


## Brief Report

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# Consecutive Waves of COVID-19 in Iran: Various Dimensions and Probable Causes

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### Abstract

**Objective:** The coronavirus disease (COVID-19) pandemic has somehow affected the lives of 80% of the world's population. Iran has also experienced numerous outbreaks of this disease. The fifth wave having occurred in August 2021 was one of the most agonizing incidences of the pandemic in the country.

**Method:** We reviewed all of publications and governmental statistics about COVID-19 pandemic in Iran between 2019 to 2021.

**Results:** The current study discusses the possible dimensions and causes of successive waves of COVID-19 in Iran, namely, the consequences of a significant delay in vaccination administration in due time, the collective overwhelming fallacy toward immunization, the polypharmacy controversy, inadequate community-based participation in risk reduction, and noticeable decrease in the public's resilience.

**Conclusion:** A variety of strategies have been recommended in the article to modify the principal challenges in order to help control the pandemic in the country.

### An Overview of COVID-19 Circumstances in Iran

Since the registration of the first case of coronavirus disease (COVID-19) in Iran (February 18, 2019),<sup>1</sup> the spread of this disease has experienced various ups and downs of 5 waves in Iran. The first wave started in mid-March 2020 followed by repeated consecutive waves (Table 1). According to the official statistics from Iranian Ministry of Health and Medical Education (MHME), from the beginning of the COVID-19 outbreak until December 16, 2021, nearly 6 200 000 COVID-19 patients have been identified in the country and 131 639 COVID-19 patients have lost their lives.<sup>2,3</sup> Iran is currently ranked 14th in the world in terms of the number of patients regardless of population and is the most affected by the pandemic among the countries in the region, after Turkey.<sup>4</sup> In general, Iran being frequently among the countries with the highest incidence and mortality,<sup>5</sup> has encountered numerous challenges.

However, like in other parts of the world, Iran has made attempts to devise strategies for disease control. For instance, the translation and implementation of World Health Organization (WHO) guidelines for prevention and treatment of COVID-19 were adopted.<sup>5,6</sup> Furthermore, in order to better understand the epidemic conditions in terms of the risk of getting COVID-19, the related authorities at MHME devised a color-code system according to the situation of each region and announced that each color code includes necessary restrictions and measures in the target areas to slow down the spread of the disease (Table 2). The present study is an endeavor to elucidate the various dimensions and the probable causes of the successive waves of the COVID-19 pandemic, particularly those of the fifth wave.

### The Current Condition of the Pandemic

Iran is currently experiencing the fifth wave of COVID-19, which, according to the statistics and the health officials' reports, is the most severe wave of the disease being recorded so far. Iran has recorded reports in terms of the confirmed infections per day (more than 50 000 cases on August 17) and the daily mortality rate (more than 700 cases per day on August 24).<sup>3</sup> While COVID-19 seemed to be better managed in Iran with the increase in vaccination (although slowly), the fifth COVID-19 wave began in Iran in early July 2021. This wave started due to the spread of the delta variant from the southeastern provinces of the country, apparently having more connections with India and Pakistan. On a daily basis, the number of infected people and the number of expired patients increased so that, according to an authorized statistic, in the last days of August, the number of infected and expired people reached an unprecedented record of 50 228 infected and 709 dead per day (Figure 1).

Meanwhile, outpatient COVID-19-related visits to medical centers increased dramatically reaching the highest point during the past 17 months. Most of the capacity of the treatment

