

Part 1:

How Long Will The 4th Wave Burn In The US?

The [July 1st Forecast](#) correctly predicted the increase in cases among unvaccinated, landing within 1% of the actual incremental deaths. The [August 1st Forecast](#) also correctly predicted that it would get much worse, increasing from 8,563k to 30,167 - we landed within 10% of that forecast at 27,600 COVID-19 deaths. This forecast, September 1st, is projecting it will continue to get worse, adding over 40,000 in incremental deaths by the end of the month and more than 150,000 deaths by the end of the year. With two powerful ways to slow the spread of the virus and reduce deaths, this wave has [rightly been called](#) ***the wave of preventable suffering***.

Why is the pandemic getting worse again? [CDC data](#) shows that 28% of those 12 and older are yet to initiate a single dose of the vaccine. 15% of Americans are under 12 and are not yet eligible. Aligning with this data, The Ad Council tracking shows about 15% of American Adults in the “Never-Ever” camp. They say they will “never ever” get vaccinated unless mandated to do so -- and even then, many (two-thirds) say they will refuse the mandate. There is another 13% of American Adults in the “Hesitant, but open” camp. They have not yet been vaccinated, but might do so.

By my calculations, if we vaccinated an additional 11% of Americans, we would effectively end the pandemic without losing another 150,000 lives. Most European countries face a similar gap. Vaccinations are not yet sufficient to end the pandemic, and those not yet vaccinated may be difficult to convince. This dynamic is at the heart of why the pandemic is getting worse.

For this month’s forecast update, I have two parts. Part 1 addresses how we got to where we are at, and the forecast of how the pandemic ends. Part 2 focuses on the segments of the population that are not yet vaccinated and what might change between now and the end of the year.

Part 1: How We Got Here

Unvaccinated are responsible for spreading Delta.

In partnership with Brown University School of Public Health, Harvard, The Nevada State Public Health Lab and Washoe County Health District, I studied every case of COVID in Washoe County over a six month period (from February 1 to July 29th). What we found was 94.5% of cases, 96.0% of hospitalizations and 100% of deaths were among the unvaccinated. The population we studied mirrored the US national average, with 51% of the population in this county “Fully Vaccinated” by the end of the study period. The ratio of confirmed cases among Fully Vaccinated was 1 in 709, while the ratio for unvaccinated was 1 in 40. **The implication of**

this disparity between unvaccinated and vaccinated is that if everyone was vaccinated, the R-naught would have been well below 1, and the virus would have burned itself out.

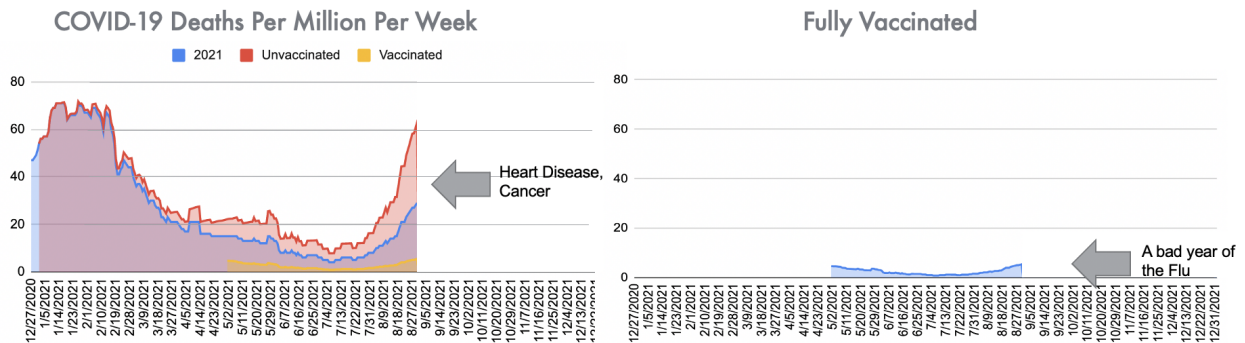
During the study period, in Mid-May, the [CDC Guideline for masking changed](#). Those vaccinated could remove their mask in most settings. But, those unvaccinated, the guideline stated, should continue to wear their masks when in public. The unvaccinated did not, by and large, follow the guideline.

