SHORT COMMUNICATION

Novel statistics predict the COVID-19 pandemic could terminate in 2022

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Abstract

Many people want to know when the COVID-19 pandemic will end and life will return to normal. This question is highly elusive and distinct predictions have been proposed. In this study, the global mortality and case fatality rate of COVID-19 were analyzed using nonlinear regression. The analysis showed that the COVID-19 pandemic could terminate in 2022, but COVID-19 could be one or two times more deadly than seasonal influenza by 2023. The prediction considered the possibility of the emergence of new variants of SARS-CoV-2 and was supported by the features of the Omicron variant and other facts. As the herd immunity against COVID-19 established through natural infections and mass vaccination is distinct among countries, COVID-19 could be more or less deadly in some countries in the coming years than the prediction. Although the future of COVID-19 will have multiple possibilities, this statistics-based prediction could aid to make proper decisions and establish an example on the prediction of infectious diseases.

KEYWORDS

case fatality rate, COVID-19, pandemic, prediction mortality, statistics

1 | INTRODUCTION

The COVID-19 pandemic caused by the novel coronavirus SARS-CoV-2 has claimed over 5.6 lives worldwide.[1,2] It has greatly affected billions of people worldwide for around 2 years and could have pushed 71–100 million people into extreme poverty due to the lockdown of cities and restrictions of traveling, gathering, and social distancing.[3]

Many people worldwide, including scientists, officials, and entrepreneurs, are wondering when the pandemic will end and life will return to normal. This question that is important for many people to make decisions is highly elusive. We have found few papers giving the answer with robust evidence.[4] The United Kingdom government and some scientists considered that the pandemic could terminate in 2022–2023, 2023–2024, or even in 2026.[5] A recent analysis suggested that the pandemic will terminate in March 2022 based on the relatively low pathogenicity and high transmissibility of the Omicron variant,[4] while the World Health Organization (WHO) claimed that the pandemic is nowhere near over and new variants are likely to

emerge.[6] Nevertheless, more statistics are needed to support any prediction on this issue.

Here, we show that the COVID-19 pandemic could terminate in 2022, but it could be more deadly than seasonal influenza by 2023, using novel statistics from the epidemiological data of COVID-19.

2 | METHODS AND MATERIALS

The COVID-19 data of each country or territory were collected from the WHO website on COVID-19,[2] and the changes in the global daily new cases (GDN-cases), global daily new deaths (GDN-deaths), and case fatality rate (CFR) over time were calculated. The CFR was calculated by dividing the GDN-death counts of each day by the GDN-case counts of the date 14 days earlier because the death dates were around 14 days later than the case confirmation dates on average.[7] The GDN-death data of July 21, 2021, was excluded as it was the unique outlier higher than its two adjacent data by >100%.

Linear and nonlinear regression equations (e.g., quadratic, cubic, compound, logarithmic, and power function) incorporated in the software tool SPSS (version 23.0) were tested for matching the temporal tendencies of the epidemiological data of COVID-19. The regression equation of no minus values regressed with any date in 2022 was assumed to match the temporal tendencies the best, if its R^2 value is the highest.

The average mortality of seasonal influenza, 1300 (800–1800) deaths/day globally, was calculated from the relevant annual esti-mate.[8] The CFR of seasonal influenza, around 0.12%, was calculated with the seasonal influenza data of the United States in the years 2010–2020.[9] Importantly, seasonal influenza and COVID-19 share a similar age distribution of deaths, namely that the majority of deaths were from the age group ≥65-year-old.[10,11]

3 | RESULTS

Figure 1 shows the GDN-deaths, which increased greatly in 2020, were generally in decline in 2021 ($p < 0.01$, by the Mann-Kendall test). Nonlinear regression using the GDN-death data after January 1, 2021, suggested that the equation, $LN(Y) = 9.470 - 0.002\,T$, where Y means the GDN-deaths, $T = 1$ for January 1, 2020, and $T = 2$ for January 2, 2020, fits the best the declining tendency of the GDN-deaths ($R^2 = 0.539$, $p < 0.001$), among the tested regressed equations.

