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Understanding COVID-19 vaccine hesitancy among K-12 staff, parents, and students— District of Columbia, February – April, 2022

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Abstract

Objective—Despite widespread availability of COVID-19 vaccines, millions of Americans have not received the recommended vaccine doses. In the District of Columbia (DC), COVID-19 vaccination rates are lowest among residents who are Non-Hispanic (NH) Black and among school-aged children. We assessed COVID-19 vaccine hesitancy among staff and parents of students in DC K-12 public and public charter schools.

Methods—We conducted a telephone-based survey from February 6 to April 16, 2022 to staff, students, and parents of students who participated in school-based COVID-19 screening testing. COVID-19-related survey items included: vaccination status, reasons for not getting vaccinated, perceived vaccine access, and trusted COVID-19 information sources. Utilizing time-to-event analyses, we evaluated differences across demographic groups.

Results—The interview response rate was 25.8% (308/1,193). Most unvaccinated participants were NH Black and ages 5–11 years. Median time from vaccine eligibility to uptake was 236 days for NH Black participants vs. 10 days for NH White participants. Vaccine safety was the top concern among unvaccinated participants. Government and healthcare providers were the most trusted COVID-19 information sources.

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DISCLAIMER STATEMENT

The findings and conclusions of this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

CONFLICT OF INTEREST DISCLOSURE STATEMENT

The authors have no conflicts of interest to disclose.

HUMAN SUBJECTS APPROVAL STATEMENT

This activity was reviewed by the CDC and was conducted consistent with applicable federal law and CDC policy (See, for example, 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 [AQ7] U.S.C. §3501 et seq.).

Conclusions—Differences in timing of vaccine uptake among respondents and greater vaccine hesitancy among NH Black participants compared to other racial/ethnic groups highlight a need for continued tailored outreach and communication using trusted sources to convey the importance, benefits, and safety of COVID-19 vaccination.

Implications for School Health Policy, Practice, and Equity—Improving COVID-19 vaccine uptake among hesitant groups serves to improve the safety of school environments, advances health equity, and minimizes disruptions to in-person learning that affect the wellbeing of students, teachers, staff, and parents.

Keywords

COVID-19; vaccine hesitancy; K-12 schools; racial/ethnicity disparities; District of Columbia; time-to-event

BACKGROUND

Over the course of the COVID-19 pandemic, schools faced closures, increased absenteeism, and constant pressure to adapt to emerging recommendations, including providing virtual and hybrid instruction to sustain education.¹ Layered non-pharmaceutical mitigation strategies such as mask use, physical distancing, ventilation, and screening testing have been important in reducing SARS-CoV-2 transmission in schools and allowing for in-person instruction to continue. The addition of COVID-19 vaccines in December 2020, added an extra layer of safety by reducing the risk of SARS-CoV-2-related illness and complications.²

Prior to June 2022, the Pfizer-BioNTech mRNA vaccine (“Pfizer”) was only approved for administration to children 5–17 years old, and no vaccine was authorized for children under 5 years of age, which left approximately 6.0% of Americans without the option to be vaccinated.³ As of April 17, 2022, 77.5% of vaccine-eligible Americans had received at least one COVID-19 vaccination dose, yet millions of Americans remained under-protected as they either have not received the recommended COVID-19 primary series or booster doses.⁴ COVID-19 vaccine concerns or hesitancy has been shown to contribute to lower vaccine uptake.^{5–7}

Vaccine hesitancy is defined by the World Health Organization’s Strategic Advisory Group of Experts on Immunization (WHO SAGE) Working Group as a “delay in the acceptance or refusal of vaccination despite availability of vaccination services” based on three criteria: confidence (degree of trust in vaccines, healthcare systems, and policy makers); complacency (perception that risk of disease is low); and convenience (access challenges).⁸ National polls conducted prior to the availability of COVID-19 vaccines, when vaccines were theoretical, showed younger adults, women, non-Hispanic Black persons, adults living in nonmetropolitan areas, and adults with lower education, lower income, and without health insurance had the highest estimates of not wanting to receive a COVID-19 vaccine, highlighting potentially vaccine hesitant groups who also make such health-related decisions for their children.⁹

We sought to characterize vaccine uptake and hesitancy, assess time-to-vaccination across different groups, understand COVID-19 vaccination concerns leading to vaccine hesitancy, and determine reasons for receiving COVID-19 vaccination among teachers, students, and parents in District of Columbia K-12 public (DCPS) and public charter schools (DCPCS).

METHODS

Participants

The study population consisted of parents or guardians (“parents”) on behalf of their children under 18 years old, students 18 years and older, and staff at DCPS and DCPCS. At the start of the 2021–2022 academic year, these schools implemented weekly randomized, opt-out school-based COVID-19 screening testing with the goal of testing at least 10% of the student population (testing percentages varied by school policy). Staff participated on a voluntary basis. We elected to survey this population to avoid burdening schools to collect data already available to public health, not because of participation in COVID-19 screening test. Students and staff were tested by Shield T3, the testing vendor, from January 21 – April 8, 2022. Test results and associated demographic data were sent to DC Health to inform contact tracing efforts and were used to select the study population. Initially, only test-positive individuals were eligible, but due to single-digit daily test-positive individuals reported after the first three weeks of the study, study inclusion was expanded to also include all test-negative staff and a random sample of test negative students tested on each day of the data collection period.

