

**Review****The Coronavirus Disease 2019 (COVID-19) Pandemic****Saira Baloch,¹ Mohsin Ali Baloch,² Tianli Zheng¹ and Xiaofang Pei¹**¹Department of Public Health Laboratory Sciences, West China School of Public Health (No.4 West China Teaching Hospital), Sichuan University, Chengdu, Sichuan, China²School of Chemical Engineering Pharmaceutical Engineering, Sichuan University of Science and Engineering, Zigong, Sichuan, China

The present study provides an overview of the coronavirus disease 2019 (COVID-19) outbreak which has rapidly extended globally within a short period. COVID-19 is a highly infectious respiratory disease caused by a new coronavirus known as SARS-CoV-2 (severe acute respiratory syndrome-coronavirus-2). SARS-CoV-2 is different from usual coronaviruses responsible for mild sickness such as common cold among human beings. It is crucial to understand the impact and outcome of this pandemic. We therefore overview the changes in the curves of COVID-19 confirmed cases and fatality rate in China and outside of China from 31st of December 2019 to 25th of March 2020. We also aimed to assess the temporal developments and death rate of COVID-19 in China and worldwide. More than 414,179 confirmed cases of COVID-19 have been reported in 197 countries, including 81,848 cases in China and 332,331 outside of China. Furthermore, 18,440 infected patients died from COVID-19 infection; 3,287 cases were from China and 15,153 fatalities were reported worldwide. Among the worldwide infected cases, 113,802 patients have been recovered and discharged from different hospitals. Effective prevention and control measures should be taken to control the disease. The presented Chinese model (protocol) of disease prevention and control could be utilized in order to curb the pandemic situation.

Keywords: China; coronavirus; COVID-19; pandemic; severe acute respiratory syndrome
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Introduction

Coronavirus disease 2019 (COVID-19) has emerged by a novel coronavirus, now known as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). SARS-CoV-2 is not similar to other coronaviruses that usually spread in human beings causing common cold. COVID-19 is an acute respiratory infectious disease which is mainly transmitted through the respiratory tract (CCDC, Chinese Center for Disease Control and Prevention 2020b). The first pneumonia case, caused by this novel coronavirus, was reported in the end of 2019 (WHO, World Health Organization 2019). The diagnosis of COVID-19 is different from that of human coronavirus 229E, NL63, OC43, or HKU1 (WHO 2019; CCDC 2020b); thus, the patients infected with SARS-CoV-2 must be evaluated and cared

differently from the patients with usual coronaviruses.

SARS-CoV-2 (COVID-19) is a single-stranded RNA virus, the name “Corona” is a latin word meaning “Crown” which has been given due to the similarity of its spikes to a crown. Coronaviruses has a history of causing numerous syndromes in humans and animals that includes Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV). SARS-CoV was first emerged in 2002 and spread worldwide (CDC, Centers for Disease Control and Prevention 2020a). The transmission of SARS-CoV was via human-to-human contact by droplet transmission. MERS-CoV was reported in September 2012 in Saudi Arabia. Through retrospective investigations, the first known case of MERS was emerged in Jordan in April 2012 (Hijawi et al. 2013). MERS-CoV, like other coronaviruses, likely spreads by respiratory secre-