As masks reduce transmission, it didn't take long to observe cases among unvaccinated rising. In Washoe county, a county with 231,778 unvaccinated individuals, there were 5,790 unvaccinated persons testing positive for COVID-19 by the end of the study period. That is 1 in every 40 unvaccinated people with a confirmed SARS-CoV-2 infection. Considering that confirmed cases generally undercount total infections by a factor of around 3, it is likely that 1 in every 13 unvaccinated people were infected with COVID and had the potential to spread it to others. It is in this environment that Delta grew from a small percentage of overall infections to the dominant strain.

The wave we are experiencing right now, which took 27,600 lives last month in the US, and will likely take another 150,000 before the end of the year is directly the result of the unvaccinated and unmasked.

Unvaccinated People Are Suffering The Most

It is mostly the unvaccinated, 12 and older, that are filling up the hospitals and dying at an average rate of nearly 1,000 per day over this last month. This equates to 70 deaths per million per week in the US as of the writing of this article. For the eligible but unvaccinated, COVID is once again the #1 killer in the US. COVID is killing the unvaccinated at nearly twice the rate of the #1 and #2 killers, Heart Disease and Cancer. For the eligible but unvaccinated, it is taking an increasing number of people in the prime of their life. The median age of a Hospitalized Unvaccinated person was 53 in Washoe, and. Data from Israel shows a similar pattern - median age of 52 among unvaccinated hospitalized vs 74 for fully vaccinated (as of August 14).



The hospital bills are mounting. In Washoe County, a relatively small county of a little less than half a million people, the estimated cost of hospitalization for the unvaccinated is expected to exceed \$20 million over the next four months, [based on the KFF \\$20,000 per hospitalization](#). Nationwide, the expected bill will be about \$15 Billion between now and the end of the year.

Applying the US Government’s statistical value of a life of \$8.7 million, this wave, a wave that could have been avoided with more vaccinations and continued mask use, will cost the US \$1.7 Trillion in economic impact. That’s on top of the trillions in economic impact already experienced due to this pandemic.

We Are All Paying The Price

We are all suffering from The Fourth Wave as hospitals fill up. Non-COVID emergencies are fraught. My son broke his foot last week, and I can’t begin to describe the complexity of navigating around emergency rooms clogged with COVID patients. Necessary procedures that aren’t as time sensitive are being postponed for many -- my wife included. Because too many decided not to get vaccinated, we are all suffering from a situation where we have to adapt to how we interact with one another, and how we engage in the economy.

While a few insurance companies are raising the premiums on the unvaccinated to account for their higher risk and cost, for the most part, we all are paying the price of tens of billions in COVID hospital bills from the unvaccinated. We will all pay the price of over a trillion dollars in economic impact due to loss of life of the unvaccinated.

And yet, in an extreme case of playing politics with people’s lives, mostly conservative states have passed laws banning mask mandates -- even though the science is clear that surgical masks or better (e.g. KN95, or N95), significantly reduces transmissions. Even though the FDA has provided full authorization for COVID Vaccines, mostly conservative states have passed laws restricting vaccination mandates. These mostly conservative states states have below national average vaccination rates and are now experiencing significantly higher than average growth in cases and COVID-19 deaths.

| | Fully Vaccinated Rate (Aug 28) | Presidential Vote Margin, 2020 |
|---|--------------------------------|---------------------------------|
| Overall | 53% | +3pts Biden (average of states) |
| Among States Banning Masking (Arizona, Arkansas, Iowa, Oklahoma, South Carolina, Texas, Utah) | 45% | +16 pts Trump |
| Among States Banning Vaccinations (Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Indiana, Montana, New Hampshire, Ohio, Oklahoma, South Dakota, Tennessee, Texas, Utah) | 46% | +16 pts Trump |

Sources: [National Academy For State Health Policy](#) for masking and vaccination policy, CDC for Vaccination Rates, Harvard Vote By County

At the opposite end of the political spectrum, 12 states requiring masks in public have an overall vaccination rate averaging 57% as well as higher overall mask use. These states are experiencing below average growth in cases and deaths from COVID as of the end of August.