Instrumentation

To assess vaccine uptake, hesitancy, and concerns among students and staff tested for COVID-19 through the school-based testing program, we conducted telephone interviews from February 6 to April 16, 2022. We collected demographic information, DC school ward location, COVID-19 vaccination status and dates of students and staff, household vaccination status, reasons for being vaccinated or unvaccinated, perceived ease of getting COVID-19 vaccine, and trusted sources for COVID-19 information. Interview questions were informed by the purpose of the study and use in previous studies and existing literature.^{5,9–11} Questions related to being fully vaccinated and receiving additional COVID-19 vaccine doses in the future were approved after the study had commenced, resulting in 32 participants who were not asked the full set of questions.

Procedure

Daily spreadsheets of all school-based screening testing results and associated personally identifiable information were sent to DC Health by Shield T3 and stored and collated on a secure cloud-based platform. Trained callers conducted interviews with assigned participants and made three call attempts unless a wrong number was indicated, or the person declined to participate. Verbal consent was obtained from all adults 18 years and older. Students 13–17 years of age who were willing to participate verbally assented in the presence of their parent. Translation services were offered to non-English speaking participants. Callers confirmed demographic and location data provided by Shield T3 and updated discrepant data to reflect self-reported information. Participants were grouped into four self-identified

race and ethnicity categories: Non-Hispanic (NH) Black (“NH Black”), Non-Hispanic White (“NH White”), Hispanic/Latino (“Hispanic”), and a group that included all other races including Asian, Native Hawaiian or other Pacific Islander, multiracial, and unspecified participants (“NH Other”). They were also categorized by their role at school and vaccine age-eligible group: students 5–11 years old, students 12 years and older, and teachers/staff.

At the end of data collection, DC Health confirmed vaccination status and vaccination dates for all participants using Chesapeake Regional Information System for Our Patients (CRISP DC), DC’s health information exchange. A participant’s self-reported vaccination status was categorized based on their age and the number of COVID-19 vaccine doses they were eligible to receive per CDC’s definitions at the time of the study. Participants were considered unvaccinated if they reported not receiving a COVID-19 vaccine dose and partially vaccinated if they reported only receiving one of the recommended two-doses of the Pfizer or Moderna mRNA (“Moderna”) vaccines. Fully vaccinated participants were those 12 years old who reported receiving the primary series of the Pfizer, Moderna, or Janssen single-dose viral vector (“Janssen”) vaccine but not the recommended first booster dose for the Pfizer and Moderna vaccines. Up-to-date participants included 5-11-year-olds who completed the primary series for the Pfizer vaccine and those 12 years old who completed the primary series for any of the three vaccines and received the recommended booster dose. At the time of the study, children 5–11 years-old were not eligible for a booster dose, and only one booster dose was recommended for those 12 years of age and older.

Data Analysis

Because the intent of the study was to assess vaccine hesitancy and concerns among parents and staff, analysis was focused on COVID-19 vaccine initiation (i.e., receiving at least one dose) to reflect willingness among participants to receive the vaccine. Descriptive statistics and prevalence ratios (PRs) were calculated for the overall study population and stratified by participants who received at least one dose of the COVID-19 vaccine and those who had not. The PR and 95% confidence intervals (CIs) were estimated using Poisson regression with robust standard errors and implemented with generalized estimating equations.¹² For time-to-event analysis, 11 participants were excluded because they received the vaccine before DC announced its availability to their age cohort as well as those with missing vaccination dates. Kaplan Meier (KM) curves were generated for time to receiving the first COVID-19 vaccine dose and for time to second dose among respondents who had the first dose.^{13,14}

The log-rank test was used to determine the significance in time to receiving the first COVID-19 vaccine dose differences between groups. Participants were assigned a time zero (t0) for following them to vaccination or censoring based on the date their respective COVID-19 vaccine was available for their age group in DC. Censoring was based on participants interview dates. Hazard ratios (HRs) and 95% CIs were calculated using a Cox proportional hazard model for repeated events to account for multiple COVID-19 vaccine doses.¹⁵ The univariable PR and HR models included race and ethnicity, role at school and age, sex, and COVID-19 screening test status. The multivariable PR and HR

models included all variables from the unadjusted models but were reduced using a stepwise procedure to only include race and ethnicity, role at school, and age.

For questions related to reasons for getting vaccinated and reasons for not being vaccinated, interviewers selected all predefined options that applied to participants' responses.

Responses for which interviewers selected "other" were examined by a three-person team who grouped responses into categories for vaccination and against vaccination based on consensual agreement.

Analyses were completed using R (version 4.1.1), RStudio (version 1.4.1717), tidyverse (version 1.3.1), survival (version 3.3.1), survminer (version 0.4.9), geepack (version 1.3.4), gtsummary (version 1.6.0.9006), and knitr (version 1.39).^{15–19} Significance was determined using an α level of .05 for all analyses. Interview data were deidentified and entered in a CDC REDCap form.^{20,21} For the final analysis, one individual with unknown vaccination status was removed. SAS version 9.4 was used for data validation. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.

