

RESEARCH ARTICLE

Traces and Effects of Biological Disasters in the World and in Turkey up to Covid-19

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Received: 08 February 2022, Accepted: 24 February 2022, Published online: 30 April 2022

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Abstract**Objective:** The purpose of this research is to evaluate the traces and effects of biological disasters in the world and in Turkey until the Covid-19 pandemic.**Methods:** This study is a descriptive study aiming to reveal the history of biological disasters and contribute to the history of medicine. The data of the study were obtained from the literature review, the data of the World Health Organization and the statistical annuals of the Ministry of Health of the Republic of Turkey. Statistical evaluations were made in the computer environment. The number of infectious disease cases and deaths were obtained by scanning all sources in the literature and were corrected by confirming from official records. Obtained infectious disease data are presented by tabulating in groups.**Results:** Biological disasters have deeply affected societies in terms of health, economic, environmental and psycho-social aspects since the earliest times of history. Epidemics have emerged as a result of unhealthy environments caused by people's lifestyles, deterioration of ecological balance, famines, natural disasters or many other reasons and have left important traces in the history of humanity by causing mass deaths. Major pandemics such as Severe Acute Respiratory Syndrome (SARS), bird flu, swine flu and Covid-19 have caused loss of lives and enormous economic damage. Epidemics are one of the types of disasters that affect the world and cause great destruction, mass deaths and population movements. It is possible to examine the epidemics in history under four headings. These are: Smallpox, Plague, Influenza and Cholera epidemics. Smallpox, which caused the most deaths throughout history, thankfully, has been eradicated from the world. Plague, which is the second biggest cause of death, has also been eliminated with treatment opportunities and preventive health services. However, influenza epidemics, which cause the third highest number of deaths, continue to have an intense effect today and seem to continue to cause the greatest biological disasters in the future. When the data of the Ministry of Health was analyzed, 3 epidemics that caused the most cases between 1956-2019 and still continue were tuberculosis, malaria and measles. However, the number of deaths from these ongoing epidemics is unknown.**Conclusion:** It is an undeniable fact that epidemics in history can be experienced again in the globalizing world. For this reason, it is a very important fact for disaster management to know the history and details of epidemics, to learn the necessary lessons, and to prepare pandemic plans and solutions accordingly.**Key Words:** Biological Disasters, Epidemic, Pandemic, Covid-19, History of Medicine**Covid-19'a Kadar Dünyada ve Türkiye'de Biyolojik Afetlerin İzleri ve Etkileri****Özet****Amaç:** Bu araştırmanın amacı, Covid-19 pandemisine kadar olan biyolojik afetlerin dünyadaki ve Türkiye'deki izleri ve etkilerini değerlendirmektir.**Yöntemler:** Bu çalışma biyolojik afetlerin tarihini ortaya koymayı ve tıp tarihine katkı sağlamayı amaçlayan betimsel bir çalışmadır. Çalışmanın verileri literatür taramasından, Dünya Sağlık Örgütü verilerinden ve Türkiye Cumhuriyeti Sağlık Bakanlığı istatistik yıllıklarından elde edilmiştir. İstatistiksel değerlendirmeler bilgisayar ortamında yapılmıştır. Bulaşıcı hastalık vaka ve ölüm sayıları literatürdeki tüm kaynaklar taranarak elde edilmiş ve resmi kayıtlardan teyit edilerek düzeltilmiştir. Elde edilen bulaşıcı hastalık verileri gruplar halinde tablolaştırılarak sunulmuştur.**Bulgular:** Biyolojik afetler, tarihin en eski devirlerinden itibaren toplumları sağlık, ekonomik, çevresel ve psiko-sosyal yönden derinden etkilemiştir. İnsanların hayat tarzlarının sebep olduğu sağlıksız ortamlar, ekolojik dengenin bozulması, kıtlıklar, doğal afetler veya daha birçok sebep sonucunda salgınlar ortaya çıkmış ve kitlesel ölümlere yol açarak insanlık tarihinde önemli izler bırakmıştır. Şiddetli Akut Solunum Yolu Sendromu (SARS), kuş gribi, domuz gribi ve Covid-19 gibi önemli pandemiler, can kayıplarına ve devasa ekonomik hasara yol açmıştır. Dünyayı etkisi altına alan, büyük yıkımlara, toplu ölümlere ve nüfus hareketlerine neden olan afet türlerinden birisi de salgınlardır. Tarihteki salgınları dört başlıkta incelemek mümkündür. Bunlar; Çiçek, Veba, Grip ve Kolera salgınlardır. Tarih boyunca en fazla ölüme yol açan Çiçek hastalığı çok şükür ki; dünya üzerinden eradike edilmiştir. İkinci en büyük ölüm nedeni olan Veba da tedavi imkânları ve koruyucu sağlık hizmetleriyle ortadan kaldırılmıştır. Ancak üçüncü en fazla ölüme neden olan grip salgınları ise günümüzde etkisini yoğun bir şekilde sürdürmekte olup gelecekte de en büyük biyolojik afetlere neden olmaya devam edecek gibi gözükmektedir. Sağlık Bakanlığı verileri analiz edildiğinde 1956-2019 yılları arasında en çok vakaya neden olan ve halen devam eden 3 salgın hastalığın; tüberküloz, sıtma ve kızamık olduğu görülmektedir. Ancak halen devam eden bu salgınlara ait ölüm sayıları bilinmemektedir.**Sonuç:** Tarihteki salgınların, küreselleşen dünyada tekrardan yaşanabileceği yadsınamaz bir gerçektir. Bu nedenle, salgınların tarihçesinin ve ayrıntılarının bilinmesi ve gerekli derslerin çıkarılması ve pandemi planlarının ve çözümlerin buna göre hazırlanması afet yönetimi açısından oldukça önemlidir.**Anahtar Kelimeler:** Biyolojik Afetler, Salgın, Pandemi, Covid-19, Tıp Tarihi**Suggested Citation: Sahinoz T, Sahinoz S, Arslan U. Traces and Effects of Biological Disasters in the World and in Turkey up to Covid-19. ODU Med J, 2022; 9(1):1-12**Copyright@Author(s) - Available online at <https://dergipark.org.tr/tr/pub/odutip>

