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SSM - Population Health

Analysis of COVID-19 vaccine uptake among people with underlying chronic conditions in 2022: A cross-sectional study

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ABSTRACT

Background: COVID-19 has been a global burden and vaccinations have proven to be the most effective measure to fight this pandemic. Since the approval and distribution of the vaccines, approximately 75% of District of Columbia residents have been fully vaccinated leaving a quarter of the population at risk. With the availability and approval of the booster doses to people with high-risk chronic conditions, it is important to understand the attitude of people towards vaccinations.

Objective: The objective of this research study is to analyze the COVID-19 vaccination uptake among people with underlying chronic conditions residing in District of Columbia residents and to determine the reason for the hesitancy to perform targeted outreach to unvaccinated populations.

Study design/methods: In 2022, we conducted a cross sectional study via a short online survey that was distributed to the target populations via email and social media. Multivariable Regression Analyses were conducted to determine the factors associated with the acceptance of the vaccination across various demographics.

Results: The findings of the study demonstrate that the acceptance of COVID-19 vaccination was low among people with chronic conditions compared to those with no underlying chronic conditions, and vaccination rates strongly differ based on social determinants like education, employment, and area of residence across District of Columbia.

Conclusion: The public health significance of this study is to understand the reason behind the vaccine hesitancy so that we can work towards building trust, extending outreach, creating targeted health education, and increasing access to vaccination to all communities across District of Columbia.

1. Introduction

COVID-19 pandemic has had a devastating effect in the U.S. with approximately 80 million cases and more than 950,000 deaths reported (CDC, 2020). The pandemic has played a pivotal role changing the landscape of healthcare by posing extreme difficulties specifically for patients with underlying chronic conditions, which contributed to increased mortality. The District of Columbia has been severely impacted by the COVID-19 pandemic. As of February 28, 2022, the COVID-19 infection has claimed the lives of 1319 DC residents, with approximately 80% of the deaths observed in people aged over 60, and 134,623 positive infections have been reported since the pandemic began(COVID-19 Surveillance | Coronavirus, n.d.). Since the approval of the vaccines against COVID-19, 74.4% of DC residents have been fully vaccinated, which leaves 24.6% of them to be unvaccinated due to a plethora of reasons such as lack of awareness, minimum or no access to

the vaccine, lack of trust in the development of the vaccine all of which contribute to vaccine hesitancy(*Vaccination Data | Coronavirus*, n.d.).

COVID-19 is a chronic disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that can result in respiratory distress. While this disease has infected millions, COVID-19 has had a direct and indirect impact on people with underlying chronic health conditions. People with compromised immune systems due to age or with underlying chronic conditions such as Diabetes, Hypertension, HIV/AIDS, Lung disease, Kidney disease, Heart disease, Organ transplant, Cancer, Autoimmune conditions are at elevated risk of developing severe complications and death due to being infected with COVID-19 (Al-Hanawi et al., 2021) The risk of developing serious symptoms increases with age and a history of other health conditions. In the United States, approximately 81% of deaths due to COVID-19 have been reported in people who are above 65 years or age. The COVID-19 pandemic has exacerbated the existing health inequities and laid bare

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underlying root causes(Hacker et al., 2021). It has also been noted that the condition displayed a disproportionate burden on different communities in terms of the severity of the illness and death due to lower socio-economic statuses and sub-optimal Social Determinants of Health (SDoH) which influence the access to health care and health education (Hacker et al., 2021). Level of education, type of employment, poor or no access to health care, lack of safe and affordable housing, lack of access to healthy food, structural racism, and other conditions all affect a wide range of health outcomes(Hacker et al., 2021). Exploring the impact of COVID-19 in people with underlying chronic conditions will contribute towards public health promotion, disease control, and effectively improve health outcomes.