RESULTS

Of 1,399 persons in the sample population, 285 test-positive (251 students and 34 staff), 237 test-negative staff, and 877 test-negative students from 153 unique DCPS and DCPCS were assigned to be interviewed. While 206 (14.7%) eligible participants were not interviewed due to time constraints, 1,193 (85.3%) were attempted to be contacted. The interview response rate was 25.8% (308/1,193). Most interviews were conducted in English (94.5%) and the remainder in Spanish (5.5%) with the assistance of an interpreter. Participant characteristics by role at school (i.e., student vs. staff) and race/ethnicity are shown in Table 1. Most participants were NH Black (55.8%), female (55.2%), and students ages 5–11 years old (59.4%). Fifty-eight percent of staff were NH Black. Each ward of DC was represented with the highest percent of participants from Ward 8 schools (21.8%), 61.2% of whom were unvaccinated.

Overall, 60.4% of the 308 participants had received at least one COVID-19 vaccine dose, 41.2% were up-to-date, 16.6% were fully vaccinated, and 2.6% were partially vaccinated (Table 1). Participants primarily received the Pfizer vaccine as their first dose (92.5%), followed by the Moderna (7.0%), and Janssen vaccines (0.5%) (Table 1). Approximately 40% of participants were unvaccinated, of whom 78.7% were NH Black and 77.9% were 5–11 years old. Fewer NH White participants were unvaccinated (3.9%) compared to other racial groups (55.8% of NH Black participants, 31.9% of Hispanic participants, and 23.7% of NH Other participants). Only 6.0% of staff interviewed reported being unvaccinated. At the household level, 14.3% of participants reported living in a household where no members were fully vaccinated (median household size = 4; IQR: 3 – 5). Almost a third of unvaccinated students (n=39) came from households where no one was fully vaccinated compared to 100% of unvaccinated staff (n=3).

Table 2 shows the prevalence and PRs of participants who received at least one COVID-19 vaccine dose. After adjusting for their roles at school, less than four tenths of NH Black participants (PR= 0.39, 95% CI: 0.33–0.48), less than two-thirds of Hispanic participants (PR=0.61, 95% CI: 0.49 to 0.76) and less than three-fourths of NH Other participants (PR=0.71, 95% CI: 0.57 to 0.88) received the first dose of the COVID-19 vaccine compared to NH White participants. Within the first 30 days of vaccine availability, 78.3% of NH White participants received the first dose compared to 8.8% of NH Black participants, 34.9% of Hispanic participants, and 55.3% of NH Other participants (data not shown).

Differences in time to receiving first COVID-19 vaccine dose were significant by racial/ethnic group ($p<0.001$) (Figure 1). From KM estimates, the median number of days to receive the first dose of the COVID-19 vaccine once eligible was 10 days for NH White participants, 236 days for NH Black participants, 91 for Hispanic participants, and 20 for NH Other participants. The median number of days to receive the second dose after receiving the first dose was 21 days for all race/ethnic groups. KM estimates were similar after removing teacher and other staff data from the analysis (Supplementary Figure 1). Table 2 illustrates the HRs of receiving at least one dose. After controlling for participants' roles at school, approximately one-third as many NH Black participants (HR= 0.33, 95% CI:0.27 – 0.41), half as many Hispanic participants (HR= 0.54, 95% CI: 0.42 – 0.70), and two-thirds as many NH Other participants (HR= 0.68, 95% CI:0.54 – 0.85) received the vaccine compared to NH White participants.

Of the participants who initiated vaccination and responded to the question asking for the reasons why they chose to get vaccinated or have their child vaccinated, 80.0% (148/185) wanted to protect themselves or others, 18.9% (35/185) were required to for school or work activities, 15.7% (29/185) provided responses related to a sense of social responsibility, and 12.4% (23/185) were recommended to do so by others (i.e., healthcare provider, family and friends, school). NH Black participants reported the highest percentage for the response of vaccination because of work or school requirements (26.7% compared to 18.8% for Hispanic participants, 13.8% for NH Other participants, and 10.2% for NH White participants) (Table 3); teachers/staff also reported the highest percentage for this response (31.9% compared to 11.4% for parents of students 5–11 years-old and 20.0% for parents of students 12+ years-old) (Table 4).

Unvaccinated and partially vaccinated participants' main reasons for not being fully vaccinated were related to concerns about vaccine safety (42.1%), lack of trust in vaccines (12.7%), and financial or logistical barriers (i.e., lack of transport or childcare, no time) (11.9%) (Table 4). COVID-19 vaccine safety was the top concern among all racial/ethnic groups and student age cohorts (Tables 3 and 4). Ten percent of parents of students 5–11 years old did not think COVID-19 vaccination was necessary compared to 0% of respondents representing students 12+ years old. Over twice as many 12+ years old respondents indicated lack of trust in COVID-19 vaccines as a reason for not being fully vaccinated compared to parents of 5-11-year-olds (24.0% vs. 10.2%).

The top two trusted sources for COVID-19 information among all participants were the federal government (31.0%) and primary care providers/health professionals (27.2%) with

differences noted by race/ethnicity (data not shown). NH White and NH Other participants reported the federal government as a most trusted source more so than NH Black and Hispanic participants (51.0% and 41.7% compared to 24.8% and 21.7%, respectively). The most trusted COVID-19 information source for NH Black and Hispanic participants was health professionals (28.6% and 32.6%, respectively). Of total respondents (regardless of vaccination status), 276 found that it was easy to get COVID-19 vaccine (96.1% of NH White, 95.7% Hispanic, and 92.1% NH Other, and 87.6% NH Black).