**Table 1.** COVID-19 pandemic waves in Iran, so far

Wave of disease	Date	Maximum daily cases	Maximum daily deaths	The most important decisions made at the national level
First	March 2020	3168	<b>158</b>	<ul style="list-style-type: none"> <li>• Lockdown</li> <li>• Preparation of instructions and flowchart for diagnosis and treatment of COVID-19</li> </ul>
Second	July 2020	3576	<b>235</b>	<ul style="list-style-type: none"> <li>• Prohibition of holding ceremonies indoors</li> <li>• Prohibition of intra-city traffic from 9 PM to 4 AM in cities</li> </ul>
Third	November 2020	14 058	<b>486</b>	<ul style="list-style-type: none"> <li>• Prohibition of intercity traffic (<i>urban quarantine</i>)</li> <li>• Closing unnecessary jobs</li> <li>• Prohibition of intra-city traffic from 9 PM to 4 AM in cities</li> </ul>
Fourth	April 2021	25 582	<b>496</b>	<ul style="list-style-type: none"> <li>• Prohibition of intercity traffic (<i>urban quarantine</i>)</li> <li>• Closing unnecessary jobs</li> <li>• Prohibition of intra-city traffic from 9 PM to 4 AM in cities</li> </ul>
Fifth	August 2021	50 228	<b>709</b>	<ul style="list-style-type: none"> <li>• Lockdown</li> <li>• Prohibition of intercity traffic (<i>urban quarantine</i>)</li> <li>• Closing unnecessary jobs</li> <li>• Prohibition of intra-city traffic from 9 PM to 4 AM in cities</li> </ul>

**Table 2.** Color codes assigned to areas affected by the COVID-19 pandemic in Iran

Color code	Alert status	Area conditions
<b>Green</b>	<b>Safe</b>	• This is an area where no new COVID-19 cases have been reported in the last 28 days, or we have less than 1 positive case per 100 000 people.
<b>Blue</b>	<b>Low risk</b>	• The blue status replaces the white status*, with the difference that until further notice, the COVID-19 National Headquarters will apply the yellow cities restriction to blue cities as well.
<b>Yellow</b>	<b>Medium risk</b>	• One or more cases of the disease have been PCR tested in the area and the risk is as expected. The number of definite new cases per 100 000 people is 1 to 9.
<b>Orange</b>	<b>High risk</b>	• The number of definite new cases is 10 to 24 per 100 000 people and the general epidemic trend is increasing.
<b>Red</b>	<b>Very high risk</b>	• More than 25 cases per day per 100 000 population and the epidemic trend is increasing.

\*White status specifications include: average daily hospitalization (per 100 000 population): maximum 1; and average number of daily hospitalizations: maximum 1.

centers were completed and hospitals did not have vacant beds for the hospitalization of patients with COVID-19. There were also reports of shortages of drugs such as remdesivir and serum for the treatment of these patients. Now (August 2021), almost the whole country is in a red (very dangerous) situation.<sup>7</sup> The pressure has been felt to such an extent that many medical centers were forced to add beds (surge capacity) and build field hospitals.<sup>8</sup>

Considering the circumstances depicted above, some of the possible COVID-19 control management inefficiencies, having triggered the abovementioned circumstances in Iran, are presented below.

### Vaccination Challenges

One effective and long-term medicinal solution to fight against epidemics, such as COVID-19, is worldwide immunization.<sup>9,10</sup> On February 10, 2020, the national vaccination against COVID-19 disease began with Sputnik V COVID-19 vaccine (made in Russia) at Imam Khomeini Hospital in Tehran and other provinces in Iran.<sup>11</sup> Vaccination in Iran started with the priority of medical staff and is currently being conducted based on prioritized age groups, high-risk occupations, and people with underlying diseases.<sup>12</sup> According to MHME, more than 9 800 000 people, so far, have received the first dose of the COVID-19 vaccine. About 2.9 million people have received the second dose of the vaccine and the total number of injected vaccines has reached over 29 500 000 doses.

