

Development of Model Vaccination Initiative in Detroit

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Abstract

The distribution of vaccines to Detroit residents faced significant challenges during the COVID-19 health crisis. Vaccine distribution was slow, ineffective, and resulted in significant disparities in vaccine coverage among various racial and ethnic populations. This study examines existing data barriers to vaccination efforts in the United States, including common factors associated with vaccine hesitancy and attempts to identify factors that impact racial and ethnic disparities in vaccine coverage. Finally, this study examines successful vaccination initiatives from other cities in the United States to discuss a model vaccination initiative in Detroit.

Introduction

During the COVID-19 public health crisis, the delivery of vaccines to Detroit's population was a challenge. According to the Detroit Health Department, only 47.2% of the city's inhabitants had been fully vaccinated as of November 11, 2021. Compared to Michigan's average rate of 54.1% and the national rate of 58.8% (Center for Disease Control, 2021), at the same time, it is clear that there were factors at play in Detroit which created barriers to effective vaccination initiatives. Research shows differences in COVID-19 vaccine hesitancy across ethnic groups (Khubchandani, et al., 2021). Accordingly, it is clear that some of the challenges related to vaccination efforts are social in nature. Understanding these barriers and the ways in which they can be overcome is instrumental in the development of successful vaccination initiatives. Research into vaccination rates with respect to the COVID-19 health crisis faces barriers due to the lack of existing longitudinal data. Research exploring vaccine hesitancy for

previous health crises exists, but connections to the COVID-19 crisis have yet to be explored.

The discrepancies in vaccination rates between racial and ethnic groups are not a novel phenomenon, and it is likely that the factors which have interfered with effective vaccination initiatives for illnesses in the past still played a role in the recent public health crisis. Examining existing research for other illnesses may therefore provide valuable insights. To this point, an examination of existing literature will be carried out to identify factors commonly associated with vaccine hesitancy during historical disease outbreaks in the United States. Successful vaccination efforts in the United States will then be discussed, with the purpose of understanding how successful initiatives can address these factors. Finally, these findings will be used to model a vaccination initiative in Detroit.

Racial/Ethnic Disparities in Vaccination Coverage

Vaccination efforts in Detroit have faced significant barriers during the COVID-19 health crisis. Notably, there exist significant disparities in vaccination coverage among racial and ethnic groups. In an analysis of survey results from the Detroit Metro Areas Communities Study from July 2021, Wagner, et al. (2021) find that Black and Hispanic Detroit residents had much lower vaccination rates—58% and 50% respectively—compared to White residents (82%). Accordingly, these communities may be disproportionately affected by barriers to vaccination efforts. To address concerns regarding vaccination rates in Detroit, the barriers to vaccination that these populations face must be examined in greater detail.

The trends described between Black and Hispanic populations are not restricted to Detroit alone. On a national level, Khubchandani, et al. (2021) find that hesitancy regarding the COVID-19 vaccine is higher among Blacks and Hispanics based on surveys performed on the U.S. population and disseminated via social media. This disparity is not unique to the COVID-19 health crisis—similar trends regarding higher rates of

hesitancy among racial and ethnic minority groups during the 2009 H1N1 pandemic have been seen by Mesch and Schwiran (2015). Furthermore, differences in vaccination rates between racial and ethnic groups outside the context of disease outbreaks have been observed. Kahn, et al. (2018) explored the rates of Tetanus, Diphtheria, and Pertussis (Tdap) vaccine coverage among pregnant women in the United States. It was found that only 42.9% of black participants and 48.8% of Hispanic participants surveyed reported receiving Tdap, compared to 59.3% of white participants. In a study done by the Centers for Disease Control and Prevention (CDC), surveys of a nationally representative group of American adults found that Black and Hispanic participants reported lower rates of vaccination for Hepatitis B, Herpes Zoster, human papillomavirus (HPV), and pneumococcal diseases (2013).

Because the trends observed within Detroit are also observed on a national level, and both within and outside of the context of the COVID-19 health crisis, it is likely that factors which influenced vaccination rates in other parts of the country and at other points in time played a role in the recent public health crisis. These factors can be grouped as either physical or non-physical barriers.

