

COVID-19 Vaccine Equity Metric Evaluation Brief

7/29/2021

Context

The Minnesota Department of Health (MDH) prioritized vaccination throughout the state in a phased approach. Given their burden and vulnerability to severe COVID-19 after infection, seniors (i.e., adults age 65 and over) were prioritized early in Minnesota. It became clear in the early weeks of 2021 that an additional intentional allocation strategy was needed to advance racial equity as gaps began to emerge by race and ethnicity. On February 6, 2021, 13.8% of non-Hispanic white Minnesotans had at least one dose of vaccine, compared to 7.7% of Black/African American, 4.8% of Hispanic, and 8.0% of Asian/Pacific Islander Minnesotans. Tribes had their own allocation criteria and as such, not only had higher vaccine coverage (17.2%) but had also vaccinated other community members who lived in counties near reservations.

Persistent disparities in vaccination coverage by race and ethnicity necessitated strategic action toward health equity. To that end, congruent with the recommendations of leading thinkers in the topic of vaccine ethics, the MDH moved to address equity by using place-based strategies to allocate vaccine doses that incorporated a metric of community need of which race/ethnicity was one of several factors.¹⁻⁴

Using the CDC's Social Vulnerability Index (SVI),⁵ MDH ranked the ZIP code areas of the state and divided them into quartiles (with quartile 1 (Q1) being areas of highest disadvantage to quartile 4 (Q4) having the lowest disadvantage) based on their SVI score. These quartiles were then used to compare the vaccination rates of Minnesotans based on vulnerability/disadvantage. One main way MDH operationalized our equity metric was to determine a specific allocation percentage prioritized for communities hit hardest by the COVID-19 pandemic using the SVI ZIP code quartiles.

Table 1 presents descriptive information about the demographics of residents in each SVI quartile. Multiple reports continue to find that SVI is associated with COVID-19 burden; nationally, this finding has been identified at the county level, and within Minnesota, our data continues to show the disproportionate impact of COVID-19.⁶⁻⁷

People of all ages living in high-SVI ZIP codes represent 29% of Minnesota's population, but represent 32% of Minnesota's COVID-19 cases, 39% of hospitalizations, and 38% of deaths. Among Minnesotans age 16 and under, people in Q1 SVI ZIP codes represent 41% of hospitalizations. Drawing from the example of California, which prioritized equity by allocating vaccine doses proportionate to the burden of COVID-19 in its most disadvantaged areas, we set an allocation goal of 40% of weekly vaccine doses being administered to Minnesotans living in Q1 SVI ZIP codes.

Table 1. Demographics of SVI Quartiles in Minnesota

| | Q1 SVI (High) | | Q2 SVI | | Q3 SVI | | Q4 SVI (Low) | |
|----------------------------------|---------------|--|--------|--|--------|--|--------------|--|
| Race/Ethnicity | | | | | | | | |
| American Indian or Alaska Native | 54% | | 17% | | 8% | | 7% | |
| Black or African American | 53% | | 20% | | 11% | | 9% | |
| Hispanic or Latinx | 47% | | 22% | | 17% | | 14% | |
| Asian or Pacific Islander | 24% | | 22% | | 22% | | 26% | |
| White | 24% | | 22% | | 22% | | 26% | |
| Multiple | 35% | | 23% | | 16% | | 20% | |
| Other | 39% | | 24% | | 14% | | 20% | |
| Other Characteristics | | | | | | | | |
| Limited English Proficiency | 59% | | 17% | | 9% | | 9% | |
| Living with Disabilities | 34% | | 23% | | 19% | | 18% | |
| MN Medicaid/MNCare enrollees | 43% | | 23% | | 17% | | 17% | |
| Total Population | 29% | | 22% | | 22% | | 26% | |

This table shows the percentage of each category in each SVI quartile (e.g., 59% of Minnesotans with limited English proficiency live in Q1 SVI ZIP codes). All data is based on ZIP codes. Totals may not add up to 100% due to some ZIP codes having a missing SVI quartile value. Data source: 2015-2019 ACS Estimate.

