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Pharmacists' Answer to the COVID-19 Pandemic: Contribution of the Federal Retail Pharmacy Program to COVID-19 Vaccination Across Sociodemographic Characteristics—United States

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Abstract

Background: The Federal Retail Pharmacy Program (FRPP) integrated pharmacies as partners in the national effort to maximize vaccination during the COVID-19 public health emergency.

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Objectives: The objective of this study was to quantify the contribution of pharmacies participating in FRPP to COVID-19 vaccination efforts during December 2020–September 2023 across sociodemographic groups in the United States.

Methods: Data on COVID-19 vaccine doses administered reported to CDC by FRPP and jurisdictional immunization information systems (IIS) of all 50 states, the District of Columbia, and U.S. territories were analyzed to estimate FRPP contributions.

Results: Approximately 314.9 million COVID-19 vaccine doses were administered by FRPP throughout this period, constituting 48.9% of all COVID-19 vaccine doses administered. FRPP contributions to COVID-19 vaccination ranged from 12.9% to 56.8% for persons aged 6 months–4 years and 12–17 years, respectively. FRPP made the highest contribution to administering COVID-19 doses to Non-Hispanic Asian (48.7%) and Hispanic/Latino (49.8%) persons. The proportion of COVID-19 doses given by FRPP pharmacies was found to be higher in urban areas (57%) compared with rural areas (45%).

Conclusion: FRPP administered a substantial proportion of COVID-19 vaccine doses in the United States and provided vaccine access for persons across a wide range of groups. Pharmacies can complement vaccination efforts during public health emergency situations and in routine vaccination programs.

Introduction

On January 31, 2020, the U.S. Secretary of Health and Human Services declared the 2019 novel coronavirus disease (COVID-19) a public health emergency in the United States.¹ By December 2020, COVID-19 has resulted in 480,000 hospitalizations and 350,000 million deaths in the United States alone.² The Food and Drug Administration (FDA) authorized and the Advisory Committee on Immunization Practices (ACIP) recommended the first COVID-19 vaccines in December 2020.³ ACIP continued to update population-based recommendations for COVID-19 vaccination based on evolving vaccine and epidemiology data.⁴ Establishing innovative partnerships and implementing programs to support vaccination were needed. Vaccination has been a highly effective public health intervention to prevent illness, mitigate the burden of infections, and minimize the morbidity and mortality being caused by COVID-19.^{5,6} The Centers for Disease Control and Prevention (CDC) along with several federal agencies and partners helped implement the nation's largest vaccine distribution program in U.S. history.⁷

Knowing that pharmacies are readily available in communities across the United States, with 90% of U.S. residents living within 5 miles of a pharmacy⁸, and pharmacists are well-trained in providing vaccination services⁹, the United States government (USG) launched the Federal Retail Pharmacy Program (FRPP), a collaboration between the U.S. government and 21 national retail and independent network pharmacy partners to build a robust and equitable vaccination program.¹⁰ Expanding sites where people could get vaccinated by reducing their distance to professionals who could administer vaccinations were key strategy components to increase vaccine uptake, and pharmacists and their teammates took a leading role in the national vaccination strategy. This was not the first time that pharmacies participated in vaccination efforts. Pharmacists have administered an increasing proportion

of adult vaccinations since the 1990s.¹¹⁻¹⁴ For example, pharmacists immunized nearly a third of all adults vaccinated for influenza in the 2018-2019 season¹⁴ and administered approximately 10% of all H1N1 vaccinations during the 2009 Influenza A H1N1 pandemic.^{23,24}

Previously published CDC report estimated that as of August 18, 2023 and as a result of the USG's efforts and partnerships with pharmacies during the COVID-19 pandemic, FRPP administered more than 307 million COVID-19 vaccine doses in the United States.¹⁵ To better understand the role FRPP played during the COVID-19 public health emergency, this study evaluated the contribution of FRPP to COVID-19 vaccination efforts in the United States from December 2020 through September 2023.

Methods

Study Period

The study period was December 13, 2020, when CDC first recommended COVID-19 vaccination for persons aged 16 years and older and launched the collaboration with three pharmacy organizations - through September 30, 2023.