The US is a multilayered political system, with local governments playing a role. In Malheur County, Oregon, a county that Trump won by a margin of 43pts, the Adrian School District Board fired the superintendent for following the state level masking requirements. Oregon is one of the 12 states requiring masks, and this school board district acted in direct opposition to the state mandate putting families, teachers and students at risk. Other schools that have gone unmasked, such as in Waco Texas, closed following the death of two teachers, a 41 year old female and a 59 year old male.

While it doesn't seem to me to be productive to shame the unvaccinated and unmasked individuals, the mostly Republican elected officials and policy makers that block masking mandates, or forbid businesses and universities from requiring vaccinations should, in my view, be held accountable. For every 300 people that get vaccinated, 1 COVID-19 death is averted. Conversely, for every 300 people these laws dissuade them from getting vaccinated, they cost 1 life, and generate five COVID-19 hospitalizations, and cost the economy approximately \$9 million. Masking reduces infections by a significant margin, as mounting numbers of studies have shown.¹ Masks reduce viral loads so that if someone does become infected, it is less likely to be severe, and therefore less likely to result in hospitalization or death.

Forgive me for expressing my confusions, but how can conservative values be termed pro-life when they are costing thousands of lives each week? How can conservatives be termed fiscally responsible when these actions cost the US economy over a trillion dollars? Part 2 will examine the White Conservative Unvaccinated segment and explain why we aren't likely to see recalls of the leaders that seem hell bent on policies that will kill their constituents and injure the economy.

How Do We Exit This Wave?

There is an easy way out and a hard way out. The hard way is unvaccinated people spreading the virus, racking up hospital bills most can't afford, and burying another 150,000 Americans by the end of the year as a way to get to herd immunity without more vaccinations.

The easy way is vaccinating a lot more of the unvaccinated and masking up so we reduce transmission, hospitalizations and deaths significantly.

Considering my model's projection of infection recoveries, which confer some level of immunity, and the CDC data on vaccination immunity, the US is about 35 million people away from a point where vaccinations and infection recoveries exert enough downward pressure on the virus to push the R-naught below 1 (the point where the virus burns itself out). The model currently forecasts adding the necessary 11 percentage points of vaccinations will occur around the end

¹ Most recent pair of studies finding masking reduces COVID transmission are based on the gold standard design of experiments, and can be found in [Nature](#) and the [Stanford Website](#).

of November. If vaccinations were to accelerate considerably, tens of thousands of lives could be saved.

There are three key unvaccinated population segments to consider. While this analysis is specific to the US, most Western Democracies will have similar subgroups. The three least vaccinated population identifiers in the US are 1) White Conservatives 2) Those Under 12 (ineligible for vaccinations) and 3) Black Americans. Part 2 of this forecast takes a look at each of these groups and provides more details on the implications to ending this pandemic.

Forecast

As described in previous forecasts, those vaccinated will experience much fewer deaths through the end of the year. Expect vaccine breakthroughs to increase over time because infections overall are increasing (The US is now adding more than a million new confirmed cases each week). At the same time, expect Case Fatality Rate (CFR) to decline as breakthrough cases occur among those fully vaccinated, but do not convert to deaths at the same rate as those unvaccinated. The Ratio of deaths among vaccinated and unvaccinated is tracked by [CDC](#). The CDC calculates 2,437 total Vaccine Breakthrough deaths as of August 30th. Considering that over 300,000 unvaccinated individuals have died since vaccination began, this is a very small percent of vaccine breakthrough deaths. I would expect booster shots to reduce deaths among those fully vaccinated.

For my forecast, I am using a more conservative estimate of vaccine breakthrough deaths that could be termed a “worse case” for the vaccinated. Even with this worse case, Deaths among fully vaccinated are very likely to be half the rate or lower than a bad year of the flu. Deaths and hospitalizations among the fully vaccinated will be concentrated in the older population, particularly those 65 and older.

For Unvaccinated, it is a different story.