Table 2. COVID-19 Burden by SVI Quartile, All Ages

| | Q1 SVI (High) | | Q2 SVI | | Q3 SVI | | Q4 SVI (Low) | |
|---------------------------|---------------|---------|-----------|---------|-----------|---------|--------------|---------|
| Indicator | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| COVID-19 cases | 125,689 | 32% | 88,638 | 23% | 83,239 | 21% | 94,888 | 24% |
| COVID-19 hospitalizations | 8,182 | 39% | 4,681 | 22% | 4,057 | 19% | 4,162 | 20% |
| COVID-19 deaths | 1,144 | 38% | 700 | 23% | 597 | 20% | 579 | 19% |
| Total population | 1,612,434 | 29% | 1,248,704 | 22% | 1,225,355 | 22% | 1,467,333 | 26% |

Data as of June 8, 2021, excluding long-term care residents. Table should be interpreted as N of Y population (X% of Y population lives in respective vulnerability quartile). Data source: 2015-2019 ACS Estimate.

Interventions

The use of MDH's vaccine equity metric has involved several components operating in tandem. Several of these strategies are highlighted below.

Engagement with external partners

Each week, we provide a list of ZIP codes to local public health, health systems, Federally Qualified Health Centers (FQHC), health care coalitions, and Medicaid managed care health plans that includes the SVI quartile and vaccine coverage of each ZIP code. This data has also been mapped out at the ZIP code level and broken down by health care coalition region and county to better inform our local partners in their response. We have also created a dashboard for local public health bureaus and community health boards that provides detailed analyses of the SVI and vaccine coverage as well as mapping down to the census tract level by SVI and vaccination rates.

Sharing data for transparency

MDH collaborates with the Minnesota EHR Consortium to securely share data matching the race/ethnicity of patients in their electronic health record (EHR) to their vaccination records from the Minnesota Immunization Information Connection (MIIC), enabling MDH to add race and ethnicity data to our public vaccination dashboard. The vaccination by race/ethnicity part of the dashboard was stood up in March 2021. After adding SVI as our vaccine equity metric it was included in the public dashboard in May in addition to the race/ethnicity data already posted. This corresponded with the development of a weekly internal vaccine equity report, which describes vaccine coverage throughout the state, identifies areas that are low in vaccine coverage and compares regions and vaccine providers.

SVI has also been used throughout MDH in other work, including in other parts of the COVID-19 response. MDH is working to standardize the use of SVI across the agency. One example is using SVI as part of various CDC grant applications, describing how MDH will use SVI to help guide equity efforts of the agency. MDH has also provided technical assistance to other state agencies; for example, working with the Minnesota Department of Education (MDE) to help use SVI for at-risk populations.

Tailored and specific vaccine distribution and outreach programs

MDH's COVID-19 response has diligently been working on COVID-19 outreach to focus communities to disseminate culturally relevant, linguistically appropriate, accurate, and timely messages related to COVID-19 vaccines, testing, and other topics. Our teams working with cultural, faith, and disabilities communities have been working in tandem with MDH's contracted diverse media vendors, community engagement contractors, and COVID Community Coordinators ("CCCs" - community-based organizations that connect Minnesota's diverse communities to COVID-19 testing, vaccination, and other resources).

Early on, community vaccination sites were recognized to be a vital strategy in helping close the gaps in our vaccination rates by decreasing the barriers communities face in accessing the COVID-19 vaccine. Use of SVI as an equity metric helped guide this strategy and the well-established work of our MDH teams and CCCs as we expanded our efforts to bring shots directly to communities. Among MDH supported community vaccination clinics carried out or planned as of June 28, 2021, 72% have or will occur in ZIP code areas that are in the Q1 SVI

quartile. When we include all the known community vaccination clinics supported by external partners like local public health agencies, FQHCs, large health care systems, and regional health care coalitions the number of events carried out or planned as of June 28, 2021, that have or will occur in Q1 ZIP code areas is 62%.

Similarly, our mobile vaccination buses have targeted outreach to communities to fill gaps in access to COVID-19 vaccination. As of June 30, 2021, 57% of events have occurred in Q1 SVI ZIP code areas.

