Increasing COVID-19 Vaccination Coverage for Newcomer Communities: The Importance of Disaggregation by Language

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Abstract. The COVID-19 pandemic has disproportionately affected refugee, immigrant, and migrant populations. Vaccines are essential for decreasing transmission and severity of COVID-19 infection. Understanding differences in vaccination coverage based on preferred language is crucial for focusing efforts to decrease COVID-19–related disparities. Four sites in the Minnesota Center of Excellence in Newcomer Health collaboratively evaluated completion of primary COVID-19 vaccination series on or before December 31, 2021, for patients who were 12 years or older on June 30, 2021, by preferred language. The non-English/non-Spanish speaking population included 46,714 patients who spoke 174 languages; COVID-19 vaccination coverage by language ranged from 26.2% to 88.0%. Stratifying vaccination coverage by specific language is a critical first step toward dismantling disparities and shaping interventions that best meet the needs of communities served.

INTRODUCTION

Immigrant communities in the United States have historically experienced multiple barriers to care, leading to persistent health disparities.1,2 Previous studies have documented delayed time to care, decreased access to healthcare services, and lower rates of health insurance coverage for immigrant patients who speak languages other than English or Spanish.2,3 Early in the COVID-19 pandemic, higher-than-typical risk of infection and hospitalization among several immigrant and other communities speaking non-English, non-Spanish (NENS) languages was observed.4–7 Risk was attributed to lack of access to testing and personal protective equipment, especially for the in-person essential workforce. Further, several immigrant communities lacked access to information in preferred languages and were excluded from pandemic relief programs.8–11 After COVID-19 vaccines received emergency use authorization in the United States, concerns were raised about equity in vaccination access for immigrant communities.12,13 Major barriers included English-only electronic vaccination scheduling portals and mass vaccination sites with hours and locations inaccessible to many in-person essential workers. Initial steps to address these disparities often prioritized Spanish-speaking communities. Although profoundly important, English/Spanish-only approaches nonetheless exclude the ~26.5 million US residents who speak other languages.14 Additionally, many efforts to understand differences in COVID-19 vaccination coverage and shape subsequent interventions have focused on race and ethnicity; these social constructs are used differently in the United States relative to many other countries.15,16 Racial categories fail to account for differences in identity, culture, and experience of individuals born elsewhere.17

The aim of this project was to examine COVID-19 primary series vaccination coverage during the first year of vaccine availability by language group to inform future interventions for NENS primary care patients within four large health systems in the United States.

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Vaccination status was also analyzed by both age group and preferred language at one site to assess whether there were differences between language groups for patients aged 65+ years because older patients are at higher risk of worse outcomes following COVID-19 infection.19

Descriptive statistics using frequencies and proportions were used to describe the differences in COVID-19 vaccination status by language. Risk ratios and associated 95% CIs were calculated to understand the likelihood of having completed a primary COVID-19 vaccination series by NENS language group compared with the English- and Spanish-speaking patient group. Data were analyzed using SAS Enterprise Guide 7.1.

RESULTS

During the study period, 1,345,848 patients with 176 preferred languages were seen for primary care across the four participating health systems. Of those, 64.9% completed their primary COVID-19 vaccination series by December 31, 2021 (Table 1). This was similar for subpopulations whose preferred language was English (64.9%), Spanish (65.7%), and NENS (63.8%).

There were 41,894 NENS-speaking patients who identified one of the 25 most common languages across all four sites as their preferred language (89.7% of NENS population). Completion of a primary COVID-19 vaccination series ranged from 42.7% to 88.0% by language group (Table 2). Compared with the English- and Spanish-speaking population, the NENS population speaking the 25 most common languages were 2% less likely to have completed a primary COVID-19 vaccination series. This ranged from 34% less likely to 35% more likely across these NENS language groups.

