HHS Public Access

Author manuscript

Sex Transm Dis. Author manuscript; available in PMC 2025 February 01.

Published in final edited form as:

Sex Transm Dis. 2024 February 01; 51(2): 102–104. doi:10.1097/OLQ.0000000000001904.

Effects of rurality on distance and time traveled to receive vaccination against Mpox — New Mexico and Idaho 2022–2023

Anna M. Stadelman-Behar, PhD[1,2], **Megan E. Cahill, PhD**[1,3], **Katherine Newell, PhD**[1], **Marla Sievers, MPH**[2], **Mika Gehre, PhD**[2], **Kris K. Carter, DVM**[3,4], **Daniel M. Sosin, MD**[2], **Elizabeth A. Torrone, PhD**[5]

[1]Epidemic Intelligence Service, Division of Workforce Development, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

[2]Epidemiology Response Division, New Mexico Department of Health, Santa Fe, New Mexico, USA

[3]Division of Public Health, Idaho Department of Health and Welfare, Boise, Idaho, USA

[4]Center for Preparedness and Response, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

[5]Division of STD Prevention, National Center for HIV, Viral Hepatitis, STD & TB Prevention, Atlanta, GA, USA

Abstract

We compared mpox vaccination access between urban and rural residents who received ≥1 JYNNEOS dose using immunization data in Idaho and New Mexico. Rural residents traveled five times farther and three times longer than urban residents to receive mpox vaccination. Increasing mpox vaccine availability to healthcare facilities might increase uptake.

Short Summary:

Rural residents in Idaho and New Mexico traveled significantly farther and longer to receive vaccination against mpox than urban residents.

Keywords

Mpox; rurality; health equity; outbreak; vaccination

Corresponding Author: Name: Anna M. Stadelman-Behar, rhq5@cdc.gov, Telephone: 952-994-7046, Fax: 505-827-8013.

Conflict of Interest and Source of Funding: None of the listed authors have any conflicts of interest to report or funding to declare regarding this manuscript or its findings.

Disclaimer: The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.

INTRODUCTION

During the 2022 mpox outbreak, transmission primarily occurred through close, intimate contact with sexual partners, and the majority of mpox infections were among men who have sex with men (MSM).[1] Beginning in July 2022, JYNNEOS vaccine, administered in 2 doses for pre- or postexposure prophylaxis, was recommended by CDC for persons at a higher risk for contracting mpox.[1] However, as of January 2023 only an estimated 23% of the at-risk population had been fully vaccinated in the United States.[2]

Rural residents face additional barriers to accessing healthcare. Compared with urban residents, rural residents have fewer clinical providers per population, and travel twice as far and 8.7 minutes longer for medical or dental care.[3] In rural communities, MSM are less likely to disclose their sexual orientation to their healthcare providers or to have been tested for HIV or STIs.[4] Incidence of mpox was much lower in rural counties, compared with urban counties.[5] However, 5.7% of MSM living in rural areas who responded to an online survey in August 2022 reported receipt of ≥1 vaccine dose, compared with 27.8% in urban and 14.5% suburban areas.[6]

As the mpox outbreak grew during 2022, public health departments worked to preposition vaccine and treatment throughout their jurisdictions. In Idaho and New Mexico, most vaccine was positioned near metropolitan areas, where most eligible recipients were likely to reside. To ensure equitable access, some vaccine was positioned in each of the 7 and 5 health districts in Idaho[a] and New Mexico[b], respectively. To better understand mpox vaccination coverage and inform ongoing vaccination efforts, mpox vaccination data from Idaho and New Mexico immunization information systems were used to compare demographic characteristics, social vulnerability, and travel behavior between rural and urban residents.

METHODS

Deidentified data regarding JYNNEOS vaccine administered during June 2022– January 2023 were retrieved from Idaho and New Mexico state immunization information systems, including unique patient numbers, demographic details (age, gender identity, race, and ethnicity), and ZIP Codes™ for residence and administering clinic. Vaccination data were deduplicated to retain all unique persons. For New Mexico, we used the New Mexico Indicator Based Information System,[c] where counties designated as rural or mixed urban or rural were defined as rural, and counties designated as small metro or metropolitan were defined as urban. For Idaho, we used Idaho's 2018 definitions for rurality,[d] where counties with a population center of <20,000 persons were defined as rural, with remaining counties classified as urban. Demographic characteristics were summarized by rural vs urban residence. Vaccination rates by race and ethnicity were calculated for New Mexico by rural residence designation. Vaccination rates were not calculated for Idaho due to insufficient population and immunization data by race, ethnicity, and rural residence designation.

