor personal hygiene, limited access to healthcare services are the most common problems aftermath of a disaster. Because of these reasons, infectious diseases can arise after a disaster. After Bam earthquake in Iran in 2003, Pakistan earthquake in 2005 and El Salvador earthquake in 2001, respiratory tract infections occurred and increased due to the reasons mainly overcrowding and bad weather conditions. Isidore K. Kouadio et al. refer to site planning, personal hygiene, personal protection, isolation of sick people, health education, disease management/treatment and/or supportive care to be prepared against the illnesses at the time of a disaster and to be able to control the situation in such a condition. It is emphasized an emergency and preparedness plan should be for each country. However, in developing countries surveillance systems and even basic facilities are not working properly and an epidemic may occur without notice. As an addition to the former study, John T. Watson et al. [43] explain the relation between the outbreaks and disasters. They believe population

displacement after disasters is the main risk factor for communicable diseases outbreaks. John T. Watson et al.[43] say "The availability of safe water and sanitation facilities, the degree of crowding, the underlying health status of the population, and the availability of healthcare services all interact within the context of the local disease ecology to influence the risk for communicable diseases and death in the affected population." Moreover, they point out the displaced population mainly suffer from ARIs. ARIs lead to illness and death, especially for children less than five years. Hurricane Mitch in 1998, Aceh tsunami in 2004 and Pakistan earthquake in 2005 are the best examples of ARIs increased among the displaced population and caused deaths.

Jonathan E Suk et al. [37] made a systematic literature review to search potential infectious disease outbreaks caused by earthquakes and floods in Europe. The impact of post-disaster outbreaks was studied in eleven research. They conclude that because of the cascade effects on the various risk drivers of infectious diseases, disasters might result in disease epidemics. There are 4 earthquakes reports that caused infectious disease outbreaks in EU. Jonathan E Suk et al.[37] also pay attention that post-disaster conditions of the population like living in a crowd, displacement, and shared bathrooms can be down to the outbreaks after earthquakes.

As all the above studies show that pre-disaster and post-disaster conditions are of utmost importance for the spread of the diseases and the impact of the disasters on ongoing outbreaks. It is understood that disasters do not bring illnesses, however, because they cause panic and chaos depending on their severity and magnitude, they accelerate the current situation if there is an outbreak. Coronavirus was already in the population when the earthquake happened in Izmir on the 30^{th} October 2020, so it is expected to increase the cases in that region if the studies above are taken into consideration .

CHAPTER 3

THE 30^{th} OCTOBER EARTHQUAKE AND THE COVID-19 PANDEMIC IN IZMIR

3.1 COVID-19 Pandemic

Coronaviruses are viruses cause diseases in birds and mammals. It is thought that these types of viruses are highly responsible for the cold cases in people. Gastrointestinal disease in children can be originated due to some coronaviruses [7]. There are seven different coronaviruses affect people, which are HCoV-229E, HCoV-OC43, SARS-CoV, HCoV-NL63, HKU1, MERS-CoV and the most recent, COVID-19. These viruses result in respiratory infections such as pneumonia and bronchitis in people, especially MERS-CoV, SARS-CoV and COVID-19 can cause the respiratory infections with considerable risk of death. Out of two previous epidemics owing to the coronaviruses, the first one appeared in Guangdong province of China in 2002, named severe acute respiratory syndrome (SARS) caused by SARS-CoV virus. The second one was in Middle East in 2012 and the disease is called Middle East Respiratory Syndrome (MERS) while the causing coronavirus is named as MERS-CoV [7]. On the 31^{st} December 2019 an unknown coronavirus is stated causing an increasing number of cases of pneumonia in Wuhan city, Hubei province of China. Other neighboring countries in Asia such as Thailand, Japan and Republic of Korea [44] followed shortly after. At the time, WHO stated the cases has already started to appear in America, Australia and Europe. On 11^{th} March 2020, WHO has declared a pandemic, which the total number of confirmed cases were 118,319 globally in 114 countries, naming the novel coronavirus as COVID-19 [45]. By following WHO's announcements countries have started to take initial precautions such as closing borders and cancelling international flights. Domestic transportation restrictions, curfews and bans on mass mobility have come after the initial limitations. The first COVID-19 is confirmed on the 11^{th} March 2020 in Turkey[1] [46]. The cases have started to increase rapidly in the country and the total number of cases is 5.235.978 and the total number of deaths is 47.271 as of the 29^{th} May 2021[1].

[1] https://covid19.saglik.gov.tr, Accessed on the 3^{rd} March 2021

3.1.1 First Negative Impacts of COVID-19 and Its Relation with Other Disastrous Event

Since the COVID-19 pandemic has started, it has negative impacts in several aspects around globe. Many countries and its citizens were affected badly due to the results of the pandemic regarding social, economic and other aspects.
Socially, people had to become more isolated due to quarantines in order to prevent the spread of the virus. Spending time on internet and entertainment platforms have become more common. During these periods of time, people had to see their relatives or organized meetings with their colleagues via online streaming platforms so it drastically changed human to human interactions.
Economically, many businesses had to shut down because of lockdowns and mandatory closings. Opposite to conventional dining at restaurants or shopping in markets, online food orders skyrocketed which raised unemployment.
Since the pandemic already has its negative impacts itself, it has put an extra burden on the shoulders of the states and people combined with other bad events such as war or natural disasters, especially on healthcare.
For example, the war between Ukraine and Russia has not just caused a big migration crisis in neighboring country Poland, but also an extra struggle on healthcare system. While Poland was already struggling with the impacts of COVID-19, Ukrainian immigrants who their number is about 1.3 million, have created a bigger problem than it usually may have, thanks to the pandemic. Because of lower vaccination coverage amongst Ukrainians (34.5% of Ukrainians versus 58.6% of Polish), it may increase COVID-19 cases in Poland [19].
Another example, people of Croatian capital, Zagreb, were awakened at 6:24 am local time by an earthquake of 5.5 Richter scale during pandemic. In addition to property damage, hospitals were evacuated where also COVID-19 infected patients were present at that time. The earthquake and evacuations made people who were supposed to be isolated to mix with other people. While healthcare system was struggling with pandemic, earthquake created an extra burden on people, especially healthcare stuff [25].
Pandemic is an extraordinary event, and it spends the resources which were supposed to be spent for other issues. Minimizing its impact combined with other events require a developed organizational structure and to build it, understanding relation between them is a must.

3.2 30^{th} October 2020 Earthquake in Izmir

Izmir is a province of Turkey located on Aegean coast. It is the third most populous city of the country with the population of 4.394.694 people in 2020 according to TURKSTAT (Turkish Statistical Institute)[2]. Aegean Region represents a geographical region including the south of the Greek mainland in the west, the Aegean Sea in the middle and Western Anatolia in the east. The area is a seismogenic zone where earthquakes were experienced in historical

[2] https://www.tuik.gov.tr/, Accessed on 1^{st} May 2021

and instrumental periods [27]. Izmir's recent history of severe earthquakes table is created by using multiple sources together with AFAD[3] [4] and it is clearly seen in Table 3.1 that the earthquake with magnitute of 6.0 and higher is not a suprise for this region.

Table 3.1: Table of Izmir's Recent History of Severe Earthquakes [3] [4]

Date	Center of the Earthquake	Magnitude of the Earthquake	Total Number of Collapsed and Damaged Buildings
19.01.1909	Foça	6.0	1700
31.03.1928	Torbalı	6.5	2000
22.09.1939	Dikili	6.6	1000
23.07.1949	Karaburun	6.6	2200
16.07.1955	Söke-Balat (Aegean Sea Centered)	6.8	300
06.11.1992	Seferihisar-Doğanbey Neighborhood	6.0	60
12.06.2017	Karaburun	6.2	

Turkey was hit by an earthquake on the 30^{th} October 2020 at 14:51 local time . The epicenter of the earthquake was 8 km north of the island of Samos in Aegean Sea with respect to MTA (General Directorate of Mineral Research and Exploration of Turkey)[27]. The magnitude of the earthquake was between 6.6 and 7.0 [11]. Turkish state institutions, e.g AFAD (Ministry of Interior Disaster and Emergency Management Authority), have reported the magnitude of the earthquake as 6.6. However, The United States Geological Survey explained the magnitude is 7.0 and The European-Mediterranean Seismological Centre said it it has preliminary magnitude of 6.9 [5].

[6] Although the most affected city of Turkey was Izmir, the earthquake has also been felt in

[3] https://deprem.afad.gov.tr/depremkatalogu, Accessed on the 21^{th} August 2022

[4] https://www.aa.com.tr/tr/turkiye/izmir-son-111-yilda-6-ve-uzeri-buyuklugunde-8-deprem-yasadi/2025256, Accessed on the 21^{th} August 2022

[5] https://www.abc.net.au/news/2020-10-31/earthquake-shakes-turkey-greece-buildings-destroyed/12834300, Accessed on the 10^{th} January 2021

[6] https://www.usgs.gov/programs/earthquake-hazards/science/introduction-national-seismic-hazard-maps, Accessed on 4^{th} March 2022

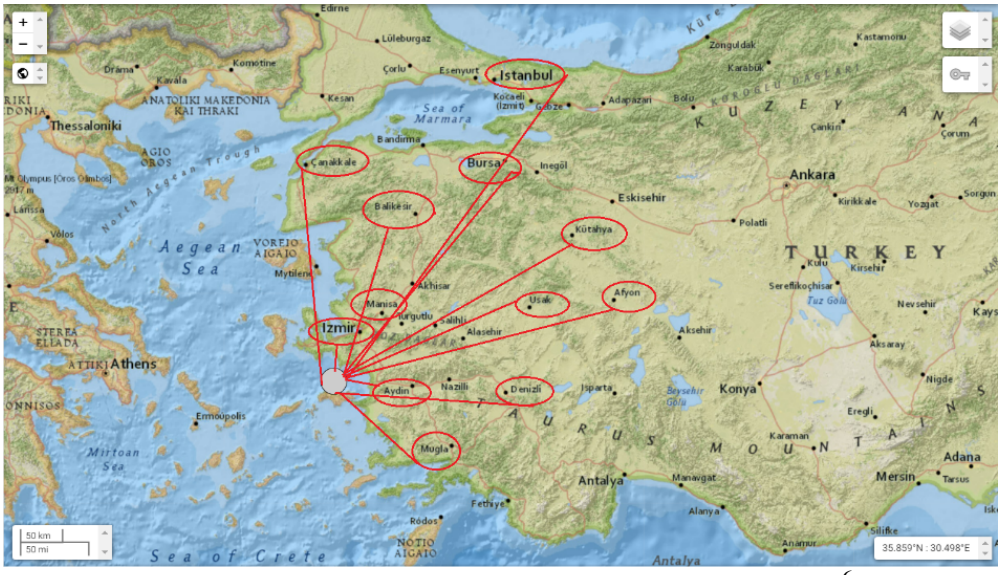


Figure 3.1: Outline of cities where seismic tremor was felt [6]

Muğla, Aydın, Denizli, Manisa, Uşak, Afyonkarahisar, Kütahya, Balıkesir, Bursa, Çanakkale, Istanbul, Sakarya and all Western Anatolia of Turkey including the North Aegean Islands (Figure 3.1).

On the map the white circular area is Samos Island. The intensity of the earthquake can be estimated from the large area affected as can be clearly seen.