At one site, vaccination status was analyzed by preferred language for 1,441 individuals aged 65+ years (Table 3). Among patients aged 65+ years, the percentage vaccinated ranged from 57.6% to over 95% for different language groups.

DISCUSSION

In this evaluation of 46,714 patients whose preferred language is NENS, there was a wide variation in the percentage of the population with a completed COVID-19 primary vaccination series by language. This project demonstrates that grouping patients who speak languages other than English or Spanish as one entity instead of stratifying by specific languages masks disparities. Furthermore, wide variation in vaccination coverage by language group was observed even when focusing only on patients aged 65+ years who—along with immunocompromised individuals—are a priority population for COVID-19 vaccination interventions.19

In lieu of examining language data, health equity assessments often focus predominantly on race and/or ethnicity. Although important, these strategies do not allow for allocation of language-related resources and can also obscure between-group differences for NENS communities. As other health equity teams have noted, the federal categories for race and ethnicity are insufficient for self-identification of many newcomer communities, including but not limited to Asian and Pacific Islander subgroups, Hispanic/Latino subgroups, and individuals from the Middle East and North Africa.17 Additionally, many individuals with a NENS preferred language do not identify with US racial groupings. Race is therefore incomplete for analyzing the impact of vaccination programs for many NENS patients.

For this reason, health systems interested in promoting vaccination equity should ask patients their preferred language, document preferred language in the EHR, and routinely examine vaccination status by specific language

Table 2

<table>
<thead>
<tr>
<th>Language</th>
<th>N</th>
<th>Vaccinated, %</th>
<th>Risk ratio (95% CI)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall*</td>
<td>41,894</td>
<td>63.87</td>
<td>0.98 (0.976–0.99)</td>
</tr>
<tr>
<td>Amharic</td>
<td>2,579</td>
<td>69.02</td>
<td>1.06 (1.04–1.09)</td>
</tr>
<tr>
<td>Arabic§</td>
<td>2,523</td>
<td>57.27</td>
<td>0.88 (0.85–0.91)</td>
</tr>
<tr>
<td>Bengali</td>
<td>236</td>
<td>75.85</td>
<td>1.17 (1.09–1.26)</td>
</tr>
<tr>
<td>Burmese</td>
<td>552</td>
<td>66.85</td>
<td>1.03 (0.97–1.09)</td>
</tr>
<tr>
<td>Cambodian</td>
<td>1,673</td>
<td>83.38</td>
<td>1.28 (1.26–1.31)</td>
</tr>
<tr>
<td>Cantonese</td>
<td>718</td>
<td>83.98</td>
<td>1.29 (1.25–1.34)</td>
</tr>
<tr>
<td>Chinese¶</td>
<td>216</td>
<td>67.13</td>
<td>1.03 (0.94–1.14)</td>
</tr>
<tr>
<td>Dani†</td>
<td>264</td>
<td>77.65</td>
<td>1.20 (1.12–1.28)</td>
</tr>
<tr>
<td>Farsi#</td>
<td>341</td>
<td>75.07</td>
<td>1.16 (1.09–1.23)</td>
</tr>
<tr>
<td>French</td>
<td>1,077</td>
<td>61.00</td>
<td>0.94 (0.90–0.99)</td>
</tr>
<tr>
<td>Hindi</td>
<td>293</td>
<td>70.65</td>
<td>1.09 (1.01–1.17)</td>
</tr>
<tr>
<td>Hmong</td>
<td>2,202</td>
<td>68.98</td>
<td>1.06 (1.03–1.10)</td>
</tr>
<tr>
<td>Karen</td>
<td>1,384</td>
<td>61.42</td>
<td>0.95 (0.91–0.99)</td>
</tr>
<tr>
<td>Korean</td>
<td>464</td>
<td>81.68</td>
<td>1.26 (1.21–1.31)</td>
</tr>
<tr>
<td>Lao</td>
<td>849</td>
<td>81.39</td>
<td>1.25 (1.21–1.29)</td>
</tr>
<tr>
<td>Mandarin</td>
<td>1,489</td>
<td>75.35</td>
<td>1.16 (1.13–1.19)</td>
</tr>
<tr>
<td>Nepali</td>
<td>1,515</td>
<td>77.16</td>
<td>1.19 (1.16–1.22)</td>
</tr>
<tr>
<td>Oromo</td>
<td>1,862</td>
<td>63.16</td>
<td>0.97 (0.94–1.00)</td>
</tr>
<tr>
<td>Portuguese</td>
<td>250</td>
<td>63.20</td>
<td>0.97 (0.90–1.07)</td>
</tr>
<tr>
<td>Russian</td>
<td>1,805</td>
<td>42.66</td>
<td>0.66 (0.62–0.69)</td>
</tr>
<tr>
<td>Somali</td>
<td>12,094</td>
<td>49.67</td>
<td>0.76 (0.75–0.78)</td>
</tr>
<tr>
<td>Swahili**</td>
<td>653</td>
<td>44.41</td>
<td>0.68 (0.63–0.75)</td>
</tr>
<tr>
<td>Tibetan</td>
<td>225</td>
<td>38.00</td>
<td>1.04 (0.99–1.09)</td>
</tr>
<tr>
<td>Tigrinya</td>
<td>696</td>
<td>65.80</td>
<td>1.01 (0.96–1.07)</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>5,934</td>
<td>79.69</td>
<td>1.23 (1.21–1.24)</td>
</tr>
</tbody>
</table>

