

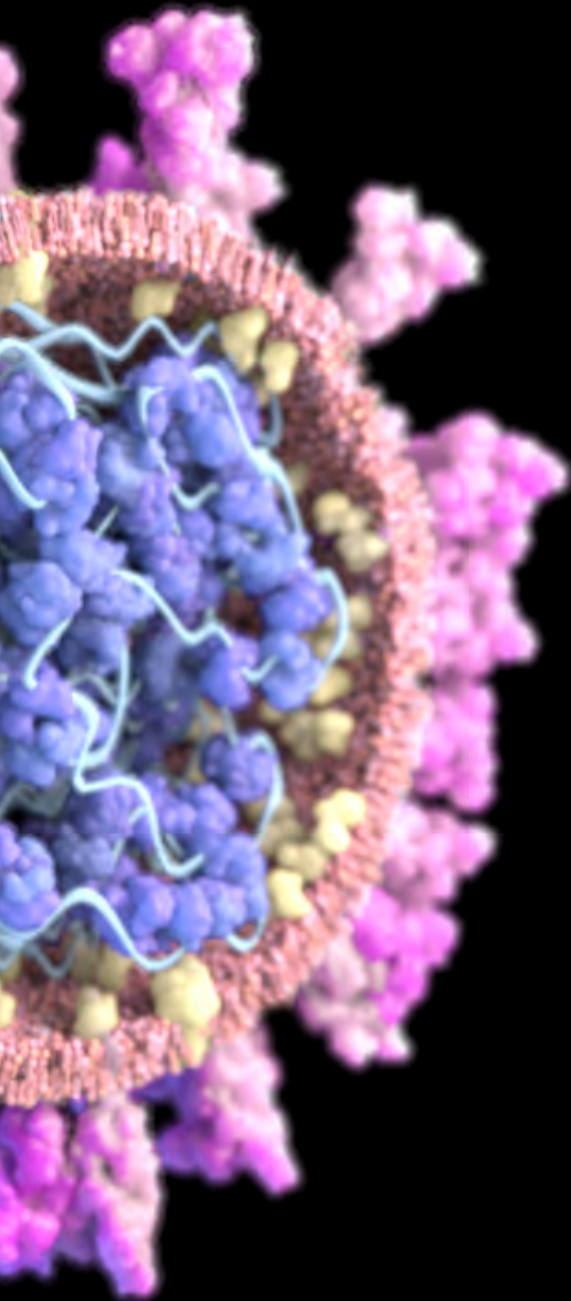
**LIFE
(SCIENCES)
AFTER
COVID-19**



How the Delta Variant Impacts Vaccination Strategies

Authored by Paul Desormaux, Klick Consulting

klick
ck
HEALTH



The piece you're about to read is from Klick Health's Life (Sciences) After COVID-19 series, a collection of expert perspectives designed to inform and inspire the life sciences community for the coming changes and opportunities we anticipate as a result of this global health crisis.

We invite you to engage with a multitude of these viewpoints by seeking out other pieces from this series, including *Health Equity and Vaccines* and *Could a Roadmap to Wellness Solve Adherence to Health Regimens?* at **covid19.klick.com**.

Throughout the COVID-19 pandemic, the Klick Consulting and Applied Sciences teams have been closely researching infection data from several sources to better understand the nature of the pandemic and how it has been evolving.

During the global vaccine rollout, our team took a keen interest in tracking the data, and manually scraped daily case and death counts from December 1, 2020, through July 30, 2021, from 192 countries to understand the impact of vaccines as they became more widely available.

Analysis A: Change in cases and deaths over time

First, we wanted to understand how cases and deaths were impacted by the delta variant's emergence in the population.

Figures 1 and 2 visualize cases and deaths over time split by *First-Dose-First* and *Full-Dose* countries.