Amid these challenging times, the development of an effective and safe vaccination within a year of onset of the pandemic served as a ray of light to human resilience and survival (Danabal et al., 2021). COVID-19 vaccine is an effective measure to manage the pandemic and prevent severe illness and death. Ultimately, the success of any vaccination is dependent on the vaccine acceptance and uptake when enough number of people are vaccinated to contribute to herd immunity. However, a large nationally representative survey conducted in the U.S. prior to the approval and public availability of a COVID-19 vaccine has found that 31% of respondents were hesitant towards the vaccination and 20% would refuse the vaccination outright irrespective of its safety and effectiveness with a follow up survey four months later which resulted in an even higher percentage of respondents saying that they would definitely or probably not be vaccinated(Arvanitis et al., 2021).

Vaccine denial and hesitancy is a persistent global concern that has been in existence for many decades which has affected routine vaccination programs. Anti-vaccination groups have always coexisted alongside the advances in vaccination technologies. "Vaccine hesitancy" is defined as refusal, reluctance, and/or delay accepting the vaccination despite its availability(Vaccine Hesitancy, n.d.) It is a multifactorial complex with the causative factors ranging from culture, politics, and socio-economic factors. Multiple studies have demonstrated the concerning patterns of decline in vaccination rates across the U.S.(Smith, 2017). The Andrew Wakefield scandal in 1998 that falsely depicted an association between MMR vaccine and Autism Spectrum Disorder (ASD) created a significant rise in vaccine hesitancy in the United States (Koslap-Petraco, 2019; Rao & Andrade, 2011; Smith, 2017). The misinformation on vaccines has led to alarming rates of increase in vaccine hesitancy over the last few decades.

It is critical to understand that people with underlying medical conditions are required to be fully vaccinated since they are particularly vulnerable to severe illness or death from COVID-19. In 2015, approximately 354,000 DC residents reported having at least one chronic disease, and 119,000 reported having two or more chronic conditions (District of Columbia | Keeping Education ACTIVE | Partnership to Fight Chronic Disease, n.d.). COVID-19 has had serious effects on population with poorly managed diabetes, cardiovascular disease, hypertension, and other health outcomes. As we continue to fight the pandemic, it is critical to prioritize the population with older age and underlying health conditions to get fully vaccinated with required boosters.

Even though the District has been successful in providing access to COVID-19 vaccinations throughout the state especially prioritizing wards 5,7, and 8 which include the areas of the city where residents are disproportionately affected by COVID-19, the vaccination rates in these wards haven't been up to the mark, which depicts a need for health education, raising awareness, along with increased access to the vaccinations in specific areas of DC via Community Outreach programs.

The purpose of this study is to understand the reason why people choose not to get vaccinated to direct our efforts on health education, health promotion, and to expand our efforts of Community Outreach to the specific population.

2. Materials and methods

We conducted an external independent pilot study which would serve as a reliable basis for future studies since the COVID-19 pandemic has proven to be extremely challenging with a constantly mutating virus resulting in continual changes to vaccine mandates, requirement of additional booster doses, and varied perceptions towards the vaccinations. We implemented a cross-sectional study design to collect the data via an internet-based survey. The target population was people who received any type of care and services at our health center including primary care, medical and non-case management services, food bank services, and chronic disease care coordination services. Eligibility criteria included being above the age of 18 years and residing in D.C. Exclusion criteria would be children below 18 years and people who reside outside of D.C. Online informed consent was obtained from all the participants before proceeding to the survey. The participants were informed about the study's aims and objectives, and that their participation is completely voluntary, and they can choose to withdraw from the study at any time without giving a reason. They were also informed that all the information provided would be anonymous and confidential.

To remain mindful of the social distancing measures implemented in DC at the time of data collection for this study and to ensure the safety of our participants, the data was collected via an online self-reported questionnaire. An online survey was designed using an online survey tool (Survey Monkey) and distributed across the target populations online via our patient engagement platform, Care Message. The survey was conducted anonymously to avoid experimenter bias. The survey included questions on patient demographics such as race-ethnicity, gender, zip code of residence, education level, employment status, and vaccination status of the participants. The remainder of the survey is split into two sections, one for people who answered 'yes' to being vaccinated and the other for those who answered 'no' to receiving the vaccine. Section A includes questions on the reasons to accept the vaccination, the type of vaccination received, the number of doses received, and willingness to receive the booster dose. Section B included questions on the reasons to not get vaccinated and if they would recommend the vaccine to others.

