



Can Vaccines Achieve COVID-19 Racial Equity?

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Introduction

As the United States continues its rollout of the COVID-19 vaccine, there are still concerns about the racially inequitable impacts of the virus and its fallout. Since the beginning of the pandemic, there have been stark racial differences in the prevalence and impact of the disease across communities in the United States where the Black population is disproportionately impacted relative to the White population.

According to the Centers for Disease Control (CDC), infection rates nationally among Black people are 1.1 times those of White people. Similarly, Black people who contract COVID-19 are 2.9 times more likely to be hospitalised and 1.9 times more likely to die than White people (CDC). Native American and Hispanic populations have suffered even greater disparities in COVID-19 infections, hospitalisations, and deaths. While these differentials have diminished over time, inequities persist. The recent availability of COVID-19 vaccinations in the United States has brought new hope to address these inequities.

The goal of vaccination is to reduce adverse health outcomes. This includes reducing the symptoms, severity, and fatality rate of infections among those people who are vaccinated and reducing transmission of the virus. Achieving racial equity for COVID-19 should therefore be defined in terms of *health outcomes*. We define racial equity for health outcomes to mean that the percentage of cases and/or deaths is equal to or less than a racial group's share of the overall population.

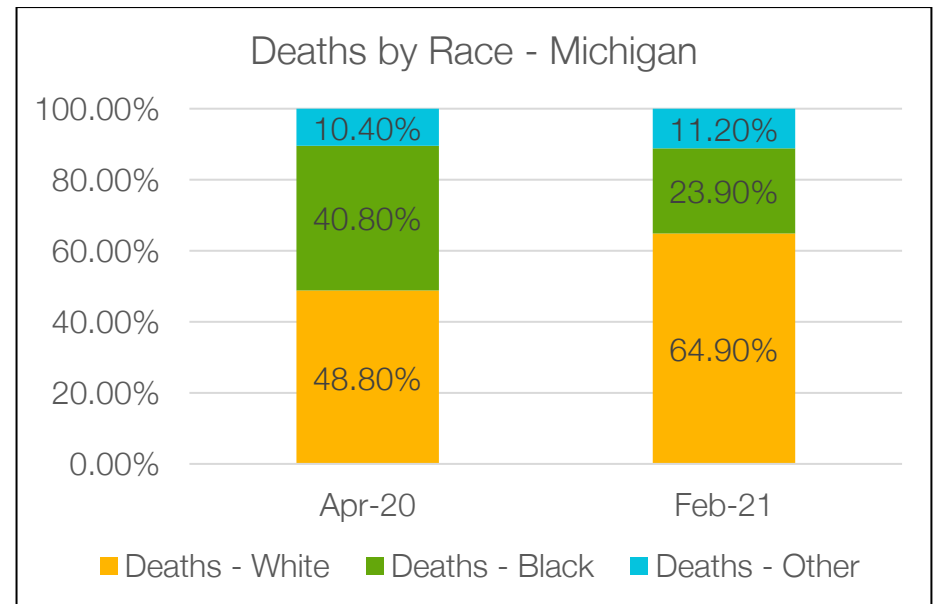
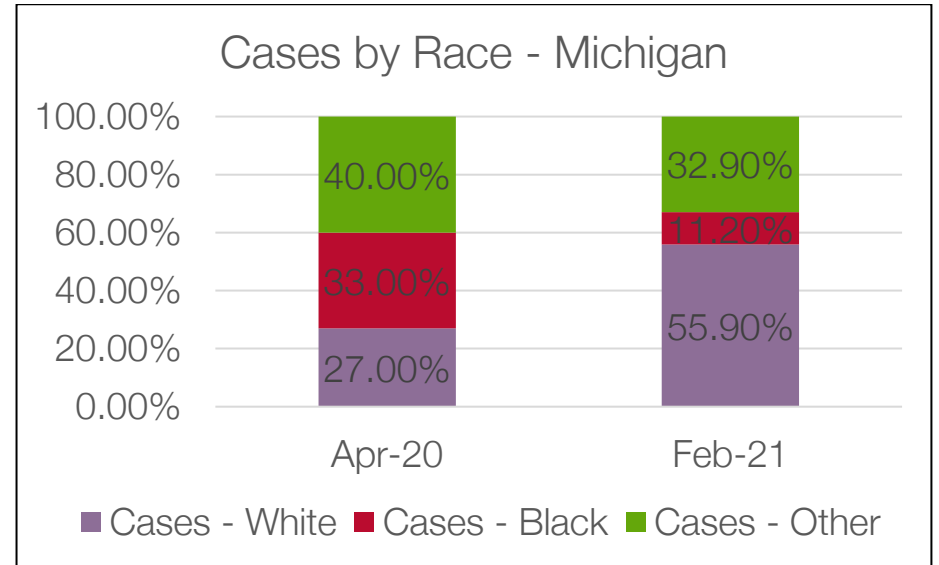
So, the question is, can vaccination be an effective strategy to achieve racial equity in this health outcome?

Modelling Vaccine Equity

To address this question, we used Palladium’s *VaxImpact* model. *VaxImpact* is an epidemiological model that estimates the health and mortality impacts of vaccine allocations to population subgroups and geographic areas (e.g., a state or county) permitting a focus on the equitable distribution of vaccine allocations that align with desired health outcomes.