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Introduction

When the course of epidemic diseases in the history of the world is followed; the negative effects of epidemics such as plague, cholera, typhus, smallpox, SARS, MERS, bird flu, swine flu, Ebola, Zika and Covid-19 on society will be seen (1).

During the First World War; especially the Spanish flu; many epidemics such as typhus, which started in Russia and spread to Western Europe, cholera, smallpox, dysentery and typhoid, which started in the Ottoman Empire, were seen (1).

Cholera, yellow fever and epidemic meningococcal diseases returned in the last quarter of the 20th century. Major international epidemics such as Severe Acute Respiratory Syndrome (SARS), bird flu, swine flu and Covid-19 have caused loss of lives and enormous economic damage. Viral epidemics such as MERS, Ebola, Marburg hemorrhagic fever and Nipah virus have also threatened global public health security (2, 3).

Due to the disruption of efforts to combat vector-borne diseases, many infectious diseases such as malaria, dengue and dengue hemorrhagic fever have started to make epidemics since the 1960s. This situation caused an unprecedented pandemic in 1998. In epidemics caused by malaria, dengue and dengue hemorrhagic fever, 1.2 million cases were reported to WHO from 56 countries, and this biological disaster adversely affected millions of people (1).

It is known that the Ebola epidemic is still a public health emergency of international importance (4). Ebola, which emerged in Guinea in December 2013 and caused an epidemic in West Africa between 2013 and 2016, caused 28,616 cases and more than 11,300 deaths. The Ebola epidemic ended in June 2016. This outbreak has been recorded as the deadliest Ebola outbreak in history (5).

The international spread of the influenza pandemic, which alarmed the world immediately after the SARS epidemic, could not be prevented (1).

Neglected tropical diseases have infected more than one billion people, mostly in developing countries. Due to urbanization, air travel, population growth and climate change, epidemics are also seen in developed countries from time to time (6).

Some infectious diseases that have prevailed for thousands of years and new and re-emerging infectious diseases still continue to pose a great threat at the global level. It is an undeniable fact that epidemics in history can be experienced again in the globalizing world.