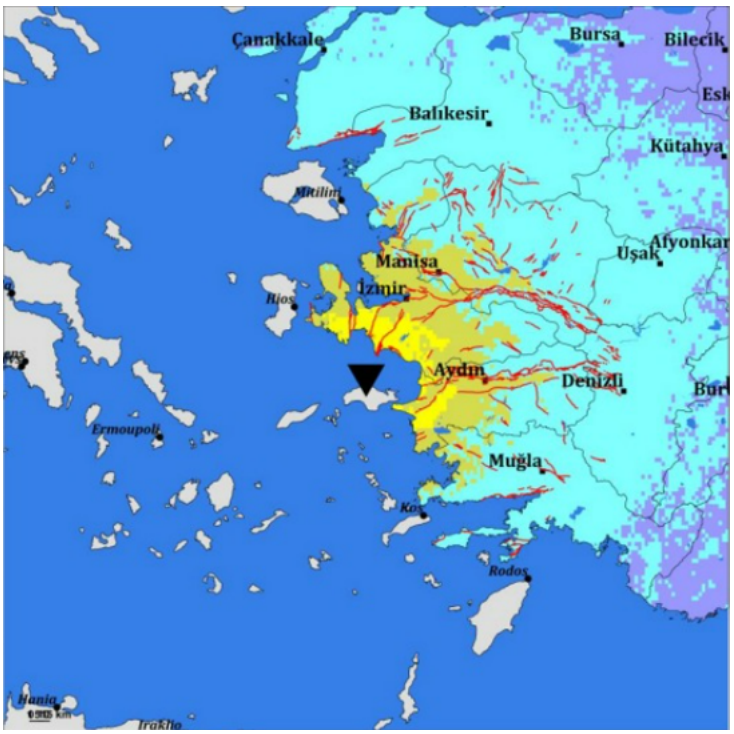


Figure 3.2: AFAD-RED estimated severity map [1]

Figure3.2 shows the map of AFAD. The black point is Samos Island and it demonstrates the same area as Figure 3.1. Yellow area is the most affected area. When the color changes the

effect of the earthquake decreases on AFAD's map.

A tsunami occurred after the earthquake, on the coast of Samos Island and in Sığacık (is a seaside neighborhood of Seferihisar district of Izmir province). In normal times the average waves were recorded to be 80 cm high, however, height of the tsunami waves towards the shore was determined as 200-250 meters [27]. According to the information received from the Coast Guard Command, 22 boats sank, 23 boats and 1 land vehicle were rescued by the Coast Guard Command teams, and 43 boats ran aground. As a result of the studies, 14 of the 22 sunken boats were removed from the water and 40 of the 43 boats that were stranded were rescued [7].

As stated in AFAD's preliminary evaluation report, the apparent duration of the earthquake was determined as 15 seconds according to the initial calculations. From the main shock to the 2^{nd} November 12:54 there has been recorded 1230 aftershocks that their magnitudes varied between 1.0 and 5.1 [1]. As a result of the earthquake, with the effect of strong ground motion there has been loss of life and property due to the destruction and damage of buildings especially in main districts of Izmir which are Bayraklı, Bornova, Buca, Kemalpaşa and Menderes [10].

The earthquake has caused 114 people to lose their lives and 1035 citizens left injured [20]. Moreover, due to the earthquake 16 buildings were destroyed in total [27]. A total of 4968 buildings were damaged including 376 buildings with heavy damage and destruction, 410 buildings with moderate damage and 4182 buildings with little damage [10]. See in Figure 3.3a and Figure 3.3b.

(a) (b)

Figure 3.3: Number of (a) buildings damaged, (b) casualties

Devastating effect of the earthquake particularly has been seen in Bayraklı, Izmir mostly due to the ground effect and structural problems. There were 7-10 storey buildings and the earthquake affected these buildings more due to the ground amplification effect. The loose-saturated ground of these region has multiplied the motion of the earthquake several times [6]. It is determined the collapsed buildings were generally 8-10 storey. This is the reason the damage was concentrated especially in Bayraklı. Moreover, it is detected most of the 9 buildings destroyed in Bayraklı district were built before 2000. Most of them completely and some of them partially collapsed. Most of the collapsed buildings are located on loose sediments that can allow earthquake waves to grow on the ground. In addition, inadequate and

[7] https://www.afad.gov.tr/izmir-seferihisar-depremi-duyuru-51-02112020—1330, Accessed on the 30^{th} April 2021

unqualified construction practices and post-housing usage errors can be listed among other important causes of structural damage. Most of the destroyed buildings, especially Doğanlar and Rızabey apartment buildings, which were destroyed in Bayraklı district, are located approximately 60 m above sea level, approximately 4-5 km from the shore, but on loose ground [27]. In the sandwich type collapses (formed by the overlapping of the floors) seen in Rıza Bey, Doğanlar, Yağcıoğlu Apartments, which were demolished in the Bayraklı district; some of the reasons were not to apply the strong column-weak beam principle, insufficient load-bearing element strength, weak floor, soft floor formation, insufficient concrete strength and application error cause collapse.
Some of the mentioned collapsed buildings can be seen below in Figures 3.4a, 3.4b, 3.4c and 3.4d:

(a)

(b)

(c)

(d)

Figure 3.4: (a) Rıza Bey Apartment, (b) Doğanlar Apartment, (c) Yağcıoğlu Apartment, (d) Karagül Apartment [27] [10]

According to AFAD Seferihisar Earthquake Report published on the 2^{nd} November 2020, 2 days after the earthquake, a total of 7,888 personnel, 25 search and rescue dogs and 1,058 vehicles of AFAD, JAK, NGOs and municipalities were assigned to the ongoing response and improvement works in the region [7]. It is stated in order to meet the urgent need for shelter, 3569 tents, 57 general purpose tents, 24382 blankets, 13280 beds, 5500 sleeping sets, 2657 kitchen sets and 4 shower-WC containers were shipped to the region by AFAD and the Turkish Red Crescent. The report issued on the 2^{nd} November 2020 gives the information throughout Izmir 1864 tent setup was completed which 791 in the Aşık Veysel Recreation Area, 120 in the Ege University campus area, 217 in the Bornova Eskişehir Stadium, 194 in the Buca Hippodrome, 158 in the Buca Stadium, 90 in the Sığacık area of Seferihisar district and 248 in various points in need while 2038 were under construction [7]. After the earthquake there were 20 encampments for the people whose houses are collapsed or heavily damaged with respect to the news of Turkish Medical Association (TMA) on the 2^{nd} November [8]. See Table3.2

Table 3.2: The list of the encampments areas [8] [7]

AFAD's Encampment Areas	**Municipality's Encampment Areas**
Aşık Veysel Encampment	Aşık Veysel Encampment
Ege University Faculty of Nursing Encampment	83/12 Öğretmenevi Encampment
Boronava Stadium Encampment	275/10 St. Bilal Çakırcalı Encampment
Buca Şirinyer Racecourse Encampment	286/5 St. Sakarya Park Encampment
Buca Stadium Encampment	1593/6 St. Bayraklı Encampment
Smyrna Square Encampment	283/6 St. Bayraklı Encampment
Bayraklı's Rink Encampment	Seferihisar Public Market and Sığacık Encampment
Eceler Park Encampment	273/5 St. Encampment
75. Yıl Park Encampment	Encampment given to Bayraklı Municipality
Smyrna Square Tepekule Street Encampment	
Barış Manço Park Encampment	

3.2.1 The Situation of The Buildings After The Earthquake

Photographs of the most affected earthquake region in Izmir and buildings approximately 9 months after the 30^{th} October 2020 Izmir Earthquake are demonstrated below. The photographs are taken on the 23^{th} July 2021 by the author. The empty areas after the collapsed buildings caused to feel like wandering around the same areas while taking the photographs, but sadly they were not the same areas. Even after 9 months, the devastating effect of the earthquake was still in sight. The flat areas on the photographs are the lands of houses destroyed due to the earthquake. As it is seen on the photographs new buildings constructions have been started on the location of the collapsed buildings. However, there are discussion about exactly when they can be used by the owners of destroyed flats. Many people lost their homes and this shows that since 9 months they were staying in temporary places and they seems to stay longer. As a person experiencing the earthquake in Izmir, the author says many

[8] https://p.dw.com/p/3kkp5, Accessed on 12^{th} May, 2021

buildings were affected in Izmir not only in Bayraklı and Bornova regions. Many high-rise buildings had visible damage. Most of the buildings had rifts on their outside and inside walls due to the earthquake. However, most of them were painted back and now they seem as they are checked by a professional and renewed now. A second severe earthquake can cause them to collapse. There are still damaged buildings which are evacuated and this means there are people who need to stay another places even if they did not lose their homes. Changing staying places may affect the spread of the coronavirus since people have more interaction with each other while moving in and out.

(a) (b)

Figure 3.5: Photographs of the most affected earthquake region in Izmir taken by the author on 23.07.2021 - Part 1

(a) (b) (c) (d) (e) (f)

Figure 3.6: Photographs of the most affected earthquake region in Izmir taken by the author on 23.07.2021- Part 2

3.3 The COVID-19 Pandemic During the Earthquake

The earthquake happened when the COVID-19 cases were increasing in Turkey, especially in big cities like Istanbul, Izmir and Ankara. A severe earthquake is the worst thing could happen during a rapidly spreading disease. As there are people need help, injureds, deaths as much as damaged and collapsed buildings, following the pandemic rules are challenging. To forget the pandemic during the panic and fear of the earthquake is an expected fact specifically after such a devastating earthquake on the 30^{th} October in Izmir. Before the earthquake a 42 $\%$ increase in COVID-19 cases are announced on 22^{nd} September, 2020 news compared to one month ago in Izmir[9]. On the 25^{th} October 2020 news, 5 days before the 30^{th} October Izmir Earthquake, it is pointed that the number of cases has increased 3.5 times compared to 20 days ago, and has doubled in the last 10 days [10]. It is clear that the severity of the situation was continuing to increase. In such a pandemic situation, the COVID-19 cases should have been accelerated by the earthquake. Many people contacted with each other during and after the earthquake. When the earthquake happened, there were people who are diagnosed with the COVID-19 at their homes in isolation or in the hospitals, also people who did not know they had COVID-19 virus or not. COVID-19 positive people contacted with others after the

[9] www.hurriyet.com.tr/galeri-Izmir-koronavirus-haritasi-22-eylul-ilce-ilce-son-durum-41617626/1, Accessed on the 15^{th} April, 2021

[10] https://www.sozcu.com.tr/2020/gundem/istanbuldan-sonra-Izmirde-de-corona-alarmi-validen-kritik-uyari-6097248/, Accessed on the 15^{th} April, 2021

earthquake, especially at the hospitals. All the patients ran out in hurry in the hospitals with the employees. Moreover, many people came from other cities to Izmir to help the citizens there. Around the collapsed buildings were very crowded because there were rescue teams, citizens and the relatives of the people who were under the debris. According to the news and reports after the earthquake, the COVID-19 cases increased a lot in Izmir. Izmir Governor Yavuz Selim Köşger said that the latest news are focused on the earthquake in last few days in Izmir, while the COVID-19 pandemic was the main topic on the 11^{th} November news. Also, he informed that the number of the COVID-19 cases are at least doubled by observing the graphics [11]. The below listed are the observations of Izmir Earthquake Rapid Evaluation Report of TMA published on the 2^{nd} November 2020 remark the risks for the COVID-19 pandemic [41]:

- Various clinics, FHCs and county health directorates in the region affected heavily by the earthquake are all damaged more or less.

- It has been reported patients diagnosed with COVID-19, who were being followed up in hospitals, left there in a panic.

- The follow-up of patients diagnosed with COVID-19 before the earthquake was delayed since entering the damaged FHC (Family Health Center) and CHC (Community Health Center) buildings was not possible.

- Tents have been set up approximately in 20 areas around Izmir. Particularly, the tent which was in Aşık Veysel Recreation Center, the largest one, was heavily visited by political representatives and physical distance rules were not followed even though the pandemic was an ongoing important risk in the country. This situation created a huge risk for earthquake victims living in tents.

- While the HES (Life Fits Into Home) code was requested at the entrance of some of the tents, it was not necessary in some.

- It was not possible to take a shower for people who took shelter in.

- Aid collection and distribution centers were also not eligible for physical distancing rules.

- By opening of stands of various associations to distribute food and aid materials carry a risk of many diseases, especially COVID-19.