Data Analysis

We evaluated the contribution of COVID-19 doses administered through FRPP, which included the Pharmacy Partnership for Long-Term Care Program (PPP), using two independent data sources. The first source was the COVID-19 vaccine doses reported directly to CDC by FRPP pharmacies, which we refer to as FRPP data. The second source, defined as the all-provider data, includes COVID-19 vaccine administration records from all types of providers, including, but not limited to, FRPP pharmacies themselves, hospitals, mass vaccination clinics, health departments, and medical practices. Those administrations were reported to CDC through state, territorial, and local jurisdictional immunization information systems (IISs), except for Texas (administrations among all ages) and Idaho (administrations among ages < 18 years). Those two jurisdictions still submitted their COVID-19 vaccine doses administered data but used aggregate table shells aligned with the all-provider data for inclusion in the overall data. Among all 50 states, the District of Columbia, and U.S. territories, the all-provider data was collected in 59 distinct jurisdictions since local jurisdictional data (i.e., New York City; Philadelphia; Chicago; Houston; and San Antonio) were included within their respective state.

Data sources were aligned with CDC's COVID-19 Vaccine Reporting Specifications (CVRS)¹⁶. Partners receiving COVID-19 vaccines were required to capture and report COVID-19 vaccine administration according to the data elements outlined in the CVRS, including but not limited to vaccination date, recipient identifier, recipient age and sex, recipient self-reported race and ethnicity, recipient county, vaccine product type, and vaccination site address information.^{16,17} Analyses were conducted using Microsoft SQL Server Management Studio 18 (Microsoft, Version 15.0) and were descriptive in nature. This activity was reviewed by CDC, deemed not research, and was conducted consistent with

applicable federal law and CDC policy. (e.g., 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq).

Inclusion and Exclusion Criteria

COVID-19 vaccine administration data were analyzed across 59 IISs. Any COVID-19 vaccine dose administered within the study period were included in the analysis unless the vaccination record had an invalid recipient's age. To evaluate doses administered in urban and rural settings, we used the 2013 National Center for Health Statistics (NCHS) urban-rural classification scheme (https://www.cdc.gov/nchs/data_access/urban_rural.htm) to classify counties where doses were administered as urban or rural. Urban counties included counties assigned to four metropolitan levels (large central metropolitan, large fringe metropolitan, medium metropolitan, and small metropolitan); whereas rural counties were those assigned to two nonmetropolitan levels (micropolitan and noncore).¹⁸ Vaccination records lacking NCHS urban-rural county level designation or missing vaccination administration county were excluded from urban-rural analysis. Specifically, seven US territories and freely associated jurisdictions (i.e., American Samoa, Federation of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, and US Virgin Islands) were excluded due to lack of urban-rural county level designation.

Outcomes Measured

COVID-19 doses administered identified from the FRPP and all-provider data sources were analyzed across six age categories (i.e., 6 months-4 years, 5-11, 12-17, 18-49, 50-64, and ≥65 years), sex, and eight racial and ethnicity categories (i.e., Hispanic or Latino [Hispanic], Non-Hispanic American Indian/Alaska Native, non-Hispanic Asian, Non-Hispanic Black, Non-Hispanic Native Hawaiian or Pacific Islander, Non-Hispanic Other, Non-Hispanic White, and Unknown). The distribution of each demographic group was calculated separately for both data sources, as well as the proportion of doses administered through FRPP for each demographic group among all-provider data. The proportion of doses administered by the FRPP was also calculated for each urban and rural county.

Results

A total of 644.1 million COVID-19 vaccine doses were administered from December 13, 2020 to September 30, 2023 in the United States. The number of COVID-19 vaccine doses administered varied over time with the highest monthly uptake occurring in April 2021, November 2021, and October 2022 (Figure 1). The FRPP administered approximately 314.9 million or 48.9% COVID-19 vaccine doses throughout this period. COVID-19 vaccine dose uptake through FRPP providers mirrored uptake throughout the all-provider trend. Table 2 in the supplementary appendix summarizes selected events in COVID-19 vaccination policy revisions throughout the pandemic.³ The total number of all-provider sites administering COVID-19 vaccines was estimated to be at least 125,000. The total number of sites administering for FRPP was at least 47,000, including 37,545 (79%) chain pharmacies and 9,987 (21%) pharmacies operating as part of independent pharmacy networks. Among the 59 jurisdictions administering COVID-19 vaccine, all but five (American Samoa, Federation of Micronesia, Palau, Marshall Islands, Northern Mariana Islands) had FRPP sites.

