Oregon Health & Science University
School of Medicine

Scholarly Projects Final Report

Title *(Must match poster title; include key words in the title to improve electronic search capabilities.)*
COVID-19 Vaccine Beliefs and Attitudes Among Oregon Healthcare Providers by Region of Practice

Student Investigator's Name
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3/17/2023

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Project Course *(Indicate whether the project was conducted in the Scholarly Projects Curriculum; Physician Scientist Experience; Combined Degree Program [MD/MPH, MD/PhD]; or other course.)*
Scholarly Projects Curriculum

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Project/Research Question
What are the differences in COVID-19 vaccine knowledge, beliefs and attitudes among Oregon healthcare providers by regions of practice (rural, suburban, urban)?

Type of Project *(Best description of your project; e.g., research study, quality improvement project, engineering project, etc.)*
Observational study

Key words *(4-10 words describing key aspects of your project)*
COVID-19 vaccination, vaccine hesitancy, Oregon healthcare providers, Rural, Suburban, Urban

Meeting Presentations
If your project was presented at a meeting besides the OHSU Capstone, please provide the meeting(s) name, location, date, and presentation format below (poster vs. podium presentation or other).
The Society for Healthcare Epidemiology of America
Colorado Springs, CO

April 12-14, 2022
Oral presentation
Northwest Immunization Conference
Portland, OR
August 22, 2022
Oral presentation

Publications *(Abstract, article, other)*
If your project was published, please provide reference(s) below in JAMA style.
N/A

Submission to Archive
Final reports will be archived in a central library to benefit other students and colleagues. Describe any restrictions below (e.g., hold until publication of article on a specific date).
N/A

Next Steps
What are possible next steps that would build upon the results of this project? Could any data or tools resulting from the project have the potential to be used to answer new research questions by future medical students?
Next steps include redistribution of the survey for larger sample size, creation of more targeted survey questions. This project could also potentially include new knowledge, attitudes and beliefs of the booster COIVD-19 vaccines.

Please follow the link below and complete the archival process for your Project in addition to submitting your final report.

https://ohsu.ca1.qualtrics.com/jfe/form/SV_3ls2z8V0goKiHZP

Student's Signature/Date *(Electronic signatures on this form are acceptable.)*
This report describes work that I conducted in the Scholarly Projects Curriculum or alternative academic program at the OHSU School of Medicine. By typing my signature below, I attest to its authenticity and originality and agree to submit it to the Archive.

X
Student's full name

Mentor's Approval *(Signature/date)*

X 3/11/2023
Mentor Name

Report*: Information in the report should be consistent with the poster, but could include additional material. Insert text in the following sections targeting 1500-3000 words overall; include key figures and tables. Use Calibri 11-point font, single spaced and 1-inch margin; follow JAMA style conventions as detailed in the full instructions.*

Introduction *(≥250 words)*

Since the onset of the COVID-19 pandemic in 2020, there have been a total of 103,268,408 cases and 1,115,637 deaths from COVID-19 reported in the United States[1]. Despite these staggering numbers, vaccine hesitancy continues to be a major topic of concern. In fact, in 2019 the World Health Organization listed vaccine hesitancy as one of the "top 10 threats to public health" [2]. While traditionally vaccine hesitancy is thought of as a patient's belief, healthcare providers are not immune to vaccine hesitancy. Nearly one-third of all healthcare providers report hesitancy about COVID-19 vaccination[4].

In a survey of 867 Americans who were hesitant before getting their vaccine, 89.3% reported being likely to turn to their healthcare provider for COVID-19 vaccine information[3]. A Pew Research Center survey showed that Americans are often more trusting of medical practitioners than researchers, indicating that healthcare providers have a key role to play against COVID-19 vaccine hesitancy[5]. It is critical that the medical community feels empowered to provide their patients with evidenced based COVID-19 vaccine recommendations. However, during the COVID-19 pandemic, the public has struggled to navigate the abundance of COVID-19 vaccine misinformation and it is unclear how this misinformation has affected medical providers and their recommendations to patients. Now, more than ever, most Americans report turning to their healthcare provider for trusted COVID-19 vaccine information[3]. Therefore, it is essential that the information healthcare providers give their patients is accurate despite their personally held beliefs. This study aims to understand differences in COVID-19 vaccine beliefs and attitudes among Oregon healthcare providers based on their region of practice (rural, suburban, urban).