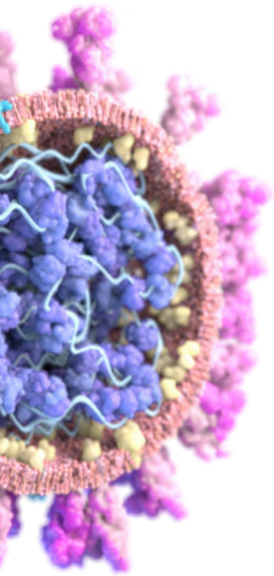
In essence, the *First-Dose-First* strategy is a public health strategy looking to maximize the number of individuals with partial COVID-19 immunity by giving one vaccine dose to as many people as possible, as quickly as possible. The *Full-Dose* strategy seeks to maximize the number of fully protected individuals by giving full vaccine doses to as many people as possible, as quickly as possible.

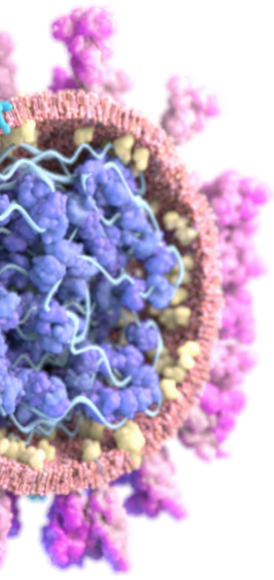


The methodology for determining whether a country is classified as a *First-Dose-First* or a *Full-Dose* country for the purpose of these analyses is set out in the Methodology and Terminology section below.

What is of note in **Figure 1** is the similarity in the change in cases prior to the emergence of the delta variant and the drastic difference afterwards. The *First-Dose-First* strategy made sense prior to the new variant but it is no longer as effective. In **Figure 2** we see that in contrast to the case rates, the death rates were always more successfully curbed in countries following the *Full-Dose* strategy. This was exacerbated after the expansion of the spread of the delta variant in early April.

Another important note from this analysis was that the uptick in cases seen since the beginning of July due to the increase in the delta variant had not yet resulted in an increase in deaths.





One possible explanation for this is that deaths are typically a lagging indicator (meaning it takes some time after infections increase before deaths also increase) so it may not yet be visible in the data. The other is that the *Full-Dose* vaccination strategy is preventing a rise in the number of population-wide deaths by immunizing (or drastically reducing the severity of infection in the event of breakthrough infections) those most likely to suffer hospitalizations or deaths if infected.

Analysis B: Change in cases by vaccination rate—before and after delta variant emergence

Our team noted that **Figures 1 and 2** compared cases to time and were not controlled for vaccination levels, and decided to include vaccination levels in the analysis. Based on the case vs. time graphs in **Figures 1 and 2**, we hypothesized that *First-Dose-First* and *Full-Dose* strategies would have a similar impact on cases prior to the expansion of the delta variant but that the *Full-Dose* strategy would have superior results after the delta variant emerged.

In **Figures 3 and 4** we looked at the *First-Dose-First* and *Full-Dose* countries' change in case rates based on their vaccination levels.

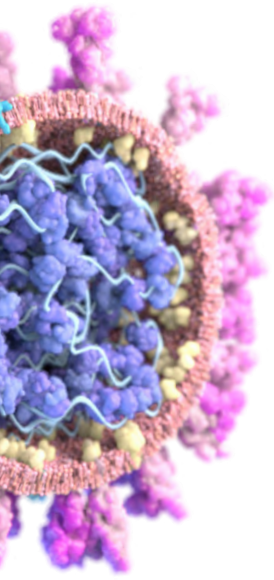
In **Figure 3**, based on the changes in case counts for the *First-Dose-First* strategy in May, it seemed at that time to be the better strategy prior to the emergence of the delta variant. When the delta variant emerged and numbers were again taken in July, the inverse trend was seen. The *Full-Dose* strategy then appeared to be more impactful at decreasing case rates.

Figure 4 shows the difference in case rate by vaccination level before and after the global uptick in cases throughout July. This change in time further highlights the *Full-Dose* strategy as the preferred solution.