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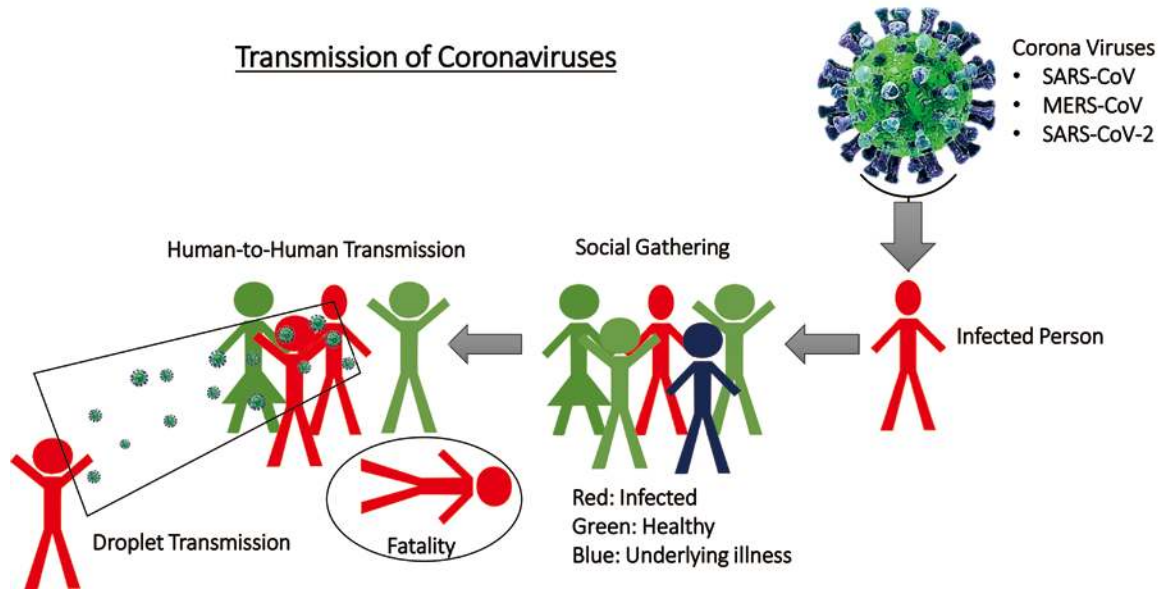


Fig. 1. Demonstration of coronaviruses transmission into human being.

The transmission of virus can occur via human to human contact or droplet transfer. The effects of coronaviruses are fatal in the human being with underlying illnesses.

Source: Created by authors.

tions of infected persons such as coughing or sneezing (Fig. 1). However, the exact route of transmission of the MERS has not been fully understood (CDC 2020b).

In this article, we used publicly accessible data sources on COVID-19 from 31st of December 2019 to 25th of March 2020. Data on confirmed infected cases were obtained from the reports published by the Chinese Center for Disease Control and Prevention. International data were obtained from the reports published by the WHO (2020a, b, c, d, e, f). We show the total confirmed cases, recovered cases and deaths in China and other countries. In addition, we compared the confirmed new infected cases between China, Europe, America, Oceania, and International conveyance. Data analysis includes most common symptoms and the comparison between Hubei Province and other provinces of China. We also show the age of deceased patients to get more in-depth knowledge about COVID-19. The analyzed data represented were manipulated using Microsoft-Excel 2019 software.

Fig. 2 indicates the countries or areas with reported confirmed cases of COVID-19 between 29th of February 2020 and 25th of March 2020. As of 25th of March 2020, 414,179 confirmed cases of COVID-19 have been reported in 197 countries, including China, Italy, Spain, United States, Germany, France, Iran, The United Kingdom, and other Asian countries, such as South Korea, Japan, India, Thailand, and Pakistan (WHO 2020f) (Fig. 2). Majority of infected cases have been reported in the European Region. As of 25th of March 2020, 18,440 COVID-19-related deaths have been reported especially among patients with a background of serious underlying respiratory illness, while 113,802 infected patients have been recovered globally

(Fig. 3). The main cause of the spreading of COVID-19 could be due to the spillover of certain wild animal contamination from seafood markets and carriers of SARS-CoV-2 via infected people or carrier's human-to-human contact worldwide (Du et al. 2020; WHO 2020b).

Outbreak of COVID-19 and Control

The Chinese government at all levels has taken strong prevention and control measures and has conducted frequent media communications including exchange to improve public security and awareness of COVID-19 prevention. The ways to reduce infection chances include social distancing via stopping large public or private gatherings, wearing masks and gloves, avoiding unnecessary travels and visits, and using mobile phone location backtracking. The aim of Chinese government for employing these preventive measures was to facilitate the management of early onset of cases to reduce the chance of further spread of the infection and to control the nosocomial infection (Du et al. 2020; CCDC 2020b).