For the unvaccinated, COVID will remain the #1 cause of death among this population through the end of the year. Because of the unvaccinated and Delta, we have switched to the “Worse Case Scenario” for 2021.

When I created the “worse case scenario” in January 2021, it was based on the early data showing some nasty variants that could spread faster, reinfect people, potentially break through vaccinations. The Worse Case Scenario translated into a Year-end-forecast of 780,000 deaths in the US, 50% higher than the base case. By July, it was clear that we had switched over to the worse case. We are now trending slightly higher than the Worse Case from January 2021. While I have not formally developed a new “Worse Case Scenario,” if I were to do so, it would include further mutations that produced higher levels of re-infections and breakthroughs with worse outcomes.

| | Overall | | | Vaccinated vs. Unvaccinated | | |
|------------------|----------------|-----------------------|---------|-----------------------------|---------------|---------------|
| | Total | Incremental for Month | Cume | Vaccinated % | Vaccinated | Unvaccinated |
| Aug 31 | 640,519 | | | 53% | 2,201* | 25,399 |
| --- Forecast --- | | | | | | |
| Sep 30 | 685,196 | 44,677 | | 57% | 3,881 | 40,796 |
| Oct 31 | 727,029 | 41,833 | 86,510 | 61% | 3,789 | 38,044 |
| Nov 30 | 764,055 | 37,027 | 123,537 | 65% | 3,397 | 33,630 |
| Dec 31 | 795,892 | 31,837 | 155,374 | 70% | 2,950 | 28,887 |

* Forecast rate of Vaccine Breakthrough Deaths of 91% in my Model is higher than rates reported by CDC. Therefore, these figures for Fully Vaccinated Deaths could be more than 2x higher than actuals.

My longer-term forecast of deaths through the end of the year may be too low, because I am expecting weekly cases to stop increasing, and decline over the next few months due to masking, increased testing, and downward pressure from vaccinations, increased vaccination mandates and incremental infection recoveries. But, as I'll explore in Part 2, there are segments of the population that are likely to remain unvaccinated and may ignore mask mandates. With back to school, cooler weather bringing people indoors, and fall Holidays, it is possible we do not see the decrease in cases I am forecasting. At the same time, we could see mutations that produce worse outcomes.

Some countries, like the UK and Israel, are leading the way on sequencing and tracking variants, infections, hospitalizations and deaths. In the US, individual county and state efforts provide some insights. Keep an eye on these areas as there is typically a couple months of advance warning of a variant of concern taking off in the population and changing the outcome dynamics.

Forecast Accuracy

Overall, the one month projection accuracy of my model has been 10 for 10 using the +/-15% threshold, with an average absolute difference of 6.4% from actual over the past 10 months. In terms of the longer-term forecast, the three month forecast has been 9 for 10 using the +/-20% threshold, missing last month's increase due to the Delta surge. The [IHME Forecast](#) is presented for comparison.

| | BRIGGS-3 Model | | | | | | IHME Model | | | | | |
|----------|------------------|------------------------------|----------------|------------------|-------------------------------|----------------|------------------|------------------------------|----------------|------------------|-------------------------------|----------------|
| | 1-month Forecast | Actual COVID Deaths, 1 month | % over (under) | 3-month Forecast | Actual COVID Deaths, 3 months | % over (under) | 1-month Forecast | Actual COVID Deaths, 1 month | % over (under) | 3-month Forecast | Actual COVID Deaths, 3 months | % over (under) |
| November | 38,490 | 37,513 | 3% | 87,216 | 84,551 | 3% | 34,784 | 37,513 | (7%) | 170,234 | 84,551 | 101% |
| December | 79,977 | 79,933 | 0% | 143,148 | 141,104 | 1% | 68,782 | 79,933 | (14%) | 203,599 | 141,104 | 44% |
| January | 85,668 | 93,340 | (8%) | 181,777 | 210,786 | (14%) | 108,283 | 93,340 | 16% | 166,443 | 210,786 | (21%) |
| February | 72,389 | 71,683 | 1% | 202,749 | 246,381 | (18%) | 65,968 | 71,683 | (8%) | 201,255 | 246,381 | (18%) |
| March | 32,602 | 37,234 | (12%) | 229,930 | 203,682 | 13% | 30,732 | 37,234 | (17%) | 218,523 | 203,682 | 7% |
| April | 26,300 | 23,997 | 10% | 130,710 | 134,339 | (3%) | 23,106 | 23,997 | (4%) | 152,355 | 134,339 | 13% |
| May | 20,052 | 18,566 | 8% | 68,305 | 79,797 | (14%) | 12,521 | 18,566 | (33%) | 59,443 | 79,797 | (26%) |
| June | 9,304 | 10,155 | (8%) | 55,435 | 52,718 | 5% | 11,361 | 10,155 | 12% | 48,415 | 52,718 | (8%) |
| July | 8,644 | 8,563 | 1% | 38,288 | 46,318 | (17%) | 5,197 | 8,563 | (39%) | 23,174 | 46,318 | (50%) |
| August | 30,167 | 27,600 | 9% | 27,478 | 46,318 | (41%) | 19,352 | 27,600 | (30%) | 36,511 | 46,318 | (21%) |

