



Is the Omicron variant of SARS-CoV-2 coming to an end?

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The coronavirus disease 2019 (COVID-19) pandemic has caused infection in more than 400 million people, and 5.8 million deaths. The most recent outbreak was caused by the Omicron variant, which was first identified in South Africa on November 11, 2021. It has spread to more than 150 countries thus far. The fast spread of the Omicron variant has caused great concern worldwide. Compared to the previous outbreaks of COVID-19 variants, the Omicron outbreak is much larger. As shown in Figure 1A, a sharp surge appeared in approximately January 2022. The role of seasonality in the process of coronavirus transmission has been discussed widely. Some researchers have argued that the spread of COVID-19 shows a seasonal trend—when cold weather came, it would accelerate the spread of coronavirus,¹ while other research indicated that although the transmission speed of COVID-19 seemed faster in cold weather, it cannot be concluded that seasonality played a determinant factor. Social interventions should be considered as well.² Although it is expected that we would see an upward trend of COVID-19 during the cold weather seasons, the high transmissibility of the Omicron variant has accelerated the transmission speed, and the highest number of daily new cases in January 2022 is more than double that of the highest daily new case recorded in January 2021. The Omicron variant has displaced the Delta variant and has become the dominant lineage in many countries. Although it shows an incomparable transmission speed across the world, the fatality rate of the Omicron variant is lower than any of the previous variants.

With the emergence and the destructive consequences of the Omicron variant, two different viewpoints have been presented to the public in terms of the development of the COVID-19 pandemic in the future. One view claimed that the appearance of the Omicron variant could also be a signal of the coming end of the COVID-19 pandemic, regardless of its fast and large-scale transmission ability. A recent published commentary argued that the transmission of coronavirus would reach a low level by March 2022, and the experience in protecting the vulnerable population, the distribution of adapted vaccines, and so forth would reduce the negative impact of severe acute respiratory syndrome-coronavirus-

2 (SARS-CoV-2) in the future.³ Moreover, the lower fatality rate of the Omicron variant means that even though COVID-19 will return, the global pandemic will come to an end after the Omicron wave.³ Another group of researchers pointed out that the COVID-19 pandemic would not end in the short-term future.⁴ The researchers argued that the need-supply mismatch problem existed in developed, developing, and underdeveloped countries, and that vaccine hesitancy has also slowed down the vaccine rollout plan in some countries. In addition, the possibility of the discovery of new variants in the future cannot be ignored. Therefore, it is likely that we will see a recurrence of a mutant variant like Omicron that leads to another outbreak of COVID-19.⁴

Here, we used the global prediction system for COVID-19 pandemic (GPCP)⁵ with the modified susceptible-exposed-infectious-recovered (SEIR) model to make predictions on the development of the COVID-19 pandemic. The assumptions of this model are as follows: (1) The total population should always be equal to the sum of the susceptible population (S), the exposed population (E), the protected population (P), the infected population (I), the quarantined population (Q), the dead population (D), and the recovered population (R); (2) the total population in each region remains unchanged; (3) COVID-19 spreads only via human-to-human contact; and (4) all of the individuals have the same immunity. The real epidemic data were used in this model to make relevant predictions. Thus, the results could reflect the real development of the COVID-19 pandemic. Our prediction results indicate that the Omicron variant will continue affecting the world throughout the rest of 2022, and the pandemic will not end until late 2023. According to Figure 1B, we can see that the current pandemic shows a downward trend. The number of daily new cases has decreased from more than 4 million cases to approximately 2 million cases (represented by the green circles). The blue curve represents the predicted trend for the COVID-19 pandemic, and the overall trend is constantly decrease, except for a small increase that will occur in April 2022 due to seasonality. After the small increase, the number of confirmed daily new cases will decrease at a fast pace. The predicted result shows that the daily global