Comparison among both data sources for COVID-19 vaccine doses administered by age, sex, race and ethnicity, and urbanicity of administration site are summarized in Table 1. For both FRPP and all-provider sites, the highest percentage of doses were given to persons aged 18–49 years (39.9% and 38.1%, respectively), females (53.6% and 52.9%, respectively), Non-Hispanic White persons (42.0% and 48.3%, respectively), and in urban locations (91.3% and 89.1%, respectively). The lowest percentage of doses administered, also for both data sets, were doses given to persons aged 6 months to 4 years (0.2% and 0.7%, respectively), males (46.3% and 46.5%, respectively), and Non-Hispanic Native Hawaiian or Pacific Islander persons (0.2% and 0.3%, respectively). It is worth noting that the FRPP reported more vaccine administrations with unknown race and ethnicity (29%) than the all-provider data (19%).

Age Groups and Sex

FRPP contributions to the COVID-19 vaccine dose administrations represented as the proportion of FRPP COVID-19 vaccine doses administered, using the all-provider data as the denominator, ranged from 12.9% to 56.8% for persons aged 6 months–4 years and 12–17 years, respectively (Table 2). FRPP administered 38.5%, 46.4%, 48.9%, and 51.2% of COVID-19 doses to persons aged 5–11, ≥65 years, 50–64, and 18–49 years, respectively. Slightly less than half of vaccinated males (48.7%) and females (49.5%) received their COVID-19 vaccine doses from FRPP pharmacies (Table 2).

Race and Ethnicity

FRPP had the highest contribution to COVID-19 doses administered to Non-Hispanic Asian (48.7%) and Hispanic (49.8%) persons and the lowest contribution to vaccine doses administered to Non-Hispanic American Indian or Alaska Native (19.5%) and Non-Hispanic Other and Multiracial persons (17.4%) (Table 2). FRPP administered 42.6%, 41.1% and 40.6% of COVID-19 doses to Non-Hispanic White, Non-Hispanic Native Hawaiian or Other Pacific Islander, and non-Hispanic Black persons, respectively.

Urban and Rural

A total of 448,245 (0.1%) records from FRPP data and 37,584,672 (5.8%) records from the all-provider data were excluded from the analyses due to missing county of administration. Among the 52 jurisdictions with urban-rural county designations, FRPP providers administered more than 50% of COVID-19 doses in 22 of the 52 jurisdictions with urban areas, and 14 of the 49 jurisdictions with rural areas. Although Rhode Island, District of Columbia, and Delaware reported COVID-19 vaccine administrations in urban areas in FRPP and all-provider data, no vaccine administrations were reported in rural areas for these jurisdictions in either data set. As shown in Table 1, most COVID-19 vaccine doses were administered in urban settings for FRPP (91.3%) and all-provider data (89.1%). Using the all-provider data as the denominator, the proportion of COVID-19 doses given by FRPP pharmacies, as opposed to other providers, was higher in urban areas (53%). Although the overall percentage of all COVID-19 doses administered in rural areas was low (10.6% across all providers including FRPP), FRPP administered 42% of those doses.

Discussion

FRPP partners administered almost half of all COVID-19 vaccine doses across the United States from December 2020 through September 2023. FRPP rapidly increased COVID-19 vaccine accessibility in the United States, especially after summer 2021, when many state-coordinated mass-vaccination clinics were closing.¹⁹ Indeed, from September 2021 through September 2022, during distribution of the bivalent mRNA COVID-19 vaccines, FRPP pharmacies administered 67.7% of all COVID-19 vaccinations.²⁰ Throughout the pandemic, differences were seen in the utilization of FRPP partner vaccination services across age groups, race/ethnicity, and urbanicity of the administering provider. In addition to administering most doses for the age groups 12 years to 65 years, FRPP administered a substantial percentage of doses given to persons aged 65 years and older (46.4%) and 5–11 years (38.5%). Even though not substantially, FRPP still supported vaccinating children as young as 3 to 4 years. This was possible due to the third amendment to the Public Readiness and Emergency Preparedness Act (PREP Act) which authorized licensed pharmacists and pharmacy interns to administer ACIP recommended vaccines for children as young as 3 years, overriding any state laws.²¹ FRPP supported several racial and ethnic minority groups demonstrating the substantial programmatic advancement of the federal retail pharmacy program to provide equitable access to COVID-19 vaccines. However, our analyses found that FRPP partners vaccinated a lower proportion of Non-Hispanic American Indian and Alaska Native persons, which may be due to these population groups receiving more of their vaccinations from other vaccination providers such as the Indian Health Service. In addition, FRPP contributed to a higher proportion of COVID-19 vaccinations in urban (57%) than rural counties (45%).