[11] https://www.sozcu.com.tr/2020/gundem/son-dakika-vali-acikladi-Izmirde-yeni-corona-kararlari-6121491/, Accessed on 21^{th} August, 2022

In many reports, the first inferences show that the situation after the earthquake was perfect for the spread of the coronavirus. Jyoti Koirala and Suman Acharya also explain how the situation was after the earthquake in their article which is published on November. They point out that more hygiene materials were required, including COVID-19 PPEs (masks and child-masks) and disinfectants, there were more needs for mobile lavatories and showers, aid and services were being delivered to the larger encampments at the cost of the smaller ones although smaller encampments were reporting more needs [20]. Water sanitation and hygiene are well-served in larger encampments. People who are in smaller encampments reported that they need hygiene goods such as Covid-related PPE and disinfectants. In some situations, portable toilets are also required [38]. According to the rapid assessment report of Supporttolife[38], families said they prefer not to stay in the larger encampments because they are too far away from their homes and they want to be close to their personal belongings. Affected people in informal encampments perceive a need for additional portable restrooms in general. The municipality had set up two mobile toilets near these encampments, but these did not entirely cover the needs. The need and the wrong organization of manpower, unnecessary agglomerations have been one of the most important reason for the aggravation of the post-earthquake pandemic in Izmir. TMA published a report after one month the earthquake on 1st December and it reveals the earthquake caused a rapid increase of the COVID-19 cases. The number of COVID-19 patients, which gained momentum in the whole country since the beginning of October, has exceeded the numbers at the beginning of the pandemic in the Aegean region. Moreover, considering the incubation periods in terms of the pandemic, it was seen that the cases in the earthquake region are at least 2 times the data of the Ministry of Health announced. The rate of increase in those caught COVID-19 among municipal employees is 3 times on average. The increase in the COVID-19 between health workers in the earthquake region was dramatic. The lack of screening tests in areas heavily affected by the earthquake, the inability to create COVID-19 isolation areas, and the lack of contact tracing have increased the impact of earthquake victims from the pandemic. The fact that the family medicine system in primary care is not region-based has also made it difficult to manage the post-earthquake process in the follow-up of patients with COVID-19 or contacts [40].

From the below figures it can be inferred that the eartquake has an impact on the COVID-19 cases in Aegean Region. The data used for all the figures below is reached from the website of TURCOVID19.[12] In data file there are 12 regions which are Istanbul, West Marmara, Aegean, East Marmara, West Anatolia, Mediterranean Region, Middle Anatolia, Western Black Sea Region, Eastern Black Sea Region, Northeast Anatolia Region, Middle Eastern Anatolia Region and Southeast Anatolia Region.

While creating the figures, the regions and population information of Hacettepe University Institute of Population Studies and reports were taken into account in order to make a population ratio.[13] Cases in the regions are limited with this data and cases of Turkey on figures are found by adding cases of each region.

[12] https://turcovid19.com/acikveri/, Accessed on the 4^{th} April 2022

[13] http://www.hips.hacettepe.edu.tr/en, Accessed on the 3^{th} September, 2022

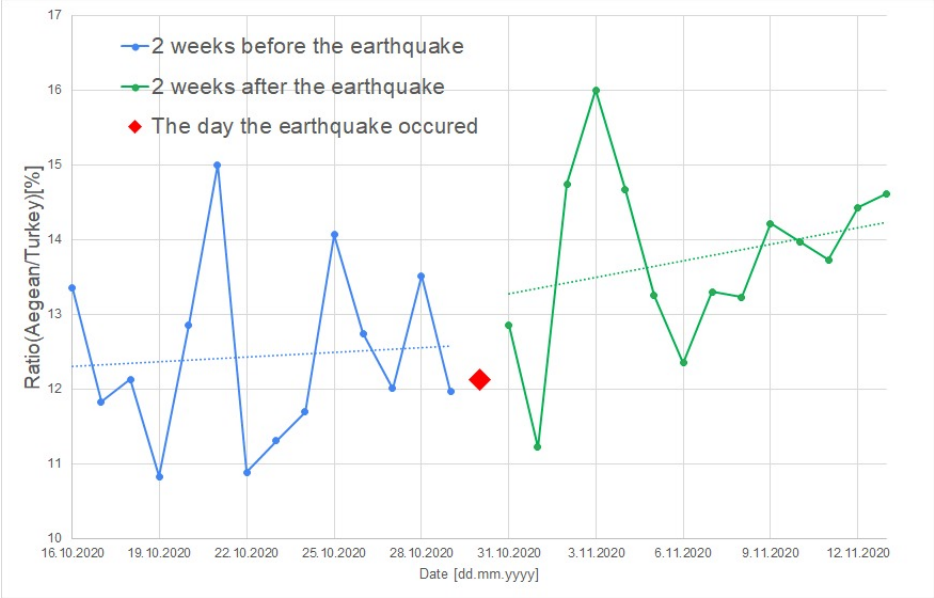


Figure 3.7: Ratio Aegean/Turkey [%] [12]

The red point on Figure 3.7 is referred to the 30^{th} Izmir Earthquake. The change on the trendline on Figure 3.7 is clear after the earthquake. The ratio of Aegean Region/Tukey is increasing after the earthquake especially around 1 month after the earthquake.

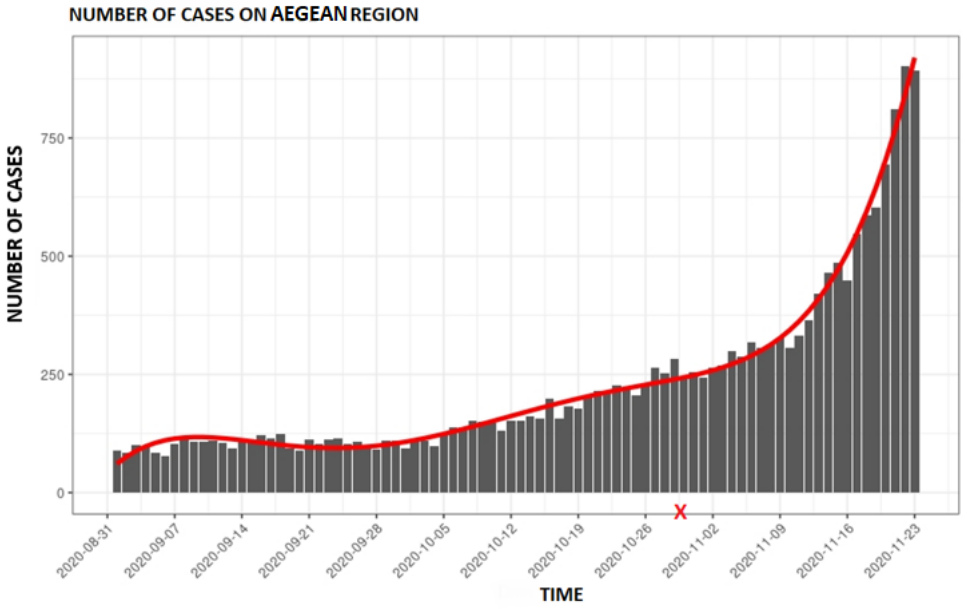


Figure 3.8: Number of Cases on Aegean Region [12]

A sharp increase of the COVID-19 cases can be clearly seen on Figure 3.8 created on R programming with limited data between August and December in 2020. All above reasons mentioned especially in TMA reports can be supported by Figure 3.8. The date of Izmir earthquake is marked with X on the Figure 3.8. If we take into account that the incubation period of the virus is 14 days, we see that the increase becomes sharper 2 weeks after the

date marked with X. Before the earthquake there were increases and decreases, however, after the earthquake, there is a continuously and rapidly increase till the end of December. To

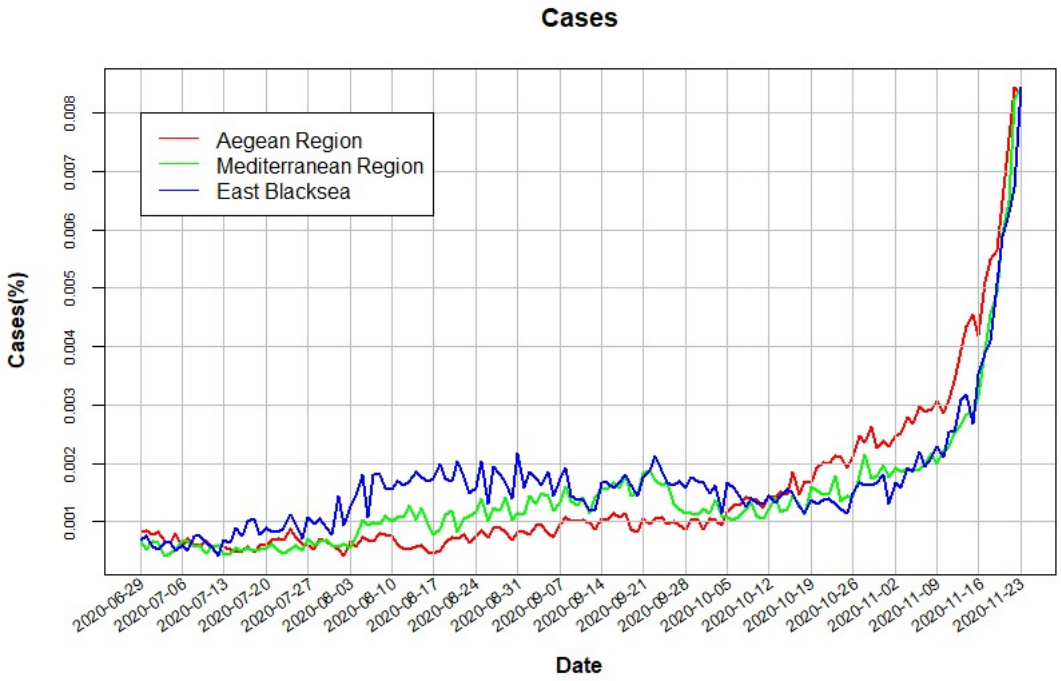
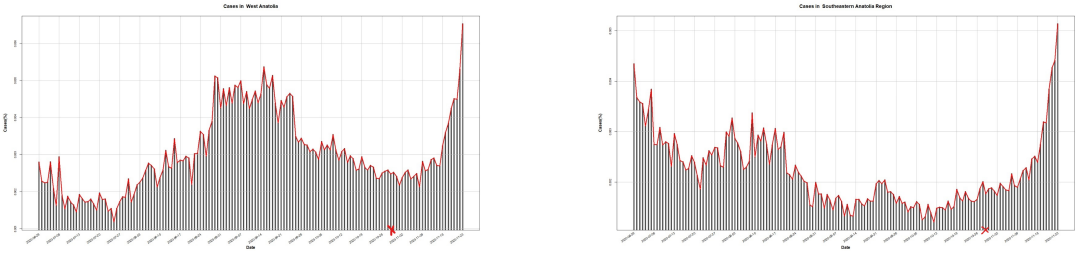


Figure 3.9: Cases in Aegean, Mediterranean and East Blacksea Regions [12]

compare the cases of different regions, Figure 3.9, Figure 3.10b and Figure 3.10a can be viewed. It seen that while cases are increasing in Aegean Region after the earthquake, in Southeastern Anatolia, West Anatolia and Mediterranean Region it is not increasing as much as in Aegean Region. Compare to Aegean Region,Mediterranean and East Blacksea Regions are less risky for the earthquakes. On Figure 3.9 we see that the highest increase in cases is in the Aegean. If the coronavirus variant at the time of the earthquake had been the delta (came out in 2021 and spreading faster than the former one) variant or any other, this increase would have been even greater. Other regions' graphics can be seen in Appendix A.3.



(a) (b)

Figure 3.10: (a) Cases in West Anatolia Region [12], (b) Cases in Southeastern Anatolia Region[12]

CHAPTER 4

METHODOLOGY

The Research area is specifically Izmir and its vicinity. Izmir have been affected by the earthquake of the magnitude of 6.6 on 30^{th} October 2020 [2]. The city is exposed to the severe earthquake during the time of the pandemic. This research focuses on how the COVID-19 pandemic and the earthquake go together in this region. It is investigated that whether the earthquake has impacts on the pandemic in Izmir.Due to the lack of province-based COVID-19 data that can be used before and after the earthquake, data was collected with the survey method, which is very frequently used in research.During the survey design [9] [17][3][26] [4] [24] [30] [18] were taken as examples since they use survey method to collect data. Due to the circumstance of the pandemic, data are collected through an online survey. The survey was created on METU Survey Service. The survey obtained after it was created was distributed online via the transport link. Before the survey was administered, necessary permissions were obtained from the Middle East Technical University Applied Ethics Research Center on 23^{rd} June 2021. After required permissions the survey was applied between dates 24.06.2021 and 02.08.2021. The survey link was distributed using all social media channels (Facebook, WhatsApp, Instagram and so on.) and email. The timeline of the study can be seen in Figure 4.1.