Conclusions

At this point, eradication of the virus is next to impossible. SARS-CoV-2 is all but certain to become endemic. Success is getting deaths per million per week to the level of a bad year of the flu or lower. If the population stays current with the COVID vaccination protocol, COVID-19 will move from being the #1 killer in America to a position toward the bottom of the top 10 causes of death in the US.

Pay particular attention to the masking data within the White Conservative Counties, and the vaccination rates vs the forecast. Failure among this group to increase vaccination rates or mask compliance will mean pockets of the US will have a very high risk for COVID. You can monitor these trends and the risk associated with visiting any given county at Brown University's www.globalepidemics.org website. Also, keep an eye on the Universities mandating their students and faculty vaccinate. For example, Reed College [reported 97% vaccination rate among the 1600 students and 95% among faculty](#). Colleges and Universities often have more testing, and better contact tracing and reporting. Currently, there has been only one case reported in the past month at Reed. Colleges and Universities provide a window on what a highly vaccinated society looks like -- and so far, the news is very good.

Part 2:

We Need 35 million Americans to Get Vaccinated (Or Get Sick) To End This Pandemic -- Which Will It Be?

In Part 1, we examined how the unvaccinated went unmasked and were confirmed with infections at a rate of 1 in 40 (and likely 1 in 13, if considering the ratio of confirmed cases to infections). In contrast, those fully vaccinated had so few infections (1 in 709) that the virus would have burned itself out but for the unvaccinated and unmasked.

Part 1 showed how it is the unvaccinated that are dying of COVID at a rate twice that of Heart Disease of Cancer, making COVID by far the #1 killer among the unvaccinated. Over 75 deaths per million occurred in the first week of September, among the unvaccinated.

The Fully Vaccinated, on the other hand, are experiencing some breakthrough cases, but these rarely result in deaths. For the Vaccinated, COVID is killing at a rate less than that of a bad year of the Flu. Put another way, even though the fully vaccinated are now a larger share of the total US population, their death rate is less than one-tenth that of the unvaccinated. The deaths that do occur among fully vaccinated are concentrated in an older population, with a median age in the 70s. For this reason, we expect booster shot adoption to be strong for the 65 and older cohort, and to provide further protection for the Fully Vaccinated.

There is an easy way out of this pandemic -- and there is a hard way out. The hard way is unvaccinated people spreading the virus, racking up hospital bills most can't afford, and burying another 150,000 Americans (mostly unvaccinated) by the end of the year as 35 million more people become infected as a way to get to herd immunity without more vaccinations.

The hard way out is not only deadly to the unvaccinated, it is risky for everyone, as each incremental infection is a chance for a more dangerous mutation.

The easier way out of the pandemic is vaccinating 35 million more of the unvaccinated and masking up so we reduce transmission, hospitalizations and deaths significantly. My model shows that if 11% (35 million) of Americans vaccinate in the next month, we can significantly reduce deaths and effectively end the pandemic.