This study was carried out in order to know the history and details of the epidemics, to learn the necessary lessons, and to contribute to the pandemic plans and pandemic management scientifically.

Methods

This study is a descriptive study aiming to reveal the history of biological disasters and contribute to the history of medicine. The data of the study were obtained from the literature review, the data of the World Health Organization and the statistical annuals of the Ministry of Health of the Republic of Turkey.

Statistical evaluations were made in the computer environment. The number of infectious disease cases

and deaths were obtained by scanning all sources in the literature and were corrected by confirming from official records. Obtained infectious disease data are presented by tabulating in groups.

Results

In this study, it has been tried to draw a vision about biological disasters by evaluating the infectious diseases that have caused or may cause disasters around the world.

As can be seen in Table 2, the epidemic disease that caused the most deaths and caused a major biological disaster throughout history is Smallpox. Thankfully; it has been eradicated from the world. Plague, which is the second biggest cause of death, has also been eliminated with treatment opportunities and preventive health services. However, influenza epidemics, which cause the third most deaths, continue today and seem to continue to be the biggest biological disaster in the future.

Table 2. Ranking of Some Historical Major Pandemics Caused by Biological Disasters by Estimated Number of Deaths

Pandemic	Estimated Number of Deaths (Million)
Smallpox Epidemics	300-500
Plague Epidemics	230
Influenza Epidemics	60
HIV/AIDS Epidemic	39
Cholera Epidemics	6
Typhus Epidemics	6
Yellow Fever	0.10-0.15

Table 3. Annual Cases and Deaths of Ongoing Pandemics as Today's Biological Disasters (2019)

Pandemic	Number of Cases	Annual Number of Deaths
Tuberculosis	10 million	1 4 000 000
Hepatitis B	2 billion	1 000 000
HIV/AIDS	37.7 million	680 000
Typhoid	16 million	600 000
Dysentery	?	600 000
Malaria	229 million	409 000
Whooping Cough	50 million	300 000
Cholera	3-5 million	100 000
Hepatitis C	180 million	?

Table 1. Major Pandemics in History (sorted by number of deaths)

Date	Epidemic Name	Estimated Number of Deaths (Million)
1519-1980	Smallpox Epidemics	300-500
1346-1353	Black Plague	75-125
541-542	Plague of Justinian	25-100
1981-	HIV/AIDS Epidemic	39
1918-1919	Spanish Flu	17-50
1894-1903	Hong Kong Plague	13.5
1855-1959	Chinese Plague	12
1817-2020	Cholera Epidemics 1-7	6
1489-1922	Typhus Epidemics	6
165-180	Antonine Plague	5
2019-	Covid-19	6
1957-1968	Asian Flu	4
1772-1773	Plague of Iraq	2
250-270	Plague of Cyprus	1
735-737	Japanese Smallpox	1
1889-1890	Russian Flu	1
1968-1979	Hong Kong Flu	1
1629-1631	Italian Plague	0.48
2009-2010	Swine Flu	0.29
1770-1772	Russian Plague	0.20
1890-1899	Yellow Fever	0.10-0.15
430 BC	Plague of Athens	0.10
627	Iranian Plague	0.10
1665-1666	Plague of London	0.10
1720-1723	Plague of Marseille	0.10

Date	Epidemic Name	Number of Deaths
2014-2016	Ebola Epidemic	11 325
2012-2014	MERS	858
2002-2003	SARS	916

Table 4. Total Number of Cases of Ongoing Biological Disasters in Turkey (T.R. Ministry of Health; 1956-2019)

Disease Name	Number of Cases
Tuberculosis	1 642 602
Malaria	1 206 233
Measles	1 100 950
Brucellosis	281 530
Hepatitis B	99 647
Anthrax	31 382
AIDS	1 819

When the statistical annuals of the Ministry of Health were examined; tuberculosis, malaria and measles were the most common infectious diseases between 1956 and 2019. However, there is no data on the number of deaths from these diseases.