The primary outcome variable for this study was the acceptance of a COVID-19 vaccination across the target population with/without underlying chronic conditions as and were asked to report 'yes' or 'no' to the question. The dependent variables in this study are: (a) Did the participant receive the vaccine (b) The type of vaccine the participant received (c) The number of doses of vaccine received (d) The reason why they chose to receive the vaccine (e) Intent to receive the booster dose (f) The reason why the patient chose not to get vaccinated in case of unvaccinated participants (g) Concern of getting infected in general and (h) Intent to recommend the vaccine to others in general.

The independent variables in this study include the presence of one or more underlying chronic conditions such as Diabetes, Hypertension, HIV/AIDS, Asthma, Lung Disease, Heart Disease, Kidney Disease, Organ transplant, Current diagnosis or personal history of cancer, Autoimmune disorders. Potential confounding variables are age, gender, race/ethnicity, education levels, and employment status. Age was categorizing it into 5 groups a) 18–35, b) 35–44 years, c) 45–54 years, d) 55–64 years, e) 65 years and above. Other covariates are coded as follows: gender is classified as (a) Male (b) Female (c) Unknown considering male as the referent group. Education levels are categorized as (a) Middle School or Less (b) High School or Equivalent (c) Undergraduate Degree (d) Graduate degree or Higher considering Graduate degree or Higher as the referent group. Employment statuses are categorized as (a) Unemployed (b) Healthcare Worker (c) Essential Worker (d)Student and (e)Other considering Healthcare Workers as referent group. Race-Ethnicity are classified as (a) African American or Black (b) Asian (c) Caucasian or White (d)Hispanic and (e) Others considering Caucasian or White as referent group.

2.1. Statistical analysis

A bivariate analysis of the categorical variables was performed along with chi-square tests to determine the associations between the dependent and independent variables. A multivariable logistic regression analysis was performed among the group who received the vaccination to determine the factors associated with the acceptance of the COVID-19 vaccination across various demographics. The significance level was set at a p-value <0.05.

2.2. Ethical considerations

This research study collected personal opinions and beliefs of individuals through an anonymous online survey and qualifies as Human Subject Research. We consulted with an external Institutional Review Board, WIRB-Copernicus Group, Inc. to review our study. WCG IRB's IRB Affairs Department reviewed the study under the Common Rule and applicable guidance and found it to be exempt under 45 CFR § 46.104(d) (2), because the research only includes interactions involving educational tests, survey procedures, interview procedures, or observations of public behavior; and the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subject.

3. Results

The size for this study was 318 participants, of which approximately

Table 1

Descriptive Statistics – Frequency distribution and chi-square analysis of people who received vaccination vs who did not receive the vaccination (N = 318).

Demographic	Vaccination Status				Total (N = 318)		P- value
	Received the vaccination (N = 305)		Did not receive the vaccination (N = 13)				
Age	N	%	N	%	N	%	0.15
18–35	113	37.05%	4	30.77%	117	36.79%	
35–44	82	26.89%	0	0.00%	82	25.79%	
45–54	40	13.11%	4	30.77%	44	13.84%	
55–64	43	14.10%	3	23.08%	46	14.47%	
65+	25	8.20%	2	15.38%	27	8.49%	
Did not specify	2	0.66%		0.00%	2	0.63%	
Gender							0.708
Female	171	56.07%	6	46.15%	177	55.66%	
Male	131	42.95%	7	53.85%	138	43.40%	
Unknown	3	0.98%	0	0.00%	3	0.94%	
Race-Ethnicity							**0.0003 *****
African American or Black	80	26.23%	10	76.92%	90	28.30%	
Asian	23	7.54%	0	0.00%	23	7.23%	
Caucasian or White	158	51.80%	0	0.00%	158	49.69%	
Hispanic	32	10.49%	1	7.69%	33	10.38%	
Did not specify	12	3.93%	1	7.69%	13	4.09%	
Level of Education							**0.001 *****
Graduate Degree or Higher	165	54.10%	1	7.69%	166	52.20%	
High School or Equivalent	44	14.43%	6	46.15%	50	15.72%	
Middle School or Less	3	0.98%	1	7.69%	4	1.26%	
Undergraduate Degree	91	29.84%	5	38.46%	96	30.19%	
Did not specify	2	0.66%	0	0.00%	2	0.63%	
Employment Type							4.46
Essential Worker	31	10.16%	4	30.77%	35	11.01%	
Healthcare Worker	16	5.25%	0	0.00%	16	5.03%	
Student	10	3.28%	0	0.00%	10	3.14%	
Other	210	68.85%	0	0.00%	210	66.04%	
Unemployed	37	12.13%	2	15.38%	39	12.26%	
Did not specify	1	0.33%	7	53.85%	8	2.52%	
Underlying Chronic Conditions							0.32
More than one	51	16.72%	1	7.69%	52	16.35%	
None	180	59.02%	6	46.15%	186	58.49%	
One	73	23.93%	6	46.15%	79	24.84%	
Did not specify	1	0.33%			1	0.31%	
Recommend the vaccine to others							2.51
No	9	2.95%	13	100.00%	22	6.92%	
Yes	288	94.43%	0	0.00%	288	90.57%	
Did not specify	8	2.62%			8	2.52%	