As per this equation, COVID-19 caused around 13000 deaths/day in January 2021 and 6000 deaths/day in January 2022 and will cause around 3900 deaths/day in August 2022, 2600 deaths/day in March 2023, and 1300 deaths/day in February 2024 (the red dotted line in Figure 1). Therefore, compared with the average daily mortality of seasonal influenza, 1300 (800–1770) deaths/day worldwide, COVID-19 that was around nine times more deadly in January 2021 could be only one to two times more deadly than seasonal influenza by 2023.

Figure 1 shows that the GDN-case counts did not decline sig-nificantly in 2021. This means that the decline of GDN-deaths re-sulted from the decline of the COVID-19 CFR. Figure 1 does show that the CFR declined significantly after April 15, 2020 ($p < 0.01$, by the Mann–Kendall test). Curve estimation using the CFR data after April 15, 2020, identified that the logarithmic equation, $Y = 0.105 - 0.015LN(T)$, where Y means the CFR and $T = 1$ for April 15, 2020, and $T = 2$ for April 16, 2020, fits the best the declining ten-dency of the CFR ($R^2 = 0.834$, $p < 0.001$), among the tested regressed equations incorporated in SPSS. This equation suggests that the CFR was around 10.5% on April 15, 2020 and will decline to 0.36% in August 2022, 0.24% in November 2022, and 0.12% in March 2023 (the blue dotted line in Figure 1). Therefore, in terms of the CFR, COVID-19, which was around 80 times more deadly in April 2020, could be only one to two times more deadly than seasonal influenza by 2023.
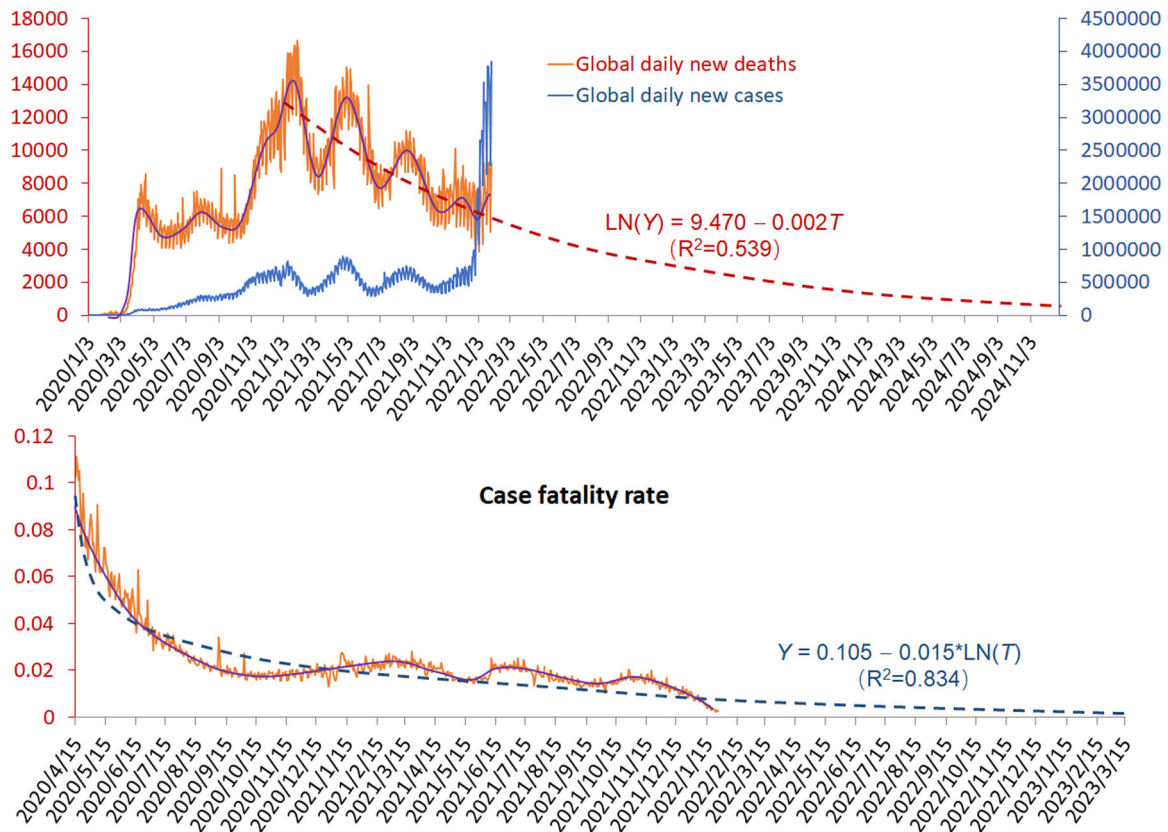
FIGURE 1 Changes of the global daily new cases, daily new deaths, and case fatality rate of COVID-19 over time

4 | DISCUSSION

It can be predicted from the above statistics that the COVID-19 pandemic could terminate in 2022 in terms of its mortality and CFR, but COVID-19 could be one or two times more deadly than seasonal influenza by 2023.