Discussion

It is possible to examine the biological epidemics in history under four headings; Plague epidemics, Cholera epidemics, Smallpox epidemics and Flu epidemics.

a) Plague Epidemics

Plague, known as the "Black Death", is one of the greatest biological disasters that has killed millions of people over the centuries. However, it should not be forgotten that all epidemic diseases were called "Plague" until the 17th century (1). Plague epidemics can be listed in chronological order as follows:

Hittite Plague (14th century BC): The first plague epidemic in history, was an epidemic that was reported, have lasted for 20 years during the Hittite Civilization in the 14th century BC. It is understood from the tablets of the period that this epidemic deeply affected the society. The Hittite King (1st Suppililuma) fell ill with the plague upon his return from the Babylonian expedition and died. The epidemic spread all over the country and the Hittite Kingdom was severely decimated due to the plague epidemic. However, there is no definite information about the number of cases and deaths (7).

Plague of Athens (430 BC): During the Peloponnesian War, this epidemic, which started in a narrow area between Athens and Sparta in its second year and continued for five years, caused approximately 100 000 deaths (World population estimated 150 million) (1).

Antonine Plague (165-180): This plague epidemic took place within the borders of the Roman Empire. It got this name because it caused the death of Roman Emperor Antoninus. The disease agent was brought by the soldiers returning from the East expeditions. During the epidemic, approximately 2 thousand people died per

day, and as a result of the epidemic, 30% of the empire population (approximately 5 million people), including the two Roman Emperors (L. Verus and MA Antoninus), died in this epidemic (1).

Plague of Cyprus (250-270): This epidemic, named after Bishop Cyprian, lasted 20 years. It caused the death of about 5,000 people a day and a million people in total. Rome, Greece and Syria were also affected by this epidemic, which started in Ethiopia (Abyssinia). As a result of the epidemic, the Roman Empire weakened and became open to attacks. The fact that the rural population took shelter in cities for security reasons and many farmers lost their lives due to the epidemic caused the collapse of agricultural production. In addition, the drought, floods and famines accompanying the epidemic brought the population of the country to the point of extinction. The world population is estimated to be around 200 million in these years (1).

Plague of Justinian (541-542): This epidemic occurred within the borders of the Byzantine Empire and especially the capital Constantinople (today's Istanbul borders) was affected. The name of the epidemic comes from Emperor Justinian I, who was sick and recovered. The entrances to the city were closed in order to protect from the epidemic, but the rats coming through the military supplies carried the plague agent to the city. The epidemic spread to the whole city within a week and deaths began. Due to thousands of deaths in a short time, the burial places were filled up and many corpses were thrown into the sea. About 40% of the people in the city died as a result of the epidemic. The Byzantine Empire was almost destroyed due to the loss of labor and soldiers in the epidemic. The strength of the Byzantine army was reduced, and its defense capacity decreased. Cities and the country have become

vulnerable. This situation has been instrumental in the developments that changed history. This epidemic also affected the Sassanid Empire and Mediterranean port cities. It is thought that the epidemic started from China and moved to Istanbul and other port cities due to rats and fleas coming by ships (8).

This epidemic, which also included the birth years of Islam, continued for about two centuries. It is thought that the epidemic spread to various regions during this time and caused a total of 25-100 million deaths. Due to the fact that the records were not kept regularly in those years and the epidemic spread over a wide area for two centuries, the death records could not be reached fully (9).

Persian Plague (627): The Battle of Nineveh (627 year) resulted by the victory of Byzantium and a great plague epidemic broke out while the defeated Sassanids were dealing with internal conflicts. Due to this epidemic, more than a hundred thousand deaths occurred in the capital of the Sassanids (Ctesiphon), and the ruler (Kawad II) also lost his life due to the plague (10).

Black Plague (1346-1353): This Plague Epidemic, which is considered to be the biggest epidemic in Europe, is thought to have originated from China and moved to Europe via the Silk Road or by ships. This epidemic is the largest biological disaster in history, killing 75-125 million people (world population was estimated as 350 million). This epidemic was one of the main reasons that started the Renaissance movement, destroying 30-60% of the European population (5).