In Wuhan, the Government took preventive measures to control the spread of COVID-19; namely, all the national or international flights, long-distance passenger transport, and local transporting system were suspended. All the citizens including foreign residents in Wuhan were advised to stay at home and could not leave the city. The other 12 prefectures and cities in Hubei province also started different protocols. COVID-19 has been in community transmission for more than two months since the early stage of its entry to the human population. The prevention and control effects were expected to avoid the outbreak of a larger epidemic or even a pandemic. The Chinese government also

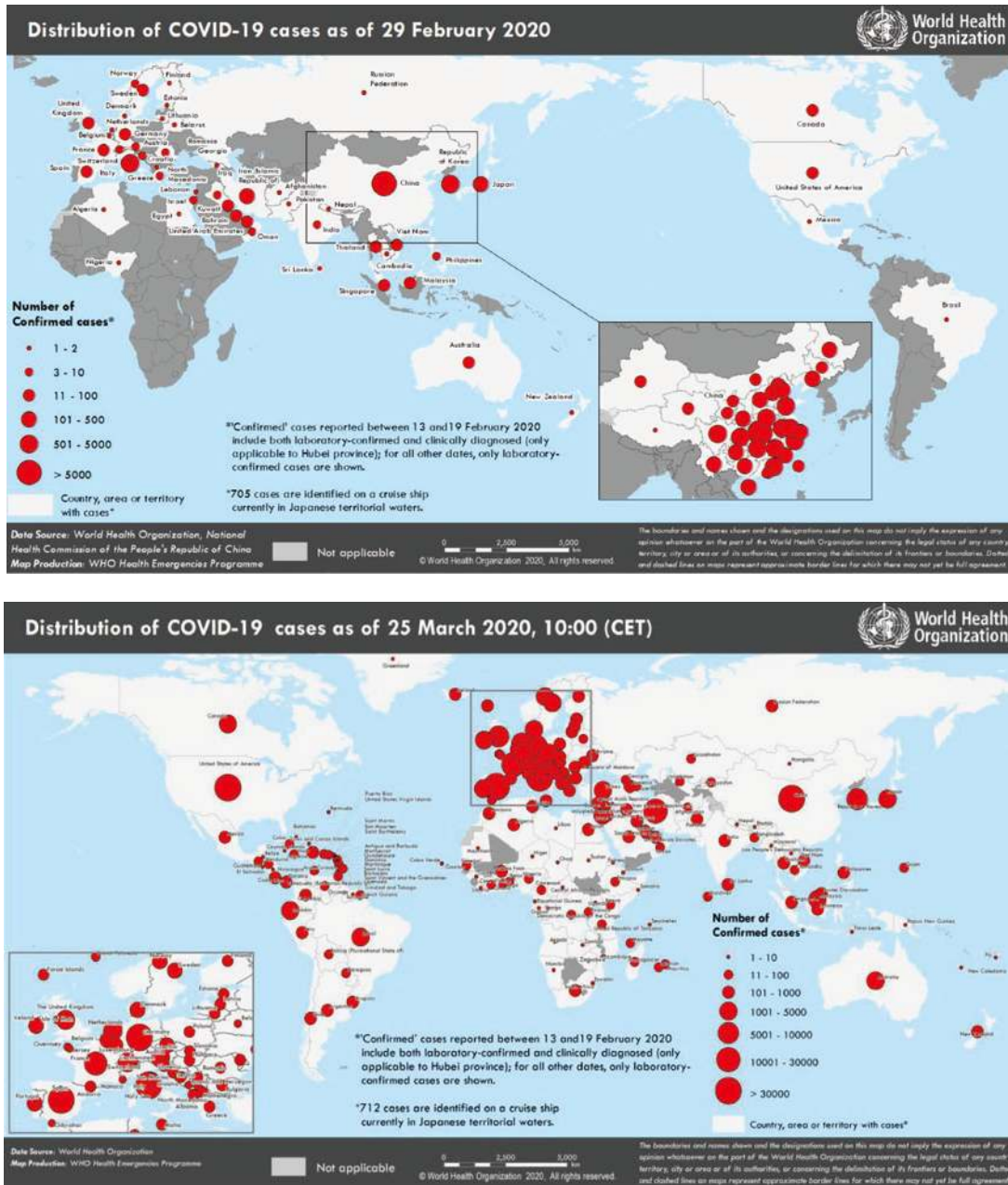


Fig. 2. COVID-19 confirmed cases as of February 29, 2020 and March 25, 2020.