As the statistics were based on the global data of several variants, including the Lambda, Delta, and Omicron variants,[1] the prediction could withstand the emergence of new variants. Meanwhile, as the herd immunity against COVID-19 established through natural infections and mass vaccination is distinct among countries,[1] COVID-19 could be more or less deadly in some countries in the coming years than the suggestion.

Multiple facts support the above prediction. First, the four influenza pandemics started in 1918, 1957, 1968, and 2009, and lasted 2, 1, 2, and 1 year(s), respectively.[12] This suggests that the COVID-19 pandemic, which has lasted 2 years, could terminate in 2022. Second, many people have obtained specific immunity against COVID-19 through natural infection of SARS-CoV-2 and mass vaccination, which is the robust mechanism to terminate the pandemic.[13–15] For instance, over 80% of people in China and over 75% of people in the United States have been vaccinated against COVID-19,[1] and over 50% of people worldwide could be infected by SARS-CoV-2 by April 2022.[4] Third, the relatively low pathogenic Omicron variant has been spreading very rapidly worldwide.[1,4] This variant is actually vaccinating millions of people every day, including those reluctant to be vaccinated, with a kind of highly effective live vaccine.[4,13–15] The variant hence aids to eliminate the previous SARS-CoV-2 strains and terminating the pandemic earlier. Like a forest fire, the more rapidly the COVID-19 pandemic spreads, the earlier it will terminate naturally.

To note, the ongoing worldwide outbreak of the Omicron variant is forming a wave of the GDN-cases much higher than the previous waves of the GDN-cases (Figure 1). This wave could lead to a high wave of deaths and the healthcare systems in some countries could be overwhelmed for some time, and proper interventions, for example, mask-wearing, disinfection, and social distancing remain desirable.[16] A recent study suggested that these interventions also aided to reduce the incidence and mortality of multiple other infectious diseases.[17]

In the future, some variants of SARS-COV-2 could break through the immunity in those people who have recovered from infections of SARS-COV-2 or have been vaccinated against COVID-19.[15] A study suggested that these variants are usually less pathogenic because human herd immunity has been strengthened by repeated natural infection of SARS-COV-2.[11] In the long run, a few SARS-CoV-2 variants carrying heterogeneous genomic parts could spark a new pandemic, similar to the fact that influenza viruses spark four pandemics last century.[12,15] This is also supported by the fact that a variant of porcine coronavirus became much more deadly and sparked a terrible swine pandemic in the 2010s, leading to 7 million deaths of pigs in the United States with a mortality of around 10%.[18] These possibilities indicate we should keep long-term surveillance of the circulation and mutation of SARS-CoV-2.

Despite the much uncertainty regarding the development of COVID-19, the above engaging prediction strengthens the hope to return to normal life in the near future, even though we are facing the very high wave of the Omicron variant outbreak. It also aids to make proper policies. For example, this prediction suggests that China could lift its restrictions on international transportation by the summer of 2022 because many vaccinated people in China maintain some immunity against SARS-CoV-2 and the COVID-19 GDN-cases shall likely reduce greatly by that time. Also, COVID-19 spreads more slowly with less pathogenicity in warm seasons, and COVID-9 cases are less likely to be coinfected with another respiratory disease (e.g., influenza) in warm seasons.

Prediction of infectious diseases that is important for making decisions is usually complicated.[19] The above prediction based on nonlinear regression of the temporal tendencies of the mortality and CFR of COVID-19 could be an example for similar work in the future.

CONFLICT OF INTERESTS

The author declares that there is no conflict of interests.

DATA AVAILABILITY STATEMENT

The data supporting the views of this analysis are available from the corresponding author on request.

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