Methods *(≥250 words)*

We constructed a 36-question survey using Qualtrics online software. During survey creation, a survey methodologist was consulted to assess survey language and question quality. Then, the survey was reviewed and approved by Oregon Health and Science University's Institutional Review Board prior to survey distribution. The survey was distributed via various email listserv or social media postings to numerous provider societies in Oregon, including nurse practitioners (NP), naturopathic doctors (ND), physician assistants (PA), Doctor of Medicine (MD), Doctor of Osteopathic Medicine (DO) or Bachelor of Medicine, Bachelor of Surgery (MBBS). The survey was also distributed via the Oregon Health Authority's immunization practice listserv. Only responses from Oregon healthcare providers were included in the final data analysis. The survey accepted responses from July 9th to August 12th, 2021. Participants were volunteers, did not receive compensation for completing the survey, and responses were anonymous. The data collected from the Qualtrics survey was electronically uploaded to Microsoft Excel. Survey responses were sorted by region of practice which the participant self-identified as urban, suburban, or rural. Then, responses to each survey question were analyzed in Microsoft Excel. Each completed question response was included in the final data analysis, regardless of if the survey was 100% completed by the participant. The primary endpoint was to evaluate differences in knowledge, attitudes,

and beliefs of healthcare providers based on region of practice (urban, suburban, rural). The survey also evaluated a secondary endpoint of differences in knowledge, attitudes, and beliefs by provider type (MD/DO/MBBS, PA, NP, and ND).

Results *(≥500 words)*

One-hundred and one responses were collected. Of those, 87 participants completed 100% of the survey questions. Survey respondents were predominantly White/Caucasian females ages 41-50 with an MD/DO/MBBS. Of those that responded to the survey, there were 30% rural, 30% suburban, and 38% urban providers. Of NP respondents, 67% practiced rurally, versus 25.6% of MD/DO/MBBS, 25% of NDs and 28.6% of PAs (table 1). Overall COVID-19 vaccination rate of respondents was 94.6%. Vaccination rate was highest among NDs (n=4) and PAs (n=7) at 100%, followed by MD/DO/MBBS (n=78) at 96.2% and NPs (n=12) at 75% (table 1).

Table 1. Participant Demographics

	MD/DO/MBBS (n=78)	ND (n=4)	NP (n=12)	PA (n=7)
Region/County of Practice				
Rural (n=31)	25.6%	25.0%	66.7%	28.6%
Suburban (n=31)	32.1%	25.0%	25.0%	28.6%
Urban (n=39)	42.3%	50.0%	8.3%	42.9%
COVID-19 Vaccination Status				
Yes, mRNA vaccine, doses #1 and #2 received	94.9%	100.0%	75.0%	100.0%
Yes, single dose vaccine received	1.3%	0.0%	0.0%	0.0%
No	3.8%	0.0%	25.0%	0.0%

The Likert scale data showed that, in total, 22% of NPs did not feel comfortable recommending the COVID-19 vaccine to patients, compared to 1% MD/DO/MBBS, 0% ND, 0% PA. All provider types had high rates of disagreement with the statement that the COVID-19 pandemic had increased their trust in vaccine safety (44% of NPs, 29% of PAs, 25% of NDs and 7% of MD/DO/MBBS) (Figure 1a). Of the rural providers that responded (n=27), 19% indicated mistrust in public health to ensure vaccines are safe versus 3% in suburban and 0% in urban areas (Figure 1b). Mistrust in COVID-19 vaccine safety is prevalent across all regions of practice, highest being in rural providers at 22% (suburban 7%, urban 11%). Of rural providers, 11% disagreed with the statement that the current COVID-19 pandemic is a severe threat to public health compared to 0% disagreement in suburban and urban areas (Figure 1b).

