

# “Omicron in the United States”

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Date: June 25, 2022

## Summary

In the Summary, I am not linking any material to relevant websites. Linking will begin in the next section, Detailed Analysis. The purpose of the Summary is to provide an easy-to-read, almost lay-level description of the topic, *“Omicron in the United States”*.

Two topics I have followed closely and am writing articles on are tentatively titled *“Omicron in the United States”* and *“Omicron in Africa with emphasis on South Africa.”* This article is the first of the two. The two will appear as two separate unpublished articles on the Center for Arms Control and Non-Proliferation’s website.

The overall goal of this study is to understand the features of the Omicron variant and the newer Omicron subvariants BA.4 and BA.5 and how they impact the United States. The Omicron and subvariants features include their highly contagious nature, their ability to evade antibodies from vaccines and previous infection, and their apparent lower virulence leading to few hospitalizations and almost no deaths. Their ability to evade antibodies has led to a big increase in infections and sometimes repeated infections in the same person.

For the near future, I am optimistic that we should not be overly concerned about Omicron infections. My optimism is apparently supported by many of the United States population, who seem to know this intuitively and/or are fed up with activity restrictions. Thus, they go about their daily activities without taking precautions. This is likely a big mistake for the unvaccinated and old people, who should minimize being indoors where many unmasked people are present, and they should take precautions indoors such as wearing masks and social distancing.

Apparently, the relaxation of precautions has caused infections all around us from Omicron and from its more contagious subvariants BA.4 and BA.5. The subvariants are now responsible for an increasing number of infections in the United States. This leads me to ask whether COVID (corona virus infectious disease), which includes Omicron, BA.4, and BA.5 will evolve into a strain of coronavirus that causes something like the common cold, or will it become like seasonal flu? There is, however, a difference. It

appears to me that Omicron variants infect many more people in most locations in the United States than the common cold or seasonal flu.

A word of caution. My lack of concern over COVID infections could change quickly since it is possible that more virulent strains will develop. We may see new COVID variants possibly originating from bats that will not respond to antibodies or B- and T-cells produced by today's vaccines or previous infection. Furthermore, for a pandemic virus different from corona viruses, such as lab-created potential pandemic pathogens, we will not be protected. We would be starting over again.

## Detailed Analysis

Throughout my analyses, [for cases and deaths](#) the website "US COVID-19 cases and deaths by state;" and [for vaccinations](#) the website "USA FACTS: US Coronavirus vaccine tracker" were consulted. In addition, both the CDC and the WHO websites provide up-to-date information including graphs that are a major part of the analyses and will be linked when appropriate.

### Introduction

Two topics I have followed closely and am writing articles on are tentatively titled "*Omicron in the United States*," and "*Omicron in Africa with emphasis on South Africa*." This study is part one of the two. These will appear as two separate unpublished articles on the [Center for Arms Control and Non-Proliferation's website](#) in the section on Biological and Chemical Security.

By my estimate (see below for the calculation), a person living alone over the course of a year might spend perhaps a total of seven full days indoors in public or outdoors in a big crowd, for example eating in restaurants or attending outdoor sporting events. The probability is only about 0.2% that you would become infected at least once with Omicron or its BA.2 or BA.2.12.1 Omicron subvariants, so would feel safe in most social settings.

Now, suppose you spend three hours a day five times a week every week with your family, a spouse and children, the probability of getting infected at least once in a year can increase substantially. The probability is about 21% (also, see below for my estimate calculation). This typical family situation is risky, because an adult parent is frequently physically close to children and children could be frequently physically close to each other. Furthermore, [children are more likely to be infected with no symptoms](#).

But what risk of hospitalization or death would you be taking? The number of deaths is low at present. [For the week ending June 24, 2022](#), only 4.4% of new infections resulted in hospitalizations, and only 0.28% resulted in deaths. Many people seem to know this intuitively and/or are fed up with activity restrictions; so, they go about their daily activities without taking extra precautions. This is likely a big mistake for the unvaccinated, who should minimize being indoors when many unmasked people are present, and they should take precautions such as wearing masks and social distancing.