Analysis C: Change in deaths by vaccination rate—before and after delta variant emergence

In Analysis C, we look at the *First-Dose-First* and *Full-Dose* countries' change in death rates based on their vaccination levels. **Figure 5** shows that the death rate was mitigated by the *Full-Dose* strategy (relative to the *First-Dose-First* strategy) prior to delta variant emergence, and this has been exacerbated by the spread of the delta variant.

Figure 6 shows the differing changes in death rate by vaccination level before and after the global uptick in cases in July. As noted in Analysis A, the uptick in cases seems to have had little impact on death rates thus far.



Analysis D: Change in cases by vaccination rate for all countries— comparing full-dose rate to single-dose rate

Finally, our team wanted another way to look at the data to confirm the hypothesis that the *Full-Dose* strategy is now more effective at slowing the number of cases. We also wanted a view of the data that combined all countries to remove possible biases in the data based on the split of countries into the two categories.

This section combines all countries together and compares the case rates based on countries at both their single-dose rate and full-dose rate. Using this new way to segment the data, in **Figure 7**, the trends still show that the *Full-Dose* strategy is more effective at controlling cases.

Final Thought: The importance of automated and up- to-date data sets

This data set illustrates the importance of up-to-date and automatically collected data sets. Outdated analyses would miss key information on variant spread and would not accurately reflect the relative successes of the two vaccine strategies.

Methodology and Terminology

A *First-Dose-First* country is one that has executed more single doses compared to two doses than the average number in all countries of the world. Individuals vaccinated compared to individuals who are fully vaccinated were taken on every date and across every country to classify each country as either a *First-Dose-First* or *Full-Dose* country.

The median level of this ratio of individuals vaccinated to individuals fully vaccinated was 2:1. All countries who have averaged above this level across all dates since their first vaccination were deemed *First-Dose-First* and all countries below this were deemed *Full-Dose*.

Change in cases (or deaths) / million is classified as the amount of increase or decrease in cases (or deaths) when compared to the zero data point on the x-axis. On the first analyses the x-axes on the graphs are for date since the country's first vaccination. On the second group of analyses, the x-axes on the graphs are for percent of vaccination level.

— FIGURES

Analysis A: Change in cases and deaths over time

Since the rapid increase in delta variant, the *First-Dose-First* strategy has become less effective for decreasing the case rate

Additional analysis must be done to compare the level of vaccination rates between the strategies.

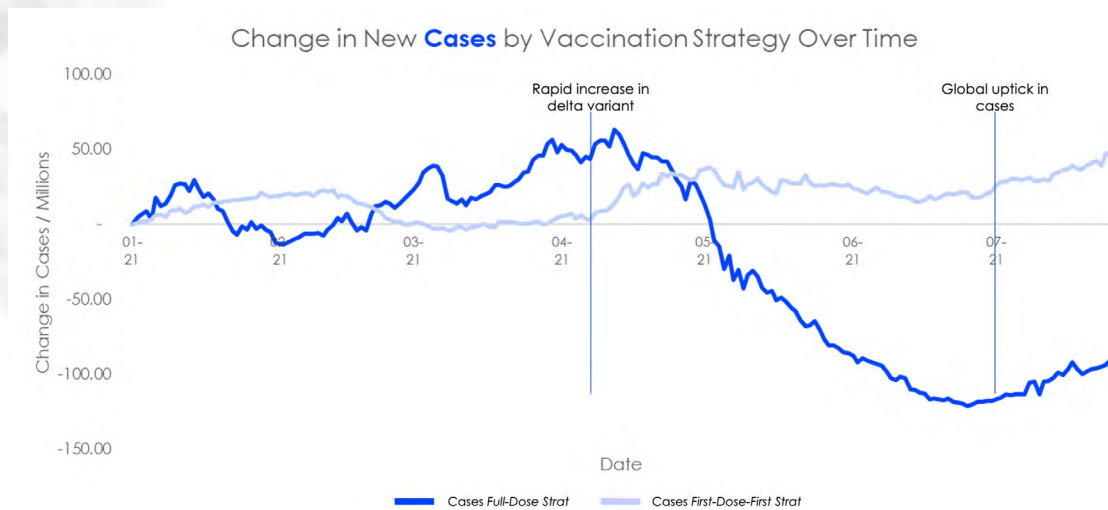


Figure 1

Death rates have been consistently decreasing within *Full-Dose* strategy countries

Additional analysis must be done to compare the level of vaccination rates between the strategies.