[a] https://public.tableau.com/app/profile/idaho.division.of.public.health/viz/IDHW_MPX_Dashboard/Demographics?publish=yes
[b] https://ibis.doh.nm.gov/contentfile/image/resource/RegionRed.png
[c] https://ibis.doh.nm.gov/contentfile/docs/CHA/UrbanRuralCounties.pdf
[d] https://www.labor.idaho.gov/dnn/Portals/0/Publications/Future_of_Rural_Idaho_FINAL.pdf

Time and distance traveled from residence to clinic to receive first dose of vaccination was calculated by Google maps using 5-digit ZIP Codes, which uses the geographic center of the ZIP Code.[e] If residence ZIP Code was the same as clinic ZIP Code, 1 mile traveled in 5 minutes was assumed.[f] Social vulnerability was summarized using the 2018 equitable distribution index (EDI) score, which characterizes population vulnerability based on ZIP Code.[g] Similar to CDC's social vulnerability index,[h] EDI uses 15 indicators categorized into 4 themes (socioeconomic status, household composition and disability, racial and ethnic minority status and language, and housing type and transportation). Based on these indicators a final score is ranked from lowest (0) to highest (1) vulnerability. ZIP Codes with EDI scores <0.333, from 0.333 to 0.666, and >0.666 correspond to low, medium, and high social vulnerability, respectively. Based on residence ZIP Code, EDI scores and interquartile (IQR) ranges were summarized by rural residence designations by state.

Differences in continuous and categorical data were evaluated using Wilcoxon rank-sum and chi-square tests, respectively.

This activity was reviewed by the Centers for Disease Control and Prevention (CDC) and was conducted consistent with applicable federal law and CDC policy.[i] This activity was conducted with ethical approval from New Mexico Department of Health and was considered public health practice by Idaho Division of Public Health.

RESULTS

During June 2022–January 2023, 6,758 JYNNEOS vaccine doses were administered to 3,985 persons in Idaho and New Mexico, including 2,718 (68%) who received 2 doses. After excluding 118 (3%) persons with missing or out-of-state residential addresses, 3,867 unique persons who received ≥1 JYNNEOS dose remained; 893 (23%) from Idaho and 2,974 (77%) from New Mexico.

Of those receiving ≥1 vaccine dose, 57 (6%) and 316 (11%) persons resided in rural areas in Idaho and New Mexico, respectively. Overall, 192 (52%) rural residents traveled to a clinic in an urban county to receive their first JYENNOS dose. Rural residents traveled a median of 52.4 (IQR: 20.3–95.2) miles and a median of 60 (IQR: 27–119) minutes to receive their first JYNNEOS dose, compared with 8.9 (IQR: 6.1–18.7) miles fand 18 (IQR: 11–31) minutes for urban residents. (Table 1) Only 158 (42%) rural residents received their first JYNNEOS dose within their county of residence, compared with 3,073 (88%) urban residents. In Idaho, 29 (51%) rural residents received their second dose of JYNNEOS, compared with 586 (70%) urban residents. Receipt of second dose of JYNNEOS was similar between rural (68%) and urban (71%) residents in New Mexico.

In New Mexico, rates of vaccination against mpox varied by race and ethnicity (supplemental table 1). In urban areas, rates of vaccination among American Indian or

[e] https://maps.google.com.
[f] https://pubmed.ncbi.nlm.nih.gov/32669759/
[g] https://www.cdc.gov/mmwr/volumes/71/wr/mm7125e1.htm
[h] https://www.atsdr.cdc.gov/placeandhealth/svi/index.html
[i] 5 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

Alaskan Native (AI/AN) persons were similar to the overall vaccination rate (15.8/10,000 persons vs 18.7/10,000 persons); however, in rural areas, vaccination rates were higher among AI/AN persons, compared with the overall rate (14.2/10,000 persons vs 4.5/10,000 persons). The overall EDI score measuring social vulnerability was higher among rural residents, compared with urban residents receiving JYNNEOS in both states (0.92 [IQR: 0.78–0.99] vs 0.71 [IQR: 0.49–0.88]). Across the 4 social vulnerability dimensions, combined scores were higher for rural residents except for the housing type and transportation dimension, where scores were similar to urban residents (supplemental table 2).