DISCUSSION

Vaccine uptake among the study population was low with 60.4% of participants receiving at least one COVID-19 vaccine dose, due to the predominance of 5-11-year-olds represented by the data. Only 48.0% of 5-11-year-olds received a first dose with increasing percentages by age group (66.7% of 12-17-year-olds, and 94.3% of adults 18 years older), a trend consistent with what has occurred in DC and nationally. More 5-11-year-olds had at least one dose compared to this age cohort nationally (35.3%) by the end of the study (April 17, 2022).⁴ Time to first vaccination based on age-eligibility showed significant differences by age with the median time to vaccine uptake almost double for 12-17-year-olds compared to adults (139 days vs. 70 days) (Supplemental Figure 2).

Findings highlight hesitancy to pediatric COVID-19 vaccination among parents of young children and adolescents. The Pfizer vaccine was approved for emergency use for 5-11-year-olds only three months prior to the study (November 2021), and prior to its approval, the coverage rate for the 12-17-year-old age cohort had not reached similar rates as adults.^{22,23} The Pfizer and Moderna vaccines available to pediatric populations are mRNA vaccines, which have not been previously approved for use in the US for protection against any disease. The perceived novelty of mRNA vaccine technology may have contributed to safety concerns related to vaccinating their children.²⁴

Significant differences in COVID-19 vaccine uptake by race/ethnicity were observed. As has been reported in other studies, more NH Black participants were unvaccinated compared to other racial/ethnic groups.^{9,19,25,26} An important finding from this study was clear differences identified among groups when evaluating the time to receiving the first COVID-19 vaccine dose with the median time to first vaccine dose for NH Black participants was more than 23 times that of NH White participants. Participants from schools in Ward 8, a predominantly NH Black area of DC, had the highest percentage of unvaccinated participants in this study and across DC Health data.^{27,28}

Despite differences in vaccine uptake by race/ethnicity and age (Figure 1 and Supplementary Figure 2), most participants who received the two-dose primary series do so at the recommended time interval; 97% of participants (167/172) received their second dose within 8 weeks (the maximum recommended time interval) of getting the first dose (data not shown). This highlights the effectiveness for scheduling follow-up appointments at the time of the first dose, as was done in DC.

Our study supports other reports that highlight a need for improving COVID-19 vaccine confidence among NH Black communities before and after vaccines were made available.^{9,29–31} CDC defines vaccine confidence as the belief that vaccines work, are safe, and are part of a trustworthy health system.³² Participants' relayed concerns about safety, and lack of trust in vaccines and the healthcare industry. Recent studies have highlighted that some vaccine hesitancy among NH Black and Hispanic communities comes from distrust in science, scientists, and the government due to historical structural racism that included unethical and unfair medical practices as well as inequitable distribution of access to healthcare.^{33,34,35}

A higher percentage of NH Black participants in the study population reported a vaccine requirement for work or school as a reason for vaccination compared to other racial/ethnic groups, which suggests a sentiment of pressure to vaccinate. Time-to-first-dose analysis showed that by 50 days after eligibility, 68% of adults (predominated by staff) remained unvaccinated (Supplementary Figure 2). By 200 days after eligibility, 23.5% remained unvaccinated. This delay in vaccination suggests initial vaccine hesitancy. It may be that staff (of whom over half were NH Black) were influenced by DC's November 2021 mandate that all adults who are regularly in schools and childcare centers facilities be vaccinated against COVID-19.³⁶

Clear themes were identified among participants for receiving or not receiving the COVID-19 vaccine. Vaccination as a social responsibility was evidenced by several participants anecdotally sharing that they “believe in the science,” a catch phrase that was often stated by leading medical and public health officials. Many participants relied on recommendations from others in their vaccination decision-making, namely healthcare providers, family, friends, and school officials. Vaccine safety and health concerns were the primary reason for not being fully vaccinated and included concerns about how quickly the vaccine was created, administering it to young children, complications due to receiving the vaccine, and wanting to “wait and see.”

Most participants reported easy access to COVID-19 vaccines. DC's COVID-19 vaccination strategy focused on equitable allocation of vaccines while also adopting strategies focused on improving vaccine convenience to prevent vaccine hesitancy.³⁷ It prioritized “critical infrastructure employees” including those working in schools.³⁸ DCPS and DCPCS staff, including those who lived outside of DC, were eligible to receive their first COVID-19 vaccine dose at the end of January 2021.³⁹ Walk-in vaccine clinics were at sites within each of the eight DC wards, providing geographic accessibility to COVID-19 vaccines. Through its COVID-19 Clinical Champion Program, DC Health identified a cadre of medical experts to speak about the importance of and science behind COVID-19 vaccinations.⁴⁰ Additionally, its “Take the Shot” campaign focused on increasing pediatric vaccinations by utilizing incentives like iPads, gift cards, and even college scholarships when vaccinated at designated DCPS locations.⁴¹

A unique aspect of the study was the ability to engage parents and staff concurrently by utilizing school-based COVID-19 screening testing data to obtain the sampling frame. Public health reporting data were used instead of placing the burden on school staff to

collate such data and may be a useful strategy for gaining the combined perspectives of those in the school community (i.e., students, parents, and school staff) going forward. Additionally, while most studies seeking to address vaccine hesitancy employ online or paper-based surveys for data collection, telephone-based interviews were used for this study. This approach, while labor-intensive, allowed for a more personalized and contextualized method of data collection, especially given the psychosocial impact of the COVID-19 pandemic on parents, students, and school staff.