No rural providers reported difficulty in obtaining their COVID-19 vaccine (0%), compared to 28% and 20% reported difficulty in suburban and urban areas, respectively (Figure 1b).

Figure 1a: Percent "strongly disagree" or "somewhat disagree" response to below statements about attitudes toward vaccination

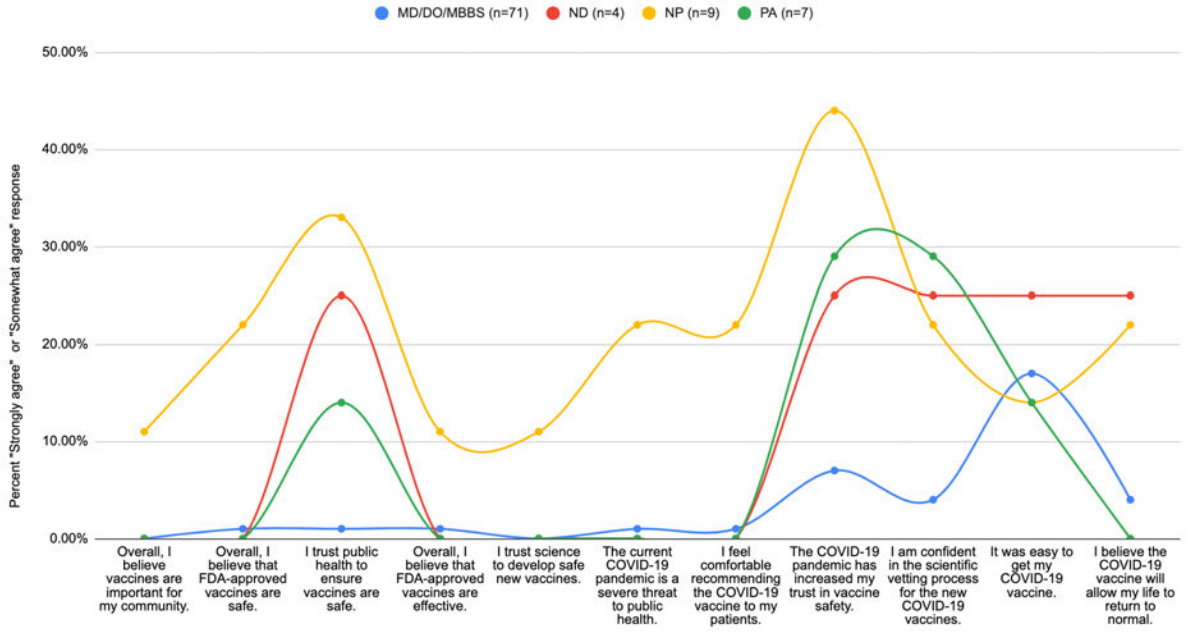
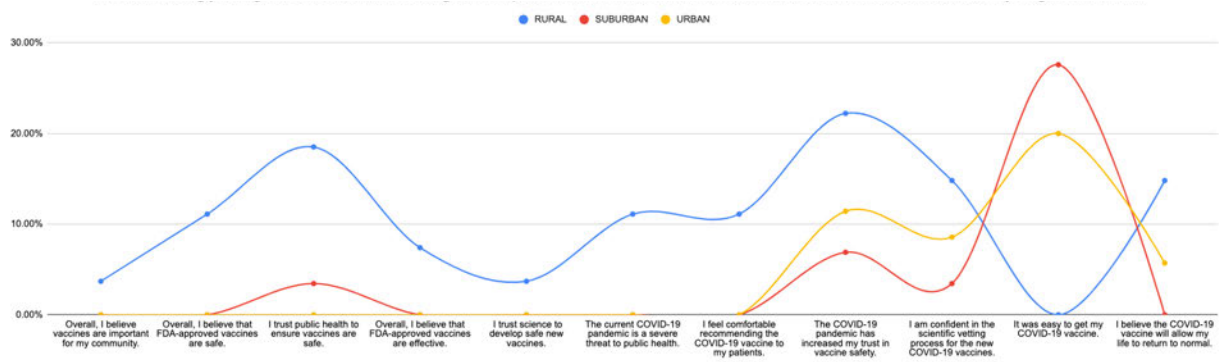