*p < 0.1.

**p < 0.05.

***p < 0.01.

25% reported to have at least one underlying condition, and 17% reported to have more than one underlying condition. Table-1 summarizes the characteristics of the respondents and the potential factors that may have influenced the willingness or hesitancy towards the COVID-19 vaccination. Among the 318 respondents, approximately (N = 27) 9% of them were above 65 years of age. Approximately 56% of the respondents were women of which 3.4% were not vaccinated, 43% were men of which 5% were not vaccinated, and ~1% listed gender as unknown who were fully vaccinated. Majority of the respondents were Caucasian/White (N = 158) of which 100% were vaccinated, followed by African Americans (N = 90) of which 11% were not vaccinated, Hispanics (N = 33) of which 3% were not vaccinated, and Asians (N = 23) of which 100% were vaccinated, and 13 respondents did not want to disclose their race-ethnicity of which 7.6% were not vaccinated. Approximately 52% of the respondents had a graduate degree or higher level of education of which 0.1% were not vaccinated, followed by 30% who had an undergraduate degree of which 5% were not vaccinated, followed by 15% who had high school education of which 12% were not vaccinated, and 1% who went to middle school or less of which 25% were not vaccinated. Majority of the respondents said that they did not qualify as essential or healthcare workers but were fully vaccinated. 12% of respondents were unemployed of which 5% were not vaccinated. 11% of essential workers reported to have not been vaccinated. 54% of people who chose to not get vaccinated did not want to specify their employment type. Approximately 3% of respondents who received the vaccination said they would not recommend it to others, while a 100% of those who did not receive the vaccine said they would not recommend it to others.

Table-2 represents the results of the logistic regression analysis estimates associated with the acceptance of the COVID-19 vaccination among the people across various SDoH and underlying chronic conditions. The people belonging to age group 18–35 years had 59% odds of getting vaccinated when compared to the other age groups (OR = 0.589, CI- 0.127, 2.718). Women are 1.28 (OR = 1.276, CI- 0.402, 4.407) times more likely to get vaccinated when compared to men. African Americans had 35% odds of getting vaccinated when compared to other racial and ethnic groups (OR = 0.35, CI- 0.156, 0.811). People who have a graduate degree or higher level of education are approximately 1.2 times highly likely to get vaccinated when compared to other levels of education (OR = 1.179, CI- 0.189, 7.358). Essential Workers had 11% odds of being vaccinated compared to people in other employment groups (OR = 0.113, CI- 0.013, 0.992). People with no underlying conditions were 1.4 times more likely to be vaccinated compared to those with one or more underlying chronic conditions (OR = 1.44, CI- 0.195, 10.616). The study also explored the interactions and the effects of modification on possible combinations of the exploratory variables, with no significant results to be reported.

