



**PUBLIC HEALTH PRACTICE**

# Real-time Monitoring and Evaluation of the Vax Cash Program: A Case Study from Columbus, Ohio

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## ABSTRACT

**Background:** The prevention of severe outcomes due to SARS-CoV-2 infection among vulnerable populations is an important public health goal. The purpose of our study was to report on the implementation and evaluation of an innovative public health prevention program. This program aimed to reduce the projected gap in COVID-19 vaccine uptake between more and less vulnerable neighborhoods by addressing issues around access and trust among communities at high risk for COVID-19 positive cases, hospitalization, and death.

**Methods:** Columbus Public Health implemented the Vax Cash program in Columbus, Ohio, from July 6, 2021, to August 22, 2021, based on regular community feedback and using a data-driven approach. The program provided a financial incentive to eligible individuals upon receiving their first dose of a COVID-19 vaccine. A time-series model was used to create short-term forecasts for COVID-19 vaccine uptake for neighborhoods in and around the 10 clinics in the program. These projections were compared with the observed uptake as the program was implemented over a 6-week period.

**Results:** Seven out of ten sites showed an increase in the observed COVID-19 vaccine uptake in and around the sites compared to projected uptake values. We observed a rapid increase in uptake among Black residents and a reduction in the Black-White vaccine uptake gap in and around the Vax Cash sites.

**Conclusion:** Vaccination rates increased in areas of high social vulnerability through the Vax Cash program. Similarly designed programs could be applied to achieve other public health prevention goals.

**Keywords:** COVID-19; Vaccination; Vulnerable populations; Financial incentive

## INTRODUCTION

An important public health goal is to reduce the incidence of severe outcomes among vulnerable populations. The COVID-19 vaccines protect against severe outcomes, such as hospitalization and death, due to SARS-CoV-2 infection. Vulnerable populations face multiple barriers to getting the COVID-19 vaccine, including limited access to vaccine providers, which can manifest in terms of time to make an appointment, navigating appointment scheduling systems, travel time to vaccine provider, and paid time off to get vaccinated and/or recover from side effects. Additionally, gaps in

COVID-19 vaccine uptake between more and less vulnerable populations may be associated with hesitancy among historically marginalized populations such as people of color and populations who continuously face discrimination in their interactions with public health and health care systems.<sup>1-3</sup> During a pandemic, it is essential that public health programs innovate to close this gap in vaccine uptake, especially when vaccines are widely available although not always accessible.

A preliminary analysis by 1 of the authors (Hyder) in May 2021 suggested that at the current levels of vaccine uptake more vulner-





able neighborhoods in Franklin County, Ohio, which includes the city of Columbus, may lag by approximately 7 months compared to less vulnerable neighborhoods in order to achieve 70% COVID-19 vaccine uptake as a county. The preliminary analysis was based on a review of the trends in vaccine uptake among vulnerable neighborhoods and simulations using a mathematical model that took into account differences in access to vaccines and delays in vaccine supply. This preliminary analysis motivated Columbus Public Health to design and implement the Vax Cash program<sup>4</sup> for eligible individuals. This public health practice report describes the implementation and evaluation of this innovative public health prevention program.