The plague epidemic, which started in China in 1331 and killed 90% of the population of Hebei province and more than 5 million people throughout China, infected the Genoese city of Kefe through trade routes and

Mongol armies (1346). The Mongolian armies, besieging the city of Kefe, threw the plague-infected corpses into the city with catapults to break the resistance. The Genoese, who wanted to get rid of the plague epidemic that started in the city, fled to Europe and carried the epidemic there. The epidemic later reached Moscow in December 1350 (11).

It is estimated that there was a plague epidemic in Istanbul between 1468-1475 and in 1501, and $\frac{1}{4}$ of the population (25 thousand people) died (12).

b) Cholera Epidemics

Cholera has always remained an important biological disaster risk for the entire world. The mixing of human feces and wastes into drinking and utility waters causes a great disaster in terms of biological disasters. Cholera epidemics usually originate in India and spread to other countries from there (13).

There have been seven major cholera epidemics throughout history. However, the deadliest of these is the third, which occurred between 1852 and 1860.

First Cholera Epidemic (1817-1824): Thailand, Indonesia, Japan, China, Afghanistan, Nepal, the Middle East, Arabia, Mediterranean coasts and Africa were affected by this epidemic, which started in India (Calcutta city). The epidemic was later transported to Europe and America via ships (13).

Second Cholera Epidemic (1829-1837): China, Russia, Finland, Poland, Hungary, England and Germany were affected by the second Cholera epidemic, which also started in India. The epidemic then spread to Mexico and Cuba and spread to the Americas. Hungary and Germany gave 100 thousand victims, France 100 thousand, Egypt 130 thousand and England 55 thousand victims to this epidemic. There were also many Native American deaths in the Americas. During

the pilgrimage season of 1831, the epidemic spread to the Hejaz through pilgrims from India, and then to Istanbul, again through pilgrims. About half of those who went on pilgrimage that year, and 5-6 thousand people in Istanbul lost their lives due to the epidemic (13).

Third Cholera Epidemic (1852-1860): This epidemic, which is the most deadly among the cholera epidemics, came out of India as usual and spread to Asia, Europe, America and Africa continents, respectively. The epidemic caused severe damage especially in Russia (13).

It was only in this epidemic that it was understood that the main cause of the cholera epidemic was the microbiological contamination of drinking and utility water. During this epidemic (in 1854), a researcher named J. Snow mapped the homes of the sick and the deceased in London and determined that the cases were gathered around a water pump. It is also recorded that the water of the well smells badly and the sewage system passes near the well. Thinking that the epidemic might be related to this water source, Snow had the handle of the water pump removed in order to prevent the use of water. Following the disposal of the water source, there was a rapid decline in the number of cases and deaths. Snow's work has been a historical turning point in terms of showing that the cholera epidemic is related to polluted waters. With the discovery of the cause of the cholera epidemic, the knowledge that drinking water should be purified and boiled became widespread all over the world. Sanitation still remains a problem for developing countries today (1).

There were five major cholera epidemics in the 19th century, and approximately one million people in Russia, 236 000 in Spain, 200 000 in Japan, 150 000 in

North America, and more than 100 000 in Mexico died from cholera (13).

Fourth Cholera Epidemic (1863-1875): The epidemic originating from India (Ganges Delta) was carried to Mecca by the Muslims who went on pilgrimage, and 30 thousand of the 90 thousand people who went on the pilgrimage that year lost their lives due to Cholera. The epidemic later spread to all over the world, again through pilgrims (13).

Fifth Cholera Epidemic (1881-1896): Asia, Africa, South America, France and Germany were affected by this epidemic originating from India (Bengali region) and 981,899 people died. Robert Koch revealed for the first time (1883) that the causative agent of cholera was *Vibrio cholerae* in this epidemic (13).

Sixth Cholera Epidemic (1899-1923): Again, this epidemic originating from India affected the Middle East, North Africa, Eastern Europe and Russia and killed approximately 1.5 million people. This epidemic emerged in the Ottoman Empire during the Balkan War (1912-1913) and caused quite a lot of deaths (approximately 48 thousand cases and 22 thousand deaths) (14).