Within a very short period of time, the outbreak of COVID-19 rapidly spread globally and has been declared a pandemic. As of February 29, 2020 (top), COVID-19 spread to 53 countries with 6,009 confirmed cases with 86 deaths (within China total confirmed and death cases were 79,394 and 2,838 respectively). As of March 25 (bottom), 2020, although within China the new cases reporting was very slowed but globally it affected 197 countries with 414,179 confirmed cases and 18,440 deaths.

Data source: WHO 2020d, f.

took major initiatives to build hospitals and provide suitable health protocol in record-breaking time throughout the major cities in China (Du et al. 2020; Wilder-Smith and Freedman 2020; CCDC 2020b). With the implementation of strong prevention and control measures by the Chinese government, the containment of the epidemic has been achieved to a larger extent in China. However, the global situation is worsening day by day with the increasing number of infected patients, as shown in Fig. 2.

Situation between Hubei Province and the Rest of China

The number of confirmed infected cases of COVID-19 in Hubei and some other provinces of China shows the severity of the infection outbreak. The first case of COVID-19 was reported on December 8, 2019. Consequently, the virus rapidly spread in other provinces of China, the comparison of infected and death cases between Hubei province

Current Pandemic Situation Worldwide

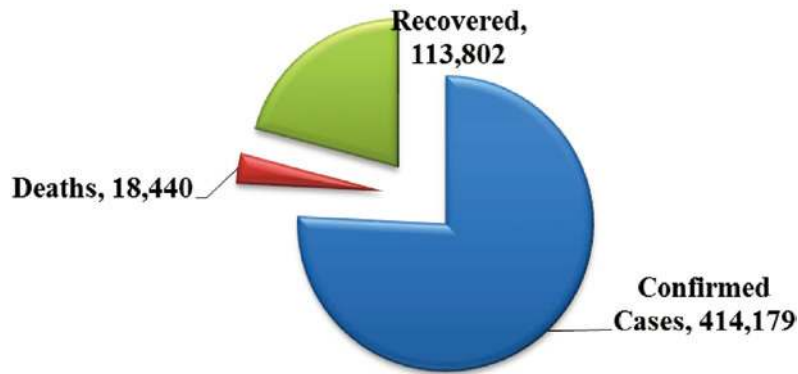


Fig. 3. Pandemic situation as of March 25, 2020. Till March 25, 2020, total confirmed cases were 414,179 globally, most of the cases were reported in European Region. Out of which 18,440 infected persons died, while 113,802 individuals were recovered mostly in China. Data source: WHO 2020f.

and other provinces of China indicates that as of 1st of February 2020, 7,153 confirmed cases with 259 fatalities were reported in the epicenter (Hubei Province alone), meanwhile in other provinces of China, 4,668 cases were reported with no fatality (Fig. 4). Within one month (as of 29th of February 2020) the total cumulative confirmed cases rapidly increased in the Hubei province and reached to a total of 66,337 cases. Likewise, in other provinces of China the total confirmed cases also continue to escalate and reached to 13,057. Moreover, fatalities in Hubei province extended to 2,727, while in other provinces of China 111 were reported.

Fig. 4 demonstrates the comparison of confirmed infected cases and deaths between Hubei Province and other Provinces of China from 1st of February 2020 to 25th

of March 2020. As of 25th of March 2020, the total cumulative confirmed cases in the epicenter stretched to 67,801 cases with 3,163 fatalities while in other provinces of China the total confirmed cases extended to 14,047 with 124 fatalities.