In May, MDH and the Minnesota Department of Human Services (DHS) launched a partnership with private health plans to identify Minnesotans who have been most impacted by COVID-19 and continue to face barriers to getting vaccinated to connect them with vaccination opportunities. As of June 29, 2021, 366,680 outreach attempts had been made to members living in Q1 SVI ZIP code areas including 19,870 individual phone calls.

Assumptions and methods

For the purposes of this analysis, vaccine coverage is defined where eligible people (i.e., age 16 and over) have had at least one dose of their vaccine series. We selected first dose because for our purposes, the number of people who have not started a series is the most indicative of barriers in access to information or immunization. In this document, a high SVI area refers to a geographic unit placed in the highest quartile of SVI rankings statewide. We used the current projections for the first three weeks of April to estimate the number of vaccines allocated. For the fourth and fifth week, we took the average of the previous three weeks, which varied. We calculated 40% of all vaccines, rather than estimating type-specific allocation. We summed the total of these four weeks to estimate the number of newly vaccinated Minnesotans living in high SVI areas. We added this to the current estimate of vaccinated people living in high SVI areas to project vaccine coverage after four weeks using this strategy.

Our projections of the impact of the equity allocation did not account for changes in vaccine supply and assumed that all weekly allocated doses would be used. This estimate did not account for migration across SVI areas (i.e., Minnesotans living in lower SVI areas migrating to high SVI areas or vice versa). This also assumed all doses allocated to our equity goal would be distributed to people living in high SVI zip code areas.

Results

An equity allocation goal of 40% of vaccines going to high SVI zip code areas was set based on the analysis performed in Table 2. Projections of allocations were used to estimate the coverage reached in high SVI areas (Q1) were we to meet the equity allocation goal. By week 5, first dose vaccine coverage in residents 16 and older of high SVI areas was expected to be 63.7%, with the actual coverage attained being 62.2%. One of the assumptions when modeling the projections was that vaccine demand was going to remain the same; however, it decreased and then plateaued. In Table 3 it can be seen that actual coverage was exceeding projections through week 2 and was then slightly lower than expected. Of note, Table 3 also demonstrates how the gap between overall first dose coverage statewide and in Q1 ZIP code areas did slightly narrow even though actual coverage did not meet our projections.

VACCINE EQUITY METRIC EVALUATION BRIEF

Figure 1 visualizes the proportion of each week’s administered doses by SVI quartile out of the total people who received them. Each vertical line corresponds to changes in vaccine allocation policies. The darkest color corresponds to greater disadvantage by SVI (Q1) and the lightest color corresponds to lower disadvantage (Q4).