Participants were thoroughly explained about the study's purpose and its estimated duration, as well as the confidentiality and privacy of the data. Access to socio-demographic questions and the questionnaires were allowed by the usage of a "I agree" button, which presupposed informed approval of participation in the study. The qualitative research involves primary data gathering the information from the people in Izmir. Clearly the target population is the population of Izmir and the sample frame includes the adults aged 18 and older in Izmir. Sample size is calculated by using the formula [21]:

$$\frac{z^2 * p * (1-p) : e^2}{1 + (z^2 * p * (1-p)) : e^2 * N} \tag{4.1}$$

where N is population size, e is the margin of error, z is z-score which is described as the number of standard deviations a given proportion is away from the mean and it is 1.96 for the given confidence level of 95 %, p is the proportion which is suggested to be takes as 50 %

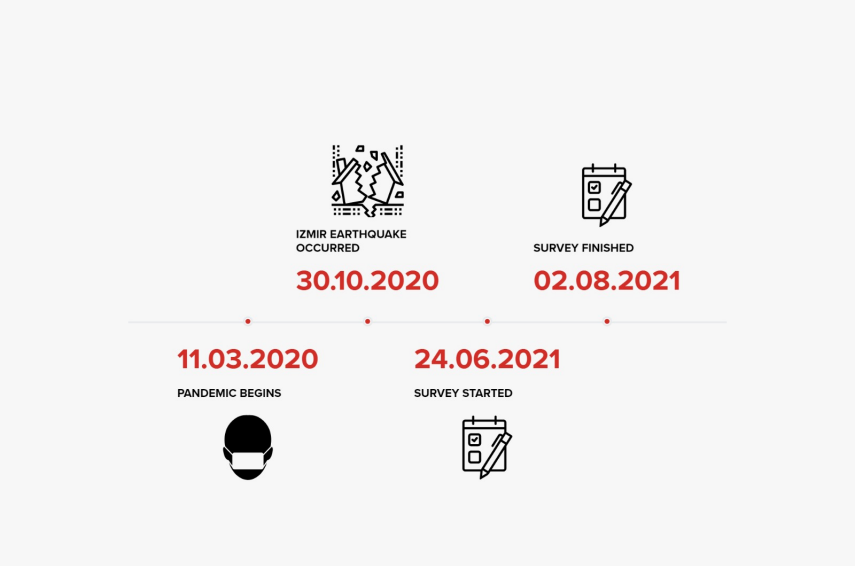


Figure 4.1: Timeline of the Study

[39]. Some certain people are chosen to transfer of the online survey and after they join the survey, they are requested to convey the survey to the people they know and this continues in this way till the deadline of the survey and the sample size is reached. The described method is called Snowball Sampling which is one of non-probability sampling methods [39]. Moreover, municipalities, especially Bornova, Bayraklı and Seferihisar, JAK and AFAD helped to distribute the survey online.

The questions are designed mostly to inquire if the people took into account the pandemic and they kept following the rules of the pandemic just before and after the earthquake. After demographic part, the survey includes three parts. All the questions of the survey can be seen in Appendix A.1. The first part is for all participants. It includes 13 general questions. The first question is where the people mostly are when the earthquake happened. This question is asked by aiming most of the people would be at homes due to the pandemic. The earthquake occurred in the day time. When it were not the time of the pandemic, people would not be at home at that time. Then, it is tried to obtain if the people know where to go after the earthquake, and if they know the assembly areas. Furthermore, it is a question if the people used a mask after the earthquake and could keep their social distance with other. 5 questions in this are of utmost importance. They are:

- Did you have COVID-19 before the earthquake?
- Were you diagnosed with COVID-19 at the time of the earthquake?
- Have you been diagnosed with COVID-19 within 14 days after the earthquake?
- Have you been diagnosed with COVID-19 within 1 month after the earthquake?
- Were you relocated to another place for a prolonged period other than your home after the earthquake? If so, where did you stay?

These questions give a direct view about the impact of the earthquake on the COVID-19 cases in the region. They allow to make comparison between the COVID-19 cases before, during and till one month after the earthquake. The period of 14 days is official incubation period of the virus determined by the authorities. When the cases during the earthquake, incubation period and people's interactions with each other after an earthquake, especially by staying other places with other people are taken into consideration, the results are expected to give a main idea about the impact of the earthquake on the COVID-19 situation in Izmir.
The second part is for the participants who stayed in the temporary sheltering areas. 7 questions are asked in this part. Every question in this part is very important to understand the situation of the temporary sheltering areas, but the below questions bring a direct idea about the management of the temporary sheltering areas regarding the pandemic.

- Were you tested for COVID-19 before being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19 ?
- Was COVID-19 tested after being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19 ?
- Were there enough spaces for those who had to quarantine to complete the quarantine process in the temporary sheltering area?

To be able to control the pandemic to apply COVID-19 test and make a space for the isolation of the COVID-19 positive tested people are significant. Even if it is supplied enough hygiene products and make people to follow the pandemic rules, when the COVID-19 negative and positive people are not separated, others will not be enough for the management of the pandemic.
The third one part is for the participants who took role in the temporary sheltering areas to help people there or to organize and to distribute the incoming aids for the earthquake victims. There are 5 questions in this part. Main questions are:

- Did you have a COVID-19 test before working in the temporary sheltering areas?
- Were you able to wear your mask regularly and correctly while working?
- Were you able to maintain your social distance while working? (For example; it may not have been possible to maintain your social distance due to the crowded environment in which you work, or the working area may not have been arranged with social distance in mind.)

These questions are asked to be able to analyze if the people could work properly by following the pandemic rules. While asking the questions, it is thought it must be difficult to use masks and keep social distance due to the crowd. These elements are all important for the protection against the spread of the virus, particularly considering that the vaccine was not available at that time.

As with any study, this study has limitations. One of the limitations of this study is the inability to conduct one-on-one interviews with people and obtain more detailed information due to the conditions of the pandemic. Another limitation is that the study was started in 2021 and therefore, observations could not be made in the temporary shelter areas immediately after the earthquake.
801 people joined the survey, but only 522 of them completed the survey. Data were downloaded from METU Survey Service. Then, it is imported into SPSS 25 for Windows (IBM, Chicago, IL, USA). SPSS is popular because of its simplicity, easy-to-follow command language, and well-documented user manual. In addition, it is easy to clean, categorize, and organize the data for statistical analyses. To understand how SPSS works and to set a statistical model [48] [16] [12] [47] [32] are applied for help. Cronbach's Alpha is a metric used to assess the internal consistency or reliability of a group of scales or test items. In other words, Cronbach's alpha is a way of gauging the strength of that consistency. The dependability of any measure, then, refers to the extent to which it is a consistent assessment of a concept.[1] It is commonly used to test the reliability of surveys. As it is seen in Table 4.1 when Cronbach's Alpha is greater or equal to .7, it is acceptable. The survey for this study is also tested with Cronbach's Alpha for reliability test. The data are binary here, however, there are sources that Cronbach's Alpha can be applied to the binary data [2] [3] [1]. Since the survey includes 3 parts, the test is applied separately for each part. Table 4.2, Table 4.3 and Table 4.4 show the results of reliability statistics. According to Cronbach's Alpha test, the survey does not seem reliable in this study as the values are smaller than .7. There are also negative Alpha values for the part-2 and part-3 due to the negative average covariance among the items. This violates the reliability of the items. Joseph A. Gliem & Rosemary R. Gliem[15] studied on Cronbach's Alpha Reliability and gathered the literature for it. They mention in their paper why the reliability is unknown for some studies. The reasons may be :

- Individual items may have a significant amount of random measurement error, i.e., are not trustworthy or each item is limited in scope.
- There is a limitation for the participants. For this study participants must be in Izmir during the earthquake and they have to be at the age of 18+. This causes to categorize the population in small groups.
- Cronbach's alpha does not provide reliable estimates for single items. This is because it is not designed to do so [15].

The data are binary and questions depend on individual experiences in this study. In addition, since there are 3 parts in the survey, number of questions might not be enough for the reliability test. There are also some limitations for the group of participants such as age and being a

[1] https://data.library.virginia.edu/using-and-interpreting-cronbachs-alpha/, Accessed on the 10^{th} September, 2022
[2] https://www.researchgate.net, Accessed on the 10^{th} September, 2022
[3] https://stats.stackexchange.com/questions/38215/cronbachs-alpha-continuous-and-dichotomous-data-in-spss, Accessed on the 10^{th} September, 2022

citizen of Izmir. The survey can be designed again in the future to implement reliability tests as it is aimed. Furthermore, for each part the reason of the negative average covariance can be analyzed to have the acceptable Alphas.

Table 4.1: Cronbach's Alpha [15]

Cronbach's Alpha Value	**Status**
>.9	Excellent
>.8	Good
>.7	Acceptable
>.6	Questionable
>.5	Poor
<.5	Unacceptable

Table 4.2: Reliability Test For Part-1

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Sta. Items**	**N of Items**
.168	.315	12

Table 4.3: Reliability Test For Part-2

Reliability Statistics		
Cronbach's Alpha[a]	**Cronbach's Alpha Based on Sta. Items**[a]	**N of Items**
-.081	-.460	7
a. The value is negative due to a negative average covariance among items.		

Table 4.4: Reliability Test For Part-3

Reliability Statistics		
Cronbach's Alpha[a]	**Cronbach's Alpha Based on Sta. Items**[a]	**N of Items**
-1.140	-.469	6
a. The value is negative due to a negative average covariance among items.		

CHAPTER 5

FINDINGS AND RESULTS

5.1 The Findings of the Survey

Total number of participants is 522 people in the survey. As it is seen in the Table 5.1 65.5 % of participants are female, 34 %.1 of the participants are male and 0.4 % of participants do not want to specify their gender.

Table 5.1: Gender distribution of research participants

Gender	**Freq.**	**Pct. %**
Female	342	65.5
Male	178	34.1
Not Specified	2	0.4
Total	522	

27.8 % of participants are at the age between 18-34, 27.2 % of them are between 35-44, 23 % of them are between 45-54 and 22 % of them are at the age of 55 or older.

Table 5.2: Age distribution of research participants

Age	**Freq.**	**Pct. %**
18-34	145	27.8
35-44	142	27.2
45-54	120	23.0
55+	115	22.0
Total	522	

62.5 % of participants have university degree, 19.3 % of them have high school degree, 14.2% of them have graduate degree, 2.1 % of them have primary school degree and 1.9 % of them have secondary school degree. See in Table5.3.

Table 5.3: Education level distribution of research participants

Level of Education	**Freq.**	**Pct. %**
Primary school	11	2.1
Secondary school	10	1.9
High school	101	19.3
University	326	62.5
Graduate degree	74	14.2
Total	522	

52.5 % of participants were at home, 23.9 % were at work, 5.6 % were in a transport, 2.3 % were in markets, 1.4 % were at hospitals and 1.6 % were at schools when the earthquake happened. 12.6 % of participants chose the option other. The majority of other answers are open-air places like streets, parks and gardens at the time of the earthquake. Although the earthquake occured on friday in the day time, 52.5 % percent of the participants were at their homes. Regarding the education level and the age interval of majority of the participants, the half of them would not have been expected to be at home if there was not the pandemic at that time. See Table5.4.

Table 5.4: Where were you during the earthquake?

	Freq.	**Pct. %**
At home	270	52.5
At work	123	23.9
In any means of transport (bus, izban, taxi, etc.)	29	5.6
Market	12	2.3
Hospital	7	1.4
School	8	1.6
Other	65	12.6

57.1 % of participants went to to an assembly area after the earthquake and they indicated it was crowded. See Table5.5.

Table 5.5: Did you go to an assembly area after the earthquake? If you went, was it crowded?

	Freq.	**Pct. %**
No	26	4.4
Yes, it was crowded	298	57.1
Yes, it was not crowded	201	38.5

43.7 % of participants could maintain their social distance with the people around them after the earthquake while 51 % of them do not remember if they could or not. See Table5.6.

Table 5.6: Were you able to maintain your social distance with the people around you after the earthquake?