While other studies have used survival (time-to-event) analysis as it relates to vaccine effectiveness and hesitancy, this study is unique in that it assessed time to vaccine uptake by using actual COVID-19 vaccination dates, conducting analyses based on date of vaccine eligibility in DC, and verifying dates using a jurisdictional immunization registry.^{25,42} Due to the point in time of the study, obtaining vaccination information was easy and non-intrusive. We found that most participants had COVID-19 vaccination cards readily available since vaccination was required to participate in activities dining at restaurants, attending a performance, or traveling by air at the time of the study.

COVID-19 vaccination remains a safe and effective strategy to reduce the harmful health effects of COVID-19, including among persons in congregate settings such as schools. As information about the etiology and epidemiology of SARS-CoV-2 continues to evolve, it may be important that public health and school officials actively seek out the opinions and perspectives of parents, teachers, and staff as it relates to vaccination through more personalized health communication and outreach including focus groups and one-on-one follow-up with hesitant individuals. Assessing reasons leading to vaccine hesitancy are key to reducing the effects of COVID-19 and other vaccine-preventable diseases.

LIMITATIONS

Many of the participants' phone numbers were inaccurate and had to be corrected by DC Health, delaying call attempts, and resulting in many eligible participants never being contacted. This contributed to a low overall response rate. Another factor was initially setting the inclusion criteria to only COVID-19 test-positive individuals. This led to a limited number of interviews attempted and completed during the first six weeks of the study. Once the study was expanded to COVID-19 test-negative students and staff, a robust number of daily interviews were completed. The low response rate and unequal sample size by race precluded stratified analysis by both race/ethnicity and age with some strata containing low numbers of participants or none (i.e., unvaccinated NH White staff). Based on the timing of the study, the 5–11 year-old age cohort was censored soon after they became eligible for COVID-19 vaccines. Findings are representative of DC K-12 parents, students, and staff in study population and may not be generalizable to the rest of the United States. Socioeconomic data such as median household income and education were not collected, limiting our ability to assess their association with vaccine hesitancy in the sample population. Finally, the cross-sectional nature of the study does not allow causal inferences to be made.

CONCLUSIONS

Almost 40% of vaccine-eligible participants remained unvaccinated at the time of this study, despite few reporting financial or logistical barriers to accessing COVID-19 vaccines. Our study population was predominated by unvaccinated pediatric participants, and lag in vaccine uptake varied among racial/ethnic groups. Known differences in vaccination coverage and uptake highlight a need for new and tailored strategies focused on improving overall trust in science and that vaccines are safe and effective. Consistent and clear messaging about the safety and efficacy of COVID-19 vaccines are still needed, utilizing trusted sources such as healthcare providers and school officials as vaccine champions.

IMPLICATIONS FOR SCHOOL HEALTH POLICY, PRACTICE, AND EQUITY

School disruptions have had a negative impact on staff and students' psychosocial and physical health. After years of modifications to education, K-12 school communities must work together to ensure that in-person instruction for subsequent school years is consistent and safe. Vaccinations have been important to schools returning to "normal" as the effects of the COVID-19 pandemic wane.

Racial differences in vaccine uptake are not new, but in terms of equity, low COVID-19 vaccine uptake among NH Black communities may have consequences that can perpetuate health and socioeconomic disparities. Understanding the opinions and lived experiences of teachers, staff, students, and their families could help achieve higher vaccination rates and fewer racial/ethnic disparities in adoption of this most effective of prevention strategies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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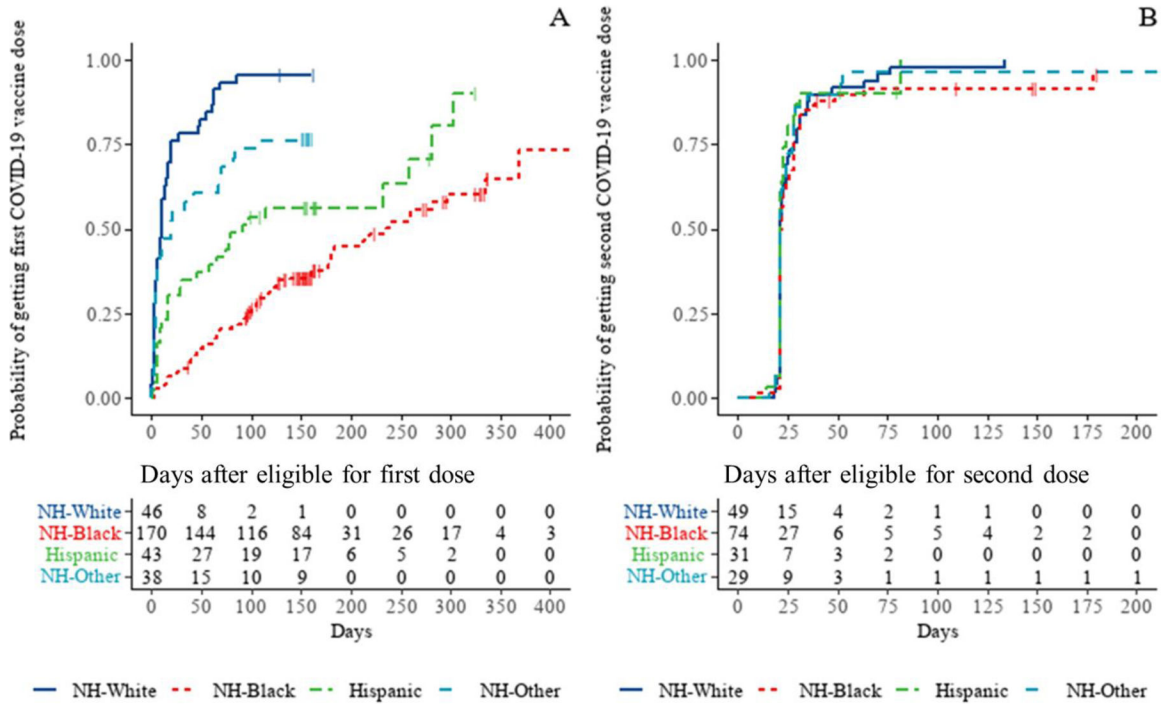