There is a serious complication with Omicron variants. They evade virus-disabling polyclonal antibodies produced in our body from vaccines or those who were infected. The polyclonal antibodies bind to surface molecules on the Omicron virus called epitopes. If mutations are present in almost all to all the epitopes, the polyclonal antibodies may not bind. Omicron is protected from binding [of over 85% of](#)

[polyclonal antibodies](#) with the remaining 15% perhaps providing some protection from infection. This complication implies that herd immunity cannot be approached for these variants, which argues for new vaccines targeted to the variants.

The arguments presented below should convince you that my thinking is reasonable, so optimism is warranted at least for now.

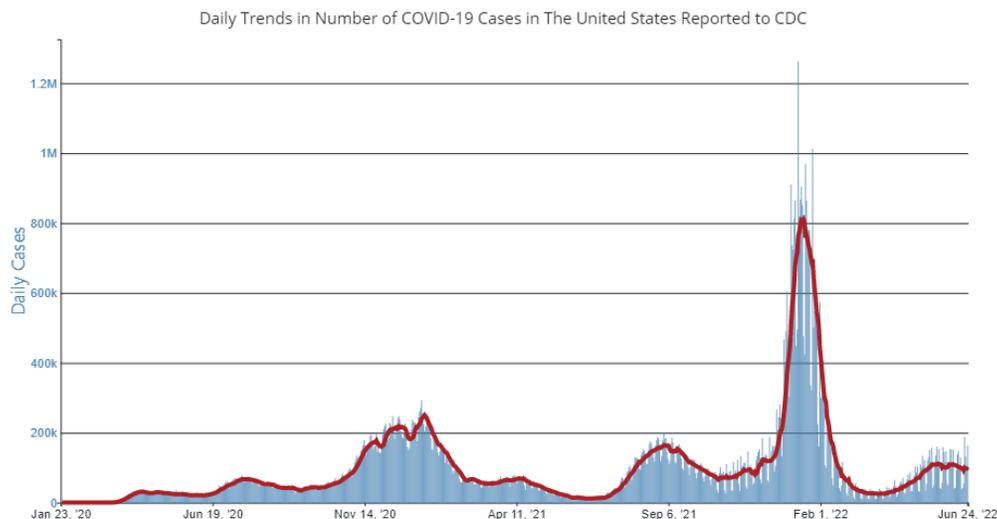
*Highly contagious Omicron variants now account to almost all COVID-19 infections in the United States*

For [the week ending June 18 2022](#) in the United States, Omicron variants BA.2 and BA.2.12.1 are the dominant strains, accounting for about 65% of cases. (Look at the bar graph on the left at the website). An older variant BA1.1 is present about 0.1%. That the percentages of Omicron BA1.1 has essentially disappeared is likely due to the high percentages of BA.2 and BA.2.12.1. The rapidly increasing percentages in the United States of the South African variants BA.4 and BA.5 now account for about 35% of cases. (Since the table for the United States on the website covers all Omicron variants, the percentages in the table must add to 100%).

It is noteworthy that the Delta variant is completely absent, 0.0%, from the United States [according to the CDC](#). When asked by me why Delta is 0.0%, Edward Ryan MD, Director of International Infectious Disease at Massachusetts General Hospital, responded by e-mail “Yes there is some cross reactivity of antibodies but not sterilizing. Indeed, omicron replaced delta largely because of intrinsic increased transmissibility, and that in part included not great antibody clearance.”

For Omicron, the percentages of BA.2 and BA.2.12.1 will become lower as the more contagious BA.4 and BA.5 takes hold in the United States.

Figure 1 is the CDC graph of [Daily Cases for COVID-19](#) over time through June 24, 2022.



**Figure 1.** CDC graph of Daily Cases for COVID-19. For any date, it is possible to see the number of Daily Cases on the CDC website by hovering over the graph on the website. There were 11,879 Daily Cases on

Apr 1 (around the minimum) and 161,431 Daily Cases on June 24. The red line is the seven-day moving average, and on June 24 is 102,250.

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The seven-day moving average is a better measure of new cases as it is not subject to the fluctuations seen in the daily numbers. The rapid increase to the peak began in December 2021, when we were beginning to be aware of the highly transmissible Omicron variant.