The Non-Physical Barriers to Effective Vaccination

When examining the shortcomings of vaccination efforts, it is shown that some of the barriers they face are not physical limitations on an individual's ability to be vaccinated, but rather factors affecting one's willingness to be vaccinated. Vaccine hesitancy is a phenomenon which often receives attention during disease outbreaks, and its role during the COVID-19 pandemic ought to be explored separately from concerns of vaccine accessibility. To consider how vaccine hesitancy can be overcome, it is first necessary to understand why people may avoid vaccination and how these factors disproportionately affect certain demographics.

Trust is a major factor influencing an individual's refusal of vaccines. A reduced level of trust in healthcare providers tends to be associated with vaccine hesitancy; Fu, Zimet, Latkin, and Joseph have observed this trend among parents in urban settings with regards to HPV vaccination and found that both distrust in healthcare providers and the correlated decrease in vaccination rates were more pronounced in Black participants (2017). The correlation between trust and vaccine hesitancy has also been observed during the COVID-19 health crisis by Liu and Chu, who reported that trust in healthcare providers and pharmaceutical companies acted as predictors of individuals' evaluations of vaccines, which in turn influenced vaccination behaviors (2021). In addition to being a contributor to vaccine hesitancy, trust in healthcare providers and vaccines tends to be lower in certain minority groups, demonstrating the potential for this factor as a mediator of the racial/ethnic disparities in vaccination rates. For example, in a survey of Non-Hispanic adults, Halbert, et al. (2006) found a significantly greater number of African American respondents reporting low levels of trust in health care providers (44.7%) compared to White respondents (33.5%). Similarly, following a study of 1,543 respondents representative of the U.S. population during the early stages of the H1N1 pandemic of 2009, Freimuth, et al. (2013) found that a notably smaller percentage of Black and Hispanic respondents reported high levels of trust in their personal physicians compared to White respondents. Wagner, et al. also observed a significant difference in trust in healthcare providers between racial/ethnic groups in Detroit during the COVID-19 public health crisis, demonstrating that these trends have persisted over a long period of time (2021). To reduce disparities in vaccination rates, trust in healthcare providers should be addressed by prospective vaccination initiatives.

The underlying reasons behind the lower levels of trust in healthcare providers seen among certain racial/ethnic groups are complex and varied. Many different factors are often believed to contribute towards distrust in

healthcare and government institutions. Individuals may be reluctant to provide personal information due to concerns regarding criminal backgrounds, immigration status, or perceived inequities inherent to these institutions. Though it is outside the purview of any one vaccination initiative to address the causes of medical mistrust, an understanding of the factors which can contribute to it will be relevant when considering how this barrier can be overcome.

Another facet of trust that is significant to vaccination efforts is the trust of individuals in vaccines themselves. Existing research has shown that attitudes towards vaccine safety, efficacy, and necessity all play a role in the likelihood that a person will accept a vaccination. For example, a study focused on a 2015 national survey of Black and White U.S. adults explored various factors associated with flu vaccine hesitancy. These factors were designated as falling under one of three different categories: “confidence,” “complacency,” and “convenience.” It was found that individuals demonstrating lower levels of “confidence” (a category including, among other things, trust in vaccine safety and efficacy) and increased “complacency” (measured by the necessity of the vaccine as perceived by respondents) often also demonstrated reduced interest in vaccination (Quinn, et al.). Similarly, Fisher, et al. analyzed nationally representative survey results of U.S. adults and found that individuals reporting uncertainty regarding the prospects of becoming vaccinated most often cited concerns of safety, efficacy, or a lack of information. Furthermore, those that reported a definite conviction to not be vaccinated did so on the basis of trust most often; the researchers note that prior experiences with vaccine inefficacy were cited as a major reason to distrust COVID-19 vaccination (Fisher, et al.). Another notable conclusion to this research was that an individual’s influenza vaccination status acted as a predictor of their willingness to accept a COVID-19 vaccination, providing direct evidence for the relevance of patterns of vaccination in previous years in future public health crises (Fischer, et al.).