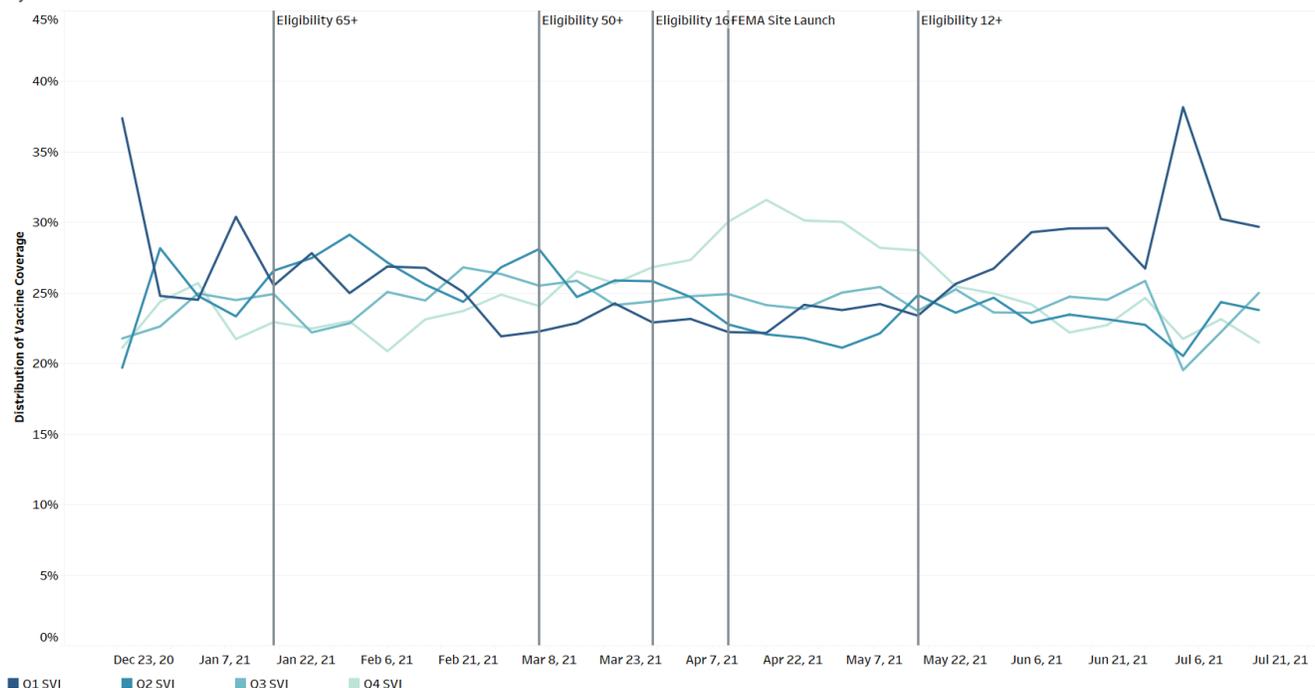
Initially, Q1 had the highest share of administered doses (largely due to early prioritization of seniors, Minnesotans in congregate living settings, and Tribal nations who were largely in or near high-SVI areas, vaccinating at high rates). By February this changed, and until the third week in May, where we began to see increases in their share, Minnesotans living in high-SVI areas had received the smallest proportion of doses.

Table 3. Equity Allocation and First Dose COVID-19 Vaccine Coverage in SVI Quartile 1

| Goal week | Expected statewide Q1 coverage | Actual statewide Q1 coverage | Overall Statewide coverage | Gap between actual Q1 coverage and state coverage |
|--------------------|--------------------------------|------------------------------|----------------------------|---|
| Week 1 (5/3-5/9) | 55.1% | 57.2% | 61.0% | -3.8% |
| Week 2 (5/10-5/16) | 57.2% | 58.5% | 62.2% | -3.7% |
| Week 3 (5/17-5/23) | 60.8% | 60.1% | 63.6% | -3.5% |
| Week 4 (5/24-5/30) | 62.6% | 61.1% | 64.5% | -3.4% |
| Week 5 (5/31-6/6) | 63.7% | 61.8% | 65.1% | -3.3% |

Figure 1. Week-to-Week Split of First-Dose Administration by SVI Quartile

Distribution of first-dose vaccine administration to eligible residents across zip codes by SVI quartile
By MMWR Week



Dashboard last updated: 7/20/2021 3:54:04 PM

Another impact of our vaccine equity strategies has been media engagement. Some of this has been through our [COVID-19 Contracts for Diverse Media Messaging and Community Outreach](https://www.health.state.mn.us/communities/equity/funding/covidcontracts.html) (<https://www.health.state.mn.us/communities/equity/funding/covidcontracts.html>) to reach a diverse breadth of communities and to create culturally specific messaging. In addition, participation in MDH's media briefings occurred weekly in May. Vaccine equity has also remained a topic of interest in multiple local news organizations. This regular engagement shows the depth of presence in the public eye, continues to help bring awareness of our work with focus communities, and helps reflect the incredible work of the MDH vaccine equity team.