**METHODS**

**Setting**

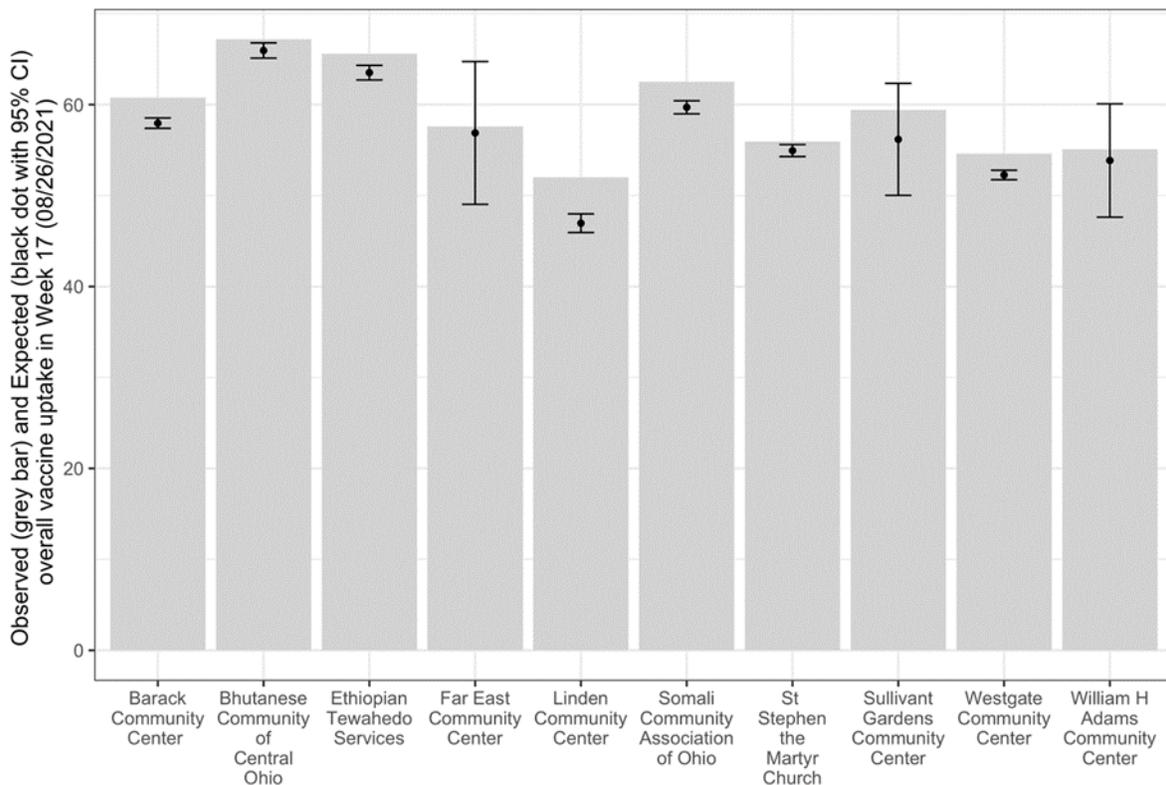
The Vax Cash program was implemented starting on July 6, 2021, at 10 satellite neighborhood clinics (Figure 1) in Columbus, Ohio, which is the capital city of Ohio.

**Community, Participant Characteristics, Recruitment**

The program was designed and implemented based on regular community feedback and a data-driven approach. Local focus groups conducted by Columbus Public Health highlighted barriers to vaccination that residents faced living in high vulnerability are-

as (based on the Centers for Disease Control’s Social Vulnerability Index<sup>5</sup>). Reasons why people did not get vaccinated included the financial cost of unpaid time off work to get the vaccine or to recover from potential side effects, lack of trust, historical injustices, and discriminatory experiences in public health and health care settings.<sup>6</sup> The Vax Cash program added a financial incentive and was implemented only at trusted community sites. The monetary amount was calculated assuming a pay rate of \$12 to \$13 per hour for an 8-hour work day. Thus, the \$100 gift card would cover wages for 1 day. Additionally, data from previous and ongoing immunization incentive programs in Ohio indicated that cash rewards of \$50 or less were ineffective.

The Vax Cash program at Columbus Public Health differed from previous incentive programs<sup>7-9</sup> in significant ways. Columbus Public health selected Visa gift cards so that program participants could use the money where they most needed it instead of being limited to a specific store. The gift cards were on-site and given to residents immediately after their first dose (the first dose of the 2-dose Pfizer/BioNTech for individuals aged 12 years and up or the single dose of the 1-dose Johnson & Johnson vaccine for individuals aged 18 years and up was offered at the clinics) so as not to bias choice of the vaccine by individuals. Interpreters were present to ensure all clients at the clinics understood the program and received the gift card.



Observed (grey bar) uptake is a point value and expected (black dot) uptake is an estimate based on time-series forecast model with 95% confidence intervals. Grey bars that do not include the black dot and confidence intervals indicated that the observed vaccine uptake by the end of the Vax Cash program was higher than the expected vaccine uptake in and around those Vax Cash clinic sites.

**Figure 1. Observed and Expected Vaccine Uptake in and Around Each Vax Cash Clinic Site**



Each clinic site had a preexisting relationship with Columbus Public Health and was trusted by community members living near the site. The Social Vulnerability Index (SVI) is a numerical value (range: 0=low vulnerability to 1=high vulnerability) based on 16 variables from the US Census.<sup>5</sup> Clinic sites were chosen based on social vulnerability (using the SVI<sup>5</sup>), census-tract level vaccine uptake, and a spatial accessibility analysis to identify areas with limited access by car or public transit to permanent or mobile vaccination sites. It is widely used for public health planning to identify vulnerable communities in need of support before, during, and after disasters. Eligible individuals had to be a resident of Franklin County, Ohio, and not have previously received the COVID-19 vaccine. Clinics were open 1 day a week (same day for each week of the program) at each location and individuals were able to walk in during opening hours (eg, clinics were open until 7:00PM). Columbus Public Health used several strategies to make eligible individuals aware of the Vax Cash program including media interviews, social media, flyers, community navigators, and outreach to community leaders and community-based organizations.