Figure 1. Kaplan Meier probabilities for receiving the COVID-19 primary series doses based on dates of eligibility, District of Columbia, February 6 – April 16, 2022.¹ Panel A shows probabilities for the first COVID-19 dose in the primary series, and Panel B shows probabilities for the second COVID-19 dose² in the primary series.

¹Availability of COVID-19 vaccinations based on DC Health’s eligibility criteria are as follows: January 11, 2021, for 65+ years old; January 25, 2021, for preK-12 education staff; February 25, 2021 for 16–64 years old with qualifying medical conditions; April 19, 2021 for 16+ years old; May 13, 2021 for 12+ years old, and; November 3, 2021 for 5+ years old.

² The second COVID-19 dose should have been administered at least 21 days and 28 days for the Pfizer and Moderna vaccines, respectively.

Table 1.

Characteristics of students and staff including teachers by COVID-19 vaccination status – District of Columbia, February 6-April 16, 2022.

Participant Characteristic	Student		Staff		Total N=308
	Unvaccinated, n=119	Received at least one dose, n=139	Unvaccinated, n=3	Received at least one dose, n=47	
Race/Ethnicity					
Non-Hispanic White	2 (1.7)	45 (32.4)	0 (0.0)	4 (8.5)	51 (16.6)
Non-Hispanic Black	93 (78.2)	50 (36.0)	3 (100.0)	26 (55.3)	172 (55.8)
Hispanic/Latino	15 (12.6)	24 (17.3)	0 (0.0)	8 (17.0)	47 (15.3)
Non-Hispanic Other ¹	9 (7.6)	20 (14.4)	0 (0.0)	9 (19.1)	38 (12.3)
Participant sex					
Male	63 (52.9)	65 (46.8)	1 (33.3)	9 (19.1)	138 (44.8)
Female	56 (47.1)	74 (53.2)	2 (66.7)	38 (80.9)	170 (55.2)
Role at School by Age Group					
Student 5–11	95 (79.8)	88 (63.3)	-	-	183 (59.4)
Student 12+	24 (20.2)	51 (66.7)	-	-	75 (24.4)
Teacher/Other Staff	-	-	3 (100.0)	47 (100.0)	50 (16.2)
Vaccination Status					
Up-to-date	0 (0.0)	98 (70.5)	0 (0.0)	29 (61.7)	127 (41.2)
Fully Vaccinated	0 (0.0)	34 (24.5)	0 (0.0)	17 (36.2)	51 (16.6)
Partially Vaccinated	0 (0.0)	7 (5.0)	0 (0.0)	1 (2.1)	8 (2.6)
Unvaccinated	119 (100.0)	0 (0.0)	3 (100.0)	0 (0.0)	122 (39.6)
% Household Fully Vaccinated					
0%	39 (33.6)	1 (0.7)	3 (100.0)	0 (0.0)	43 (14.3)
1% - <25%	8 (6.9)	0 (0.0)	0 (0.0)	1 (2.2)	9 (3.0)
25% - <50%	27 (23.3)	4 (2.9)	0 (0.0)	1 (2.2)	32 (10.6)
50% - <75%	37 (31.9)	9 (6.6)	0 (0.0)	12 (26.7)	58 (19.3)
75% - 99%	5 (4.3)	22 (16.1)	0 (0.0)	3 (6.7)	30 (10.0)
100%	0 (0.0)	101 (73.7)	0 (0.0)	28 (62.2)	129 (42.9)
Unknown	3	2	0	2	7
Vaccination Brand					
Johnson and Johnson	-	0 (0.0)	-	1 (2.1)	1 (0.5)
Moderna	-	2 (1.4)	-	11 (23.4)	13 (7.0)
Pfizer	-	137 (98.6)	-	35 (74.5)	172 (92.5)
No vaccine	119	-	3	-	122
DC Ward of School, n (%)					
Ward 1	10 (8.5)	17 (12.2)	0 (0.0)	0 (0.0)	27 (8.8)
Ward 2	6 (5.1)	17 (12.2)	0 (0.0)	1 (2.1)	24 (7.8)
Ward 3	2 (1.7)	27 (19.4)	0 (0.0)	0 (0.0)	29 (9.4)
Ward 4	13 (11.0)	24 (17.3)	0 (0.0)	2 (4.3)	39 (12.7)
Ward 5	12 (10.2)	20 (14.4)	1 (33.3)	25 (53.2)	58 (18.9)