	Freq.	**Pct. %**
No	28	5.4
Yes	228	43.7
I do not remember	266	51.0

72.6 % of participants says that the people around them did not follow the social distancing rules after the earthquake. See Table5.7.

Most of participants stated assembly areas were crowded. In crowded areas to keep your social distance is difficult. The panic and fear after the earthquake make it more difficult. As someone who experienced the earthquake the author can say it was really hard to keep your social distance and keep wearing mask immediately after the earthquake. The author was in Izmir Karşıaya High School. There was a meeting with parents of the students, so the school was crowded. The meeting would be held in the canteen where was in the lowest floor. When the earthquake started, in few seconds people started running out. The author was the only one waited the earthquake stops. If the building had collapsed, most probably other people could have been trapped on the stairs and died. This shows that there is not enough information how to act during and after the earthquake. There should be frequent trainings for it. When the earthquake stopped, the author quickly left the building. Many people were crying around and some people were helping the ones who were crying and were in panic due to the fear of the earthquake. Moreover, the garden of the building were full of people in a short time because there were no other assembly area to go after the earthquake. There were no masks and social distance after a while. Not be able to keep your social distance and crowded assembly areas are expected results. After the earthquake this high school is decided to destroy because it was damaged. If it collapsed at that time, there would have been many deaths and injures.

Table 5.7: Did the people around you follow the social distancing rules after the earthquake?

	Freq.	**Pct. %**
No	379	72.6
Yes	100	19.2
I do not remember	43	8.2

52.5 % of participants were at home when the earthquake occurred, so it is likely to expect there would be many people were not wearing mask before the earthquake and at the time of the earthquake. 65.9 % of them were not wearing a mask at their home and 69.2 % of them were not wearing a mask during the earthquake. See Table5.8.

56.5 % of participants were wearing a mask after the earthquake.

15 participants had COVID-19 before the earthquake, 3 participants were diagnosed with COVID-19 at the time of the earthquake, 12 participants were diagnosed with COVID-19 within 14 days after the earthquake and 22 participants were diagnosed with COVID-19

Table 5.8: Were you wearing a mask at the time when the earthquake occurred?

	Freq.	**Pct. %**
No	344	65.9
Yes	152	29.1
I do not remember	26	5.0

Table 5.9: Were you wearing a mask during the earthquake?

	Freq.	**Pct. %**
No	361	69.2
Yes	139	26.6
I do not remember	22	4.2

Table 5.10: Were you wearing a mask after the earthquake?

	Freq.	**Pct. %**
No	20	3.8
Yes	295	56.5
I do not remember	207	39.7

within 1 month after the earthquake. Official incubation period is 14 days for the COVID-19. By considering the official incubation period, it is seen COVID-19 cases increased 4 times compared to the number of COVID-19 cases at the time of the earthquake. Many people stayed homeless and stayed at temporary shelters. Some of them went to their friends or relatives houses. Many of them could not go to their homes in that day and spent the night outside in cold weather. When all of these conditions are taken into consideration, COVID-19 cases are expected to continue increasing and the results show that it increased more than 7 time in 1 month compared to the cases at the time of earthquake in survey sample. If there is more than 7 times increased in 522 participants, the cases should have been increased a lot in whole population of Izmir and its vicinity.

According to Turkish Statistical Institute (TSI) the number of people with the age 18 and 18+ are 3 429 827. With the basic mathematics if 3 people had COVID-19 during the earthquake in 522 people, it may be around 20 000 in whole population.Moreover, in 14 days if it is 12 people had COVID-19 in 522 people, then it may be around 80 000 and around 145 000 after a month from the earthquake happened. Unfortunately, there no published data based on Izmir at time of earthquake and in a one month after it.

Table 5.11: Did you have COVID-19 before the earthquake?

	Freq.	**Pct. %**
No	505	96.7
Yes	15	2.9
I do not remember	2	4

55.7 % of participants declared they stayed at hotels or similar accommodations and 2.1 % of them stayed at temporary shelters provided for the earthquake victims. People who chose the

Table 5.12: Were you diagnosed with COVID-19 at the time of the earthquake?

	Freq.	**Pct. %**
No	519	99.4
Yes	3	0.6

Table 5.13: Have you been diagnosed with COVID-19 within 14 days after the earthquake?

	Freq.	**Pct. %**
No	510	97.7
Yes	12	2.3

Table 5.14: Have you been diagnosed with COVID-19 within 1 month after the earthquake?

	Freq.	**Pct. %**
No	500	95.8
Yes	22	4.2

option “other” are 28.6 %. "Other" includes mostly cars, summer houses, work places. Some of them said that they worked at the earthquake area and helped the attendants.

Table 5.15: Were you relocated to another place for a prolonged period other than your home after the earthquake? If so, where did you stay?

	Freq.	**Pct. %**
No	29	5.6
Yes, hotel and similar accommodation	290	55.7
Yes, in the earthquake tent	11	2.1
Yes, at a friend's house	19	3.6
Yes, at a relative's house	23	4.4
Yes, other	149	28.6

70.7 % of participants think that the earthquake increased COVID-19 cases in Izmir. 92.7 % of participants said that they did not stay with strangers in the temporary shelters.

Table 5.16: Did you stay with other people that you do not know in the temporary sheltering area?

	Freq.	**Pct. %**
No	165	92.7
Yes	13	7.3

41.5 % of participants indicated there were not enough hygiene products while 43.7 % of them said there were enough hygiene products in temporary shelters.

Table 5.17: Were there enough (hygiene) products such as soap, disinfectant, mask, etc. required for hygiene in the area you stay?

	Freq.	**Pct. %**
No	59	41.5
Yes	62	43.7
I do not know	21	14.8

After the earthquake many people had to stay in temporary sheltering areas and 54.7 % of participants indicated that they do not know whether the pandemic rules were followed or not there. Only 21.6 % of them said yes for this question while 23.7 % of participants said no. In an environment where the pandemic started in March 2020 and vaccination has not yet taken place, these rates show that the pandemic has actually been put in the background in this region after the earthquake.

Table 5.18: Have the pandemic rules been followed in the temporary sheltering area?

	Freq.	**Pct. %**
No	3	23.7
Yes	30	21.6
I do not know	76	54.7

Table 5.19: Were you tested for COVID-19 before being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19?

	Freq.	**Pct. %**
No	97	18.58
Yes, it is done. I was diagnosed with COVID-19 positive	0	0.00
Yes, it is done. I was not diagnosed with COVID-19 positive	7	1.34

Table 5.20: Were you COVID-19 tested after being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19 ?

	Freq.	**Pct. %**
No	82	15.71
Yes, it is done. I was diagnosed with COVID-19 positive	0	0.00
Yes, it is done. I was not diagnosed with COVID-19 positive	11	2.11

Table 5.21: Were there enough spaces for those who had to quarantine to complete the quarantine process in the temporary sheltering area?

	Freq.	**Pct. %**
No	18	3.45
Yes	33	6.32
I do not know	57	10.92

Table 5.22: Did you have a COVID-19 test before working in the temporary sheltering areas?

	Freq.	**Pct. %**
No	84	89.4
Yes	10	10.6

Table 5.23: Were you able to wear your mask regularly and correctly while working?

	Freq.	**Pct. %**
No	25	29.4
Yes	60	70.6

Table 5.24: Were you able to maintain your social distance while working? (For example; it may not have been possible to maintain your social distance due to the crowded environment in which you work, or the working area may not have been arranged with social distance in mind.)

	Freq.	**Pct. %**
No	37	46.3
Yes	43	59.8

5.2 Association Test Results

The McNemar test is designed to assess if two related groups differ on a dichotomous dependent variable. It is comparable to the paired-samples t-test but uses a dichotomous dependent variable rather than a continuous one[1].
P value expresses whether each variable has a statistically significant effect in the model. When p < 0.05, the model is statistically significant [5].
As it is seen in Table 5.25 p-value is smaller than 0.05. This means there is a relation between being diagnosed with COVID-19 at the time of the earthquake and being diagnosed with COVID-19 within 14 days after the earthquake.

Table 5.25: McNemar Test for "Were you diagnosed with COVID-19 at the time of the earthquake?" & "Have you been diagnosed with COVID-19 within 14 days after the earthquake?"

Test Statistics[a]	
N	522
Exact Sig.(2-tailed)	.035[b]
a. McNemar Test	
b. Binomial distribution used.	

Table 5.26: McNemar Test for "Were you diagnosed with COVID-19 at the time of the earthquake?" & "Have you been diagnosed with COVID-19 within 1 month after the earthquake?"

Test Statistics[a]	
N	522
Exact Sig.(2-tailed)	.000[b]
a. McNemar Test	
b. Binomial distribution used.	

As it is seen in Table 5.26 p-value is smaller than 0.05. This means there is a relation between being diagnosed with COVID-19 at the time of the earthquake and being diagnosed with COVID-19 within 1 month after the earthquake. Being diagnosed with COVID-19 at the time of the earthquake is a factor that can cause the increase in COVID-19 cases in the region after the earthquake due to the interaction of many people.
A chi-square independence test determines if two categorical variables in a population are linked[2]. Pearson Chi-Square should be checked under the column Asymptotic Significance (2-sided) for p-value here. The higher the chi-square value, the more significant the relevant test. In other words, the effect of that variable on the main variable increases as the number increases[3]

[1] https://statistics.laerd.com/spss-tutorials/mcnemars-test-using-spss-statistics.php, Accessed on 9^{th} September 2022

[2] https://www.spss-tutorials.com/spss-chi-square-independence-test/, Accessed on 9^{th} September, 2022

[3] https://www.westga.edu/academics/research/vrc/assets/docs/ChiSquareTest_LectureNotes.pdf, Accessed on the 15^{th} September 2022

Table5.27 shows that there is no relation between the education level of participants and keeping social distance after the earthquake. Education level of the participants did not affect the keeping social distance of the participants after the earthquake.

Table 5.27: Chi-Square Tests Results to Show The Relation Between Education Level and Keeping Social Distance After The Earthquake

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	7.013	8	.535
Likelihood Ratio	8.416	8	.394
Linear-by-Linear Association	.596	1	.440
N of Valid Cases	522		

Table5.28 shows that there is no relation between the age of participants and keeping social distance after the earthquake. Age of the participants did not affect the keeping social distance of the participants after the earthquake.
Table5.29 shows that there is a relation between the education level of participants and using

Table 5.28: Chi-Square Tests Results to Show The Relation Between Age Range and Keeping Social Distance After The Earthquake

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	12.198^a	6	.058
Likelihood Ratio	12.663	6	.049
Linear-by-Linear Association	7.860	1	.005
N of Valid Cases	522		
a.0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.17.			

mask after the earthquake. Education level affected the participants to use the masks.
Table5.30 shows that there is not a relation between the age range of participants and using

Table 5.29: Chi-Square Tests Results to Show The Relation Between Education Level and Using Mask After The Earthquake

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	16.775	8	.033
Likelihood Ratio	16.945	8	.031
Linear-by-Linear Association	7.302	1	.007
N of Valid Cases	522		

mask after the earthquake. Age range did nothave an impact on using masks.
Table5.31 shows that there is relation between the gender and education level of the participants. Since female participants are in the majority, we can deduce that it affects the education

Table 5.30: Chi-Square Tests Results to Show The Relation Between Age Range and Using Mask After The Earthquake

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	1.261	6	.974
Likelihood Ratio	1.272	6	.973
Linear-by-Linear Association	.064	1	.800
N of Valid Cases	522		

level of the participants.
Table5.32 shows the relation between the gender and age range of the participants. It is seen

Table 5.31: Chi-Square Tests Results to Show The Relation Between Gender and Education Level

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	17.613	8	.024
Likelihood Ratio	19.361	8	.013
Linear-by-Linear Association	.003	1	.956
N of Valid Cases	522		

that there is no link between the gender and the age of the participants.

Table 5.32: Chi-Square Tests Results to Show The Relation Between Gender and Age Range

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	10.793	6	.095
Likelihood Ratio	11.740	6	.068
Linear-by-Linear Association	.317	1	.573
N of Valid Cases	522		

Table5.33 shows that there is no relation between the age range and the education level of the participants. Age range did not affect the education level as like the gender.