There is a clear slightly downward trend in the seven-day moving-average data, which may be the beginning of a downturn that I expected until two recent events had me worried that the current Omicron variant outbreak bolstered by the [growing numbers of BA.4 and BA.5](#) might continue to be a full-blown outbreak like the one beginning in December 2021. I suspect that many communities are no longer reporting new cases, because citizens of these communities are not reporting them to department of health authorities. Even the CDC graph in Figure 1 does not reflect the rapid increase we saw in December 2021. There was a study published in the Journal Clinical Infectious Diseases early in the pandemic that looked at reporting of disease from February–September 2020. [They reported](#) “We estimated that through the end of September 1 of every 7.1 nonhospitalized illnesses may have been nationally reported.” I submit that lack of reporting is likely worse today.

One event that contributed to a relaxation of COVID restrictions and more risky behavior was the recent decision by US district judge Kathryn Kimball Mizelle in Tampa Florida who [struck down](#) the Biden administration’s mask mandate covering airplanes, airports and other public transportation. I have observed greater community spread, as new infections seem to be all around me.

To provide perspective using the June 24 seven-day moving average data where there were 102,250 Daily Cases. (Note that for each updated Figure 1, the CDC changes slightly numbers from the numbers listed in earlier versions of Figure 1, meaning the numbers I use in calculations may be slightly different from those you observe.) The population of the United States is about 334 million. So, the probability that you would encounter one infected person in one day is  $1.02 \times 10^5 / 0.334 \times 10^9 = 3.05 \times 10^{-4}$ , assuming the infected persons are evenly distributed throughout the United States and that contact with the infected person would result in you being infected. The probability of an infected person transmitting the infection to you from contact for a short time is actually small.

Let’s guess that a typical person in a year would spend perhaps a total of seven full days indoors or outdoors in a crowd where mostly everyone is unmasked, not considering family situations. Obviously, the seven days are not all at one time. Then, the probability that the typical person would become infected at least once is still low  $1 - (1 - 3.05 \times 10^{-4})^7 = 0.0021$  or about 0.2%. Almost all of us would feel safe in most social settings indoors sometimes without wearing a mask. This describes my personal situation living alone, but not for someone in a family of three or more people where there may be close contact for several hours per day.

Clearly, the more time you spend indoors close to an infected person, the probability of being infected can increase substantially. For example, suppose you spend three hours with your family five times a week every week. In a year, the probability of being infected at least once by my estimation is  $1 - (1 - 4.15 \times 10^{-4})^{3 \times 5 \times 52} = 1 - (1 - 4.15 \times 10^{-4})^{780} = 0.212$  or about 21%. A typical family situation is risky, because an adult parent is frequently physically close to children and children may be close to each other. [Children](#)

[are more likely to be infected with no symptoms](#). This behavior is, of course, based on my judgement of risk perception.

### Explanations for Omicron evading antibodies

In a study [published in the Proceedings of the National Academy of Sciences](#), the authors reported “cell-to-cell transmission that has the ability to evade antibody neutralization, accounting for efficient virus spread and pathogenesis, as has been shown for HIV and hepatitis C virus.” The study was accepted for publication on November 29, 2021 and published on December 22, 2021; therefore, the study could not include Omicron and its subvariants. I assume that that Omicron and its subvariants will also exhibit cell-to-cell transmission and avoid antibody neutralization.

Omicron virus that has spread throughout your body by cell-to-cell transmission could become more virulent, but not necessarily so, which we should see in the data on hospitalizations and deaths. As will be documented below, increased hospitalizations and deaths are not an increased virulence problem.