Fisher, et al. also observed significant increases in vaccine hesitancy associated with these factors among Black and Hispanic participants, indicating that differences in beliefs of vaccine safety or efficacy may also explain racial disparities in vaccination rates. Evidence for racial disparities in perceptions of vaccine safety and efficacy have been observed in the past, as demonstrated by a 2010 survey of a nationally representative sample of U.S. parents regarding their compliance with pediatrician vaccine recommendations. In this study, Freed, et al. observed a significantly greater proportion of Hispanic respondents (37%) reported distrust in vaccine safety compared to White (22%) or Black (23%) respondents (2010). With regards to Detroit in particular, the Detroit Metro Areas Communities Study of July 2021 observed that 78% of Detroit residents who report being unvaccinated cite concerns of vaccine safety as their main reason for avoiding COVID-19 vaccination (University of Michigan, 2021). Corroborating these findings are the results of a study by Wagner, et al. exploring the relationship between vaccine safety, efficacy, and acceptance among Detroit residents. Wagner, et al. found that beliefs of vaccine safety and efficacy were strongly associated with respondents' willingness to be vaccinated among Black Detroiters, with an increase of 25.9% of respondents expressing willingness if vaccine efficacy increased from 50% to 95% and the probability of fever as a side effect decreased from 20% to 5%. Given existing research during and before the ongoing public health crisis, encouraging trust in the safety, necessity, and efficacy of the vaccine itself seems to be a promising method of mitigating disparities in vaccine acceptance in Detroit.

The reasons for racial and ethnic disparities in trust with respect to vaccine safety or efficacy has yet to be fully understood by research, but it is likely that a myriad of factors contribute to this issue. Underlying causes can include factors which prevent the dissemination of information regarding vaccine safety and necessity, such as low literacy rates among certain minority populations or the inaccessibility of formal education.

Language barriers can also exacerbate challenges with the distribution of information. Solving these systemic and overarching issues is likely outside the scope of any one vaccination initiative, but an awareness of these potential factors is still valuable during the design of vaccination initiatives.

The Physical Barriers to Effective Vaccination

Physical barriers to effective vaccination are also of interest. Identifying medically underserved areas and ensuring equitable access to vaccination opportunities is necessary to completely address disparities in vaccination rates. Rader, et al. explored trends in spatial barriers to COVID-19 vaccination across various U.S. census tracts. Statistical analysis of results from a large-scale, nationally representative web survey revealed a significant negative correlation between the amount of time individuals were willing to travel for vaccination and their degree of vaccine hesitancy (Rader, et al.). To model spatial barriers to vaccination in urban settings and the ways in which they differentially affect minority communities, Rader, et al. examined Detroit and Chicago in detail. They discovered that the geospatial distribution of vaccination sites in both locations were far more concentrated in areas with a reduced percentage of Black and Hispanic residents (Rader, et al.). This finding is especially concerning when coupled with the previously discussed trends regarding vaccine hesitancy among minorities. The communities that are most likely to consider long travel times for vaccination to be burdensome are seen to have the most sparse access to vaccination distribution sites.

Spatial barriers to vaccination remain underexplored by research, and a greater understanding of these barriers would be valuable both for the recent and future health crises. However, for vaccination initiatives, an understanding of the need to establish distribution sites in minority communities is itself valuable as it provides another potential method of addressing racial and ethnic disparities in vaccination rates.

Effective Vaccination Initiatives

With an understanding of physical and non-physical factors associated with vaccine hesitancy established, prior initiatives can be examined to determine how these barriers can be addressed. To this point, initiatives carried out in the United States which were observed to successfully improve vaccination rates in target communities are discussed. Three initiatives in particular are of note. These include the Motivate, Vaccinate, and Activate program employed in San Francisco; a vaccination strategy created by Penn Medicine and the Mercy Catholic Medical Center in Philadelphia; and the 2004 influenza vaccination strategy tested in New York City under Project VIVA.