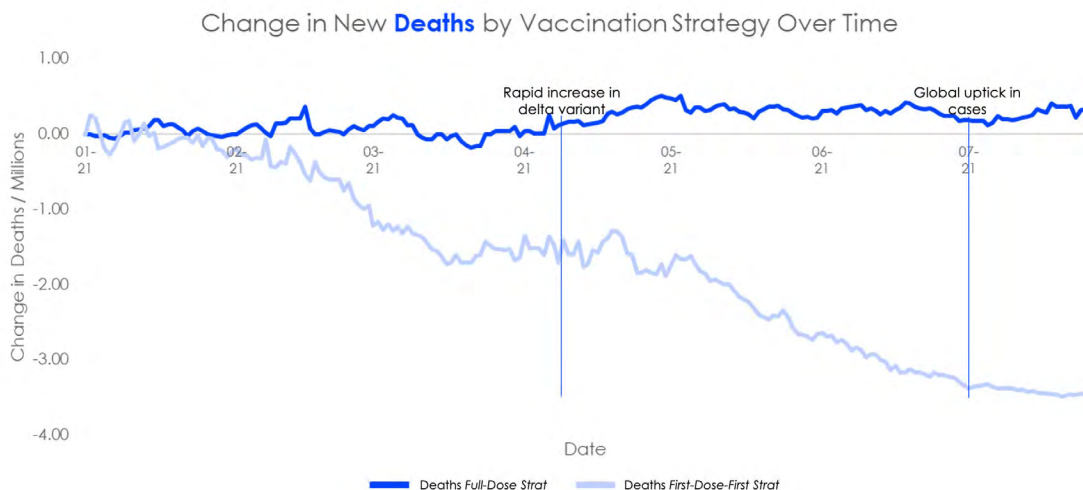


Figure 2

Data pulled from the Open Source site <https://ourworldindata.org/>

— FIGURES

Analysis B: Change in cases by vaccination rate – before and after delta variant emergence

Since the rapid increase in the delta variant, *Full-Dose* strategy has been more effective **at slowing cases**.



Figure 3

Since the worldwide increase in cases in July, *First-Dose-First* strategy has become even less effective **at slowing cases**.