Seventh Cholera Outbreak (1961-): It started in South Asia (Indonesia) in 1961, spread to Africa in 1971 and the Americas in 1991. This Cholera epidemic, which is thought to be caused by aquatic products contaminated by the bilge waters of ships off the coast of Peru, caused approximately 400,000 cases and more than 4000 deaths in a year in 16 countries in Africa, Asia and Europe (13).

c) Smallpox Epidemics

The Smallpox epidemic first began in Japan in 735 and killed a third of the Japanese. The epidemic spread to neighboring countries within two years, causing the

death of approximately one million people, mostly children. Smallpox is thought to have spread from Asia to Europe, Africa, and finally the Americas (during the 16th century Spanish invasion) (15).

Europeans who immigrated from their countries between 1520 and 1902, knowingly or unknowingly transmitted this disease to the local people who were not immune to these diseases, causing the death of 90-95% of the 60 million indigenous population (15).

4. *Influenza Epidemics*

Influenza is a contagious disease that affects 20-50% of the population each year. The best way to prevent the flu is to get vaccinated with the flu vaccine. However, it is useful to remember that no vaccine can provide full protection. Influenza viruses are constantly changing. This change is the main cause of flu epidemics that occur every year. Therefore, every year, it is necessary to develop a new vaccine against changing viruses.

Russian Flu Pandemic (1889-1890): It started in Russia and spread all over the world in a few months; caused the death of more than one million people. The people who died in this epidemic were usually the elderly and sick people (16).

Spanish Flu Pandemic (1918-1920): This epidemic, caused by the H1N1 influenza virus, broke out in 1918 in Kansas City, USA, during the First World War. About one third of the world population (approximately 500 million cases) caught this disease. The epidemic caused more deaths (17-50 million) than the war (8 million) (5% of the world's population). The risk of illness and death was highest in the 20-40 age group. The Spanish flu also infected the top executives of the countries. The American President (W. Wilson), the British Prime Minister (L. George), the French Prime Minister (G. Clemenceau) and the German Chancellor

(M. Von Baden) were among those caught this flu (17). The epidemic caused the death of approximately 675 thousand (43,000 soldiers) in the USA and at least 50 million people worldwide (1).

It is estimated that the epidemic caused 90 thousand deaths in the territory of the Ottoman Empire. It is known that the capital Istanbul was affected more by the epidemic and 6403 people died due to this epidemic (18).

The Spanish Flu epidemic was recorded as one of the greatest biological disasters in history. The virus that caused the Spanish Flu, like the Covid-19 virus, caused respiratory tract infections, and patients were dying of pneumonia. The disease was transmitted from animals (geese, pigs) to humans. The epidemiology of these two epidemics is extremely similar. The measures that could be taken in the Spanish Flu epidemic were the same as today's (mask, distance, hygiene) and it was recommended that patients stay at home (isolation) (1).

As an interesting information, the Spanish Flu didn't actually start in Spain. It originated in the USA, but Spain was the first to announce it and make it public. This epidemic, which broke out in the USA, spread to Europe and the whole world in a short time through the soldiers. Due to the war, many countries concealed that the society and soldiers died from the disease and denied the existence of the epidemic. However, since Spain, which did not participate in the First World War, was the only country that published the flu news first and uncensored and announced the epidemic to the world, the name of this pandemic is known as the Spanish Flu (18).

Another interesting feature of the Spanish Flu is that it was more likely to infect and kill healthy people rather than the elderly and sick (19). This pandemic still

remains a mystery due to its characteristics such as the fact that it started in summer, the spread is very rapid, and the lethality rate is different according to societies.

Asian Flu Pandemic (1957-1968): This epidemic, which started in Singapore in February 1957 and was caused by the Influenza-A H2N2 virus, affected China, Hong Kong, England and the USA. It caused 1 million deaths in China, 116,000 in the USA and 70,000 in the UK. The Asian flu lasted ten years and caused close to 4 million deaths. The epidemic was prevented with a vaccine. 40 million people were vaccinated in one year. Asian Flu has been one of the most important examples showing the importance and impact of mass vaccination (1).