Table 5.33: Chi-Square Tests Results to Show The Relation Between Age Range and Education Level

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	16.002	12	.191
Likelihood Ratio	18.953	12	.090
Linear-by-Linear Association	1.277	1	.258
N of Valid Cases	522		

The detailed results for the demographic part of the survey the figures in Appendix A.4 can be seen.

CHAPTER 6

CONCLUSION AND SUGGESTIONS

Actions to be taken before disasters come to the fore so that disasters can both reduce the loss of life and not adversely affect the development process. Activities such as training, awareness raising and exercises should be carried out as well as activities such as improving the infrastructure related to disasters, housing quality and zoning plans. Unsuccessful development policies of countries have resulted in unsustainable results and deficiencies in infrastructure. Sustainable development has an important place in the relationship between disasters and development. Multi-hazards scenarios make Sustainable Development Goals (SDGs) crucial to be able to to deal with multiple disasters with minimal impact on normal life. The 30^{th} October Izmir Earthquake is a good example of why the countries should take into consideration the disasters in their SDGs.
Severe and big disasters may lead the following [13]:

- The disruption of its economy and growth targets throughout the country.
- Major problems in the balance of payments.
- Disruption of the budget income-expenditure balance.
- The fact that it can increase poverty even more by creating negative effects on income distribution.
- Suspension of planned investments and the possibility of cutting resources allocated to investments.
- Loss of production and stock, loss of market, shortage of goods and price increases.
- Unemployment, deterioration of social balances, sudden and uncontrolled population movements.

All of above can greatly affect sustainable development and even lead to the deterioration of political and social cohesion, so one of the most important factors hindering sustainable development is disasters. In addition to the destruction and loss of life caused by disasters, disasters can seriously disrupt the development processes of countries. Moreover, this destruction is

not at the same level in every country, but varies according to the level of development of the countries. For this reason, disasters cannot be considered independently of the concept of development.

The following elements are important for disaster mitigation and management[13]:

- Establishing strong institutional structures at central and local levels in order to address the issue of disaster risk reduction as a priority issue at national and local levels and to prepare effective implementation programs,

- The determination and monitoring of disaster hazard and risk, and the establishment and development of early warning systems are adopted as a continuous duty by the authorities,

- Establishing and effectively implementing systematic, continuous and sustainable public education programs in order to develop the resilience and coping capacities of communities that may be affected by disasters and to create a culture of mitigation in the society,

- Elimination of the main causes of vulnerability such as poverty, lack of education, unemployment,

- Developing and strengthening preparedness activities in order to respond to disasters in a timely, rapid and effective manner.

These are directly related to Sustainable Development Goals (SDG) 2030 shown in Figure 6.1 below.

With the sustainable development program in line with these goals, fighting poverty in the world in general, providing economic growth, meeting many social needs such as education, health, social protection and unemployment, reducing violence against women, bringing equality and a better quality education system to girls and boys, It is aimed to reduce deaths, improve public transportation and provide quality housing, prevent income inequality, target the economic growth rate of 7% in underdeveloped countries, combat climate change and protect the environment more effectively [29] [42]. The relationship between disasters and development can be summarized as positive and negative developments[13] :
Positive development approaches:

- Settlement and construction decisions, infrastructure and economic and social development planning that take into account disaster hazards and risks will significantly reduce existing vulnerabilities. (Unfortunately, there is no example from our country.)

Figure 6.1: The 17 Sustainable Development Goals of the 2030 Agenda [28]

- After a disaster, planned, comprehensive and holistic recovery and reconstruction programs aiming to reduce future hazards and risks can significantly reduce future disaster hazards and risks (Example; 1992 Erzincan Practice)

Negative development approaches:

- Disasters can prevent local, regional and national development for a long time with the physical, economic, social and environmental losses and damages they may cause. (For example, 1971 Gediz and 1999 earthquakes)

- Development and development programs implemented without considering disaster hazards and risks will increase the future disaster risks as they will increase the values (population, infrastructure, industry, etc.) in risky areas. (For example, Istanbul and Marmara region)

Disasters such as geological, biological and meteorological have been in our lives so far and they will continue to exist. Many natural hazards, depending on the geographical regions of the countries, can be controlled with suitable preparedness plans for that region. However, many countries are not yet able to implement these preparatory plans in practice. The severity and effects of disasters that may occur are increasing due to factors such as global warming and climate changes. Combined with human-induced effects, the impact and severity of disasters also increase. Being conscious and prepared at this point can greatly alleviate the impact and severity of disasters. COVID-19 pandemic showed many countries were not prepared for the combination of different kind of disasters. This is a lesson to be learnt and evolve new preparedness and resilience plans. Pandemic will be a part of our life, so we need to be prepared for pandemics and other types of disasters. As like many other countries Turkey were

not ready for a second severe disaster during the pandemic. An earthquake is a disaster can have devastating effects depending on its severity and cause panic among the society.

The 30^{th} October Izmir Earthquake was severe earthquake during the time of COVID-19 pandemic in Izmir. It did not cause only many loss of life and property, it also affected COVID-19 cases in the region. It broke the pandemic rules like using a mask and keeping social distance with others. This study shows how it affected the pandemic in the city by the survey applied there.

The main findings of the survey show the earthquake has an impact on the COVID-19 pandemic. People diagnosed with COVID-19 had to go out and mixed with other people. Many people could not keep their social distance. Just after the earthquake many people went out and gathered with others with the panic and fear of the earthquake. Search and rescue teams had difficulties regarding the pandemic rules due to the people who lost their relatives, volunteers to help, people who could not go back to their homes around that region and so on. More people than expected were at homes due to the online education provided by schools and some occupational groups working remotely from home. Also, many people were not going out if it was necessary to avoid the virus. This might cause many deaths and injuries considering that the destroyed buildings are mostly houses. Moreover, people do not use mask at home if there is no one has the virus, so with panic many people might leave their home without a mask and joined the crowded. Findings also give a view that while homeless people were placed in temporary shelters, COVID-19 testing was not done, so those who were in contact with coronavirus and those who were not in contact, were not separated. It is not even certain whether there is enough isolation space for COVID-19 contacts. The risk of transmission of the coronavirus in an unprotected environment is very high and it will not take hours to transfer from one person to another. All of these reasons increase the possibility of spreading the virus. In 522 participants, 3 people were diagnosed with COVID-19 at the time of the earthquake. It increased 4 times in 14 days after the earthquake and approximately 7 times in one month after the earthquake. Analysis supports the result that the earthquake accelerated the cases in Izmir.

The example of Izmir shows us that it is essential to take quick action and implement the prepared plans in practice in the case of pandemic and earthquake coexistence. The most important preparations will be to determine the assembly areas, to plan where the temporary shelters will be set up, to include separate areas for isolation against infectious diseases in the temporary shelters, and to have the necessary equipment for hygiene. In addition, for the pandemic situation it is absolutely necessary to determine the people who carry the disease and those who do not carry the disease when entering and exiting the temporary shelterings. Although education are given for earthquakes, the 30^{th} October Izmir Earthquake showed people do not follow the rules with panic and fear, so education for the disasters should be a must, regular and frequent.

The COVID-19 pandemic is not the last pandemic. Various pandemics and epidemics are expected in the future. The existence of biological disasters does not end the existence of other types of disasters. So the world must learn how to deal with more than one type of disaster at the same time. With this study, it is aimed to set an example in this sense and to shed light on future studies.

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APPENDIX A

A.1 QUESTIONNAIRE

Demographic Part

-Please select your gender:

- Female
- Male
- I do not want to specify

-Please select your age range:

- 18-34
- 35-44
- 45-54
- 55+

-Please select your highest level of education:

- Primary school
- Secondary school
- High school
- University

- Graduate degree

Questions

1. Where were you during the earthquake?

- At home
- A t work
- In any means of transport (bus, izban, taxi, etc.)
- Market
- Hospital
- School
- Other (.....)

2. Did you go to an assembly area after the earthquake? If you went, was it crowded?

- No
- Yes, it was crowded
- Yes, it was not crowded

3. Were you wearing a mask at the time when the earthquake occurred?

- Yes
- No
- I do not remember

4. Were you wearing a mask during the earthquake?

- Yes
- No
- I do not remember

5. Were you wearing a mask after the earthquake?

- Yes
- No
- I do not remember

6. Were you able to maintain your social distance with the people around you after the earthquake?

- Yes
- No
- I do not remember

7. Did the people around you follow the social distancing rules after the earthquake?

- Yes
- No
- I do not remember

8. Did you have COVID-19 before the earthquake?

- Yes
- No

9. Were you diagnosed with COVID-19 at the time of the earthquake?

- Yes
- No

10. Have you been diagnosed with COVID-19 within 14 days after the earthquake?

- Yes
- No

11. Have you been diagnosed with COVID-19 within 1 month after the earthquake?

- Yes
- No

12. Were you relocated to another place for a prolonged period other than your home after the earthquake? If so, where did you stay?

- No
- Yes, at a relative's house
- Yes, at a friend's house
- Yes, in the earthquake tent
- Yes, hotel and similar accommodation
- Yes, other (.....)

13. Do you think the earthquake increased COVID-19 cases in Izmir?

- Yes
- No
- O do not know

If you stayed in the temporary sheltering areas (tents, prefabricated houses etc.) set up by the municipality after the earthquake, please answer the questions below.

14. Did you stay with other people that you do not know in the temporary sheltering area?

- Yes
- No

15. Were there enough (hygiene) products such as soap, disinfectant, mask, etc. required for hygiene in the area you stay

- Yes
- No
- I do not know

16. Have the pandemic rules been followed in the temporary sheltering area?

- Yes
- No
- I do not know

17. Were you tested for COVID-19 before being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19 ?

- Yes, it's done. I was diagnosed with COVID-19 positive.
- No
- Yes, it's done. I was not diagnosed with COVID-19 positive.

18. Was COVID-19 tested after being placed in the temporary sheltering area? If so, have you been diagnosed with COVID-19 ?

- No, not tested.
- Yes, it was tested. Yes, I have been diagnosed with COVID-19 positive.
- Yes, it's been tested. No, he has not been diagnosed as COVID-19 positive

19.Were there enough spaces for those who had to quarantine to complete the quarantine process in the temporary sheltering area?

- Yes
- No
- I do not know

20. If you evaluate it in terms of the COVID-19 pandemic, do you think that the temporary sheltering areas are set up in a suitable area?

- Yes
- No
- I do not know

Please answer the following questions if you worked in the temporary sheltering areas or help points or as a search/rescue team after the earthquake.

21. Did you have a COVID-19 test before working in the temporary sheltering areas?

- Yes
- No

22. Were you able to wear your mask regularly and correctly while working?

- Yes
- No

23. Were you able to maintain your social distance while working? (For example; it may not have been possible to maintain your social distance due to the crowded environment in which you work, or the working area may not have been arranged with social distance in mind.)

- Yes.
- No. Explain: (For example; crowded search and rescue teams, crowded environment)

24. Were you able to use gloves while organizing and distributing the incoming aid? Did you have enough gloves?

- Yes. There was.
- No. Did not have.
- I do not know know

25.Were you able to disinfect your hands regularly while working? Was there enough disinfectant?