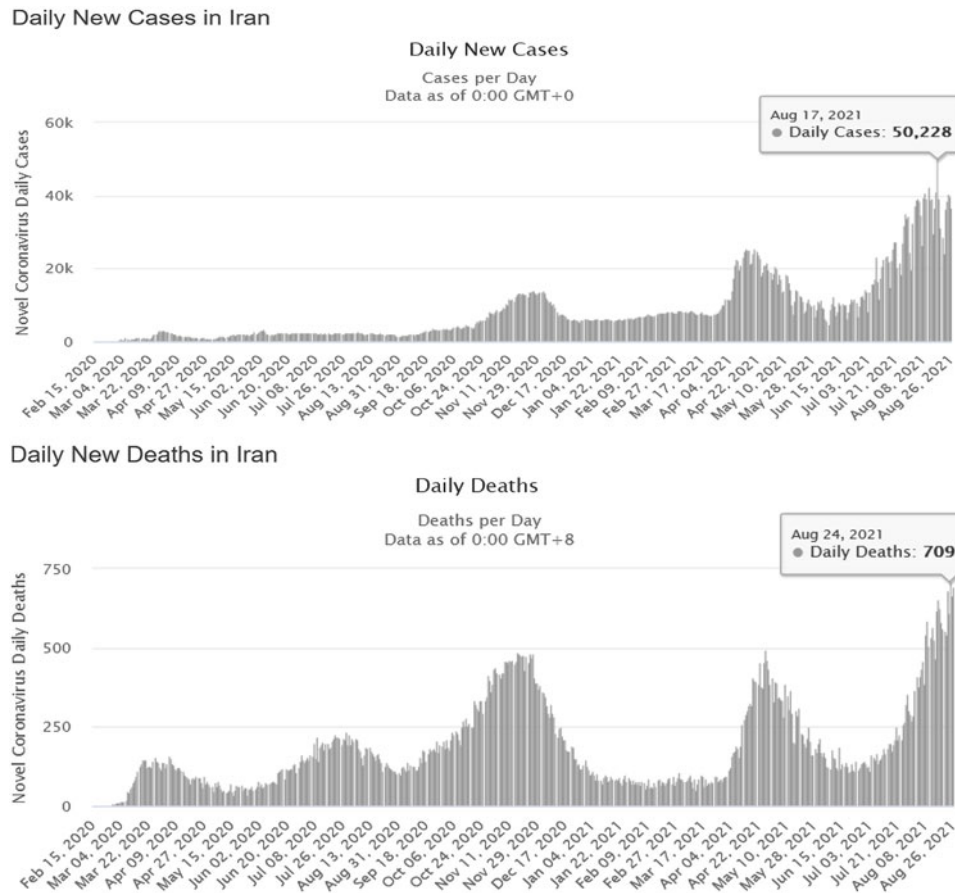
The vaccines administered in Iran have, so far, included 4 foreign and 2 Iranian brands. The imported vaccines include

India's *Covaxin* vaccine, Russia's *Sputnik V* vaccine, *Sinopharm BIBP* vaccine (made in China; the one mostly administered), and *Oxford-AstraZeneca* (imported from Korea, Italy, and Japan). The 2 Iranian vaccines, *COVIran Barekat* and *Pastocovac* (both in the third phase of clinical trials), have recently entered the COVID-19 vaccination cycle in Iran, but the number of the injected doses of these 2 brands has not yet reached 1 million.<sup>13</sup>

It is necessary to mention that there is a causal relationship between adequate vaccination coverage and the disease prevention. As a logical principle, immunization does not develop if the vaccination coverage is incomplete.<sup>14</sup> With the spread of the fifth wave, criticism toward the health system increased and most of the complaints were related to lack of a proper program for importation of vaccines approved by the WHO. Less than 10 million people in the target population received both doses of the vaccine (August 2021), according to the latest report released by the MHME. On the other hand, about 2000 people have died of COVID-19 in the country after being fully vaccinated, which is much higher than the international standards.