Unidos en Salud: *Motivate, Vaccinate, and Activate*

Created to address barriers to effective vaccination among the Latin American community of San Francisco, *Unidos en Salud (UeS)* is a partnership between academic, public health, and community outreach institutions. Between February and May of 2021, *UeS* put into practice and evaluated a COVID-19 vaccination strategy entitled “Motivate, Vaccinate, and Activate.” This strategy was demonstrated to be successful in increasing vaccination among the Latin American community of San Francisco during the 16-week evaluation period (Marquez, et al.). Because this vaccination initiative targeted underserved minority communities in an urban setting its goals are analogous to those of a hypothetical initiative carried out in Detroit.

The *Unidos en Salud* neighborhood vaccination program was implemented within San Francisco’s Mission District, a neighborhood with significant Latin American, Asian, and Black representation in the population. Targeting this district can be considered an attempt to remove spatial barriers between the historically at-risk Latin American population of San Francisco and vaccination distribution sites. The approach is described as specifically seeking to address physical barriers such as a lack

of transportation as well as institutional distrust within the Latin American population (Marquez, et al.).

The “Motivate, Vaccinate, and Activate” strategy had three main components. The “Motivate” phase of this strategy involved generating demand for vaccinations within the target community. Based on survey results of the population, community workers were trained, and informational materials were disseminated to provide greater information on vaccine safety, efficacy, and side effects. Door-to-door canvassing, collaboration with elder care facilities, and the distribution of automated text messages to community members who previously participated in COVID-19 testing were all specific methods used to these ends (Marquez, et al.).

The “Vaccinate” phase of this initiative involved the selection of an appropriate location for walk-up vaccine distribution sites to be established. The site chosen was located within a public plaza and transport hub: a location with an above-ground bus and streetcar system as well as a subway system belowground. This location was chosen to maximize accessibility and foot traffic. The initiative design emphasized minimizing barriers to vaccination registration. To that end clients were not required to show any personally identifying documentation. Furthermore, community members were allowed to self-attest their vaccine eligibility. These factors were implemented to encourage participation from individuals with institutional distrust or immigration concerns (Marquez, et al.). Furthermore, all staff at the vaccination clinic were either bilingual or monolingual Spanish speakers. This helped ensure that language barriers did not impede accessibility.

The “Activate” phase of the vaccination initiative is of particular interest as a specific and unique strategy employed by *UeS*. In this phase, clients who received COVID-19 vaccination were encouraged to help further generate demand for the vaccine through social media outreach. Staff members at vaccination sites asked clients to act as “vaccine

ambassadors” and share their positive vaccination experiences with friends or family they knew to be unvaccinated through social media. This strategy is notable in that it directly employed close friends and family of unvaccinated individuals in a community. In doing so, it encouraged vaccination through individuals that otherwise skeptical members of the community may be more inclined to trust (Marquez, et al.).

Evaluation of these strategies after their use between February and May 2021 demonstrates that they were effective in encouraging vaccination among the target population. Researchers reported that over 20,000 doses were administered at the *UeS* neighborhood vaccination site and that over 70% of recipients were Latin American residents. Surveys of clients revealed that primary factors indicating their decision to accept vaccination at that site included the site’s presence within the local neighborhood, convenience with scheduling, and recommendations from someone they trusted. The way clients most commonly learned of the clinic was through recommendations from friends or family. These results clearly indicate that the choice of location and the “Activate” phase of the initiative were both major contributors to the location’s success. Notably, 26.3% of Latin American clients surveyed indicated that the lack of documentation requirements was a major factor influencing their decision to be vaccinated at that location.

Penn Medicine and Mercy Catholic Medical Center in Philadelphia

In response to the inequitable distribution of the COVID-19 vaccine during the early stages of rollout, a partnership between Penn Medicine, the Mercy Catholic Medical Center, and Black community leaders in Philadelphia was established; their goal was to improve vaccination rates among Black residents of Philadelphia. Three different mass vaccination sites were run for seven hours as a result of this initiative, with planning and execution geared towards encouraging vaccination among Black communities. Structural barriers to vaccination faced by these communities

were of particular concern, although trust-associated factors were also addressed (Lee, et al.).