- Yes. There was.
- No. Did not have.
- I do not know know

A.2 GLOSSARY

In order to understand the concept of the thesis, we should have a look at the terms that widely used to define the classification at first hand. So here are some of these terms;

Disaster: "A disaster is a serious event that causes an ecological breakdown in the relation between humans and their environment on a scale that requires extraordinary efforts to allow the stricken community to cope, often with outside help or international aid." [36]

Natural hazard: "Natural hazards are naturally occurring events that became disastrous when they create large casualties and property losses, which impede social and economic development" [8]

Complex Emergency: "Complex emergency is a humanitarian crisis which occurs in a country, region, or society where there is a total or considerable breakdown of authority resulting from civil conflict and/or foreign aggression." [1]

Communicable disease: "A communicable disease is one that is spread from one person to another through a variety of ways that include: contact with blood and bodily fluids; breathing in an airborne virus; or by being bitten by an insect." [2]

Acute Respiratory Infections (ARIs): "Acute respiratory infections (ARIs) are defined as those infections of the respiratory system, caused by viruses or bacteria, with an evolution of less than 15 days, and which manifest with symptoms such as cough, nasal congestion and obstruction, sore throat, dysphonia or respiratory distress, accompanied or not by fever." [3]
Outbreak: "An outbreak is when an illness happens in unexpected high numbers. It may stay in one area or extend more widely. An outbreak can last days or years. Sometimes, experts consider a single case of a contagious disease to be an outbreak. This may be true if it's an unknown disease, if it's new to a community, or if it's been absent from a population for a long time." [4]

Epidemic: "An epidemic is when an infectious disease spreads quickly to more people than experts would expect. It usually affects a larger area than an outbreak." [4]

Pandemic: "A pandemic is a disease outbreak that spreads across countries or continents. It affects more people and takes more lives than an epidemic. The World Health Organization (WHO) declared COVID-19 to be a pandemic when it became clear that the illness was severe and that it was spreading quickly over a wide area." [4]

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[1] https://interagencystandingcommittee.org/system/files/legacy_files/WG16_4.pdf, Accessed on the 10^{th} May 2021

[2] https://acphd.org/communicable-disease, Accessed on the 10^{th} May 2022

[3] https://fifarma.org/en/acute-respiratory-infections-ari-among-the-leading-causes-of-death-in-the-world, Accessed on the 21^{th} August 2022

[4] https://www.webmd.com/cold-and-flu/what-are-epidemics-pandemics-outbreaks, Accessed on the 10^{th} May 2022

A.3 GRAPHICS

The data to use for the graphics below is reached from the website of TURCOVID19[12].

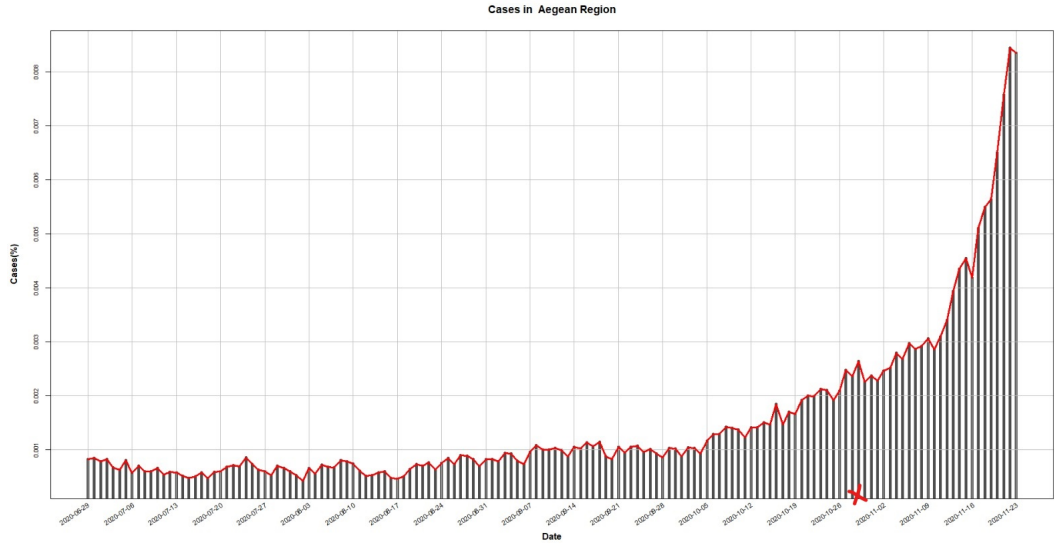

Figure A.1: Cases in Aegean Region [12]

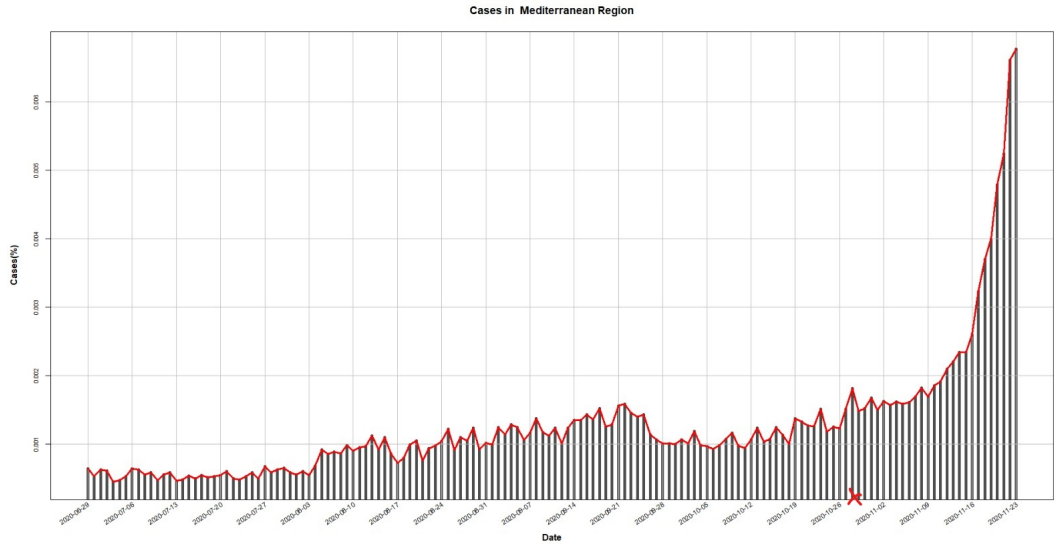

Figure A.2: Cases in Mediterranean Region [12]

A.4 CHI-SQUARE ASSOCIATION RESULTS

Chi-square results are given in Section 5.2 and here the relation between the demographic part data can be viewed in detail.

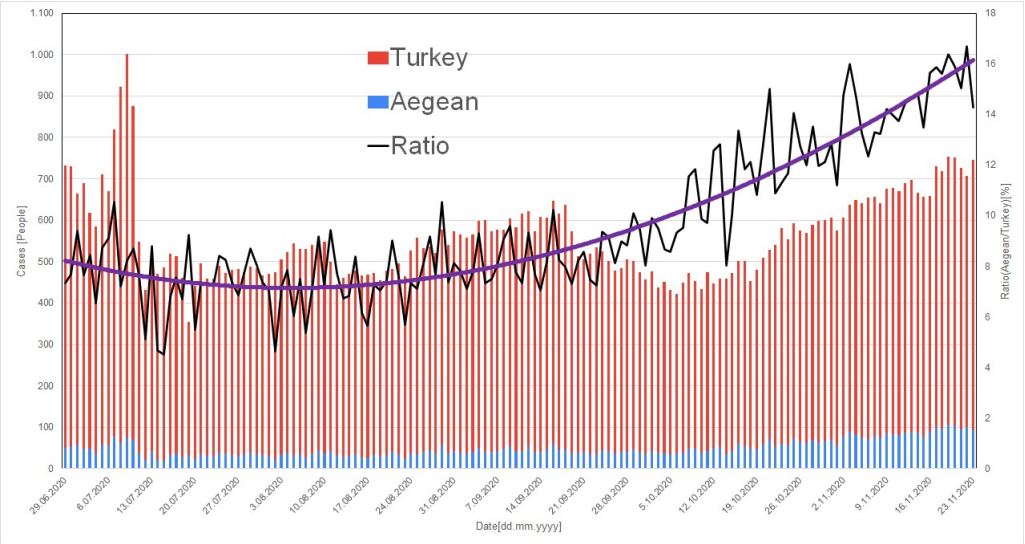

Figure A.3: Cases in Aegean vs Turkey [12]

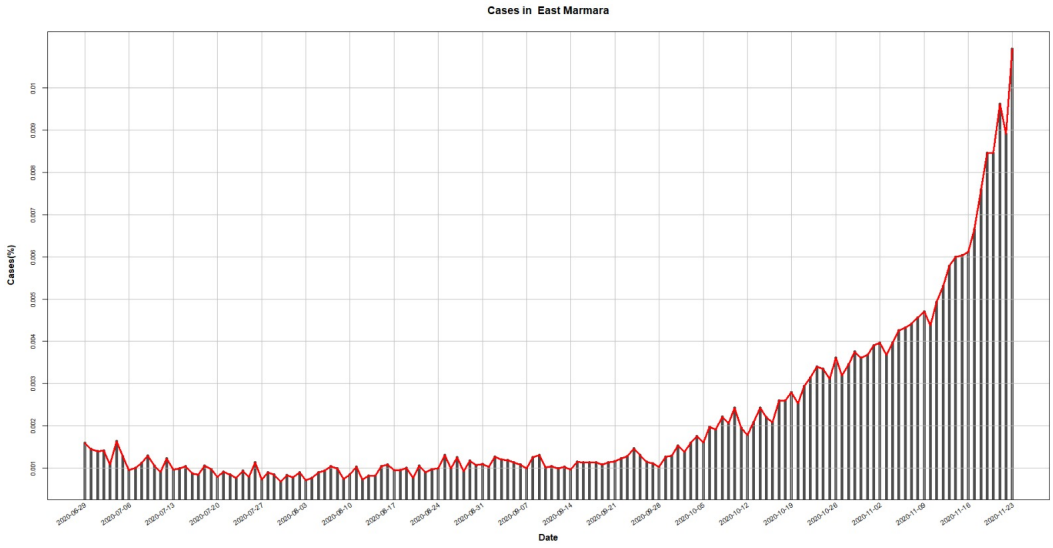

Figure A.4: Cases in East Marmara Region [12]

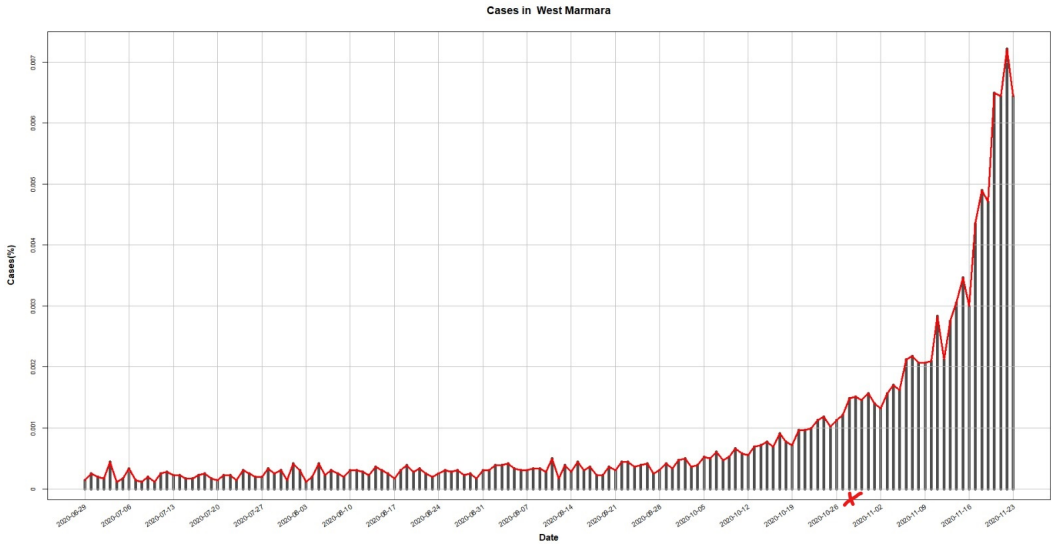

Figure A.5: Cases in West Marmara Region [12]