Limitations

While we can describe the contribution of our vaccine equity strategies to increasing vaccine coverage among Minnesota's most disadvantaged residents, it is a challenge to attribute how much specifically was due to these strategies. Our equity strategies worked in tandem with one another at the state level, and many other events coincided. Local public health agencies, health systems, clinics, and pharmacies created their own events to vaccinate people outside our campaign. In addition, the doses allocated in the strategy mentioned above were not the only doses administered for equity purposes. Through FEMA funding, we received doses and support to vaccinate at community sites (separate from the state's allocation) along with setting up a site at the Minnesota State Fairgrounds. These doses were specifically prioritized for Q1 SVI ZIP code areas. Over the course of this successful effort, 97% of Minnesotans vaccinated were from Q1 SVI ZIP codes. FEMA doses were not captured when we talk about the equity allocation goal because they were allocated directly by the federal government. However, the impact of those doses on the overall immunization rate in Q1 illustrates the need to have a multi-pronged approach that prioritizes equity.

A broader limitation is that our current data does not allow insight into vaccination rates among Minnesotans with disabilities or those who identify as Lesbian, Gay, Bisexual, Transgender or Queer (LGBTQ), communities that have noted barriers to testing, vaccines, and care. We also are not currently able to further disaggregate vaccination data by race and ethnicity in a standardized way that allows us the ability to identify where gaps and disparities exist within racial and ethnic communities within Minnesota. We recognize that SVI is an imperfect proxy and MDH is continuing to work on improving our data to meet our commitment to health and racial equity.

Next steps

Overlap of race/ethnicity, SVI, and vaccination rates

Although SVI was selected a proxy for the impact of historical disinvestment in areas of our state, it does not completely capture the impact of structural racism. The disproportionate impact our Black, Native American, Hispanic, Asian, and other communities of color have experienced during COVID-19 related to the overlap of geographic deprivation, racism, and language was recently described by looking at Minnesota communities using the Area Deprivation Index⁸. This effect was also seen when looking at vaccination rates among race/ethnicity groups in Minnesota stratified by SVI using Minnesota Immunization Information Connection (MIIC) data.

While a gap in vaccination rates do exist for white Minnesotans who live in Q1 ZIP codes versus those in Q4 ZIP codes, as seen in Table 4, the difference is more than three times larger for Black Minnesotans and American Indian/Alaskan Native Minnesotans and two and half times larger for Asian Pacific Islander Minnesotans. This suggests that we need to focus further on Q1 ZIP code areas experiencing gaps in immunization rates stratified by

race/ethnicity as we continue to target both outreach and vaccination opportunities. Our vaccine equity team has generated a list of priority ZIP codes stratified in this manner and attentive to regional geography. We will be working with our existing contracted COVID Community Coordinators, Community Based Organizations, vaccine outreach directors and external partners to prioritize engagement and vaccination efforts in these communities through the months of July and August. Additionally, this information can help inform MDH leadership's strategy around broader COVID-19 resources like testing and guidance around other mitigation measures if we see a rise in infection rates from new variants.

Regional level data

There are notable differences in vaccination rates based on geography. This has been noted nationally and in Minnesota. We have been looking at the overlap of SVI and regional vaccination rates to help guide strategies since the end of June (Figure 2). To further assist our partners we will be launching a tool for local public health through our trusted partners site that allows them to see the vaccination rates stratified by SVI quartile down to the county level, as well as the overall distribution of administered vaccines at the county level by SVI quartile compared to the overall distribution of the county's population by SVI quartile. In this dashboard, local public health officials will also be able to compare the first dose coverage by quartiles in their jurisdiction to the statewide coverage by quartiles as well as estimate the number of individuals yet to be vaccinated. This report, in combination with regional vaccine rates will allow officials working on vaccine initiatives to be more strategic with outreach and engagement efforts so as to increase coverage over time (Figure 3).

Public vaccine equity report

Data transparency for vaccine equity is an important issue for MDH to continue to address. Having stood up a vaccine equity metric and created an internal vaccine equity report, we are also now publishing a weekly version that is available for the public along with a dataset that includes ZIP code level data on SVI quartile and vaccination rates. The report can be found on [COVID-19 Vaccine Equity in Minnesota](https://www.health.state.mn.us/diseases/coronavirus/vaccine/mnsvi.html) (<https://www.health.state.mn.us/diseases/coronavirus/vaccine/mnsvi.html>).