DISCUSSION

Despite vaccine availability in rural areas in Idaho and New Mexico, most rural residents traveled to urban counties for JYNNEOS vaccination. Overall, rural residents traveled five times farther and three times longer than urban residents to receive a vaccination against mpox. In Idaho, rural residents were less likely to receive the second dose, which might limit vaccine protection.[5] Previous studies reported up to 4 times greater travel time for healthcare by rural residents, compared with urban residents, with many rural residents seeking care in nonadjacent counties.[3,7] Reasons for the disparity are multifactorial, from scarcity of specialized health services to insufficient public transport.[8] Although the housing type and transportation dimension of EDI was lower for rural compared with urban residents in this analysis, overall increased social vulnerability might have decreased the ability of rural residents to travel for vaccination. Stigma around STIs and against the MSM community in rural communities might have also impacted travel behaviors associated with vaccination.[4,7]

In New Mexico, approximately 80% of rural residents who were vaccinated against mpox did not identify as White, non-Hispanic or Latino, and approximately half identified as AI/AN. The vaccination rate among AI/AN-identifying persons was similar in rural and urban counties, possibly attributable to increased vaccination acceptance and awareness due to the COVID-19 pandemic and access to mpox vaccinations at Indian Health Service (IHS) facilities located on tribal land in rural areas. The vaccine-distribution network developed between IHS, state and tribal governments, and community organizations during the COVID-19 pandemic may have facilitated access to JYNNEOS doses for AI/AN-identifying rural residents in New Mexico.[9] Future vaccination campaigns during outbreak responses in rural areas might adopt network-building strategies used in previous vaccination campaigns among AI/AN communities to improve overall vaccine uptake in rural areas.

Although limited to Idaho and New Mexico, we document additional travel burdens for rural residents, compared with urban residents. Our study is limited by not knowing why rural residents were more likely to travel to urban areas for vaccination; possible factors are lack of awareness of vaccine availability in rural areas, inability to schedule appointments at rural clinics, fear of stigma of being seen seeking vaccination, or convenience of using urban clinics (e.g., while traveling to those urban areas for work). Analyses included all persons who received JYNNEOS vaccination regardless or risk factors or behaviors. Transgender persons might be underrepresented in this analysis because of limited category options on the state vaccination portals for both Idaho and New Mexico. For persons who received both

doses, our analysis used the clinic location where the first dose was received and did not capture persons who switched clinic locations between doses.

Rural residents of Idaho and New Mexico spent more time traveling further distances to receive JYNNEOS vaccination than urban residents and were less likely to get a second dose of the mpox vaccine. Our study was unable to determine why rural residents traveled to urban clinics or the effect of travel time and distance had on receipt of prophylaxis. However, increasing access to healthcare facilities with vaccine availability while also addressing other potential barriers for rural residents, including fear of stigma, might increase mpox vaccine uptake.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGEMENTS

Kathryn Cruz NMSIIS Manager with NMDOH.

Support:

Centers for Disease Control and Prevention, New Mexico Department of Health, and Idaho Division of Public Health

REFERENCES

1. CDC. Mpox 2023 [Available from]: https://www.cdc.gov/poxvirus/mpox/index.html.
2. Owens LE, Currie DW, Kramarow EA, et al. JYNNEOS Vaccination Coverage Among Persons at Risk for Mpox — United States, May 22, 2022–January 31, 2023. MMWR Morb Mortal Wkly Rep 2023;72:342–47. [PubMed: 36995962]
3. Kristin Akinlotan MP; Khodakarami Nima; Bolin Jane; Ferdinand Alva. Rural-Urban Variations in Travel Burdens for Care: Findings from the 2017 National Household Travel Survey. Southwest Rural Health Research Center 2021
4. Sarno EL, Bettin E, Jozsa K, Newcomb ME. Sexual Health of Rural and Urban Young Male Couples in the United States: Differences in HIV Testing, Pre-exposure Prophylaxis Use, and Condom Use. AIDS Behav 2021;25(1):191–202. [PubMed: 32607917]
5. Farrar JL, Lewis NM, Houck K, et al. Demographic and Clinical Characteristics of Mpox in Persons Who Had Previously Received 1 Dose of JYNNEOS Vaccine and in Unvaccinated Persons - 29 U.S. Jurisdictions, May 22-September 3, 2022. MMWR Morb Mortal Wkly Rep 2022;71:1610–15. [PubMed: 36580416]
6. Delaney KP, Sanchez T, Hannah M, et al. Strategies Adopted by Gay, Bisexual, and Other Men Who Have Sex with Men to Prevent Monkeypox virus Transmission. MMWR Morb Mortal Wkly Rep 2022;71:1126–30. [PubMed: 36048582]
7. Bono RS, Pan Z, Dahman B, et al. Urban-rural disparities in geographic accessibility to care for people living with HIV. AIDS Care 2022
8. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health 2015;129(6)
9. Foxworth R, Redvers N, Moreno MA, et al. Covid-19 Vaccination in American Indians and Alaska Natives - Lessons from Effective Community Responses. N Engl J Med 2021;385(26):2403–06. [PubMed: 34919356]