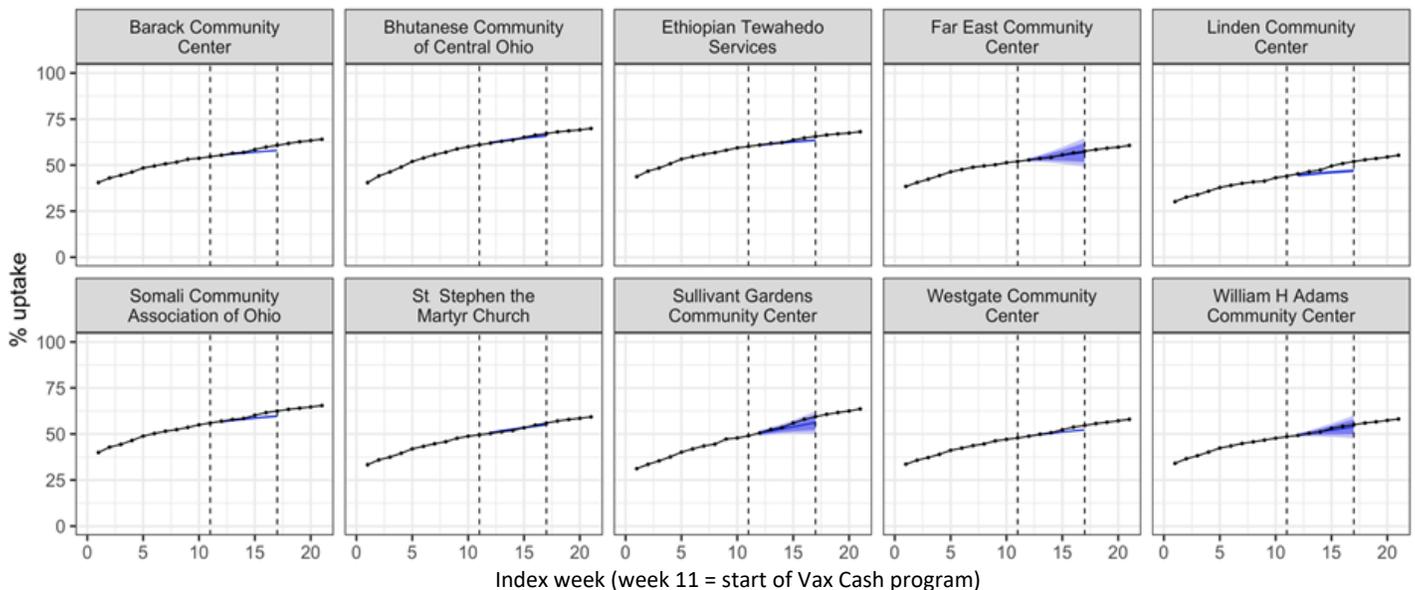
**Measures/Outcomes**

Data on vaccine uptake stratified by race at the census-tract level were provided to Columbus Public Health by the Ohio Department of Health as part of a larger project called the Equity Mapping Tool project.<sup>10</sup> Columbus Public Health reported the data from each clinic to the Ohio Department of Health via the Ohio Impact Statewide Immunization Information System (ImpactSIIS) web application. An exponential smoothing time-series model based on simple exponential smoothing<sup>11</sup> was used to create short-term

forecasts for COVID-19 vaccine uptake for neighborhoods in and around the 10 clinics in the Vax Cash program. These projections or expected uptake were compared each week in real time with the observed uptake over a 6-week period. Ultimately, the program was extended for additional weeks and changes were made to the location of sites offering the program. Therefore, to avoid bias in assessing the impact of the program due to these changes, we only included data from the first 6 weeks of the program, which is how long it was originally intended to run. We also compared trends in vaccine uptake among White residents and Black residents of census tracts where Vax Cash clinic sites were located and surrounding census tracts.