Childhood immunization

Shortly after the March 2020 declaration of the COVID-19 pandemic in the United States, an analysis of provider ordering data from the federally-funded Vaccines for Children program found a substantial decrease in routine pediatric vaccine ordering⁹. While initial drops have partially recovered for some vaccine-preventable illnesses, several notable gaps have persisted throughout the pandemic¹⁰. An MDH analysis of data from MIIC, the state's immunization information system (IIS), found that immunization coverage rates among children and adolescents are lagging behind previous years. Routine immunization coverage among children and adolescents show disparities exist along lines of race, ethnicity and SVI zip code quartile, with gaps most pronounced in adolescent vaccination. Additional MDH analyses using 2020-21 school immunization data further highlight the adolescent gap with large decreases in coverage for the vaccines required for seventh grade students seen. Tdap and meningococcal coverage dropped by 8 and 7 percentage points, respectively. Also of note, since the CDC's Advisory Council on Immunization Practices (ACIP) approved Pfizer's mRNA COVID-19 vaccine down to age 12 and also provided guidance on co-administration of the COVID-19 vaccine with other routine immunizations, there has been minimal co-administration noted in Minnesota. This translates into missed opportunities to address gaps in both COVID-19 and routine immunization. In addition to preparing our children to be protected from COVID-19 as they re-enter school and fall activities, preventing additional vaccine-preventable outbreaks using the impressive

VACCINE EQUITY METRIC EVALUATION BRIEF

infrastructure we have in place for COVID-19 vaccination is among MDH’s goals and will be a priority in the work of the vaccine equity team over the next two months. These efforts will continue to be guided by our vaccine equity metrics.

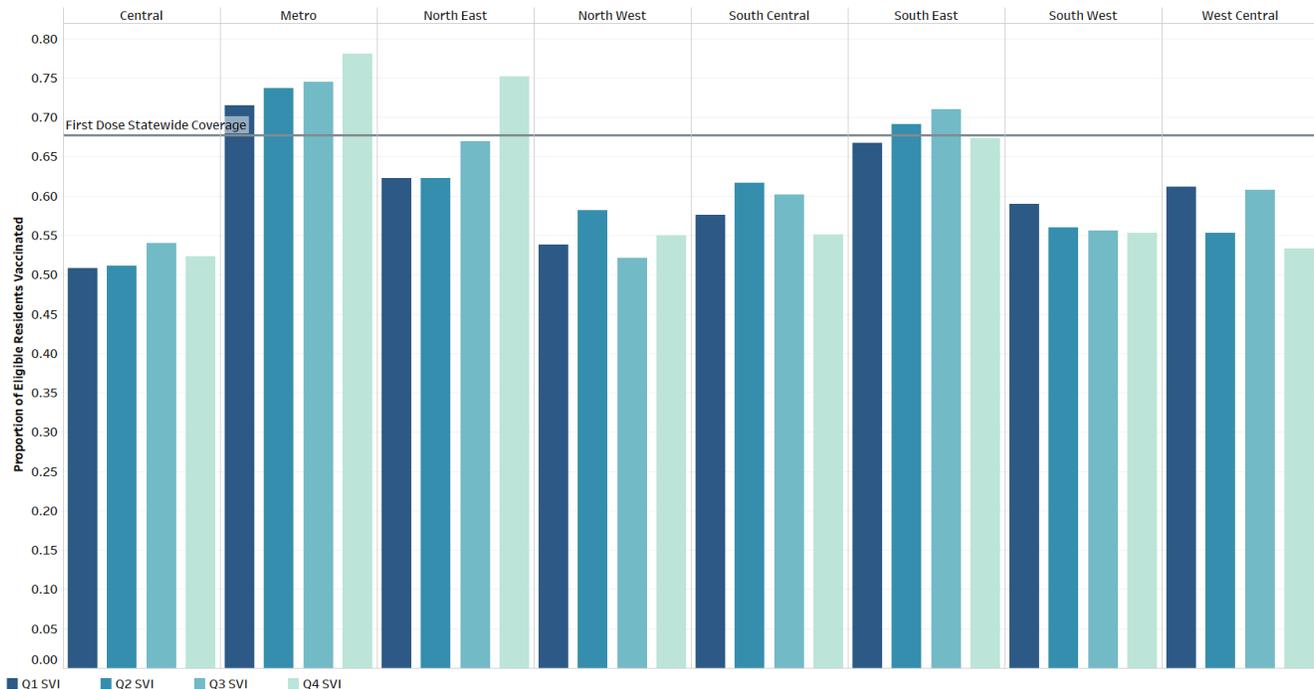
Table 4. Difference in Statewide First Dose 16+ Vaccination Rates by Race/Ethnicity and SVI ZIP Code Quartile based on MIIC data