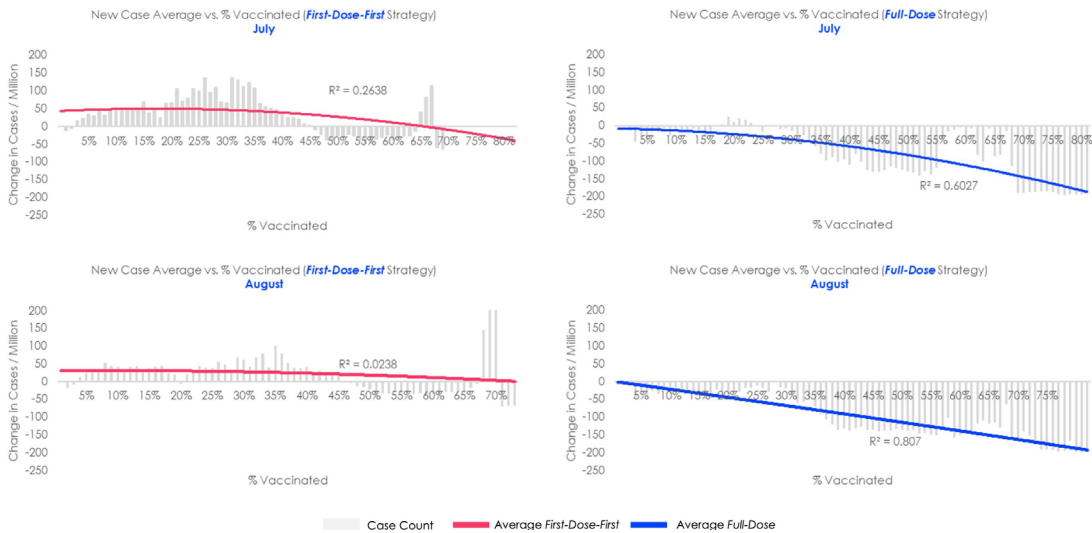


Figure 4

Data pulled from the Open Source site <https://ourworldindata.org/>

— FIGURES

Analysis C: Change in deaths by vaccination rate – before and after delta variant emergence

Prior to and after the increase in delta, countries following a *Full-Dose* strategy were more effective at slowing deaths.

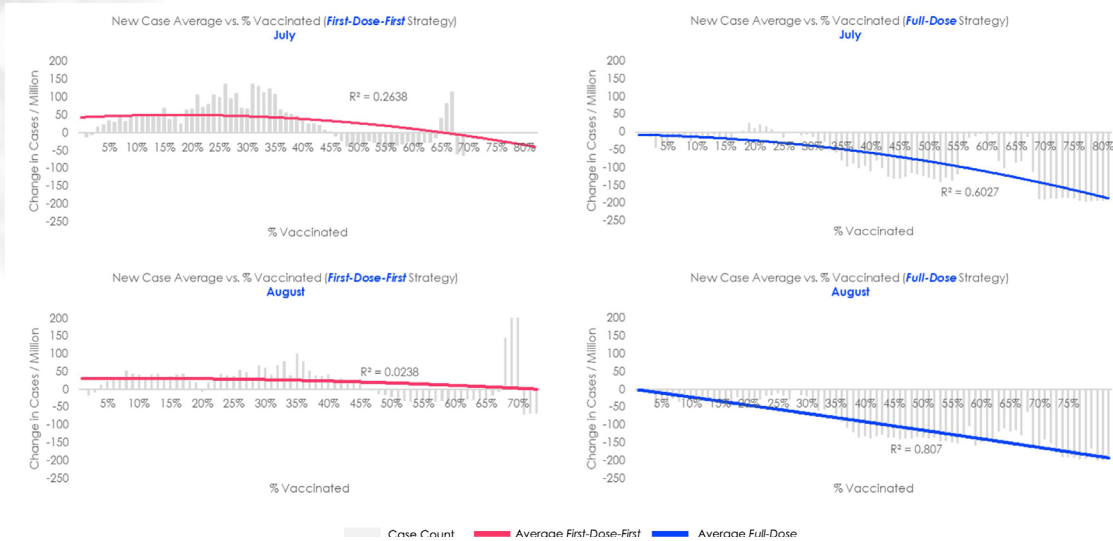


Figure 5

Since the worldwide increase in cases in July, the change in death rates based on vaccination levels have not been impacted.