Part 2 examines the major segments of the unvaccinated population. While this analysis is specific to the US, many European countries have similar segments. Many European countries have a similar segment of children that are not yet vaccinated. Many European countries have a similar less educated populist conservative segment that are undervaccinated. Many European countries have historically marginalized minorities, often associated with colonialism, that have a historical basis to lack trust in government institutions -- and for this segment, this lack of trust has held many back from being among the first to be vaccinated.

Looking more closely at each segment in the US, from the fewest to most populated segment, we start with unvaccinated Black Americans.

Black Americans

Black Americans are about 20% less likely to be vaccinated, compared to the national average. Unvaccinated Black Americans represent about 5% of the total US population. It is understandable why Black Americans would be hesitant to be first in line for a new vaccine, given the history of Tuskegee. The Ad Council has worked to address the historical concerns of Tuskegee with this [video](#). Now that more than 170 million people in the US have been fully vaccinated with an impressive safety record, it seems that a concerted effort to support vaccinations efforts in Black American communities could save lives. The share of vaccinations going to Black people in August increased from 26% to 43% in DC and from 25% to 38% in Mississippi, according to an [analysis by KFF](#). Overall, rates of vaccinations among Black Americans have been increasing recently. While a lack of trust in government is the leading barrier, for some Black Americans, access remains a challenge.

Black Americans are a little more likely to mask, based on my analysis of data from [Carnegie Mellon University / Delphi Group](#). Among counties with 40% or less of the population fully vaccinated as of August 15, with a population that indexes above the national average in terms of black population, 67% report masking regularly. This is above the national average of 65%. This population has experienced more COVID infections, hospitalizations and deaths than the overall US population. Increasing masking and increasing vaccinations will help avoid more COVID-19 suffering.

Children Under 12

Those under 12, which are not currently eligible for vaccination, represent 15% of the total US population (about 48 million in total). More than 500,000 children tested positive for Covid-19 in the US from August 5 to August 26, according to state data [analyzed by the American Academy of Pediatrics](#), representing 16% of total cases reported. This equates to about 1 in 100 children with a confirmed case, and likely about 1 in 30 infected -- in less than one month, before back to school has started in many areas. What is clear in the data is children can become infected with COVID and they can (and do) infect others.

Cases today among children are now about as high as they were in the peak of January 2021, and they are growing quickly. Children rarely die of COVID, but the rate of death is about one to two children per day in the US. Hospitalization is rare for children, compared to other age cohorts, but it is increasing at a rapid pace. Long-covid and other health effects are concerning for this population. In addition, because children can become infected and can spread it to others, the household dynamics of an unvaccinated child are important to consider. Are the parents and grandparents and other caregivers fully vaccinated? If not, the risk to the household is meaningful. To date, [applying the coefficient published in JAMA Pediatrics](#), approximately 50,000 children under 18 have lost one or more parents to COVID-19. While there are a variety of chains of transmissions, to have a child become infected and lose a parent as a result is devastating, and we should seek to minimize this outcome.

Mandating vaccinations among parents and guardians in the household of school age children could be considered as a condition of attending in-person classes. Such an approach may be workable in many European Democracies, but may prove challenging in many US states. Several mostly conservative states, as pointed out in Part 1, have placed prohibitions on mandating vaccinations or masking.

While masking is practiced for this age group in many Asian countries without negative effects, it is a new element of American education and has been hotly debated. In Marin, California, where masks are required, [the health department documented how](#) an unvaccinated teacher removed a mask to read aloud, and infected half the students in his classroom.



Source: CDC

Taking extra care to protect children that can not yet be vaccinated, and the people around these children, should be a priority.

The FDA may approve vaccinations for 5 and older, and perhaps 2 and older before the end of the year, but that is uncertain. I had expected the FDA to prioritize Emergency Use Authorization approval consideration before the start of the school year. Instead, the FDA asked for more data.

My modeling currently assumes the FDA will approve vaccination of those 5 and older before the end of October, and about one-third of parents will get their children vaccinated before the end of the year. This will contribute to the US achieving vaccination rates of approximately 70% by the end of the year. However, if The FDA does not approve vaccinations for children, it will be very difficult to achieve the 35 million incremental vaccinations I calculate as necessary to effectively end the pandemic without losing another 150,000 lives.

