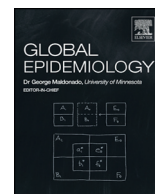


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## International Perspective

## Challenges for management of the COVID-19 epidemic in Iran

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The epidemic curve of Iran followed a bimodal shape in the last six months. It started on 19 February 2020, reached its first peak at the end of March (effective reproductive number,  $Re = 2.57$ ), and after a one-month steep drop ( $Re = 0.95$ ) the curve showed an increasing trend with the second peak at the beginning of June. However, the epidemic curve has had small fluctuations over the recent ten weeks (Fig. 1). To some extent, the same pattern was observed in the number of daily reported deaths, with a two to four-week delay and a dominant secondary peak (Fig. 2) [1]. A sharp decreasing trend in March was mainly due to restrictions and lockdown.

Iran is a vast country with variations in climate, cultures and sub-cultures, and socioeconomic status. Consequently, it is not comparable to many other countries in the world with regard to its challenges and responses to the pandemic.

Religious festivals and ceremonies, such as group worship and regular family parties, are among the main practices of the Iranian people. At the beginning of the outbreak, a substantial part of the population changed their behavior, supported by the advice of the government and main religious leaders. In addition, schools, universities, main markets, sports centers, and even most of the governmental offices were closed soon after the detection of the outbreak.

Forces from inside and outside of the country have affected the management of the epidemic, perhaps more so than in other countries. The epidemic curve of Iran peaked faster than in other countries and showed a bimodal shape before the same pattern was observed in other countries. This issue caused high stress on the Iranian people and authorities; Iran was even mistakenly identified by some as the source of the epidemic for other countries [2], but later it was found that the virus, even before formal reporting of the disease in China, was in circulation in other countries [3,4]. There is no substantial evidence for the exact starting point of the epidemic in other countries, particularly in the Eastern Mediterranean region. However, more than half of the regular regional reports of the World Health Organization are about the scope of the epidemic in Iran, which shows higher transparency, and even accuracy, of statistics in Iran. Therefore, early detection and

reporting of the disease in Iran and a higher rate of infection might be attributed to a functional surveillance system in the country [5].

The second wave of the disease in Iran caused a new round of pressures, since it was a unique pattern in the world at that time. Criticism was mainly around the impact of early reopening policies, which was attributed as the main source of reactivation of the epidemic. The early reopening gave most people the impression that the situation had become somewhat normal, and they abandoned the health considerations they had followed for several months. However, when the same bimodal pattern or extended epidemic was observed in other parts of the world, the level of pressure diminished significantly.

Part of the high rate of reopening in Iran compared to other countries was due to the country's economic problems, which had been already exacerbated by sanctions. For the reopening, more than 2.3 million small businesses, shops and industrial units were registered, and step-by-step reopening was accomplished. Mask mobile application was developed and used to facilitate the process. In this nationally used application, a map of COVID-19 cases was available for all cities and regions of the country, and people were alarmed to avoid entering more infected areas. People could also assess their probability of being infected by answering the app questions on symptoms and risk factors of COVID-19 infection.

There were some concerns in the management of the epidemic mainly because of the lack of experience to control such an extended and vast epidemic caused by a novel virus, and the detrimental impact of the strict embargo against Iran.

The strong embargo imposed by the US administration, backed by a political and mass media propaganda, diverted the type of pressure from a justified scientific form to a distorted format. For example, Iran did not have any access to its financial resources in the other countries to purchase medicine, and laboratory equipment in this crucial point of time [6,7]. Another challenge of the epidemic was to achieve a single database for the disease. In the early months of the epidemic, different databases were used for data entry and analysis by different medical universities, in which the quality of data was not the same. Over time, this problem was somewhat resolved, and a more uniform with better quality data was achieved.

The variety of customs in different regions, such as mourning and wedding ceremonies, have been other challenges in the