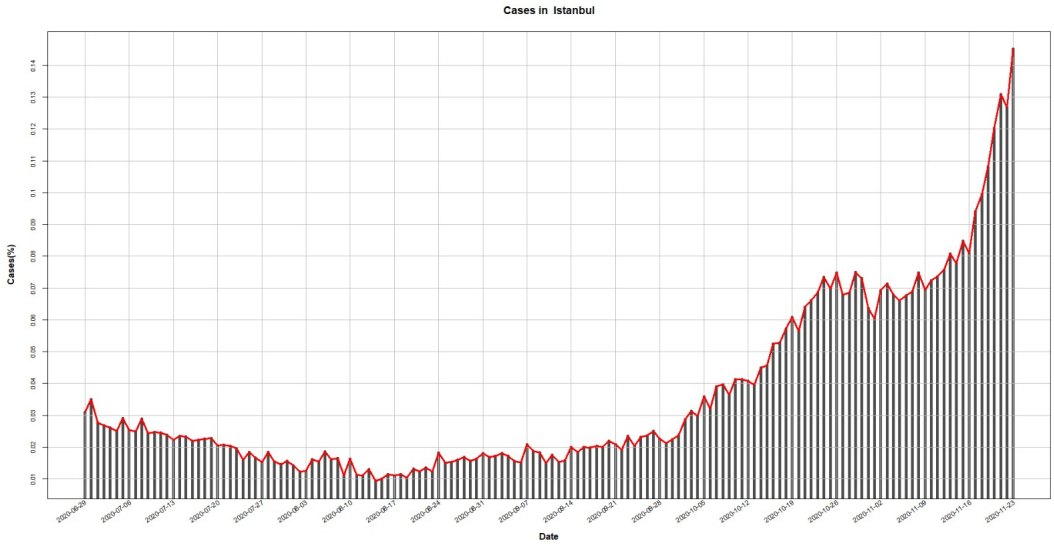

Figure A.6: Cases in Istanbul [12]

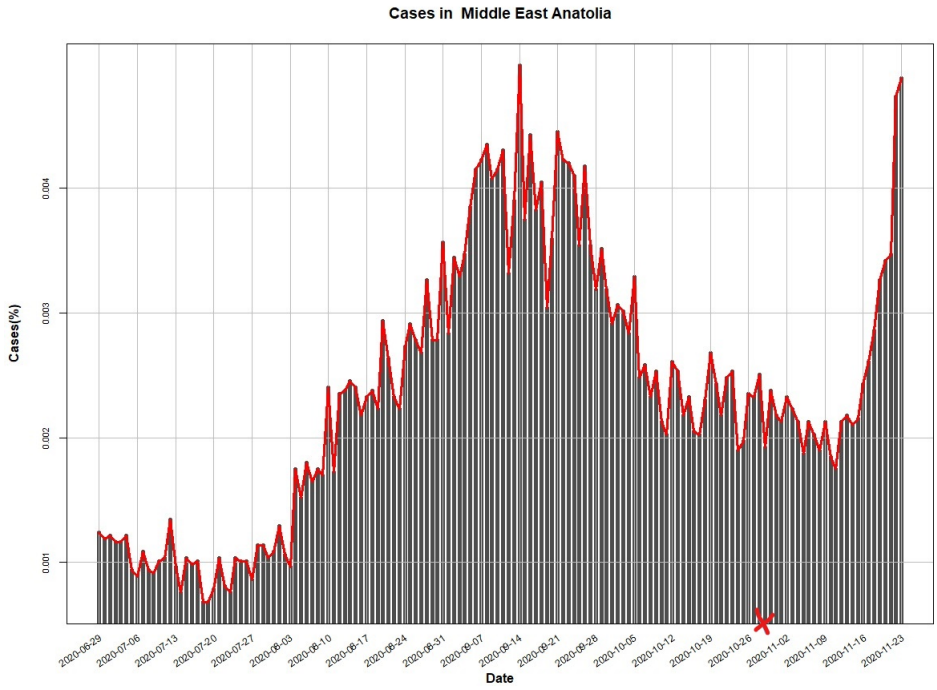

Figure A.7: Cases in Middle East Anatolia [12]

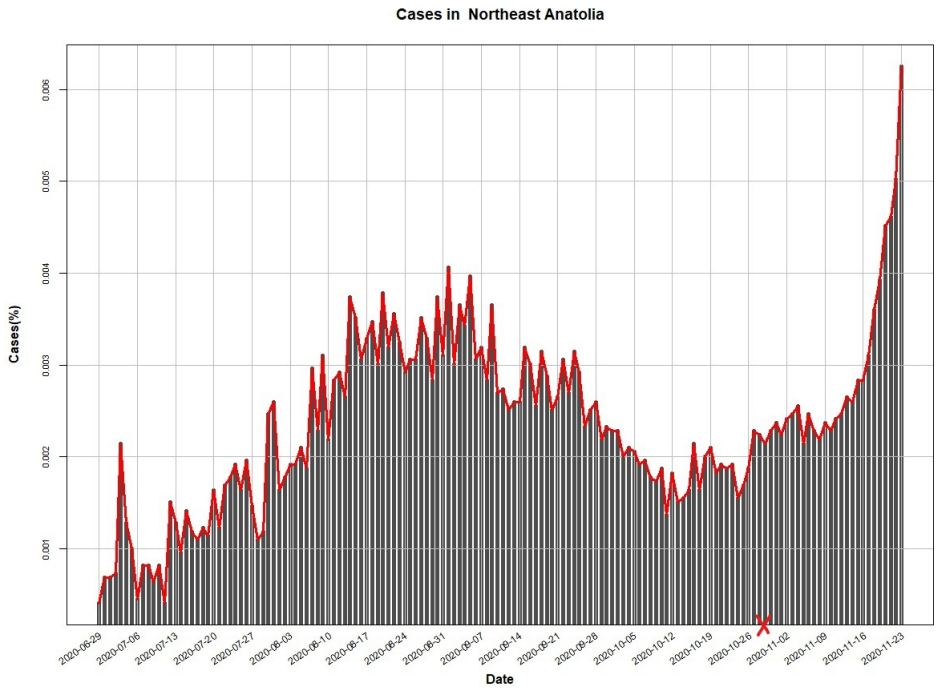

Figure A.8: Cases in Northeast Anatolia [12]

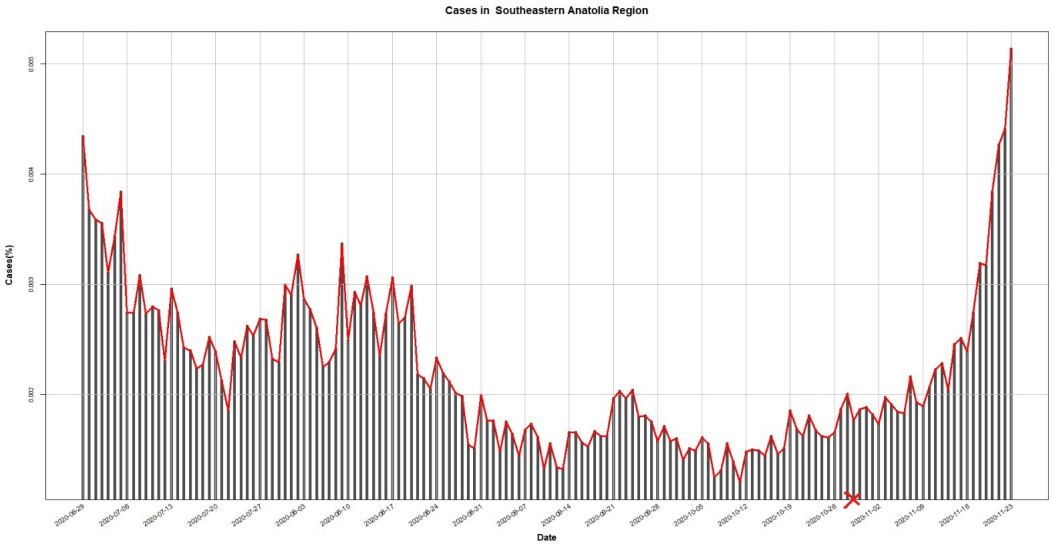

Figure A.9: Cases in Southeastern Anatolia Region [12]

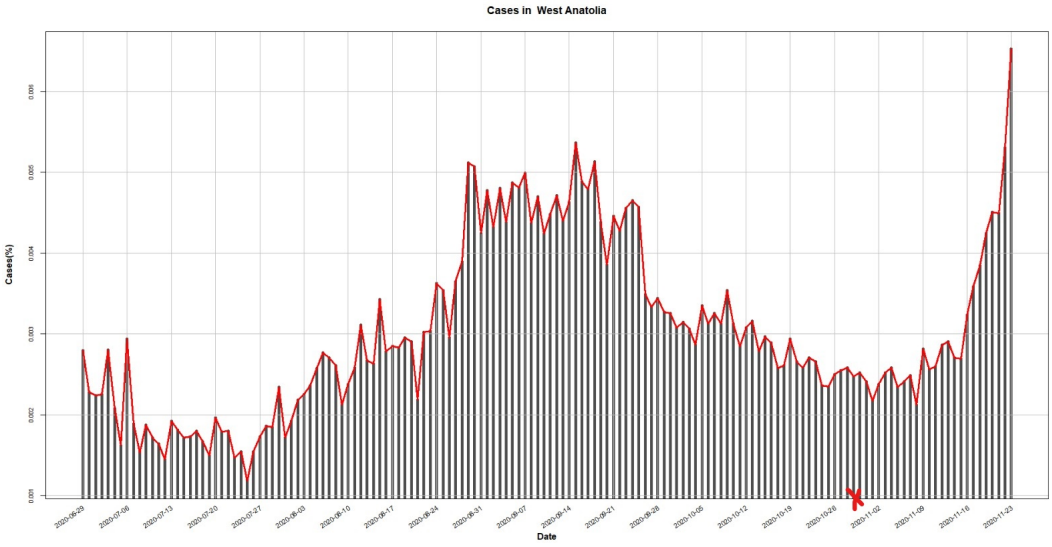

Figure A.10: Cases in West Anatolia Region [12]

Please select your gender: * Please select your age range:

Please select your gender: * Please select your age range: - Crosstab - September 8, 2022

Crosstab

			Please select your age range:				Total
			18-34	35-44	45-54	55+	
Please select your gender:	Male	Count	51	49	29	49	178
		% within Please select your gender:	28.7%	27.5%	16.3%	27.5%	100.0%
		% within Please select your age range:	35.2%	34.5%	24.2%	42.6%	34.1%
		% of Total	9.8%	9.4%	5.6%	9.4%	34.1%
	Female	Count	93	93	90	66	342
		% within Please select your gender:	27.2%	27.2%	26.3%	19.3%	100.0%
		% within Please select your age range:	64.1%	65.5%	75.0%	57.4%	65.5%
		% of Total	17.8%	17.8%	17.2%	12.6%	65.5%
	I do not want to specify	Count	1	0	1	0	2
		% within Please select your gender:	50.0%	0.0%	50.0%	0.0%	100.0%
		% within Please select your age range:	0.7%	0.0%	0.8%	0.0%	0.4%
		% of Total	0.2%	0.0%	0.2%	0.0%	0.4%
Total		Count	145	142	120	115	522
		% within Please select your gender:	27.8%	27.2%	23.0%	22.0%	100.0%
		% within Please select your age range:	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	27.8%	27.2%	23.0%	22.0%	100.0%

Figure A.11: Gender-Age Range Relation

Please select your gender: * Please select your highest level of education:

Please select your gender: * Please select your highest level of education: - Crosstab - September 8, 2022

Crosstab

			Please select your highest level of education:					Total
			Primary school	Graduate Degree	University	High school	Secondary school	
Please select your gender:	Male	Count	0	24	123	28	3	178
		% within Please select your gender:	0.0%	13.5%	69.1%	15.7%	1.7%	100.0%
		% within Please select your highest level of education:	0.0%	32.4%	37.7%	27.7%	30.0%	34.1%
		% of Total	0.0%	4.6%	23.6%	5.4%	0.6%	34.1%
	Female	Count	11	50	203	71	7	342
		% within Please select your gender:	3.2%	14.6%	59.4%	20.8%	2.0%	100.0%
		% within Please select your highest level of education:	100.0%	67.6%	62.3%	70.3%	70.0%	65.5%
		% of Total	2.1%	9.6%	38.9%	13.6%	1.3%	65.5%
	I do not want to specify	Count	0	0	0	2	0	2
		% within Please select your gender:	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
		% within Please select your highest level of education:	0.0%	0.0%	0.0%	2.0%	0.0%	0.4%
		% of Total	0.0%	0.0%	0.0%	0.4%	0.0%	0.4%
Total		Count	11	74	326	101	10	522
		% within Please select your gender:	2.1%	14.2%	62.5%	19.3%	1.9%	100.0%
		% within Please select your highest level of education:	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	2.1%	14.2%	62.5%	19.3%	1.9%	100.0%

Figure A.12: Gender-Education Level Relation