### The Prevailing Fallacy Toward Immunization

Some people, having been vaccinated, mistakenly assume that they have gained complete immunization and, therefore, minimize their compliance with health protocols. It is likely that the whole community have not been exposed to efficient educational activities in this regard. The experience of the countries having had vaccination with a high level of coverage but disregarded sufficient compliance with health protocols has shown



**Figure 1.** The maximum daily cases and death rate due to COVID-19 in Iran, so far.

that they eventually were faced with an increasing wave of the disease.<sup>13</sup>

### The Polypharmacy Controversy

Since the beginning of the pandemic, the list of the prescribed medication for COVID-19 patients has been constantly changing in Iran due to the controversial opinions of the specialists. There have been no agreed nationwide guidelines introducing appropriate medications for the COVID-19 pandemic disease. The majority of prescribed medications comprise hydroxychloroquine, doxycycline remdesivir, favipiravir, famotidine, oseltamivir, Kaletra and ribavirin, dexamethasone, and vitamin C.<sup>2</sup> However, circulating rumors have been observed about the negative impacts of the prescribed medications on the mortality of COVID-19 patients in Iran. These rumors emerged following the statements of the officials of the MHME and some well-known medical specialists of the country concerning the ineffectiveness of the medications mentioned above. Hydroxychloroquine, for instance, was originally proposed as a promising option and was approved by the US Food and Drug Administration (FDA) for emergency use. But, on June 17, 2020, it was discontinued in some countries due to its ineffectiveness in reducing patient mortality.

Remdesivir, one of the drugs widely used in Iran to treat patients with COVID-19, is an inhibitor of RNA polymerase, which has shown to inhibit severe acute respiratory syndrome

coronavirus 2 (SARS-CoV-2) in vitro. In a multidisciplinary randomized clinical trial, remdesivir has proved to reduce the recovery time of COVID-19 hospitalized adults compared to a placebo. Despite high hopes for remdesivir, the available information on the effectiveness of this drug shows a clear contradiction. Nonetheless, this drug is still one of the most widely used medications in Iran and the one that is, for the most part, the treatment of choice in patients during the fifth wave. Low-dose dexamethasone was the first drug to show survival progress in 3 hospitalized COVID-19 patients compared to the standard care in 3 large randomized controlled trials.<sup>15,16</sup> Lopinavir and ritonavir, on the other hand, are 2 acquired immunodeficiency syndrome (AIDS) drugs that had no effects on the condition of patients with COVID-19.

Experiments have shown that these drugs, commonly sold under the brand name Kaletra, neither reduce the risk of death from COVID-19 nor that of mechanical ventilation. This method of treatment has not even shortened the length of hospital stay of patients.<sup>17</sup> However, no studies have been found to evaluate the effectiveness of the mentioned drugs in Iran. High use of unapproved drugs in the treatment of patients with COVID-19 and lack of attention to the results of international research on the ineffectiveness of prescribed medications as well as the dangerous side effects of these drugs suggest that an unprecedented increase in death in the fifth wave may be the result of a polypharmacy phenomenon.

## A Wave of Inattentiveness in Following the Health Instructions

Due to the prolongation of the vaccination process and the continuation of the disease spread, a kind of fatigue and mistrust has become prevalent among people believing that compliance with health protocols has no longer any effects on disease prevention. This perception has caused many people not to seriously adhere to health protocols. According to the latest estimates, the rate of compliance with health protocols in the country has reached less than 40%.<sup>18</sup> Among the reasons for this issue are the economic problems, high inflation in Iran, prolongation of vaccination process, uncertainty about the effectiveness of some imported vaccines, lack of choice in determining the type of the vaccine for eligible people, vaccination of the elderly, cultural challenges, and incorrect nationwide policies.<sup>18</sup>

## Discussion

According to Gallup Institute, the COVID-19 pandemic affects the lives of 80% of the world's population, especially women, children, the deprived classes of the society, and those with low literacy.<sup>19</sup> These effects include severe restrictions, long and extensive closures of businesses, and the subsequent imposition of major economic problems. They have also caused social, physical, mental, and psychological problems such as deprivation of visiting the loved ones, the long and painful duration of disease involvement, the agonizing misery following the death of family members, and eventually the despair dominating the majority of people's attitudes. Among the 10 countries most affected by the epidemic, Iran and Turkey are second (after Kenya) with 66% of impact received from COVID-19.<sup>19</sup>