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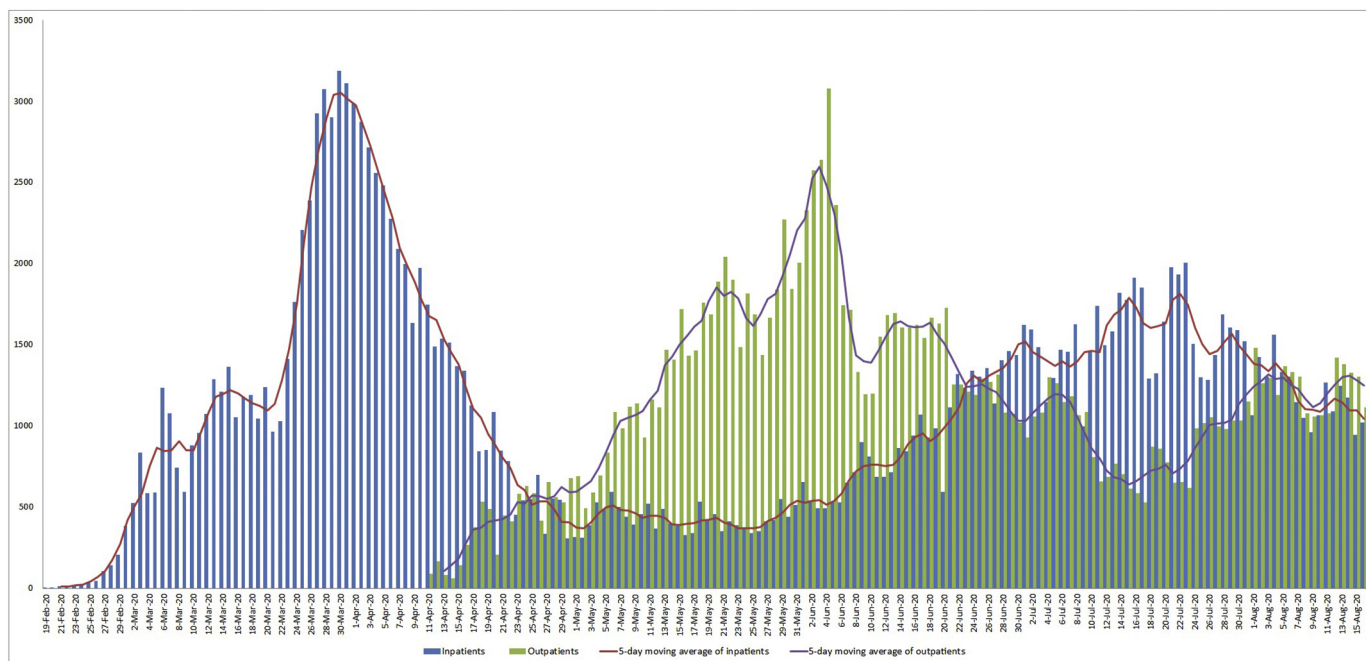


Fig. 1. Daily reported cases of COVID-19 in Iran.

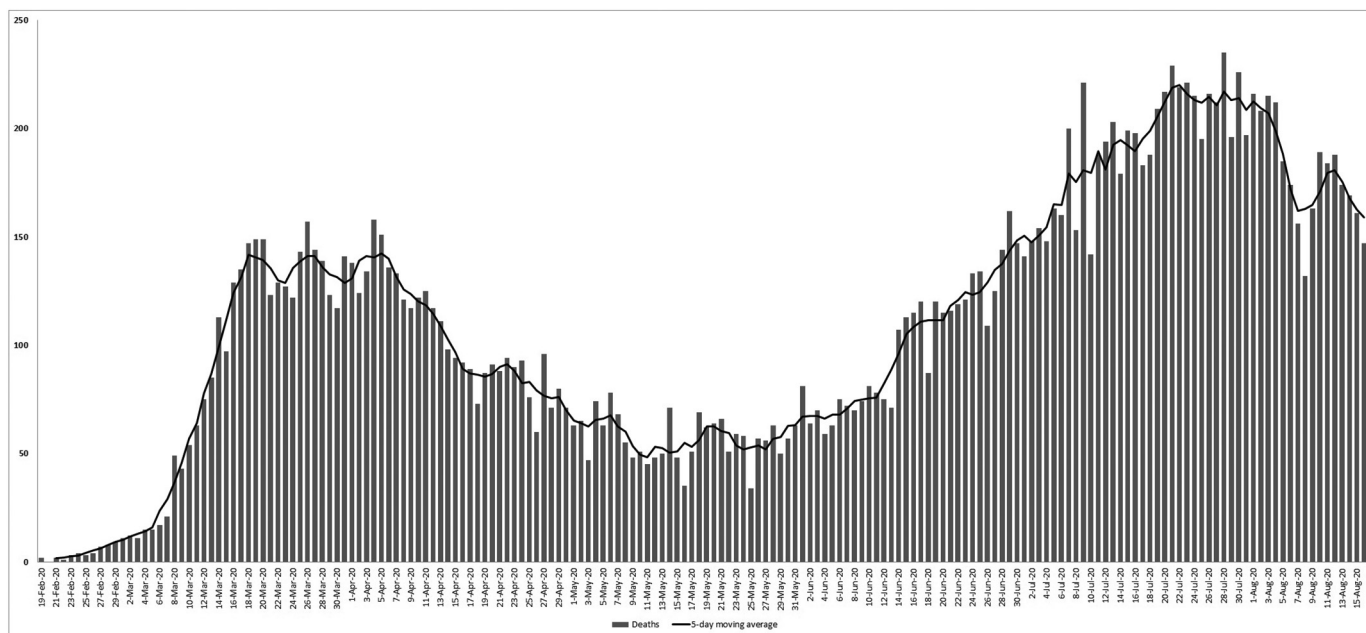


Fig. 2. Daily reported deaths due to COVID-19 in Iran.

management of the epidemic in Iran. Besides, the pattern of the epidemic was not the same in all regions, and epidemic started with a delay in some provinces which was among the reasons of the second wave of the epidemic in Iran.

The control of the pandemic will not be achievable without the cooperation of all countries, and if they leave each other in such a situation, managing pandemic will be difficult. The countries' experiences in the management of the epidemic may be useful for others, though it may not apply to all due to differences in their situation. The epidemic curve and management of the epidemic in Iran are not comparable with

other countries. For a valid comparison of countries in managing the COVID-19 epidemic, their conditions should be taken into account. Overall, the response of Iran to the epidemic, given its conditions, has been somewhat plausible and defensible.

**Declaration of Competing Interest**

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