Table 1

Demographic characteristics and travel behaviors for persons who received vaccination against mpox during 1 June 2022–31 January 2023 by state and rurality

	Combined		Idaho		New Mexico		
	Rural Median (IQR*) or No. (%)	Urban Median (IQR*) or No. (%)	Rural Median (IQR*) or No. (%)	Urban Median (IQR*) or No. (%)	Rural Median (IQR*) or No. (%)	Urban Median (IQR*) or No. (%)	p < 0.05[a] ID, NM, or Combined (CB)
Total	373 (10)	3,494 (90)	57 (6)	836 (94)	316 (11)	2,658 (89)	
Gender Identity							
Women	37 (10)	319 (9)	10 (18)	125 (15)	27 (9)	194 (7)	
Men	332 (89)	3,142 (90)	47 (82)	711 (85)	285 (90)	2,431 (92)	
Transgender[b]	4 (1)	22 (<1)	0	0	4 (1)	22 (<1)	
Unknown	0	11 (<1)	0	0	0	11 (<1)	
Age (yrs)							
0–14	1 (<1)	0	0	0	1 (<1)	0	
15–24	27 (7)	335 (10)	6 (11)	115 (14)	21 (7)	220 (8)	
25–34	104 (28)	1,028 (29)	19 (33)	291 (35)	85 (27)	737 (28)	
35–44	94 (25)	779 (22)	11 (19)	194 (23)	83 (26)	585 (22)	
45–54	73 (19)	499 (14)	12 (21)	108 (13)	61 (19)	391 (15)	
55–64	60 (16)	539 (16)	8 (14)	85 (10)	52 (16)	454 (17)	
>64	14 (4)	314 (9)	1 (2)	43 (5)	13 (4)	271 (10)	
Race							NM, CB
AI/AN[c]	149 (40)	237 (7)	1 (2)	10 (1)	148 (47)	227 (9)	
Asian	7 (2)	123 (3)	0	24 (3)	7 (2)	99 (4)	
Black	5 (1)	128 (4)	0 (0)	17 (2)	5 (1.5)	111 (4)	
White	187 (50)	2,764 (79)	46 (81)	678 (81)	141 (45)	2,086 (78)	
Other	16 (4)	196 (6)	6 (10)	89 (11)	10 (3)	107 (4)	
Unknown	9 (3)	46 (1)	4 (7)	18 (2)	5 (1.5)	28 (1)	
Hispanic or Latino	102 (27)	1,203 (34)	10 (20)	123 (15)	92 (29)	1,080 (41)	NM
White, not Hispanic or Latino	110 (29)	1,802 (52)	40 (70)	608 (73)	70 (22)	1,194 (45)	NM, CB
Received 2nd dose	237 (64)	2,481 (71)	29 (51)	586 (70)	208 (68)	1,895 (71)	ID, CB
Vaccinated in urban county[d]	192 (52)	3,469 (99)	51 (89)	835 (99.9)	141 (45)	2,634 (99)	ID, NM, CB
Clinic and residence in the same county[d]	158 (42)	3,073 (88)	6 (11)	728 (87)	152 (48)	2,345 (88)	ID, NM, CB
Miles traveled to vaccination[d,e]	52.4 (20.3–95.2)	8.9 (6.1–18.7)	50 (34.6–72.7)	8.3 (6.35–12.4)	56.3 (19.7–98.8)	9 (5.9–22.9)	ID, NM, CB
Minutes traveled to vaccination[d,e]	60 (27–119)	18 (11–31)	56 (45–105)	20 (16–27)	66 (26–125)	16 (11–36)	ID, NM, CB

*IQR = Interquartile range

[a]P values calculated using Wilcoxon rank-sum and chi-square for continuous and categorical data, respectively.

[b] Transgender persons might be underrepresented in New Mexico because of limited category options on the state vaccination portal.

[c] AI/AN = American Indian or Alaska Native.

[d] Data from first doses only.

[e] Estimated based on geocoded Zip Code™.