Participant Characteristic	Student		Staff		Total N=308
	Unvaccinated, n=119	Received at least one dose, n=139	Unvaccinated, n=3	Received at least one dose, n=47	
Ward 6	17 (14.4)	8 (5.8)	0 (0.0)	0 (0.0)	25 (8.1)
Ward 7	19 (16.1)	13 (9.4)	0 (0.0)	6 (12.8)	38 (12.4)
Ward 8	39 (33.1)	13 (9.4)	2 (66.7)	13 (27.7)	67 (21.8)
Unknown	1	0	0	0	1

¹ Non-Hispanic Other includes Asian (N=16), Native Hawaiian and Pacific Islander (N=3), multiracial (N=14), and unspecified race/ethnicity (N=5).

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Table 2.

Prevalence, prevalence ratios, and hazard ratios for receiving at least one vaccination dose by participant characteristics, District of Columbia, February 6 – April 16, 2022.

Participant Characteristic	Prevalence	Unadjusted Prevalence Ratio (95% CI)	Adjusted Prevalence Ratio (95% CI) ²	Unadjusted Hazard Ratio (95% CI)	Adjusted Hazard Ratio (95% CI)
Race/Ethnicity					
NH White	96.1	—	—	—	—
NH Black	44.2	0.46 (0.39 to 0.55)	0.39 (0.33 to 0.48)	0.36 (0.29 to 0.44)	0.33 (0.27 to 0.41)
Hispanic/Latino	68.1	0.71 (0.58 to 0.87)	0.61 (0.49 to 0.76)	0.58 (0.46 to 0.74)	0.54 (0.42 to 0.70)
NH Other	76.3	0.79 (0.66 to 0.96)	0.71 (0.57 to 0.88)	0.74 (0.61 to 0.91)	0.68 (0.54 to 0.85)
Role at School by Age Group					
Student 5–11	48.1	—	—	—	—
Student 12+	68.0	1.41 (1.14 to 1.76)	1.66 (1.36 to 2.04)	0.98 (0.74 to 1.30)	1.23 (0.95 to 1.59)
Teacher/Other Staff	94.0	1.95 (1.66 to 2.31)	2.19 (1.82 to 2.64)	1.51 (1.21 to 1.89)	1.73 (1.39 to 2.16)
Participant sex					
Male	53.6	—	—	—	—
Female	65.9	1.23 (1.02 to 1.48)	—	1.18 (0.96 to 1.45)	—
COVID-19 Screening Test Status					
Test-positive	61.2	—	—	—	—
Test-negative	60.1	0.98 (0.80 to 1.20)	—	0.92 (0.74 to 1.15)	—

¹NH Other includes Asian (N=16), Native Hawaiian or other Pacific Islander (N=3), multiracial (N=14), and unspecified (N=5).

²Race/ethnicity and role at school by age group were two variables included in the model.

Table 3.

Reasons for receiving at least one COVID-19 vaccine dose and not being fully vaccinated for COVID-19 by race/ethnicity, District of Columbia, February 6 – April 16, 2022.

Reasons for getting the COVID-19 vaccine	Overall, N = 186	NH White, N = 49	NH Black, N = 76	Hispanic/Latino, N = 32	NH Other, N = 29
Protect self or others					
No	37 (20.0)	3 (6.1)	22 (29.3)	8 (25.0)	4 (13.8)
Yes	148 (80.0)	46 (93.9)	53 (70.7)	24 (75.0)	25 (86.2)
Unknown	1	0	1	0	0
Recommended					
No	162 (87.6)	39 (79.6)	69 (92.0)	28 (87.5)	26 (89.7)
Yes	23 (12.4)	10 (20.4)	6 (8.0)	4 (12.5)	3 (10.3)
Unknown	1	0	1	0	0
Required for work or school activities					
No	150 (81.1)	44 (89.8)	55 (73.3)	26 (81.2)	25 (86.2)
Yes	35 (18.9)	5 (10.2)	20 (26.7)	6 (18.8)	4 (13.8)
Unknown	1	0	1	0	0
Social responsibility					
No	156 (84.3)	39 (79.6)	67 (89.3)	29 (90.6)	21 (72.4)
Yes	29 (15.7)	10 (20.4)	8 (10.7)	3 (9.4)	8 (27.6)
Unknown	1	0	1	0	0
<hr/>					
Reasons for not being fully vaccinated against COVID-19	Overall, N = 130	NH White, N = 2	NH Black, N = 102	Hispanic/Latino, N = 17	NH Other, N = 9
Unsafe					
No	73 (57.9)	0 (0.0)	64 (65.3)	7 (41.2)	2 (22.2)
Yes	53 (42.1)	2 (100.0)	34 (34.7)	10 (58.8)	7 (77.8)
Unknown	4	0	4	0	0
Conflicts with beliefs					
No	114 (90.5)	2 (100.0)	88 (89.8)	15 (88.2)	9 (100.0)
Yes	12 (9.5)	0 (0.0)	10 (10.2)	2 (11.8)	0 (0.0)
Unknown	4	0	4	0	0
Financial or logistical barriers					
No	111 (88.1)	2 (100.0)	84 (85.7)	16 (94.1)	9 (100.0)
Yes	15 (11.9)	0 (0.0)	14 (14.3)	1 (5.9)	0 (0.0)
Unknown	4	0	4	0	0
Not effective					
No	117 (92.9)	2 (100.0)	90 (91.8)	17 (100.0)	8 (88.9)
Yes	9 (7.1)	0 (0.0)	8 (8.2)	0 (0.0)	1 (11.1)
Unknown	4	0	4	0	0
Fear of medical procedures					
No	120 (95.2)	2 (100.0)	94 (95.9)	15 (88.2)	9 (100.0)