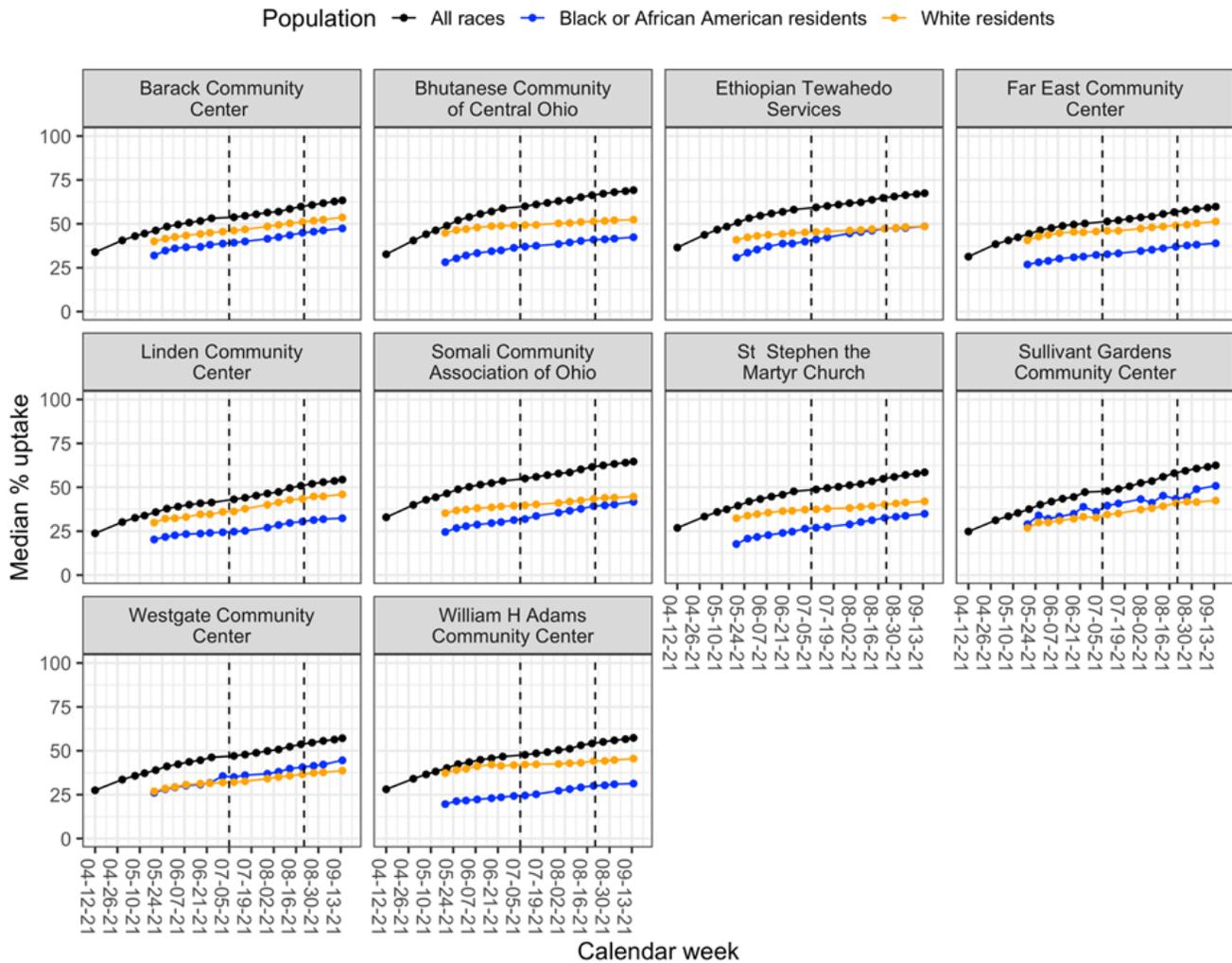
**RESULTS**

The observed vaccine uptake was above the upper 95% confidence levels of the expected uptake estimates based on the time-series model in 7 sites: Barack Community Center, Bhutanese Community of Central Ohio, Ethiopian Tewahedo Services, Linden Community Center, Somali Community Association of Ohio, St Stephen the Martyr Church, and Westgate Community Center (Figure 1). Three sites: Far East Community Center, Sullivant Gardens Community Center, and William H Adams Community Center had observed uptake values increase over time but were within the 95% confidence levels of the expected vaccine uptake estimates (Figure 2). We observed a rapid increase in vaccine uptake among Black residents in and around the Vax Cash sites that occurred during the same time that the intervention was ongoing (Figure 3). These trends have continued similarly beyond the initial 6-week period of the Vax Cash program.