COVID-19 in China and outside of China

The data analysis shows that the total number of COVID-19 confirmed cases has rapidly increased worldwide since 31st of December 2019 (WHO 2020a, b, c, d, e, f). COVID-19 has affected more than 197 countries around the globe. Consequently, WHO declared COVID-19 a pandemic on 11th of March 2020. The severity of COVID-19 can also be assessed by an increase in the number of fatalities that occurred across China and in other countries. Fig.

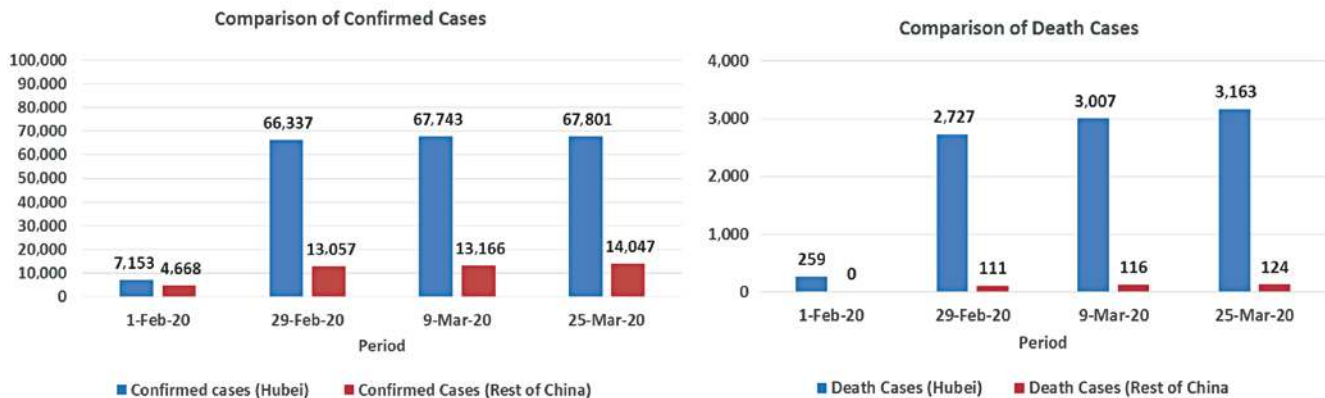


Fig. 4. Comparison of confirmed and death cases between Hubei province (epicenter) and other provinces of China from February 01, 2020 to March 25, 2020.

As of February 01, 2020, 7,153 confirmed cases with 259 fatalities were reported in the epicenter (Hubei Province alone), while in other provinces of China, 4,668 cases were reported with no fatality. Within one month (as of February 29, 2020) the confirmed cases reached to 66,337 along with 2,727 deaths in Hubei province alone, while in rest of China the confirmed and death cases also continue to rise. Afterwards, the reporting of new cases in Hubei and rest of China was slowed. As of March 25, 2020, the total cumulative confirmed cases in the epicenter reached to 67,801 cases with 3,163 fatalities while in other province of China the total confirmed cases reached to 14,047 with 124 fatalities.

Data source: WHO, 2020a, b, c, d, e, f.

5 reveals the timeline of COVID-19 and Pandemic situation.

In the end of January (30th of January 2020), the total confirmed cases and fatalities within China were 7,736 and 170 respectively, while outside of China 82 cases were reported with no fatalities. Within one month, on 29th of February 2020, the total confirmed cases and fatalities within China reached to 79,394 and 2,838 respectively, while outside of China, it spread in 53 countries with 6,009 confirmed cases and 86 deaths. Further, within the next ten days, on 9th March 2020, the confirmed cases within China were maintained with a slight increase to 80,904 with 3,123 fatalities. However, outside of China, COVID-19 affected a high number of persons, particularly, 28,673 confirmed cases along with 686 deaths in 104 countries were reported.

On 25th of March 2020, a total of 81,848 confirmed cases with 3,287 deaths have been reported in China, which shows that the epidemic situation in China has been maintained and now very rarely new cases appear. However, the worldwide situation of COVID-19 is worsening day by day and a large number of cases are being reported daily (see Fig. 2).