In preparation for the COVID-19 vaccine Emergency Use Authorization (EUA), USG launched a collaboration with three pharmacy organizations, known as the Pharmacy Partnership for Long-Term Care Program (PPP) in December 2020. In February 2021, PPP efforts were expanded to include a total of 21 federal retail pharmacy organizations, referred to as the Federal Retail Pharmacy Program (FRPP). FRPP represented over 46,000 pharmacy providers and created increased opportunity for COVID-19 vaccination in the United States.¹⁰ Prior to the pandemic and launch of FRPP, vaccinations were primarily administered at provider sites such as health departments, medical offices, healthcare systems, independent and chain pharmacies, community and federally qualified healthcare centers, and other federal agencies. These provider sites continued to contribute to vaccination efforts during the COVID-19 pandemic.

Prior to the COVID-19 pandemic, providers, including pharmacies, submitted their routine administration data to state and local immunization information systems (IIS) whose requirements and policies varied across jurisdictions.²² During the COVID-19 emergency response, expanded federal authorities allowed the CDC to require partners to report doses administered in alignment with the CVRS to the CDC Data Clearinghouse (DCH), a federal application developed specifically for the submission of all COVID-19 vaccine administrations.¹⁰ CDC provided continuous support to help partners prepare their data management systems to collect and report vaccine administrations.¹⁰ COVID-19 vaccine administration data were initially reported to CDC daily to establish a centralized

national surveillance system with timely COVID-19 immunization data to inform vaccine distribution and vaccination efforts. The cadence of COVID-19 vaccine administration reporting was later adjusted to weekly, and then monthly, to reduce the burden on partners.

COVID-19 vaccine administration trends across all-provider and FRPP data fluctuated in a similar pattern following evolving pandemic needs and updates in vaccine recommendations (Figure 1). This showed that FRPP, just like all other providers, was able to accommodate evolving needs of the pandemic as vaccine recommendations expanded. Also, FRPP started with about 10,000 vaccination sites in February 2021, and expanded to more than 35,000 by mid-April 2021.²³ Figure 1 showed that out of the three highest peaks for COVID-19 doses administered (occurring during April 2021, November 2021, and October 2022), the latter two had majority of their doses administered by FRPP. This could probably be due to the fact that by November 2021, vaccine supply was more abundant, USG recommended pharmacies offer walk-in services in addition to scheduled appointments, and mass vaccination clinics had closed.¹⁹ Also, after June 2021 was the time when FRPP partners had expanded to include more than 46,000 vaccination sites. Previously published CDC data also demonstrated that during the bivalent COVID-19 vaccination campaign, from September 2022 to September 2023, FRPP partners were the primary administration sites for vaccination for most age groups.²⁰

Pharmacies are readily accessible brick-and-mortar structures across the United States and can serve as an important resource to expand vaccination efforts. During the public health emergency, pharmacies also served and offered offsite clinics and mass vaccination clinics to make COVID-19 vaccine more accessible.¹⁰ The volume of FRPP administered doses reinforces pharmacies as an important partner to immunization campaigns seeking to increase vaccination in the United States.¹² Pharmacies have been leveraged in the past to expand pandemic influenza vaccination during the 2009 influenza A (H1N1) pandemic. During the 2009 H1N1 pandemic, pharmacies administered approximately 10% of all H1N1 vaccinations.^{24,25} Lessons learned from this initiative can be used to guide opportunities with pharmacies that optimize community-level vaccination planning, implementation, and evaluation with both federal and state/local health department partners.^{14,24-27}