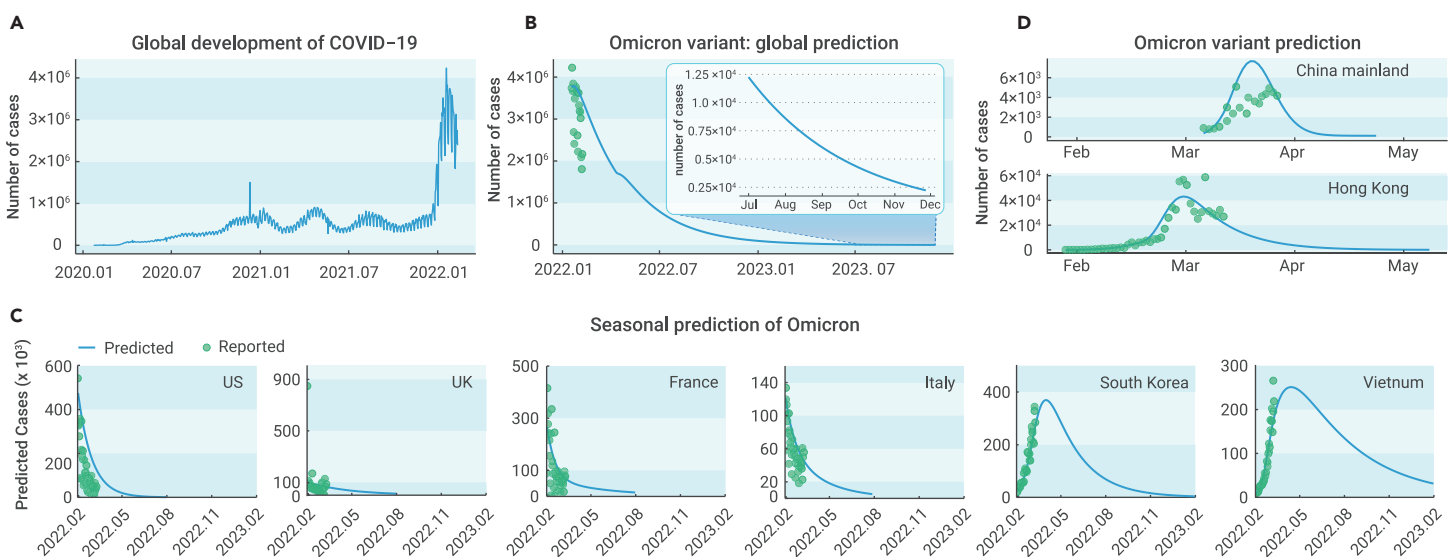


Figure 1. The prediction results on Omicron variant (A) The real development of the COVID-19 pandemic globally (the time period of the COVID-19 data is from January 22, 2020 to February 11, 2022). (B) The prediction result on the development of COVID-19 from February 2022 to November 2023, in which the green circles represent the real daily new cases globally (January 18, 2022–July 2, 2022), and the blue curve represents the predicted result (January 18, 2022–November 28, 2023). The small plot at the right corner of (B) is the enlarged plot for the predicted result from July 2023 to November 2023. (C) The prediction results of 6 countries, namely the United States, the United Kingdom, France, Italy, South Korea, and Vietnam. The green circles represent reported cases (January 31, 2022–March 10, 2022), and the blue curve indicates the predicted results. (D) The prediction results of mainland China and Hong Kong, where the green circles represent the reported cases (mainland China: March 1, 2022–March 24, 2022; Hong Kong: January 29, 2022–March 13, 2022) and the blue line represents the predicted results.

COVID-19 cases will drop down to approximately 3,000 cases in November 2023. As more and more countries declare relaxed restriction measures and the resumption of social life, we can say that the COVID-19 pandemic will come to an end by November 2023. The total confirmed cases will reach at least 750 million by the time the pandemic ends. In addition, we calculated the average accuracy rate for global cases. The result is approximately 57%, and the accuracy rates for countries that were heavily affected by COVID-19 such as the United States, the United Kingdom, France, Italy, South Korea, and Vietnam are 71.3%, 66.3%, 66.9%, 75.6%, 82.9%, and 75.3%, respectively. Since the GPCP system used real epidemic data to make prediction, the accuracy of prediction results rely largely on the data quality. Therefore, for countries that have poor data quality, the accuracy will be low and vice versa. Other models, such as the Institute for Health Metrics and Evaluation (IHME) models, are also used for predicting the development of COVID-19 globally. However, the predicted result of the number of confirmed cases from the end of November 2021 to January 17, 2022 from IHME models is almost 5 times more than the reported cases,³ which demonstrates a low accuracy compared to the GPCP system.

Although the prediction result indicates that the COVID-19 pandemic will end in November 2023, it cannot be stressed enough that this result is based on the recent development of the COVID-19 pandemic, and more specifically, the result is focused on the possible consequence caused by the Omicron variant. If a more transmissible variant appears, then our result needs to be adjusted accordingly. Since the pandemic will likely continue for another year, it is important for the public to remain alert to COVID-19. According to the prediction results, it shows that some of the heavily affected countries, such as the United States, the United Kingdom, and some European countries, exhibit a sharp decreasing trend after April 2022, so that the pandemic seems to be ending in 2022 in these countries, while in other countries (e.g., South Korea, Vietnam) this epidemic will continue until 2023 (shown in Figure 1C). Therefore, one cannot conclude that the COVID-19 pandemic will come to an end only by focusing on the development

of COVID-19 in some specific countries. Although vaccine rollout has been implemented successfully in some countries, and a large population has been fully vaccinated so far, it does not mean we are safe from and immune to SARS-CoV-2. The effectiveness of current vaccines was reduced for the Omicron variant for its resistance to antibodies. Figure 1D shows the prediction results of the development of COVID-19 in mainland China and Hong Kong. Based on the results, we can see that mainland China and Hong Kong both experienced an outbreak of COVID-19 in March 2022. However, compared to other countries, the outbreak in mainland China is much smaller, and it will likely be contained on approximately April 16, 2022. The main reason that mainland China has fewer confirmed cases is due to the strict restriction measures that the Chinese government implemented. Therefore, before a more effective vaccine is developed, we should still follow the anti-epidemic protocols, such as wearing face masks and limiting large-scale gatherings, to slow down the transmission speed of COVID-19 and to end the spread of the Omicron variant.

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DECLARATION OF INTERESTS

The authors declare no competing interests.