Table-3 is a description of the attitudes towards the vaccine that were reported by the respondents, as to why they those chose to get vaccinated vs being not vaccinated. The primary reason reported by majority of the respondents who were vaccinated was protection from serious illness and death (94%), followed by approximately 2% who reported the reason to be resuming travel/work/school/social life. 1.6% reported the primary reason they got vaccinated was because it was a District Mandate to hold their job at that point of time, 1.32% said they were encouraged by others to take it, whereas 0.67% were not sure why they got vaccinated.

Amongst the unvaccinated, 38% of the residents chose not to get vaccinated because they did not believe in the vaccine, and it was a personal choice not to be vaccinated. 21.43% of the unvaccinated participants reported being concerned about being infected with COVID-19 and 78.57% reported no concern of being infected with COVID-19. 31% said they did not have enough information about the vaccine, 23% said they are afraid of symptoms if they took the vaccine, which ~7.6% listed a variety of other reasons such as 'COVID vaccine gives you impotency', 'Jesus will protect me', and 'I don't have time for it', etc. It is noted that

Table 2
Logistic Regression Analysis of factors associated with COVID 19 vaccination acceptance rates (N = 305).

Demographic	Odds Ratio	95% Confidence Interval (Lower, Upper)	P-value
Age			
18-34 (ref)	0.589	0.127, 2.718	**0.008 ****
35–44	0.368	0.08, 1.698	**0.099 ***
45–54	0.151	0.033, 0.697	0.528
55–64	0.164	0.036, 0.758	0.489
65+	0.089	0.019, 0.412	0.729
Did not specify	0.007	0.001, 0.03	1.003
Gender			
Female(ref)	1.276	0.402, 4.047	9.414
Male	0.753	0.237, 2.388	**0.023 ****
Unknown	0.01	0.003, 0.032	1.05
Race-Ethnicity			
African American or Black	0.356	0.156, 0.811	0.578
Asian	0.082	0.036, 0.186	1.037
Caucasian or White(ref)	0.518	0.227, 1.181	0.351
Hispanic	0.117	0.051, 0.267	0.977
Did not specify	0.041	0.018, 0.093	1.1
Level of Education			
Graduate Degree or Higher(ref)	1.179	0.189, 7.358	1.013
High School or Equivalent	0.169	0.027, 1.052	0.309
Middle School or Less	0.01	0.002, 0.062	0.979
Undergraduate Degree	0.425	0.068, 2.655	**0.009 *****
Did not specify	0.007	0.001, 0.041	0.988
Employment Type			
Essential Worker	0.113	0.013, 0.992	0.333
Healthcare Worker (ref)	0.055	0.006, 0.485	0.649
Student	0.034	0.004, 0.297	0.789
Other	2.211	0.252, 19.374	1.778
Unemployed	0.138	0.016, 1.21	0.234
Did not specify	0.003	0.0003, 0.029	0.979
Underlying Chronic Conditions			
More than one	0.201	0.027, 1.48	0.144
None(ref)	1.44	0.195, 10.616	2.575
One	0.315	0.043, 2.32	**0.021 ****
Did not specify	0.003	0.0004, 0.024	0.983

*p < 0.1.
**p < 0.05.
***p < 0.01.

none of the people who chose to not get vaccinated listed severe allergic reactions or access to vaccine as a reason in the survey.

A geospatial analysis of the survey respondents across DC wards shows that the unvaccinated residents are concentrated in Ward 5 and Ward 8 (see Fig. 1) which aligns with the DC government database on vaccination rates across wards(Vaccination Data | Coronavirus, n.d.). This distribution helps prioritize our targeted community outreach efforts to these specific wards.

4. Discussion

COVID-19 pandemic has affected millions of lives with a more horrific impact on people with underlying chronic conditions. Getting vaccinated against COVID-19 is considered as one of the most reliable protective public health interventions. While the hesitancy towards the

Table 3
Attitudes towards the vaccine.