Further, on 25th of March 2020, 332,331 confirmed cases have been reported globally (Grand total 414,179 including cases in China), while 15,153 people have died so far outside of China. The death rate is constantly growing since the declaration of Pandemic by WHO (as shown in Fig. 3).

Symptoms of COVID-19

Most of the infected patients with COVID-19 had a history of being in contact with virus contained surface or infected patients or carriers of the virus. Furthermore, the infected patients have common symptoms relative to common cold like fever, cough, fatigue, and shortness of breath in severe cases. The most common complication among the infected patients was pneumonia followed by respiratory disorders and shocks were rarely found (CCDC 2020a, b; Du et al. 2020).

Below are some symptoms found in several infected patients with COVID-19 (Fig. 6):

- Diarrhea
- Hemoptysis
- Headache

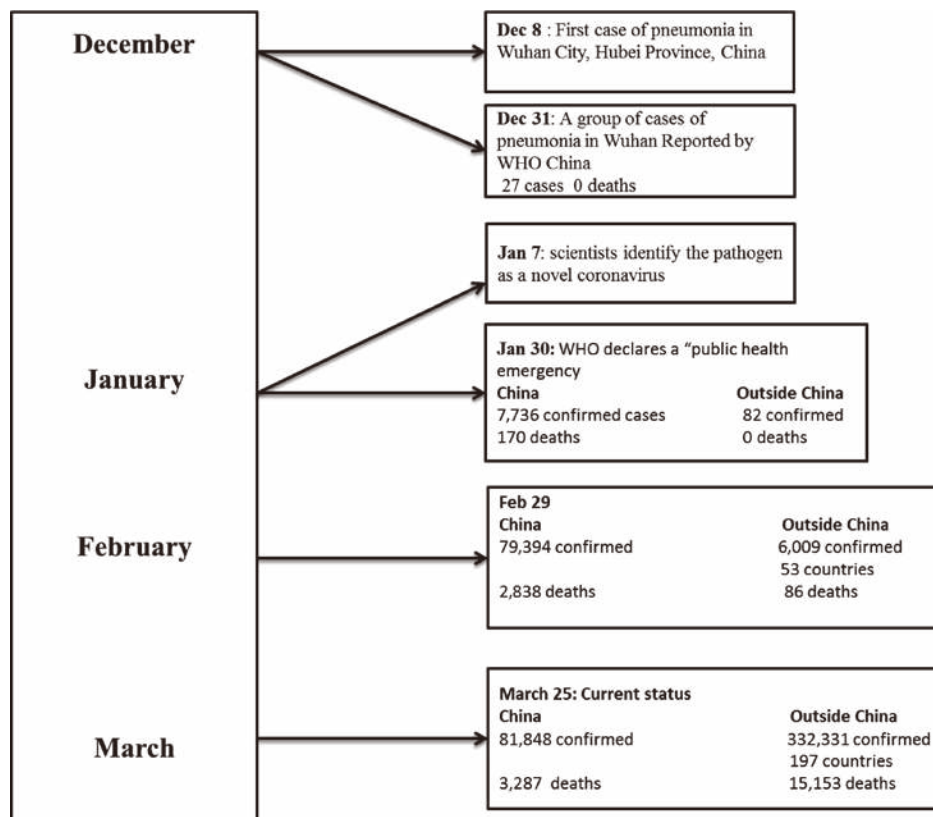


Fig. 5. COVID-19 outbreak timeline for the period from December 31, 2019 to March 25, 2020.

During this period, COVID-19 rapidly spread in different parts of China as well as globally. On January 30, 2020, WHO declared it a public health emergency. As of February 29, 2020, there were 6,009 confirmed cases outside of China, however, since the beginning of the month of March, the cases have been rapidly increased outside of China. Based on the severity of the disease and its rapid spread all over the world, WHO declared COVID-19 a pandemic on March 11, 2020. As of March 24, 2020, the outbreak of the disease is under control in China, however, outside of the China, it is rapidly spreading day by day.

Data source: CCDC 2020a; WHO 2020a, b, c, d, e, f.