Trends from week 1 (calendar week of March 29, 2021) to 4 weeks after the end of the intervention in week 21 (calendar week of September 14, 2021). In both panels, black lines with dots show the observed vaccination uptake in and around the Vax Cash clinic site. The blue line shows the short-term forecast for uptake during the data collection phase of the intervention period (week 11 to week 17 and indicated by the area between the vertical dashed lines) with 95% confidence intervals in dark blue and 90% confidence intervals in the light blue shaded area.

**Figure 2. Temporal Trends in Vaccine Uptake Where Vax Cash Clinic Sites Were Located and Surrounding Census Tracts**



Temporal trends in vaccine uptake among White (orange dotted line) residents, Black (blue dotted line) residents, and all (black dotted line) residents of census tracts where Vax Cash clinic sites were located and surrounding census tracts. In several sites, the gap in uptake between Black residents and White residents started to close during the intervention period. The intervention period was from the calendar week of July 5, 2021, to the end of the week of August 16, 2021 (indicated by the area between vertical dashed lines). The actual start to end dates were July 6, 2021 to August 22, 2021, respectively.

**Figure 3. Temporal Trends in Vaccine Uptake by Population**

**DISCUSSION**

Innovative strategies have been applied to increase vaccine uptake, but there is limited information on their impact and descriptions of their implementation in the literature. We report on an innovative public health program that identified new mobile vaccination sites and provided financial incentive to eligible individuals for getting vaccinated. The Vax Cash program was designed to focus on individuals who were hesitant about the COVID-19 vaccine for reasons including concerns about the side effects and had limited access to vaccination sites in terms of travel time and hours of operation. Sustaining the program is important for reaching this latter group of individuals and new strategies may be needed that go beyond offering a financial incentive. Also, burnout among public health professionals who were staffing multiple community clinics will need to be addressed through changes to the program to ensure that it remains effective and responsive to

the changing dynamics of the pandemic, such as new variants. New variants and the need for boosters will require changes in public health messaging, too. Motivating individuals to get their first shot by giving a financial incentive may result in those individuals getting motivated to continue getting subsequent series of vaccinations beyond the initial vaccine dose. Financial incentives for getting vaccinated pose ethical concerns as well, such as exploitation and autonomy, when one person’s vulnerability is used to achieve the goals of another person. On the other hand, arguments for offering financial incentives include utility and equity where lives could be saved, hospitalizations could possibly be averted, and disease transmission could possibly be reduced among vulnerable populations. We did not measure these outcomes in our study. Additional research is needed to measure these possible impacts of the Vax Cash program.



One may argue that 2 separate interventions were implemented at the same time; new sites as well as a financial incentive. Therefore, a limitation of our findings is that they may not be completely attributable to the financial incentive alone. Comparing vaccination rates of other providers in the same neighborhoods as the Vax Cash sites before and after the intervention would allow us to better measure the impact of the Vax Cash program. A preliminary analysis for such a comparison was done by epidemiologists at Columbus Public Health and indicated that Columbus Public Health was the provider for most vaccines administered in and around the Vax Cash clinic sites over the course of the program. Other potential sources of bias may be the rise of the COVID-19 Delta variant as well as school reopening and resumption of in-person learning, both of which occurred near the end of the evaluation period of the Vax Cash program.

The Vax Cash program further helps build a bridge between local health departments and the community. A higher uptake rate among the high SVI populations may also help build trust in the vaccine as residents see their neighbors get vaccinated and, in the community overall, people in general start feeling safer about getting the COVID-19 vaccine. Given what we as public health researchers know about the likelihood of hospitalization due to COVID-19 infection among unvaccinated and vaccinated individuals,<sup>12</sup> it is more important than ever for public health efforts to continue to increase uptake within socially vulnerable communities and, consequently, increase the overall uptake in the city/county and bring the community at large closer to achieving desired levels of herd immunity.

### PUBLIC HEALTH IMPLICATIONS

This public health practice report provides details on the design, implementation, and evaluation of a COVID-19 vaccination effort in an urban setting. Our findings imply that financial incentives may be effective under certain circumstance even though the literature is mixed on the impact of such incentives as part of public health prevention strategies. Also, real-time monitoring of program impact through the Equity Mapping Tool<sup>10</sup> offers a new way for public health departments to use local data for local decision-making to close gaps in immunization rates among vulnerable populations.

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