One structural barrier addressed by the vaccination strategy created by Penn Medicine and the Mercy Catholic Medical Center was the limitations associated with web or app-based scheduling as used by most vaccine distribution sites. To minimize difficulty in registration among individuals with limited internet or computer access, a “no/low-tech” approach was used. Informed by input from Black community partners, a combination of text message sign-up (“low tech”) and a parallel no-tech strategy was employed. Furthermore, by working with community leaders, individuals were identified that struggled to sign up on either of the two methods and phone-based outreach was performed (Lee, et al.).

Similar to the vaccination strategy employed by *Unidos en Salud*, community ambassadorship was also used as a means of encouraging vaccination demand in Philadelphia. Community leaders were partnered with for these purposes. Penn Medicine and the Mercy Catholic Medical Center worked with over 20 pastors from West and Southwest Philadelphia Black churches, encouraging them to recommend vaccination to their congregations. To ensure pastors felt comfortable supporting these initiatives, healthcare systems leaders met with them and requested input on the vaccination strategies employed. The pastors themselves were vaccinated on-site once the first distribution site opened as a demonstration of support and trust. Through the partnerships with faith leaders virtual events with Black physicians within the community were held to offer community members scientific information about the vaccine. Furthermore, the Black-owned radio station WURD held a focused segment on the COVID-19 vaccine in partnership with other community leaders (Lee, et al.).

All clients attending the vaccination sites were offered a post-vaccination survey for the purposes of evaluating the strategy. When asked about the major factors influencing their decision to be vaccinated, 37%

cited ease of registration while 21% cited trust in community and faith leaders. The fact that a significant portion of clients sought out vaccination at least in part due to the organizers' efforts to remove barriers to registration and partner with community leaders demonstrates that these two strategies are valuable tools for vaccination in urban settings. Furthermore, as 85% of the clients that visited the clinic were Black, these strategies seem to be effective in promoting vaccination among Black community members—a finding that has direct relevance to Detroit (Lee, et al.).

Lessons Learned: Vaccination Strategy Modeling in Detroit

Following an evaluation of these three vaccination initiatives, clear strategies emerge that could be extremely effective if used in Detroit. *Unidos en Salud*, through the “Motivate, Vaccinate, and Activate” program, demonstrates how care can be delivered to traditionally underserved racial or ethnic communities by generating demand through ambassadorship. By encouraging clients to act as ambassadors and motivate friends and family to seek vaccination, *UeS* was able to address a major non-physical barrier vaccination initiatives face. Another key takeaway from “Motivate, Vaccinate, and Activate” is the potential value of relaxed requirements of documentation. It was found during the evaluation of survey results that removing the usual documentation requirements such as identification and proof of insurance greatly improved the appeal of vaccination among the Latin American community of San Francisco (Marquez, et al.).

Due to the similar target population the vaccination initiative designed as a product of the partnership between Penn Medicine, the Mercy Catholic Medical Center, and various community leaders among Black neighborhoods in Philadelphia is a very valuable source of insight when considering initiative design in Detroit. Key takeaways from this initiative include the value of low-tech and no-tech approaches to appointment scheduling and the value of partnership with community faith

leaders. In addition, outreach with various community leaders would be an effective method of generating demand for a vaccine. As Detroit hosts a majority Christian population, church pastors are expected to hold a high degree of trust from their local community and could be valuable community partners.

Unlike the other two initiatives examined, Project VIVA was a large-scale project which examined many different interventions among several communities. One specific strategy employed was door-to-door vaccination, which has the advantage of practically eliminating travel time as an inconvenience for individuals. As demonstrated by Rader, et al., willingness to travel is lessened dramatically in individuals that report higher levels of vaccine hesitancy to the point that 50% of individuals that identified as being “very hesitant” to receive a COVID-19 vaccination were unwilling to travel more than 30 minutes to receive a vaccination (2021). Accordingly, removing travel time as a factor by delivering vaccinations to peoples’ homes could improve vaccination outcomes.