Hong Kong Flu (1968-1969): The causative agent is the H3N2 strain of the Influenza A virus, which has killed more than one million people. It was more fatal in infants and the elderly. The epidemic originated in Hong Kong and quickly spread to Vietnam and Singapore. American soldiers returning from the Vietnam War brought the virus to the United States (fall of 1968). Epidemic spread all over the World and it caused approximately 33 800 deaths in the USA and approximately 1 million deaths worldwide (1).

Severe Acute Respiratory Syndrome (SARS) Outbreak (2002-2003)

It is a severe acute respiratory syndrome that took effect in Asia and Canada between 2002-2003. Severe acute respiratory syndrome is a respiratory disease caused by the Corona virus (SARS- CoV). It has been determined that SARSCoV was transmitted from civet cats to humans. The SARS epidemic, the first case of which was seen in Hong Kong, caused 8 422 cases and 916 deaths worldwide. The World Health Organization

declared the death rate to be 10.9%. The SARS epidemic has spread to 37 countries (20).

Avian Influenza Outbreak (1997-2007): Human cases and deaths from H5N1 avian influenza were first reported in 1997 in the Hong Kong Special Administrative Region. By 6 June 2007, 310 cases and 189 deaths were reported to WHO. Although very few in number, this situation has become a symbol of an epidemic disease that poses a great threat to life, economies and security. These bird flu cases in humans have been accompanied by cases in poultry. In many countries, tens of millions of birds have been destroyed as part of a control strategy. In much of Asia, this virus has been tightly controlled. This pandemic has given a signal of what is to follow, giving the world the advantage of unprecedented early warning that a pandemic may be imminent. Although the H5N1 virus was first isolated in humans in 1997, it was first identified in children who had definitively died of severe respiratory disease caused by H5N1 infection in a pediatric hospital in Vietnam between 2003 and 2004 (21).

The virus has spread far from its original point of origin in Southeast Asia and has reached as far as Africa, Central Asia, Europe and the Eastern Mediterranean Region. Rapid containment of the virus has become more desperate as wild birds join the transmission cycle. The epidemic, which became a pandemic, in 2007 spread to 12 countries in Asia, Europe, the Middle East and Africa, reporting human cases and deaths (14) from H5N1 infections. Most cases were in Egypt (20 cases, 4 deaths) and Indonesia (6 cases, 5 deaths). Poultry epidemics and sporadic cases in humans continued (22).

While the death rate in the Spanish flu pandemic (1918-1919 influenza pandemic) was around 2.5%, in the avian flu epidemic (H5N1 infections), the death rate was more than 58%. Most cases are in healthy children and teenagers who have had contact with sick or dead chickens. The most severe cases died after suffering primary viral pneumonia (22).

Countries with limited resources are exhausted by the constant demands of fighting a virus so stubborn in birds and so treacherous and dangerous in humans.

H1N1 Swine Flu Epidemic (2009-2010): The epidemic caused by the H1N1 virus, a seasonal flu agent, started in Mexico in April 2009. The epidemic spread rapidly because it was transmitted through the respiratory tract. The virus was carried to the USA by university students and spread to other continents and 212 countries in a very short time, causing a pandemic. WHO declared a pandemic on 11 June 2009. There were approximately 284 500 deaths in this epidemic, mostly in Africa and Southeast Asia. WHO declared the end of the pandemic on 10 August 2010 (22).

MERS Epidemic (2012-2014): In April 2012, it was determined that this epidemic originating from Jordan was transmitted from dromedary camels to humans. In total, it has been seen in 27 countries (most seen in Saudi Arabia, the United Arab Emirates and the Republic of Korea) and has led to 858 deaths since 2012 (23).

Middle East Respiratory Syndrome Coronavirus (MERS- CoV) is a zoonotic virus transmitted from infected dromedary camels to humans. It can be transmitted through direct or indirect contact with infected animals. MERS- CoV has been detected in dromedary camels in many countries in the Middle East, Africa and South Asia. The origins of the virus are not fully understood, but according to analysis of different

virus genomes, it is believed that it may have originated in bats and then transmitted to camels at some point in the distant past (23).

Typical MERS symptoms are fever, cough, and shortness of breath. Pneumonia is common, but not always present. Approximately 35% of MERS-CoV reported patients with infection died (22).