Many rural counties have limited health access points, and oftentimes disproportionately experience poor health outcomes. Obstacles to health access points represents a challenge to public health prevention activities in many rural population groups. Findings from our study suggest that FRPP pharmacies extended vaccination intervention reach across urban and rural areas. The higher percentage of COVID-19 doses administered in urban areas for both FRPP (91.3%) and all-provider data (89.1%) (Table 1) aligns with the fact that most of the U.S. population (85.2%) live in urban counties as described in the 2013 NCHS scheme.¹⁸ Geography can influence proximity to healthcare and public health services and functions as an important dimension to the social determinants of health, reflecting reduced care access opportunities and producing downstream impacts on health outcomes. Additional explorations are warranted to characterize program and policy implementation components of the FRPP pharmacy partnership that supported enhancing local-level vaccination access across the rural U.S.^{28,29}

The scale and complexity of the COVID-19 pandemic vaccine program required the largest vaccine distribution in the US history. FRPP data showed that pharmacies scaled up and contributed to a high percentage (48.9 %) of vaccinations across the United States, administering COVID-19 doses to persons across various sociodemographic characteristics. These findings add to the existing evidence of FRPP contributions beyond the COVID-19 mRNA campaign.¹⁹ It is worth noting that some pharmacies who were not participating in FRPP were also administering COVID-19 vaccines allocated from their respective jurisdictions. Previous studies have shown that there are around 62,000 pharmacies in the United States.⁸ Knowing that around 47,000 pharmacies (75%) were participating in FRPP, the contribution of pharmacies nationwide could even be more prominent if vaccination efforts of pharmacies not participating in FRPP were accounted for or if more pharmacy sites were able to participate in this program.¹⁰

Factors enabling community pharmacies to rapidly scale up included trust, longstanding training and experience administering vaccinations, proximity to most U.S residents, convenience of hours of operation, ability to deliver critical health education and immunization services to walk-in patients, and their capability to provide services when other healthcare providers were closed.^{24-27,30} Pharmacists were already equipped to offer clinical services including vaccination, but their role and authority was expanded during the COVID-19 pandemic.²¹ Additionally, pharmacies had to adjust hours of operation and staffing to adapt to restricted patient contact and infection-control measures while meeting vaccination demand.¹⁹ Finally, FRPP partnership provided an efficient platform to leverage existing supply chain systems to distribute vaccines to local pharmacies¹⁹ and accommodate the ultra-low temperature storage requirements on a large scale. Even though FRPP officially ended with the end of the public health emergency, the legacy continues and based on interviews conducted by CDC between January until March 2024, 71.5% of vaccinated adults reported receiving their updated COVID-19 vaccine in a pharmacy.³¹ As CDC continues to build upon successes and lessons learned from the FRPP model, future implementation considerations could include strengthened data collection on race, ethnicity, and other social determinants among vaccination recipients at pharmacy sites. The collection of additional social risk data could support a better understanding for where inequitable vaccination access opportunities exist and reveal characteristics about the populations disproportionately impacted. Pharmacists, pharmacy support staff, and other vaccination providers are well primed as trusted champions to accelerate culturally competent health education activities focused on vaccine awareness, and when combined with the use of strong data for action, provides a roadmap toward improved vaccination access and uptake during any future large scale public health emergency.

Limitations

The findings of this study are subject to several limitations. First, because individuals in the FRPP data could not be uniquely identified, it was not possible to calculate COVID-19 vaccination coverage estimates using data from this analysis. Also, because pharmacy and non-pharmacy administrations could not be uniquely identified in the all-provider data, it was not possible to conduct a comparison looking at pharmacy versus non-pharmacy administrations. Second, the PREP Act allowed for pharmacists to vaccinate individuals as