Reasons for getting the COVID-19 vaccine	Overall, N = 186	NH White, N = 49	NH Black, N = 76	Hispanic/Latino, N = 32	NH Other, N = 29
Yes	6 (4.8)	0 (0.0)	4 (4.1)	2 (11.8)	0 (0.0)
Unknown	4	0	4	0	0
Do not think it is necessary					
No	116 (92.1)	2 (100.0)	90 (91.8)	17 (100.0)	7 (77.8)
Yes	10 (7.9)	0 (0.0)	8 (8.2)	0 (0.0)	2 (22.2)
Unknown	4	0	4	0	0
Lack of trust					
No	110 (87.3)	2 (100.0)	86 (87.8)	14 (82.4)	8 (88.9)
Yes	16 (12.7)	0 (0.0)	12 (12.2)	3 (17.6)	1 (11.1)
Unknown	4	0	4	0	0

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Table 4.

Reasons for receiving at least one COVID-19 vaccine dose and not being fully vaccinated for COVID-19 by age cohort, District of Columbia, February 6 – April 16, 2022.

Reasons for getting the COVID-19 vaccine	Overall, N = 186	5–11 years old, N=88	12–18 years-old, N = 51	Teachers/Staff N=47
Protect self or others				
No	37 (20.0)	9 (10.2)	13 (26.0)	15 (31.9)
Yes	148 (80.0)	79 (89.8)	37 (74.0)	32 (68.1)
Unknown	1	0	1	0
Recommended				
No	162 (87.6)	73 (83.0)	46 (92.0)	43 (91.5)
Yes	23 (12.4)	15 (17.0)	4 (8.0)	4 (8.5)
Unknown	1	0	1	0
Required for work or school activities				
No	150 (81.1)	78 (88.6)	40 (80.0)	32 (68.1)
Yes	35 (18.9)	10 (11.4)	10 (20.0)	15 (31.9)
Unknown	1	0	1	0
Social responsibility				
No	156 (84.3)	76 (86.4)	44 (88.0)	36 (76.6)
Yes	29 (15.7)	12 (13.6)	6 (12.0)	11 (23.4)
Unknown	1	0	1	0
<hr/>				
Reasons for not being fully vaccinated against COVID-19 ¹	Overall, N = 126	5–11 years old, N=98	12–18 years-old, N = 28	Teacher/Staff, N=4
Unsafe				
No	73 (57.9)	50 (51.0)	20 (80.0)	3 (100.0)
Yes	53 (42.1)	48 (49.0)	5 (20.0)	0 (0.0)
Unknown	4	0	3	1
Conflicts with beliefs				
No	114 (90.5)	92 (93.9)	21 (84.0)	1 (33.3)
Yes	12 (9.5)	6 (6.1)	4 (16.0)	2 (66.7)
Unknown	4	0	3	1
Financial or logistical barriers				
No	111 (88.1)	86 (87.8)	22 (88.0)	3 (100.0)
Yes	15 (11.9)	12 (12.2)	3 (12.0)	0 (0.0)
Unknown	4	0	3	1
Not effective				
No	117 (92.9)	92 (93.9)	22 (88.0)	3 (100.0)
Yes	9 (7.1)	6 (6.1)	3 (12.0)	0 (0.0)
Unknown	4	0	3	1
Fear of medical procedures				
No	120 (95.2)	93 (94.9)	24 (96.0)	3 (100.0)
Yes	6 (4.8)	5 (5.1)	1 (4.0)	0 (0.0)

Reasons for getting the COVID-19 vaccine	Overall, N = 186	5–11 years old, N=88	12–18 years-old, N = 51	Teachers/Staff N=47
Unknown	4	0	3	1
Do not think it is necessary				
No	116 (92.1)	88 (89.8)	25 (100.0)	3 (100.0)
Yes	10 (7.9)	10 (10.2)	0 (0.0)	0 (0.0)
Unknown	4	0	3	1
Lack of trust				
No	110 (87.3)	88 (89.8)	19 (76.0)	3 (100.0)
Yes	16 (12.7)	10 (10.2)	6 (24.0)	0 (0.0)
Unknown	4	0	3	1

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