Reason to accept/reject the vaccine	N	Percentage
Primary reason to get vaccinated		
Protection from serious illness and death	286	94.39%
Encouraged by others	4	1.32%
Resume travel/work/school/social life	6	1.98%
District mandate to hold my job	5	1.65%
Not sure	2	0.66%
Primary reason to not get vaccinated		
Not enough information	4	30.77%
Fear of symptoms	3	23.08%
Do not believe in the vaccine/personal choice	5	38.46%
Other (Open ended responses)	1	7.69%
Severe Allergic Reaction	0	0
No access to vaccine	0	0

vaccination is an expected concern, understanding the reason for the hesitancy towards the vaccine can help health care workers determine how to address the concern in the first place. Community health centers are focused on working towards building trust, extending outreach, health education, and increase access to vaccination to all communities to ensure higher levels of vaccination rates. Our organization is a multidisciplinary and integrated community health center located in the heart of our nation's capital and is dedicated to serving hard to reach communities, including vulnerable populations and historically marginalized populations.

As a Federally Qualified Health Center (FQHC) Look Alike, we serve low- and moderate-income individuals and communities regardless of their ability to pay. Our health center is an integrated delivery team that services over 3,285 patients annually, many of which are people of color, with underlying chronic conditions, and an outreach team who provide extensive case management services to the patients with chronic conditions based in low-income communities specifically residing in Wards 7 and 8 of the District, which incidentally are the same wards with low vaccination rates against COVID-19(*Vaccination Data |*

Coronavirus, n.d.). As of April 30, 2022, Our organization has been able to vaccinate 640 individuals living in the D.C., Maryland, Virginia area, have administered over 1400 COVID-19 vaccinations, and performed over 250 COVID-19 tests. The vaccine coverage rates across the district depict a clear picture of the inequity in vaccination rates across different wards[11].

This study explored the acceptance of the COVID-19 vaccination across the wards in DC and how it varies in people with different SDoH and underlying chronic conditions. The current study revealed that people who had no chronic conditions were more likely to get vaccinated when compared to those with one or more than one chronic condition. This can be attributed to a fear factor in people with chronic conditions which was listed as one of the reasons why people chose not to get vaccinated, fear of symptoms. Among the people who received vaccinations, it has been reflected that people with graduate degree or higher education are more likely to receive the vaccinations which can be attributed to lack of public health awareness in people with less education. The study also revealed that among the people who said they wouldn't recommend the vaccination to others, 41% of them were already vaccinated, which poses a scenario that either they were not sure of why they got vaccinated or they received the vaccine due to the District mandate and might not be willing to receive a booster dose in the future. This demonstrates a need for public health education on the importance of vaccinations and how they help us battle the infections not only during the current pandemic, but also for any further public health emergencies that may arise in the future. The burden of building trust in the vaccinations is collaborative effort which lies on the shoulders of public health professionals, community health workers, and the providers who admit the vaccinations and by performing extensive outreach efforts prioritizing the underserved and underprivileged communities across the different wards of DC.

The strengths of this study are there is no duplication of data since the patient must complete the survey online and it can be completed only once. The survey is anonymous to eliminate the possibility of investigator bias and reporting bias. The limitations of this study are the survey not being accessible to people who do not have access to electronic devices such as mobile phones or computers which limits the
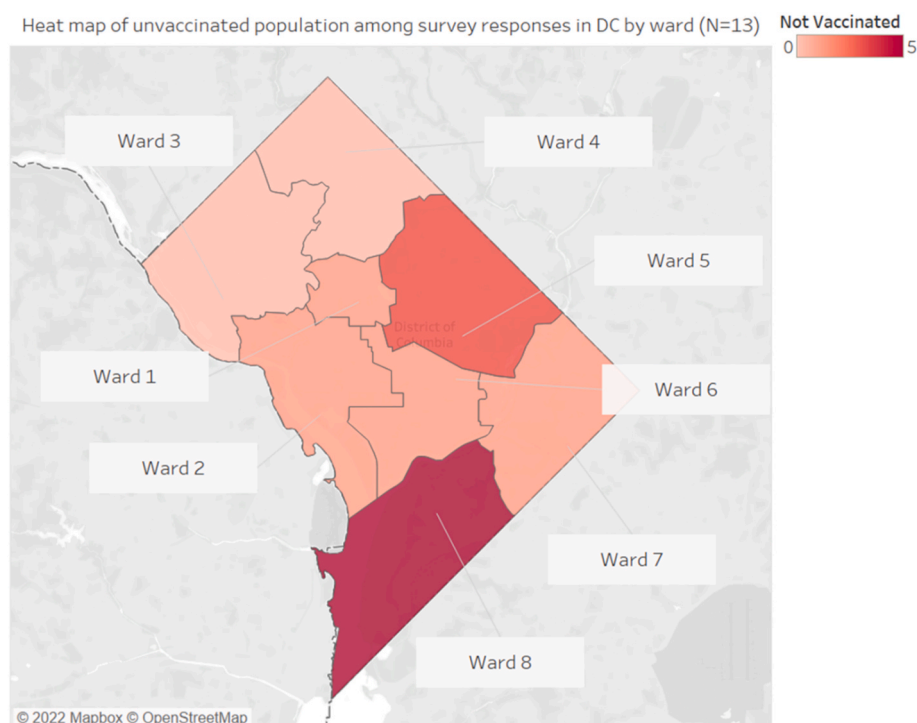