young as 3 years of age; however, the all-provider data contained vaccinations across all provider types for individuals as young as 6 months of age and we were not able to remove vaccination for those 6 months through 2 years of age. Therefore, the denominator used for the youngest age group includes more individuals from age groups that are not represented in the FRPP data. This makes determination of the proportion of children for each age in this age group vaccinated by a FRPP provider more challenging and possibly underestimated FRPP contribution for ages 3 to 4 years. Third, prior to the COVID-19 pandemic pharmacies did not routinely collect demographic information. Pharmacies required a ramp up period to modify their systems and ensure functionality to capture race and ethnicity data. This, as well as other factors (e.g., self-reporting, importance of data capture among providers), may have contributed to a higher rate of unknown race and ethnicity reported in the FRPP data (29.6%) compared to the all-provider data (19.0%). Fourth, there are limits to the extent of sociodemographic characteristics that could be monitored in this study. The data used to determine urban-rural designations may not accurately represent current geographic areas, particularly for rural areas, because the National Center for Health Statistics Urban-Rural Classification was updated in 2013 and several counties once classified as rural may no longer be so. There is also wide variability in sociodemographic characteristics within a single county, which further extends to urban and rural designated areas. Additional analyses may be helpful in more precisely depicting these characteristics at a more granular level (e.g., zip code). Additionally, urban-rural analysis may be greatly impacted by the larger percentage of records that were removed from the all-provider data (5.8%) compared to the FRPP data (0.1%) due to the lack of matching urban-rural classification. Sociodemographic characteristics not included were not captured by the CVRS and determined to not be a priority for monitoring during the COVID-19 pandemic. Finally, around 75% of pharmacy sites were estimated to be part of FRPP; therefore, pharmacy contribution to COVID-19 vaccination is underestimated since contributions of non-participating sites were not accounted for in the numerator but were included in the all-provider data (denominator).

Conclusions

FRPP partners were critical in expanding access to COVID-19 vaccination services throughout the United States. This partnership proved to be an effective model to address vaccination administration needs during emergency responses and with the constantly evolving recommendations. Although the pandemic has ended, the need for ensuring equitable access to all recommended vaccines, including COVID-19 vaccines, remains.³² Public-private partnerships, like the FRPP, could be a suitable channel to address future vaccine-preventable disease emergencies. Continuing active partnerships between public health entities in the United States with private vaccination partners, for routine vaccinations, emergency preparedness training, and collaboration on emergency responses will further prepare the U.S. for future responses to public health crises.³³

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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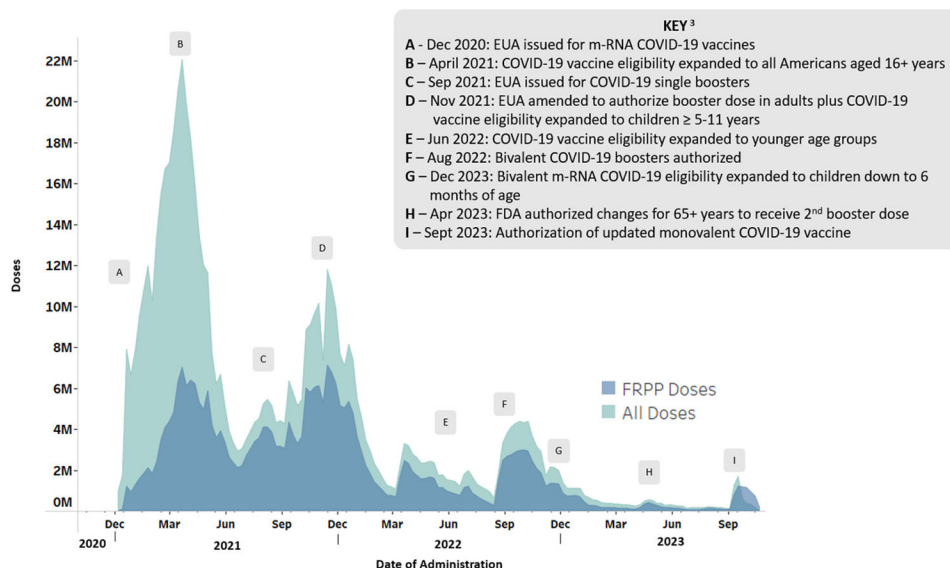


Figure 1.

Comparison of COVID-19 Vaccinations Administered among All Providers compared to Federal Retail Pharmacies by Epidemiologic Week, United States, December 2020 – September 2023. *

*All-provider data doesn't include records from Texas (all ages) and Idaho (<18 years of age) due unavailability of their aggregated data over this time frame

Table 1.