* These 25 languages were spoken by 89.7% of non-English, non-Spanish speaking individuals.
† High rates of vaccination coverage in some language groups may reflect the circumstances of communities with a large proportion of newcomers for whom COVID-19 vaccination was strongly recommended or required for US entry or adjustment of status. The ratio of the % vaccinated in the individual language group compared with the % vaccinated in the English and Spanish speaking control group (64.95%).
§ Moroccan Arabic, Sudanese Arabic, and Arabic (not otherwise specified) were all categorized as Arabic.
¶ Chinese was not combined with Mandarin or Cantonese due to lack of specificity.
† Dani was not combined with Farsi because Dani speakers from Afghanistan are not always able to communicate with Farsi interpreters from Iran.
# Persian and Farsi were both categorized as Farsi.
** Type of Swahili spoken (e.g., Swahili spoken in the Democratic Republic of Congo vs. Swahili spoken in Tanzania) was not specified in the electronic health record of participating health systems.

Table 1

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total population</th>
<th>Vaccinated, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall*</td>
<td>1,345,848</td>
<td>64.91</td>
</tr>
<tr>
<td>Overall non-English</td>
<td>103,581</td>
<td>64.85</td>
</tr>
<tr>
<td>Overall non-English/non-Spanish†</td>
<td>46,714</td>
<td>63.80</td>
</tr>
<tr>
<td>English</td>
<td>1,242,267</td>
<td>64.92</td>
</tr>
<tr>
<td>Spanish</td>
<td>56,876</td>
<td>65.71</td>
</tr>
</tbody>
</table>

Sites include Denver Health and Hospital Authority (Denver, CO), Children’s Hospital of Philadelphia (Philadelphia, PA), Thomas Jefferson University (Philadelphia, PA), and HealthPartners (Minneapolis, MN).