While most countries in the world are experiencing a declining trend in morbidity and mortality of COVID-19, in Iran, the morbidity and mortality of the fifth wave of COVID-19 have reached their highest levels since the outbreak. The prevalence of the delta variant is one of the main reasons for this situation. However, some reports cite polypharmacy as a cause of increased mortality. It can thus be said that a high consumption of unapproved drugs in the treatment of patients with COVID-19, lack of attention to the results of international research on the ineffectiveness of prescribed medications, the dangerous side effects of these drugs, and lack of attention to the appropriate time of drug administration based on different periods of the disease may suggest that the unprecedented increase in mortality in the fifth wave is partly due to polypharmacy. In addition, a decline of compliance with health protocols has significantly aggravated the status quo.

## Community-Based Participation

As mentioned in Sendai Framework for Disaster Risk Reduction (SFDRR), reducing the risk of disasters requires broad and people-centered preventive approaches, so effective response to disasters requires active support and participation of people in the community. The results of Samadipour et al.'s study have shown that the perception of Iranian people toward the danger of the pandemic is not appropriate and needs to be improved. Developing a realistic perspective toward the threat can stimulate them to take the announced recommendations seriously.<sup>20</sup> The actions and promises given to the people by officials and policy-makers must be implemented effectively and in a timely manner. When the most important component of communication and cooperation between government and society, namely *trust*, is lost, no more

strategies and decisions will be implemented efficiently at the community level. Yet, evidently, the authorities' failure to fulfill their promises and the announced schedules for vaccination have created a kind of *distrust* in the society so that some people have lost their motivation to follow the health protocols and the announced restrictions.<sup>20</sup>

## Resilience

Resilience is an imperative social variable in order to fight tolerably against COVID-19. In days when the minds of all people are somehow connected to COVID-19, maintaining social resilience is a challenge that has inundated people and governments. After more than 1 year and a half of fighting against COVID-19, people's resilience has dropped dramatically. In addition to the physical dimension, COVID-19 has also affected the psychological dimension of humans.<sup>21,22</sup> The extent and duration of the dominance of the epidemic are such effective determining factors that in countries where vaccination has been conducted more rapidly, people are slowly returning to normal life. Conversely, delay in vaccination causes an increase in the number of deaths and decrease in the resilience and power of people.

It, therefore, can be claimed that the decision-makers' timely implementation of vaccination and people's accountability to follow the protocols are both mutually inclusive. In other words, it will be impossible to maintain their resilience if people are not sure that the disease period is coming to an end and that the conditions will soon improve. The main indicator of maintaining resilience will be hope for better days in the future. The important thing that governments should convey to the people is to remind them that this is not a permanent situation and that this pandemic will eventually end, and that the most important thing is to go through this situation safely.

## Conclusion

It seems that in order to manage this wave of the pandemic in the country, the process of vaccination should be accelerated by reforming the political view toward public immunization. The target groups who did not show a desire to be vaccinated should be encouraged to receive the vaccine. Moreover, studies to evaluate the effectiveness of the prescribed medications in the country are necessary to be launched, and a guideline approved by the WHO should be developed for prescribing drugs to the patients.

A review of the experiences in the field of infectious diseases shows that there are 2 effective factors to control the pandemic not only in Iran but also all over the world. One is active adherence to the health protocols (including regular handwashing, use of masks, avoidance of gatherings, observance of social distancing, not staying in crowded and closed environments, and use of air conditioning). The second is effective immunization of the community by increasing the speed of vaccination and use of effective vaccines. Through showing clarity in the actions taken, along with telling the truth about the disease condition, authorities can gain people's trust and confidence in order to benefit from the active participation of the community in controlling the pandemic.

**Conflict(s) of interest.** None

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