Common Symptoms of COVID-19

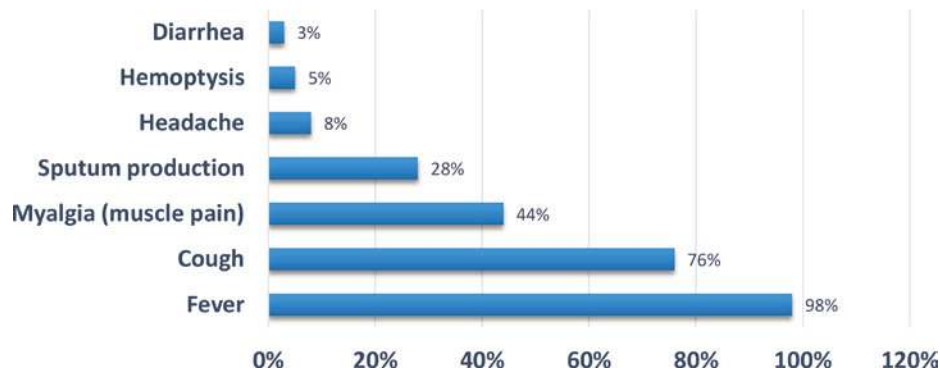


Fig. 6. Common symptoms of COVID-19

In most of the infected cases, the common symptoms were fever, cough and muscle pain, while some cases also reported headache, hemoptysis and diarrhea.

Data source: CCDC 2020a, b (data as of February 11, 2020).

- Sputum production
- Myalgia (muscle pain)
- Cough
- Fever

Transmission of COVID-19

The COVID-19 is usually transmitted either through physical contact with an infected person (person-to-person), droplets transmission or less possibly through oral transmission (WHO 2019). The reported results provided evidence of human-to-human transmission. In addition, researchers also detected SARS-CoV-2 in stool samples, gastrointestinal tract, saliva and urine of the infected patients (Du et al. 2020). ACE2 (Angiotensin-converting enzyme 2) plays an important part in the immune systems, and SARS-CoV-2 infects host cells through ACE2 receptors causing COVID-19 (Turner et al. 2004); hence, the individuals infected with SARS-CoV-2 face immune system disorders through progression of the disease.

Age and Sex of Patients

Fig. 7 shows the age-specific fatality rate. All people across all age groups can be infected with SARS-CoV-2. According to National Health Commission of China (NHC), approximately 80% of the fatalities were reported among patients above the age of 60 years, while 75% of them were having previous health issues including diabetes and cardiovascular diseases. In line with the WHO Situation Report No.7 issued on 27th of January 2020, the cases detected outside of China had the median age of 45 years (2-74 years). The male is dominant among those detected cases (71%). A study of 138 hospitalized patients with the novel coronavirus-infected pneumonia (2019-nCoV) showed that the median age was 56 years (interquartile range: 42-68 years old; range: 22-92 years old) and 75 (54.3%) were men while 63 (45.7) were female (Wang et al. 2020a). Elderly people, particularly having previous health

issues such as asthma, diabetes, or heart disease, are more likely to die from COVID-19 (CCDC 2020b; Wang et al. 2020a; Wilder-Smith and Freedman 2020).

Possible Treatment

According to WHO (2019), no particular medicine (e.g., anti-biotic) has been recommended for the treatment of COVID-19 at present. However, some treatment can be provided based on early symptoms, such as mild pain relievers, cough syrup, resting and high amount of fluid intake. Additionally, some particular medications are under investigation and are being tested through clinical trials in the United States and all around the world (WHO 2019; CDC 2020c). In addition, ventilators help infected patients in breathing and support lung function, although ventilators do not cure COVID-19. Extracorporeal membrane oxygenation (ECMO) is another useful technique to support the body during infection; ECMO is considered as a life saving therapy for refractory respiratory failure (Henry 2020).