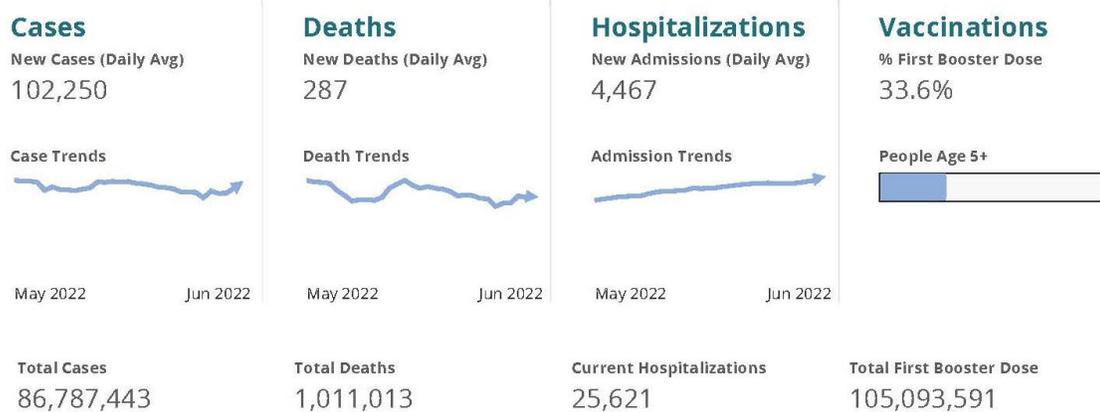
I propose an alternative explanation for evading antibodies, which leads me to suggest that Omicron will likely become much less virulent in the United States. Omicron evades polyclonal antibodies produced in our body from vaccines and previous infection. The polyclonal antibodies should bind to surface molecules on the virus called epitopes. If mutations are present in all the epitopes, antibodies may no longer bind to them.

To make a variant more contagious implies new mutations in the virus proteins that control contagiousness. In my opinion, mutations will occur in the other of the viruses 26 proteins as well.

Supporting my opinion, a large group of researchers [published a few months ago](#) in Nature (February 24, 2022) that Omicron epitopes have mutations that prevent polyclonal antibodies from binding. The publication is aptly titled “*Omicron escapes the majority of existing SARS-CoV-2 neutralizing antibodies.*” The authors state “Various single mutations of Omicron can impair neutralizing antibodies of different epitope groups... In total, over 85% of the tested neutralizing antibodies were escaped by Omicron... our data suggest that infection with Omicron would result in considerable humoral immune evasion.” I take “escaped by Omicron” to mean 85% of antibodies don’t bind to their epitopes, not that 85% of the epitopes prevent binding of polyclonal antibodies. Nevertheless, this publication supports my argument that mutations in epitopes protect Omicron variants from polyclonal antibodies.

This is a two-edged sword. On the one edge, the Omicron variants avoid antibodies; and on the other edge, the variants become less virulent causing less illness and almost no deaths. The other edge idea is supported by the data in Figure 2 and the discussion that follows Figure 2.

## Daily Update for the United States



CDC | Data as of: June 25, 2022 1:50 PM ET. Posted: June 25, 2022 2:50 PM ET

**Figure 2.** Cases, hospitalizations, deaths, and vaccination status for COVID-19 for May 2022 through June 22, 2022. [Recent case, hospitalization, and death data.](#)

Recent case, hospitalization, and death data are consistent with the thought that as Omicron variants become more contagious, they will become less virulent causing only mild illness, few hospitalizations, and few deaths.

Over the period from May 2022 through June 2022, the daily average New Cases is 102,250, daily average New Hospitalizations is 4,467, and daily average New Deaths is 287. Thus only 4.4% of New Cases resulted in hospitalizations, and only 0.28% resulted in deaths. Deaths are moving downward at a slow rate. Hospitalizations are slowly trending upward.

Future more contagious variants will have reproduced and therefore must be present in the human body. These Omicron variants may not disappear until specific Omicron vaccines are developed; or functionally equivalent, variants become non-dangerous when the cumulative mutations reach the point that virulence is stunted.

For now, I am cautiously optimistic, and Figure 2 is consistent with my optimism that Omicron will be far less virulent causing fewer hospitalizations and deaths. The upward trend in hospitalizations may be due to the rapid increase in the more contagious BA.4 and BA.5 subvariants in the United States, which should be less virulent.

### Conclusion

Earlier, I made the observation that Omicron infections are a two-edged sword. On one edge, Omicron variants avoid antibodies; and on the other edge, the variants become less virulent causing little illness and very few deaths.

I hope the arguments presented above have convinced you that these conclusions are reasonable with the caveat that the situation could quickly change. For now, my optimism that we should not be as concerned over Omicron infections is reasonable. Of course, there is an issue for everyone's analyses, as we are looking at a moving target that is changing from week to week.

Ending on a cautionary note: While the data argue that COVID-19 has become much less virulent; it is possible that in the future, viruses could become more virulent because they are protected from antibodies by cell-to-cell transmission as has been shown for and hepatitis C virus and HIV virus.