White Conservatives

The largest population segment among the unvaccinated are White Conservatives. This unvaccinated population is about 16%² of the total US population. Most live in counties where

² Calculation: 3,095 Counties are first sorted by 2020 Election vote Margin. 2003 counties with a total population of 105,843,469 have are 89% White. The unvaccinated rate of 63.5% (Vaccinated is 36.5%). The calculated size of White Unvaccinated Conservatives is 50,844,821, which removes

Trump won by an average of 47 points in the 2020 election. These counties are also much less likely to mask, making this group particularly susceptible to infection, and spreading the infection to others.

| | Mask Use (August 26, 2021) |
|--|----------------------------|
| US Overall | 67% |
| Conservative Counties (Counties where Trump won by a margin of 16pts or more in 2020) | 50% |
| | |

Source: Briggs Analysis of [Carnegie Mellon University & Delphi Group](#) data.

The reasoning of White Conservatives may seem inconsistent. Statements like, “Requiring vaccinations is un-American” despite the fact George Washington required vaccinations of his soldiers at Valley Forge and Ben Franklin wrote of his own regret in not vaccinating his son early enough. History suggests there may not be an America without vaccinations. Or, un-ironically using slogans like “My Body, My Choice,” a slogan popularized by the pro-choice movement, which [most White Conservatives oppose](#). The key to understanding this segment is to consider this group’s distrust of government - especially when they didn’t vote for the leader. This largely rural population has lower overall educational attainment, which may make a studied analysis of vaccine clinical trials or masking randomized controlled experiments challenging.

White conservatives were actually MORE likely to be vaccinated early on, prior to the change of administration. Even though the vaccine didn’t change in formulation, when the leader in the White House changed, vaccination rates within conservative leaning counties decreased significantly. It appears to be the case that if the opposing party is in favor, then they are against.

Without vaccinations and without masks, SARS-CoV-2 will keep spreading in these predominantly white, conservative and rural communities. Perhaps lower population density will reduce spread, but with schools, churches and other social interactions which too often will not include masks, hospitals and funeral homes should expect a busy end to the year. As the US learned the hard way with the [measles outbreak](#), even if the overall vaccination rate is high, unvaccinated pockets of people can become infected and can cause meaningful outbreaks.

children under 12 within these white conservative families from the calculation. Total county population sum to 318,321,030, and is used as the denominator. The figure is an approximation. White conservative live in other counties (and are not counted here), and not all whites in these counties are conservative.

FORECAST

As described in previous forecasts, those vaccinated will experience much fewer deaths. While the total number of vaccine breakthroughs will increase over time, there will be fewer hospitalizations and deaths among the vaccinated. Booster shots, particularly for those over 60, should lower both hospitalizations and deaths. Of those fully vaccinated that are hospitalized or die, the typical age is likely to remain in the 70s and 80s. The death rate for the vaccinated should be less than a bad year of the Flu.

For those unvaccinated, it is a different story. The current model projects 794,880 COVID deaths by the end of the year, almost all of them among unvaccinated. This number may be conservative, as we are expecting weekly cases to stop increasing, and begin to decline due to masking, increased testing, and downward pressure from vaccinations and infection recoveries. It is possible that the unvaccinated do not mask up, do not get vaccinated, and mutations lead to more breakthroughs with more severe outcomes. While it is logistically possible to end the pandemic in a month, with 35 million of the unvaccinated taking the jab, that outcome is unlikely. It is more likely another 150,000 people will die of COVID, hundreds of thousands will be hospitalized, and over a trillion dollars in economic impact will be experienced. The US is likely to take the hard way out of the pandemic.

Many countries in Europe may take an easier exit. While most countries in Europe have had less infections than the US and therefore have less natural immunity, vaccination rates are now surpassing the US. With vaccine passes, easy testing, and vaccination mandates encouraging more to get vaccinated now, Europe is in a race to avert a rough fall and winter.