Figure 1b: Percent "strongly disagree" and "somewhat disagree" responses to the below statements about attitudes toward vaccination by region of practice



When respondents in high vaccine hesitancy areas were asked to select their top 5 concerns regarding the COVID-19 vaccine, concern for long-term safety was the top concern across rural (78%), suburban (93%) and urban (83%) counties. Belief that the COVID-19 vaccine is unnecessary was highest in

providers practicing in rural counties at 59%, followed by suburban at 41% and urban at 37%. Mistrust in the companies that make the vaccines was reported as a top concern more often in rural areas (44%) than suburban (14%) and urban (26%) areas. Additionally, concerns that the vaccines have been politicized were ranked more often in rural providers at 41% compared to suburban at 24% and urban at 23%. Wanting to wait and watch others before getting vaccinated was selected as a top concern more often in urban counties at 60% compared to 41% in both rural and suburban counties.

Discussion *(≥500 words)*

When it comes to healthcare and medical science, Americans have greater trust in their "medical provider than researchers" working in the same areas[5]. This places healthcare providers in a prime position to provide vaccine information to a receptive audience of patients. However, in an era of vaccine hesitancy, it is unclear how a provider's personal beliefs and attitudes toward COVID-19 vaccination influences their recommendations to patients. The results of this study demonstrate that COVID-19 vaccine hesitancy is prevalent among healthcare providers and may be increased in nurse practitioners and those practicing rurally. Belief that the COVID-19 vaccine was unnecessary was a top concern for providers working in rural areas, and rural providers were less likely to agree with the statement that COVID-19 is a severe threat to public health. This low perceived risk of infection and its association with greater COVID-19 vaccine hesitancy has also been demonstrated in other studies[6]. Unfortunately, rural areas also have increased COVID-19 incidence and mortality when compared to urban areas[7]. The relationship between COVID-19 vaccine hesitancy and increased mortality from COVID-19 infection demonstrates the importance of addressing vaccine hesitancy in rural areas. Results from this research indicate a need for widely accessible vaccine education that is targeted towards rural healthcare providers during public health crises.

The limitations of the study include a small sample size, lack of diversity within the study population, and nonresponse bias due to lack of survey completion. The survey only collected one hundred and one responses from primary care providers. When the survey was distributed during the summer of 2021, many other surveys regarding COVID-19 vaccination were circulating and flooding provider's inboxes. We believe this led to survey fatigue and a poor response rate to our survey. Additionally, respondents that did complete our survey did not represent a diverse population. Respondents were overwhelmingly White/Caucasian females with an MD/DO/MBBS. While MD/DO/MBBS providers comprise 71% of primary care providers in Oregon, this lack of diversity may not accurately reflect the beliefs and attitudes of other healthcare providers in Oregon as a whole[8]. Lastly, only 86% of respondents completed the survey in its entirety. Lack of survey completion can be partially attributed to prevalent survey fatigue in the setting of a lengthy 36 question survey. Also, it is possible that those that did not complete the survey had differing beliefs or attitudes than those who did complete the survey; thus, the survey may not have collected an important portion of data.

Future directions for this project include obtaining a more robust and diverse sample size that is more representative of the population. Increasing the number of providers that the survey reaches by redistributing the survey through more email listservs or other platforms could improve the sample size. The survey could also be reconstructed to have fewer questions that are more targeted to the areas outlined in the results from this study. Lastly, future research on COVID-19 booster vaccines could add valuable information to our preexisting data.

Conclusions *(2-3 summary sentences)*

The results of this study show that COVID-19 vaccine hesitancy is prevalent among healthcare providers and may be increased in NPs and those practicing rurally. Belief that the COVID-19 vaccine was unnecessary was a top concern for providers working in rural areas, and rural providers were less likely to agree with the statement that COVID-19 is a severe threat to public health. Future research should focus on these providers to better understand their knowledge, beliefs, and attitudes about COVID-19 vaccines. These results can also inform future targeted vaccine education to healthcare providers during public health crises.

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