| | Gap in Q1:Q4 first dose coverage (% difference) |
|--------------------------------|---|
| American Indian/Alaskan Native | -36.1% |
| Asian or Pacific Islander | -28.8% |
| Black/African American | -37.1% |
| White | -11.8% |
| Hispanic/Latinx | -16.5% |

Table 4 shows the percent difference in vaccine coverage by race and ethnicity between SVI Q1 areas (high vulnerability) and SVI Q4 areas (low vulnerability). The gap in coverage is smallest for white Minnesotans and largest for Black/African American Minnesotans. Roughly 7% of race data and 30% of ethnicity data is missing or unknown. Data from MIIC.

Figure 2. First Dose 16+ Vaccination Rates by Health Care Coalition Region and SVI ZIP Code Quartile

Proportion of Eligible Residents that are Vaccinated with at least one dose by Social Vulnerability Index Quartile Across Zip Codes by Health Care Coalition Region

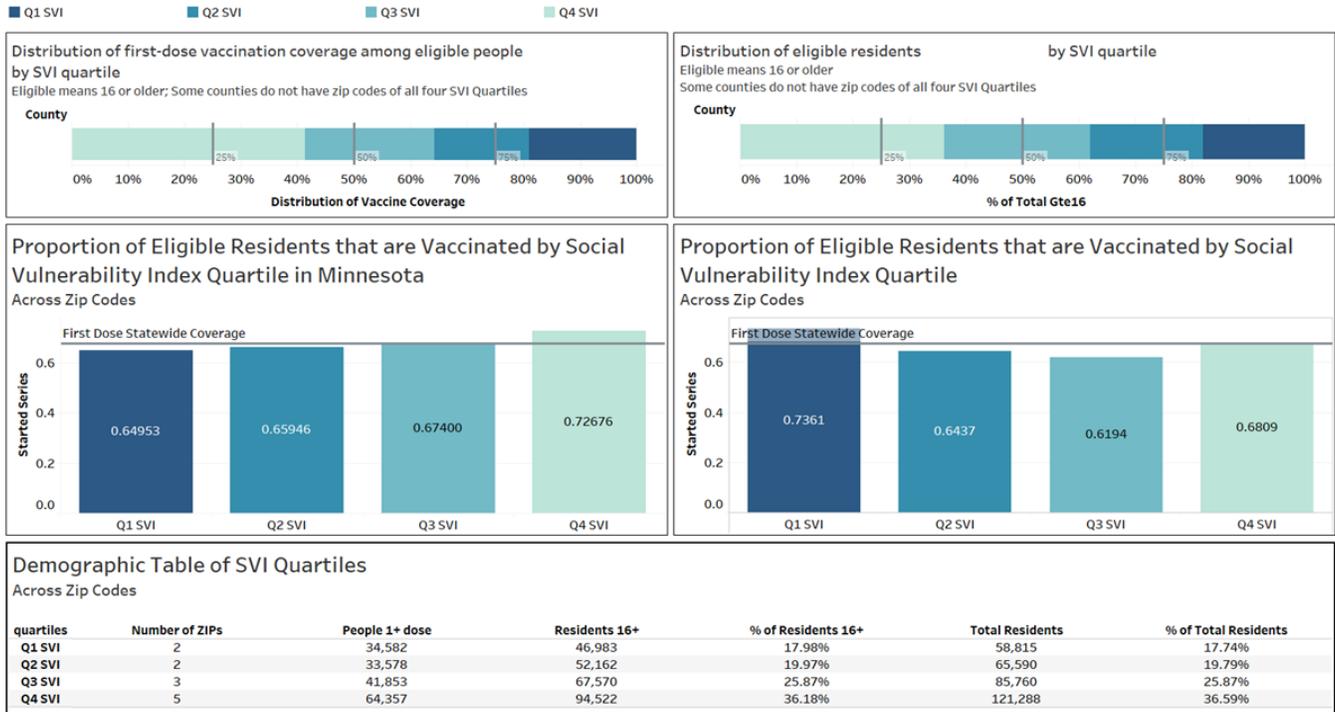


Dashboard last updated: 7/20/2021 12:58:34 PM

VACCINE EQUITY METRIC EVALUATION BRIEF

Figure 2 shows the first dose vaccine coverage across SVI quartiles by Health Care Coalition Region for residents 16 years and older. The horizontal line across the chart indicates the statewide first dose coverage. Data from MIIC.

Figure 3. Local Public Health Dashboard – County-level View of Vaccination Data by SVI



ZIP Code Quartile

Figure 3 is an example of the distribution of first dose coverage by SVI quartile for a specific county (top left), the distribution of the total population 16 and older in a specific county (top right), the proportion of residents age 16 and older who are vaccinated by quartile across the state (middle left), the proportion of residents age 16 and older who are vaccinated by quartile in a specific county (middle right), and a table with demographic characteristics of the vaccine doses (bottom). The horizontal lines across the middle charts indicate the statewide first dose coverages. Data from MIIC.

References

1. Persad, G., et al. (2020). "Fairly Prioritizing Groups for Access to COVID-19 Vaccines." JAMA 324(16): 1601.