Vaccination Strategy Design

With the effective strategies observed in previous vaccination initiatives and an understanding of the various barriers to vaccination, it is possible to design a model vaccination initiative which could address those barriers in Detroit. The first step in designing this initiative is to determine the specific neighborhoods of interest. As observed by Radar, et al., vaccine distribution sites in Detroit tend to be clustered rather than evenly spread throughout the city. This phenomenon should be considered in the context of population shrinkage in Detroit—areas of lesser population density tend to be overlooked with regards to infrastructure development and, in this case, vaccine distribution. Neighborhoods in regions without nearby vaccination sites are good targets for a vaccination initiative as they present an opportunity to address spatial barriers. A similar method can be used to this end—specifically, the online service “VaccineFinder” can be

used to identify regions without vaccine distribution sites. Searching through VaccineFinder allows for the identification of areas in Detroit with a low concentration of vaccine distribution locations and the neighborhoods within them. One example of such a neighborhood is Joy Community and its surrounding neighborhoods, where those without ready access to a personal vehicle commute by walking or public transit, which can take upwards of 30 minutes.

To assist in identifying at-risk communities, vaccination initiatives could be structured with an initial information-gathering phase, similar to that undergone by Project VIDA. Through surveying, perhaps targeted at neighborhoods identified via tools like VaccineTracker, Detroit residents could be given the opportunity to provide information on how accessible pharmacies are to them. This phase would also be used to collect data on trust and attitudes towards vaccines in specific neighborhoods, for the purpose of informing subsequent vaccination efforts.

As demonstrated by the various vaccination initiatives examined, partnership with community members greatly improves vaccination outcomes. Once communities are identified with the least convenient access to vaccine distribution sites, efforts could begin to reach out to local community leaders. Meetings with community partners would be an essential part of this process. Such meetings would serve to ensure that community leaders themselves have trust in the vaccination initiative and its goals and allow for healthcare distributors to gain a more complete understanding of the community in which they plan to work. During this process planning of the specific vaccine distribution site locations would also be occurring and could be informed by community leaders. Ideal locations would be accessible and clearly visible with high levels of foot traffic. Depending on the neighborhood distribution may occur in a local park, school, or church.

Before vaccination can begin, it will be necessary to take efforts to increase vaccine demand in the area. Again, endorsement from community

leaders would help significantly. Similar to the strategies employed in Philadelphia, community leaders could hold events with medical professionals to provide information to the community on vaccine safety and necessity and address concerns from those with reservations. Dissemination of information and close partnership with the community during this process could help address trust barriers once distribution begins.

Vaccination distribution sites should seek to maximize accessibility and minimize barriers once distribution begins. One specific strategy that has been examined which accomplished this is a reduction in the requirements for registration—allowing individuals to become vaccinated without showing personal identification or proof of residence. Another useful strategy is the employment of low-tech and no-tech methods of appointment registration to prevent internet or computer access from acting as a barrier to registration. Registration could be accomplished via text, and individuals could have the option to register family members in person from the distribution site.

In addition to partnership with community leaders, ambassadorship from clients as employed by the “Motivate, Vaccinate, and Activate” initiative could help improve vaccination outcomes in Detroit. Clients would be encouraged, after receiving a vaccination, to act as “vaccine ambassadors” and share positive vaccination experiences with friends and family, especially through social media. By using members of a community as vectors of information and positive encouragement towards vaccination the barrier of low trust in healthcare providers or government institutions could be mitigated.

In addition to established vaccination sites, at-home vaccinations would be offered to the community to further diminish spatial barriers to vaccination. Registration for at-home vaccination appointments could be made via the aforementioned text-based “low-tech” methods; alternatively, friends or family of individuals preferring at-home vaccination

appointments could schedule at vaccine distribution sites. Teams of clinicians could then visit the homes of community members and administer vaccinations.

Relevance Beyond the Scope of Detroit

An examination of existing research into the underlying causes of vaccine hesitancy, as well as literature on practiced vaccine interventions, has made it possible to propose a COVID-19 vaccination initiative in Detroit to address the most common and significant barriers. It should be emphasized, however, that the value of these strategies extends beyond the COVID-19 public health crisis. Future public health crises will arise, and the response to these crises will face similar barriers with respect to equitable distribution of care. To ensure that interventions during public health crises proceed in an equitable manner, it will be necessary to integrate strategies targeting barriers associated with racial or ethnic disparities during the early stages of initiative design. Having an existing awareness of which strategies can be employed in urban settings like Detroit is therefore valuable beyond the scope of the present.

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