The model tracks the population through three compartments – susceptible, infected, and removed – known as an SIR model. The susceptible compartment represents people who have not yet been infected and are still at-risk for contracting COVID-19. Vaccinated individuals are removed from this compartment. The infected population can pass on the virus to others that are susceptible, according to the basic reproduction number, or R0, and other epidemiological assumptions. The removed compartment includes those who have recovered from infection or have died of the disease.

The model combines data about the epidemic with demographic data from the US Census Bureau and an index of vulnerability by location. In this application, we used the US CDC Social Vulnerability Index (SVI), which is an aggregate of 15 vulnerability scores for the population of each county, covering topics such as socioeconomic status, household composition and disability, minority status and language, and housing type and transportation. The SVI is used to inform a geographic distribution strategy that is consistent with the fact that racial groups tend to be geographically clustered.



Source: Covidtracking.com

Race	White	Black	Other
Share of population	75.20%	13.60%	11.20%

Data from the CDC and the Michigan Department of Health and Human Services were used in the *VaxImpact* model to explore the question of achieving racially equitable health outcomes for COVID-19 in the Black population. Michigan’s Black population as a percentage of the total population (14 per cent), is close to that of the overall US population. Over the course of the pandemic in 2020, the percentage of all COVID-19 cases in Michigan among Black people fell from 33 per cent in April 2020 to 11.2 per cent in February 2021.

However, while COVID-19-related deaths in Michigan among Black people declined during this same period from 42 per cent to 24 per cent of total deaths, disparities in terms of mortality, while improving, persisted. Moreover, Michigan vaccination data from late February 2021 shows that the Black population is underrepresented with less than 4 per cent of total vaccinations administered going to Black people, compared to nearly 42 per cent for White people.

Contributing to this disparity are barriers to access and vaccine hesitancy in the Black population: Black patients reported the lowest likelihood of accepting the COVID-19 vaccine (39.5 per cent) compared to other racial groups, although this appears to be improving.

We ran two *VaxImpact* model scenarios for a twelve-month period for Michigan in which we simulated the distribution of Michigan’s share of vaccine doses under the Biden Administration vaccine program goal of “100 million doses in 100 days” (equivalent to 31,000 doses per day in Michigan). In the “business-as-usual” scenario (reference case) we continued vaccine distribution using the same current geographic and racial pattern of distribution in Michigan in early 2021.

In this scenario, only 6 per cent of vaccinations are administered to Black people.


In the second scenario we simulated the distribution of vaccine doses by county focusing on the most vulnerable counties first, using CDC’s Social Vulnerability Index (SVI). In this scenario, we simultaneously increased the vaccine acceptance rate of Black people to be the same as that of White people.

Shares of cases and deaths by race over one year

Race	White	Black	Asian	Other
Population Shares	75.20%	13.60%	3.00%	8.20%
Scenario	Cumulative cases over projection period			
Current uptake and distribution	53.25%	11.70%	1.30%	33.65%
Improved uptake and focused distribution	56.23%	8.74%	1.35%	33.68%
Scenario	Deaths over projection period			
Current uptake and distribution	61.98%	24.85%	0.89%	12.80%
Improved uptake and focused distribution	67.26%	18.68%	0.95%	13.11%

This scenario increased the vaccination percentage for Blacks to 14 per cent, the same as their share of the total population. The simulation results show that as expected the “business-as-usual” scenario does not change the percentage of COVID-19 cases or deaths in the Black community.

But in the second scenario, with improved uptake and geographic focus offered by the *VaxImpact* model, the share of COVID-19 cases for the Black population falls to 8.7 per cent and deaths fall to 19 per cent, still higher than their population share of 14 per cent.



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To compensate for the higher mortality rate in the Black population, Black people would need to be vaccinated at higher rates to achieve racial equity in COVID-19-related outcomes.

The two methods used in the model to increase vaccination of Black people – focusing on vulnerable geographic areas and increasing vaccine acceptance rates, are not sufficient enough to achieve the level of vaccination coverage required for equity in the Black community.

While the second scenario reaches more Black people than the “business-as-usual” distribution of vaccine across counties, in Michigan the SVI is not directly correlated with race at a level that effectively impacts the Black community.

Are Vaccines the Key to Equity?

Improving vaccine uptake in the Black community when combined with focused distribution to socially vulnerable communities has the largest effect on COVID-19-related health outcomes but does not achieve racial equity in terms of mortality.

This is because the case fatality rate among Black people who are not vaccinated and contract the virus is higher than other racial groups as noted earlier. The underlying inequities in health and other social indicators facing the Black community are well known, and inevitably contribute to COVID-19 mortality disparities. Compared to the White population, being Black remains a risk marker for heart disease, stroke, cancer, asthma, influenza, pneumonia, diabetes, and HIV/AIDS according to the [US Department for Health and Human Services](#).

The modelling scenarios show that a strategy to tackle racial inequity in COVID-19-related health outcomes cannot rely solely on vaccinations and must be seen in the larger context of a US health system and other systems that contribute to numerous inequities in the Black community, including but not limited to, the wide spectrum of pre-conditions that exacerbate the impact of COVID-19.

Until these issues are remedied, we cannot rely on vaccinations alone to attain racial equity in COVID-19 related health outcomes.



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