Distribution of COVID-19 vaccine doses by sociodemographic characteristics, United States, 2020—2023

	Federal Retail Pharmacy Program (FRPP) doses (%)	All-provider doses (%)
Total vaccine doses	314,945,158 (100%)	644,142,309 (100%)
Age group		
6 months—4 years	596,741 (0.2%)	4,643,283 (0.7%)
5—11 years	9,396,693 (3.0%)	24,377,677 (3.8%)
12—17 years	21,203,987 (6.7%)	37,321,827 (5.8%)
18—49 years	125,700,135 (39.9%)	245,571,119 (38.1%)
50—64 years	74,166,993 (23.5%)	151,558,819 (23.5%)
65+ years	83,880,609 (26.6%)	180,669,584 (28.0%)
Sex		
Male	145,895,029 (46.3%)	299,277,126 (46.5%)
Female	168,862,780 (53.6%)	340,941,197 (52.9%)
Unknown	187,349 (0.1%)	3,923,986 (0.6%)
Race and ethnicity		
Hispanic or Latino	43,423,046 (13.8%)	87,166,771 (13.5%)
AI/AN, NH	930,555 (0.3%)	4,774,655 (0.7%)
Asian, NH	18,673,166 (5.9%)	38,379,837 (6.0%)
Black, NH	20,637,736 (6.6%)	50,835,727 (7.9%)
NH/OPI, NH	690,148 (0.2%)	1,681,080 (0.3%)
White, NH	132,429,342 (42.0%)	311,012,932 (48.3%)
Other Race, NH	4,822,357 (1.5%)	27,668,575 (4.3%)
Unknown	93,338,808 (29.6%)	122,622,732 (19.0%)
Urban/ rural (total doses *)	314,496,913	606,557,637
Urban	287,255,002 (91.3%)	540,566,375 (89.1%)
Rural	27,241,529 (8.7%)	64,511,591 (10.6%)
Missing	382 (0.0%)	1,479,671 (0.2%)

Abbreviations: AI/AN = American Indian or Alaska Native; NH = Non-Hispanic; NH/OPI = Native Hawaiian or Other Pacific Islander.

Exclusions

A total of 108,557 records were excluded from the FRPP data and 11,160 records were excluded from all-provider data due to invalid age reported. These records were excluded from all analyses.

* A total of 448,245 records were excluded from FRPP doses, and 37,584,672 were excluded from the all-provider doses due to lack of NCHS designation.

Table 2.

Proportion of COVID-19 vaccinations administered by Federal Retail Pharmacy Program partners (FRPP) by recipient sex, age group, and race/ethnicity, United States, December 13, 2020–September30, 2023.

Characteristic	COVID-19 vaccine FRPP doses (N) (Numerator)	COVID-19 vaccine all-provider doses (N) (Denominator)	Proportion of vaccinations administered by FRPP pharmacies, overall and among each sociodemographic group (%) Numerator/ Denominator *100
Total COVID-19 vaccine doses	314,945,158	644,142,309	48.9
Age			
6 months–4 yrs	596,741	4,643,283	12.9
5–11yrs	9,396,693	24,377,677	38.5
12–17 yrs	21,203,987	37,321,827	56.8
18–49 yrs	125,700,135	245,571,119	51.2
50–64 yrs	74,166,993	151,558,819	48.9
≥65 yrs	83,880,609	180,669,584	46.4
Sex			
Male	145,895,029	299,277,126	48.7
Female	168,862,780	340,941,197	49.5
Race and ethnicity			
Hispanic or Latino	43,423,046	87,166,771	49.8
AI/AN, NH	930,555	4,774,655	19.5
Asian, NH	18,673,166	38,379,837	48.7
Black, NH	20,637,736	50,835,727	40.6
NH/OPI, NH	690,148	1,681,080	41.1
White, NH	132,429,342	311,012,932	42.6
Other race, NH	4,822,357	27,668,575	17.4

Abbreviations: AI/AN = American Indian or Alaska Native; NH = Non-Hispanic; NH/OPI = Native

Hawaiian or Other Pacific Islander.

*The sex of the recipient was unknown for 187,349 (0.1%) of vaccine doses administered by federal retail pharmacies, and 3,923,986 (0.6%) of doses administered by all providers.

§The race and ethnicity of the recipient was reported as unknown for 93,338,808(29.6%) of vaccine doses administered by FRPP, and 122,622,752 (19.0%) of doses administered by all providers.