Discussion

The findings from this study highlight the significant difference of confirmed cases and deaths between Hubei province and the rest of the provinces across China. This massive variance is because Hubei includes the COVID-19 epicenter city (CCDC 2020b; Du et al. 2020; Wang et al. 2020b; Wilder-Smith and Freedman 2020). Newly reported cases of COVID-19 were supposed to peak on 23th of January 2020. The quick reaction and preventive measures taken by Chinese authorities substantially helped to control the outbreak of COVID-19 across China and it was only confined in Hubei province. A chain of preventive measures comprised the lockdown of Wuhan city, and some other adjacent cities have been also proved to be useful to confine the outbreak of the COVID-19 (Du et al. 2020; Wang et al. 2020b; WHO 2019). Moreover, the data related to COVID-19 was publicly disclosed after the promulgation

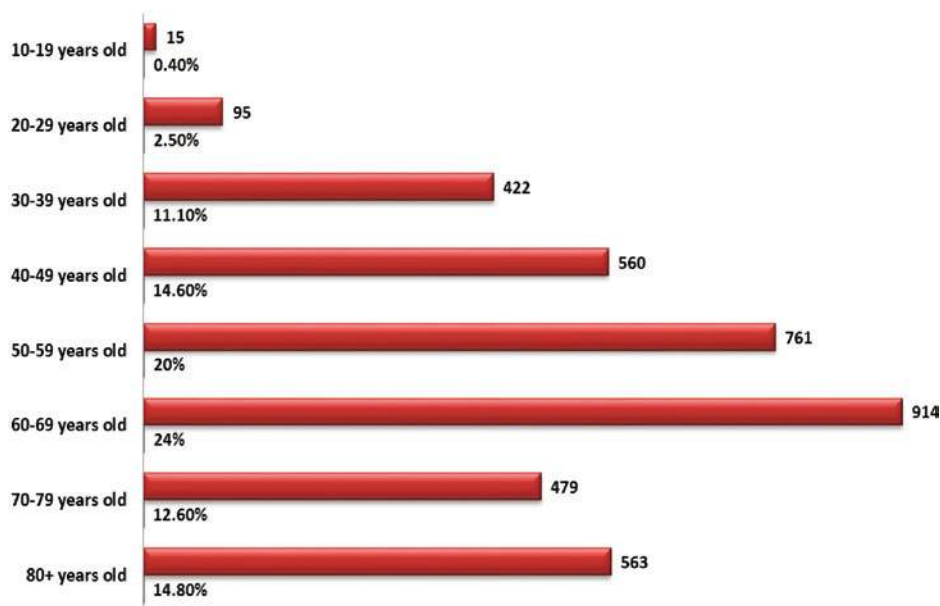


Fig. 7. Age-wise fatality rate in China

In terms of age, most of the persons died due to COVID-19 were between 60-69 years old, followed by 50-59 years, 80 years and older, and 40-49 years old. However, below 40 years, were few death cases have been reported.

Data source: CCDC 2020b (data as of February 11, 2020).

of the national emergency of the COVID-19. Such a step taken by the Chinese government authorities was applauded which allowed national and international scholars including health community researchers to conduct research and share their efforts to improve the preventive measures and find a remedy (CCDC 2020a, b; Wang et al. 2020b; WHO 2020b, c). Although the outbreak of COVID-19 appears to be under control in China, the global situation is still out of control and confirmed infected cases are rapidly increasing each day.

Conclusion

Currently, COVID-19 has been controlled to a larger extent in China, and new cases registration has been decreasing since 2 weeks, all thanks to the tireless efforts and control measures of the Chinese government. Furthermore, the discharge of recovered cases is cumulating each day. Expectantly, the situation will be completely under control and back to normal life in China in near future. However, besides China, still in different countries day by day increase in confirmed COVID-19 cases are being reported, which concludes it might take a longer time to control the pandemic situation worldwide. China is providing the possible help by donating and providing medical equipment and medical doctors services to different countries to help fight the epidemia and preclude the world from worst of the COVID-19 pandemic. There is a strong necessity to consider and promote to the Chinese model (protocol) of disease prevention and control as it has been tested and proved beneficial to forefend most uncollectible damage of this pandemic situation.

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Conflict of Interest

The authors declare no conflict of interest.

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