2. Schmidt, H., et al. (2020). "Is It Lawful and Ethical to Prioritize Racial Minorities for COVID-19 Vaccines?" JAMA 324(20): 2023.
3. Schmidt, H., et al. (2020). "Covid-19: how to prioritize worse-off populations in allocating safe and effective vaccines." BMJ: m3795.
4. Shen, A. K., et al. (2021). "Ensuring Equitable Access To COVID-19 Vaccines In The US: Current System Challenges And Opportunities." Health Affairs 40(1): 62-69.
5. Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC Social Vulnerability Index, 2018 Database, Minnesota. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed on March 31, 2021.
6. Association between social vulnerability and a COUNTY'S risk for becoming A COVID-19 hotspot - United STATES, june 1–JULY 25, 2020. (2020, October 22). Retrieved February 20, 2021, from <https://www.cdc.gov/mmwr/volumes/69/wr/mm6942a3.htm>
7. Barry V, Dasgupta S, Weller DL, et al. Patterns in COVID-19 Vaccination Coverage, by Social Vulnerability and Urbanicity — United States, December 14, 2020–May 1, 2021. MMWR Morb Mortal Wkly Rep 2021;70:818–824. DOI: <http://dx.doi.org/10.15585/mmwr.mm7022e1>
8. Ingraham, N.E., Purcell, L.N., Karam, B.S. et al. Racial and Ethnic Disparities in Hospital Admissions from COVID-19: Determining the Impact of Neighborhood Deprivation and Primary Language. J GEN INTERN MED (2021). <https://doi.org/10.1007/s11606-021-06790-w>
9. Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration — United States, 2020. MMWR Morb Mortal Wkly Rep 2020;69:591–593. DOI: <http://dx.doi.org/10.15585/mmwr.mm6919e2>
10. Patel B, Murthy , Zell E, et al. Impact of the COVID-19 Pandemic on Administration of Selected Routine Childhood and Adolescent Vaccinations — 10 U.S. Jurisdictions, March–September 2020. MMWR Morb Mortal Wkly Rep 2021;70:840–845. DOI: <http://dx.doi.org/10.15585/mmwr.mm7023a2>



Minnesota Department of Health | health.mn.gov | 651-201-5000
625 Robert Street North PO Box 64975, St. Paul, MN 55164-0975

Contact health.communications@state.mn.us to request an alternate format.