Fig. 1. is a Geospatial Analysis of unvaccinated population across DC by wards to strategize the targeted outreach of COVID-19 vaccine clinics in these locations.

uniform distribution of survey among the DC residents. The stigma around COVID-19 and its vaccinations may lead the people to not answer the survey if they chose not to get vaccinated. The time frame of the data collection for this study was just during the emergence of Omicron Variant (BA.1) of Sars-Cov-2 which may have led to biased responses.

5. Conclusion

The purpose of this study was to develop an intervention to promote public health education and improve access to COVID-19 vaccinations by collaborative community outreach efforts across the different wards of the District especially prioritizing Ward 5 and Ward 8. Our organization has regularly scheduled health literacy seminars to address the myths on vaccine hesitancy and importance of COVID-19 vaccinations to the communities. The Geo-spatial mapping (Map- 1) helps us identify the areas of high unvaccinated rates so that we can prioritize our efforts such as mobile vaccination camps to these areas with high unvaccinated rates. We currently offer COVID-19 vaccinations onsite at our Main location in Ward 5 to our internal patient base but also welcomes everyone from the community to get vaccinated irrespective of their demographic status. We recently launched a new site location as a Men's Shelter in Ward 6 where we provide primary care and prioritize COVID-19 vaccinations to the patients in the shelter. We also offer regular COVID-19 vaccinations and testing at our Food Bank to all our HIV positive client base under Ryan White Federal Grant.

In addition, we built collaborative partnerships with other FQHCs and University Hospitals in Ward 8 to perform Community Outreach and provide COVID-19 vaccinations by offering incentives. We have partnered with St. Elizabeth Church, Maple Springs Baptist Church, and New Samaritan Baptist Church to expand community outreach into Wards 5 and 8 by building trust, promoting health education, and increase access to vaccination to all communities to improve the levels of vaccination rates across DC.

Ethical considerations

This research study collected personal opinions and beliefs of individuals through an anonymous online survey and qualifies as Human Subject Research. We consulted with an external Institutional Review Board, WIRB-Copernicus Group, Inc. to review our study. WCG IRB's IRB Affairs Department reviewed the study under the Common Rule and applicable guidance and found it to be exempt under 45 CFR § 46.104(d)(2), because the research only includes interactions involving educational tests, survey procedures, interview procedures, or observations of public behavior; and the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subject.

This research study has been reviewed by an external Institutional Review Board, WIRB-Copernicus Group, Inc. WCG IRB's IRB Affairs Department reviewed the study under the Common Rule and applicable guidance and found it to be exempt under 45 CFR § 46.104(d)(2), because the research only includes interactions involving educational tests, survey procedures, interview procedures, or observations of public behavior; and the information obtained is recorded by the investigator

in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subject. This manuscript has not been previously published and is currently not under consideration for publication elsewhere. The authors received no financial funding to conduct this research study/authorship and/or publication of this article. This study is free of any Conflict of Interest. All the authors listed in this study have contributed to, seen, and approved the final, submitted version of the manuscript.

Data availability

The data that has been used is confidential.

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