* Inclusion criteria for this study was anyone aged 12 years or over on or before June 30, 2021, seen for primary care (internal medicine, family medicine, pediatrics, OB/GYN) between January 1, 2019 and December 31, 2021. Records were excluded if preferred language was unknown, missing, or declined.
† A total of 174 non-English, non-Spanish languages were identified in the study cohort.
often need to be tailored to regional differences in immigrant
options and re-coded all other languages as
be more comprehensive (e.g., one site allowed only 100
language lists within the EHR: lists at some sites need greater
in Mandarin. This analysis also uncovered problems with lan-
ferred language may be entered as
for care. For example, if a pediatric patient who speaks English
on how preferred language is recorded when patients present
ation of preferred lan-
fi
m a yi n d i c a tM a n d a r i no ro t h e r
subgroups.20 Accurate documentation of language facilitates
health systems’ ability to identify communities that should be
prioritized for outreach, education, and access in preferred lan-
guages. Across the four sites that participated in this analysis,
examination of baseline data for specific language groups
allowed newcomer health teams at participating sites to adva-
cate for a wide range of multilingual vaccination outreach, edu-
cation, and other access initiatives. Site-specific strategies
included recruitment of bilingual staff and volunteers, adjust-
ment of the geographic distribution of mobile vaccination clinics,
creation of multilingual scheduling protocols for languages other
than English, partnerships with ethnic community
-organizations, and cultivation of relationships with selected trusted
messengers, such as religious leaders.

This analysis was subject to several limitations. Vaccination
records may be incomplete if patients were vaccinated at sites
with lags in reporting to state vaccination registries or were
vaccinated in other states. However, data were pulled more
than 1 month after the end of the study period to help account
for data lag issues. Potential misclassification of preferred lan-
guage is another potential limitation because it is dependent
on how preferred language is recorded when patients present
for care. For example, if a pediatric patient who speaks English
is accompanied by a relative who speaks Mandarin, their pre-
ferred language may be entered as “English” in the EHR. How-
ever, their caregiver requires vaccine education and outreach
in Mandarin. This analysis also uncovered problems with lan-
guage lists within the EHR: lists at some sites need greater
specificity (e.g., “Chinese” may indicate Mandarin or other
varieties of Chinese, such as Cantonese), lists often need to
be more comprehensive (e.g., one site allowed only 100
options and re-coded all other languages as “other”), and lists
often need to be tailored to regional differences in immigrant
communities represented (e.g., specific languages spoken by
indigenous groups may need to be added). Data presented
here do not consider time of US arrival of specific subpopula-
tions and legal status type, so some subpopulations may have
had more robust uptake of COVID vaccinations due to US
immigration requirements. It is also important to recognize that
there may be differences in vaccination by language in differ-
ent parts of the country. For this analysis, all patients were
grouped by language irrespective of where they live. Future
analyses could work to understand variation within language
groups across sites. Finally, this analysis was limited to
addressing language groups; however, efforts to support the
health of newcomer communities may also benefit from know-
ning patients’ countries of origin. For example, preferred media
and trusted messengers for Swahili-speaking populations who
are Tanzanian may be very different from those for Swahili-
speaking populations who have origins in the Democratic
Republic of Congo.

These results have clinical, structural, and policy implica-
tions. Lower rates of vaccination in subpopulations speaking
particular NENS languages could result in relative increased
illness burden in groups already disadvantaged by barriers
to accessing health systems supports and information in pri-
mary languages. Effective efforts to decrease health dispari-
ties and improve access to healthcare require adequate
identification of these disparities. Health systems and EHR
vendors should ensure that preferred language fields within
the EHR are comprehensive and unambiguous. They should
also ensure staff training includes guidance on standard
scripted questions and accurate documentation of preferred
language. Data systems should be programmed to examine
individual language groups rather than English, Spanish, and
“other.” Analyzing vaccination coverage by preferred lan-
guage can significantly inform public health efforts by illumi-
nating disparities in vaccination coverage and can support
the tailoring of interventions to increase vaccination in speci-
fic subpopulations with lower vaccination rates.

Received November 23, 2022. Accepted for publication February 11,
2023.

Published online April 17, 2023.