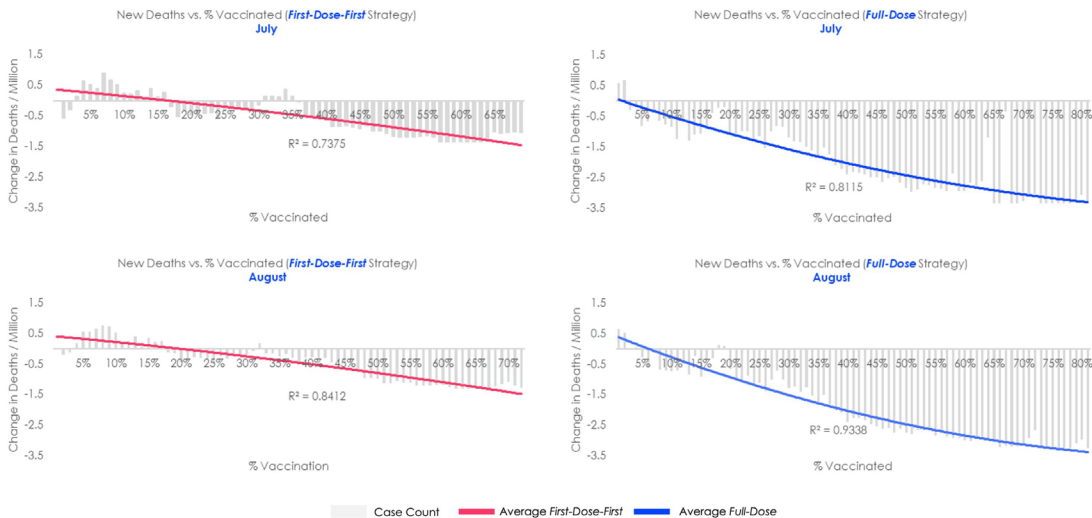


Figure 6

Data pulled from the Open Source site <https://ourworldindata.org/>

— FIGURES

Analysis D: Change in cases by vaccination rate for all countries – comparing full-dose rate to single-dose rate

Combining all countries together and comparing *Full-Dose* and *Single-Dose* rates shows the greater impact on case reduction following *full-dose* execution.

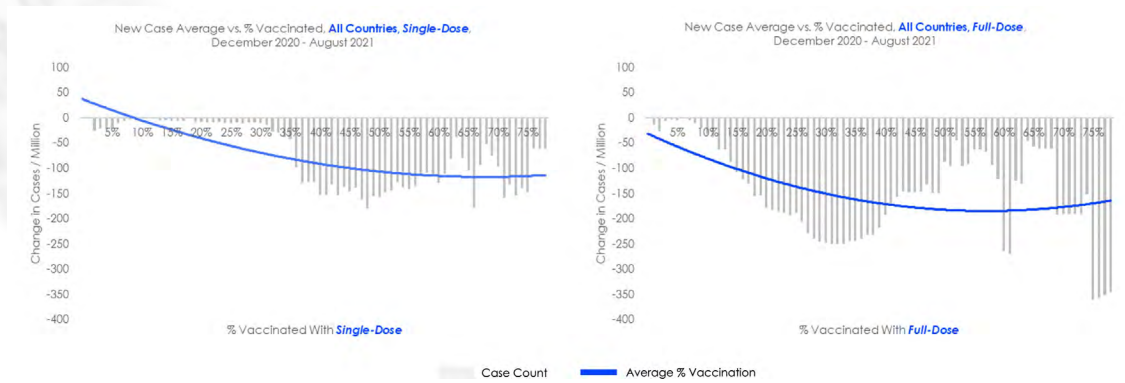


Figure 7

Data pulled from the Open Source site <https://ourworldindata.org/>



Paul Desormeaux

Klick Consulting

Paul Desormeaux is a healthcare consultant with over five years of experience researching and consulting for major pharmaceutical and medical device companies.

Part of Klick's expanding Consulting and Data Science practice, Paul specializes in developing digital offerings for companies who are looking to commercialize in the pharmaceutical industry.

He is one of Klick's experts on telemedicine and leads a number of business development initiatives across Klick Consulting.

Prior to joining Klick, Paul held several roles with consulting firms across healthcare specialties with experience in market access, pharmaceutical pricing, and supply chain management.



While change can create challenges, it also opens the door to new opportunities. Join us as we explore the many imaginable paths to post-pandemic growth. We welcome you to start a dialogue with the author of this piece:

Paul Desormeaux
pdesormeaux@klick.com

Disclaimer: Klick Inc. is not a law firm, and the authors of this document are not lawyers. The information provided in this document is not intended to be taken as legal advice. If you have legal questions, please seek the advice of a licensed attorney.