Most cases of MERS-CoV infection in humans have been in the form of human-to-human transmission in healthcare settings. The precise role of dromedaries in transmission and the precise route of transmission are unknown (WHO, 2021e). The virus is not easily transmitted from person to person unless there is close contact with a patient (as when providing unprotected service) (23).

New Type Corona Virus Outbreak (COVID 19): The epidemic, which started in Wuhan, China in December 2019, spread very quickly all over the world. The disease agent was announced by the World Health Organization as a new virus from the corona family, and the first death occurred on January 10, 2020. The first case in Europe was seen in France on January 27, 2020. In Turkey, the first case was announced on March 10, 2020, one day before WHO declared a pandemic (March 11, 2020). The first death in Turkey occurred on 17 March 2020 (24).

WHO described the COVID-19 outbreak as an “international public health emergency” on January 30, 2020, and declared it as a global epidemic (pandemic) as of March 11, 2020, due to the presence of cases in 113 countries outside of China. The name of the disease was COVID-19, and the virus was named SARS- CoV -2 due to its similarity to SARS CoV (25).

Covid-19 has caused an unprecedented crisis in history. Despite all the measures taken, COVID-19,

which has become a pandemic due to the lack of information and the lack of a ready vaccine at the beginning, is the biggest health problem experienced by humanity in the last century. The COVID-19 pandemic has caused both a public health crisis and a humanitarian crisis, affecting the lives, health and livelihoods of many people around the world.

More than 400 million confirmed cases of COVID-19 and nearly 6 to WHO million deaths have been reported. Approximately 10 billion doses of vaccine have been administered worldwide, mostly in developed countries (as of 11.02.2021). More than three-quarters of reported cases and one-third (34%) of deaths occurred in the Americas and European Region. Almost half (48%) of all reported cases of COVID-19 occurred in the Americas (WHO, 2021f). However, China has gone down in history as a true success story in the fight against the pandemic. Despite being the starting point of the pandemic, China managed to keep the number of cases at 106 thousand and the number of deaths at 4 636 (as of 05.02.2021). More than 86% of the 23.1 million cases reported in the Southeast Asian Region originated in India. COVID-19 cases are predominantly concentrated in high-income countries. The 20 most affected developed countries (only one-eighth of the world's population, 12.4%) account for almost half (45%) of the world's total COVID-19 cases (26).

Conclusion

When the statistical annuals of the Ministry of Health were examined, the 3 most reported diseases between 1956 and 2019 were tuberculosis, malaria and measles.

The epidemic that caused the most deaths and a major biological disaster throughout history is Smallpox. With the studies carried out, this disease has

been eradicated from the world. Plague, which is the second biggest cause of death, has also been eliminated with treatment opportunities and preventive health services. However, influenza epidemics, which cause the third most deaths, continue today and seem to continue to be the biggest biological disasters in the future.

In line with these results, the following recommendations can be made:

1. An effective and comprehensive surveillance, early response and response infrastructure should be established, and these infrastructure systems should be based on global cooperation between governments, United Nations agencies, private sector organizations and organizations, professional associations, universities, media organs and civil society.
2. All infectious disease data should be included in the health statistical annuals, and other necessary information should be shared.
3. It is very necessary for surveillance to publish the number of infectious disease cases in that province on the web page of the Health Directorate of each province. WHO's recommendation is in this direction.
4. Infectious diseases should also be included in the health disaster and emergency plans implemented in our country.
5. It should not be forgotten that the risk of using infectious disease agents as biological weapons is high and may cause disasters.
6. Precautions against possible epidemics of infectious diseases (biological disasters) should be taken. When a biological disaster occurs, continuous plans should be made, and the plans should be updated according to the current conditions in order to survive with the least damage.

Ethics Committee Approval: not required

Peer-review: Externally peer-reviewed.

Author Contributions:

Concept: TS, SS, NH. Design: TS, SS, NH. Literature search: TS, SS, NH. Data Collection and Processing: TS, SS, NH. Analysis or Interpretation: TS, SS, NH. Written: TS, SS, NH.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study hasn't received no financial support.

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