Acknowledgments: We acknowledge the support of everyone partici-
pating in the Minnesota Center of Excellence for Newcomer Health.
We also acknowledge the patient navigators, community health
workers, and community-based organizations that work in all of our

<table>
<thead>
<tr>
<th>Language*</th>
<th>Mean age, years</th>
<th>Median age (IQR)</th>
<th>N</th>
<th>Vaccinated, %</th>
<th>N</th>
<th>Vaccinated, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amharic</td>
<td>44.5</td>
<td>42 (33–56)</td>
<td>999</td>
<td>68.2</td>
<td>164</td>
<td>70.1</td>
</tr>
<tr>
<td>Arabic</td>
<td>42.0</td>
<td>40 (29–56)</td>
<td>1373</td>
<td>57.5</td>
<td>207</td>
<td>74.4</td>
</tr>
<tr>
<td>Burmese</td>
<td>34.5</td>
<td>36 (22–43)</td>
<td>331</td>
<td>58.3</td>
<td>9</td>
<td>77.8</td>
</tr>
<tr>
<td>Chinese</td>
<td>55.2</td>
<td>63 (32–78)</td>
<td>139</td>
<td>69.1</td>
<td>66</td>
<td>78.8</td>
</tr>
<tr>
<td>Dari</td>
<td>33.3</td>
<td>31 (23–37)</td>
<td>214</td>
<td>82.2</td>
<td>17</td>
<td>&gt; 95†</td>
</tr>
<tr>
<td>Farsi</td>
<td>45.4</td>
<td>42 (31–62)</td>
<td>175</td>
<td>75.4</td>
<td>37</td>
<td>91.9</td>
</tr>
<tr>
<td>French</td>
<td>41.0</td>
<td>38 (29–53)</td>
<td>412</td>
<td>60.4</td>
<td>60</td>
<td>71.7</td>
</tr>
<tr>
<td>Mandarin</td>
<td>61.7</td>
<td>71 (44–80)</td>
<td>182</td>
<td>81.3</td>
<td>103</td>
<td>89.3</td>
</tr>
<tr>
<td>Nepali</td>
<td>42.4</td>
<td>39 (29–56)</td>
<td>645</td>
<td>73.3</td>
<td>94</td>
<td>78.7</td>
</tr>
<tr>
<td>Oromo</td>
<td>37.6</td>
<td>36 (28–46)</td>
<td>190</td>
<td>66.3</td>
<td>13</td>
<td>69.2</td>
</tr>
<tr>
<td>Russian</td>
<td>63.3</td>
<td>68 (51–81)</td>
<td>641</td>
<td>47.7</td>
<td>370</td>
<td>57.6</td>
</tr>
<tr>
<td>Somali</td>
<td>36.1</td>
<td>35 (21–47)</td>
<td>525</td>
<td>53.3</td>
<td>36</td>
<td>63.9</td>
</tr>
<tr>
<td>Swahili</td>
<td>32.7</td>
<td>30 (20–42)</td>
<td>257</td>
<td>40.9</td>
<td>12</td>
<td>83.3</td>
</tr>
<tr>
<td>Tigrinya</td>
<td>41.6</td>
<td>38 (26–57)</td>
<td>370</td>
<td>61.4</td>
<td>64</td>
<td>78.1</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>45.6</td>
<td>48 (28–62)</td>
<td>919</td>
<td>77.8</td>
<td>189</td>
<td>90.5</td>
</tr>
</tbody>
</table>

*IQR = interquartile range.
* To prevent deductive identification of vaccination status for members of small communities, only the 15 largest language subgroups are shown. These languages were spoken by 78.1% of non-English, non-Spanish-speaking individuals.
† Total vaccinated was more than 95% of the subpopulation.
communities to connect newcomer populations to healthcare. The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of each participating institution, of the Minnesota Center of Excellence in Newcomer Health, or of the CDC. The American Society of Tropical Medicine and Hygiene has waived the Open Access fee for this COVID-19 article.

Financial support: The Minnesota Center of Excellence in Newcomer Health is supported by funding from grant NU50CK000563 of the CDC. Dr. Yun and Ms. Mudenge are also supported by NIH.

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