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COVID-19 Testing Factors Among Great Plains American Indians

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Abstract

Background COVID-19 created unparalleled challenges for vulnerable communities, especially among American Indians and Alaska Natives. An effective COVID-19 response requires a tribally driven effort to understand the perspectives of Tribal members on testing and to ensure that delivery strategies are grounded in the cultural values, traditions, and experiences of the Tribes.

Methods We conducted a cross-sectional, anonymous survey in October 2021 using established methods to reach Tribal members residing in three Reservations in the Great Plains ($N=679$). Multivariate analyses were conducted using logistic regression to assess the association between independent variables and COVID-19 testing uptake after adjusting for confounding.

Results After multivariate adjustment, a respondent's employment status, ability to isolate if diagnosed with COVID-19, and endorsing that COVID-19 testing is only needed if one has symptoms were significantly correlated with having been previously tested for COVID-19. Participants without a full-time job were about half as likely to have been tested for COVID-19 compared to those with full-time jobs. Participants who reported not being able to isolate if they tested positive for COVID-19 and participants who did not think testing was needed if asymptomatic were also half as likely to be tested.

Conclusions Ensuring that everyone has the ability to isolate, that people who are not working have easy access to testing, and that everyone understands the value of testing after exposure are key steps to maximizing testing uptake. Efforts will only be successful if there is continued investment in programs that provide free testing access for everyone on Reservations.

Keywords American Indians · COVID-19 · COVID-19 testing · Native American · Reservation · Coronavirus

Introduction

The impact of COVID-19 has been greatest among vulnerable populations, including American Indians and Alaska Natives (AI/ANs) [1–7]. Across the USA, AI/ANs have a 1.6 times greater risk of contracting COVID-19 and nearly 3 times the rate of COVID-19-associated hospitalization and deaths compared to the non-Hispanic white population [8, 9]. While it is clear that this disproportionate burden is driven by multiple factors, including higher rates of acute and chronic diseases, poor and crowded housing conditions, insufficient resources needed to prevent disease transmission, and limited opportunities for remote work, the high rates of disease and mortality among AI/ANs in many communities have been influenced by a lack of access to necessary healthcare, including COVID-19 testing [6, 10–19].

Testing for COVID-19 is an important part of controlling community transmission because it enables people who are infectious to isolate in order to prevent transmission to others [18]. While testing availability was extremely limited early in the pandemic, many communities set up COVID-19 testing programs once testing became commercially available in mid-2020 [20]. Given

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the concern about COVID-19 among AI/AN communities, Tribal leadership across the USA attempted to increase access to testing, including within three Reservations in the Great Plains [19, 21, 22].

Once supplies allowed, free COVID-19 testing was available at multiple sites throughout the Great Plains, including at Indian Health Service (IHS) locations, on Reservations, at community outreach events, and in the nearby jails [23, 24]. Later, drive-through COVID-19 testing sites were implemented to improve access [25]. Some Reservations established a single phone number to track COVID-19 testing availability and location, as well as promoted testing over the community radio stations in an attempt to improve COVID-19 testing rates [26–29]. However, little is known about the uptake of testing and factors influencing the use of testing in these communities.

When this study was conducted in October 2021, COVID-19 testing was becoming increasingly available across the USA. In the Great Plains, both PCR and rapid tests were available. Tribal leaders and public health professionals urged the community to get tested for COVID-19 and stay home when symptomatic or after an exposure [30]. Many employers required COVID-19 testing upon exposure or when symptomatic; however, this varied depending on the company and the county [31]. The majority of schools on Reservations in the Great Plains area offered free PCR saliva tests [32]. Consumer access to at-home tests was limited: insurance companies were not required to cover the cost and the price was a barrier for many Americans [33]. It was not until January 2022 that at-home COVID-19 tests were required to be covered by insurance companies and the United States Postal Service (USPS) began to send out free at-home tests [34].

In the USA, COVID-19 vaccination became available to the general public in April 2021; however, vaccination rates were mixed and underreported on Reservations. Thus, widespread testing was still essential in October 2021 to control the spread of COVID-19. During the Fall of 2021, COVID-19 rates were increasing across the USA and in the Great Plains Area [35]. On October 1, 2021, the USA was reporting a 7-day average of 109,208 COVID-19 cases per day [36]. From September 30 to October 6, 2021, the Great Plains Area reported 19,008 new cases [37]. In South Dakota, one state included in the Great Plains Area, 56 out of 66 counties were reported as having "high" or "substantial" COVID-19 community spread in October 2021 [38]. High community spread was classified as a 10% or higher PCR test positivity rate.

Given this background, we conducted a cross-sectional survey to assess the determinants of testing uptake among three Tribes in the Great Plains as part of the National Institutes of Health (NIH) Rapid Acceleration of Diagnostics of Underserved Populations (RADx-UP) consortium [39]. The survey was available from October 7 to October 15, 2021. Based upon prior research on health care utilization in these and similar communities [40–44] and models of health behavior, including the Gelberg-Andersen Behavioral Model for Vulnerable Populations [45–47] and the Health Belief Model [48], we created and implemented a cross-sectional survey to assess the correlation between social, cultural, and economic factors and the use of COVID-19 testing. As these models stress the moderating effect of socio-economic factors on health behavior, the authors hypothesized that socio-economic status would be an important factor in the uptake of COVID-19 tests.

Methods

We conducted a virtual cross-sectional, anonymous survey using established methods to reach members of three Tribal Nations living on Reservations in the Great Plains. The survey was released on October 7, 2021 and closed on October 15, 2021. Based upon the experience of the Great Plains Tribal Leaders' Health Board (GPTLHB) [30], multiple modalities were used to recruit survey participants including a flyer placed on Facebook and Tribal websites, public service announcements on local radio stations, and print survey distribution at Tribal offices for a convenience, non-random sample.

The study was guided by a community advisory board with members from three of the largest Tribes in the region [49]. Community advisory board meetings were held four times a year for 1-h time blocks with each Tribe. Each meeting was hosted virtually over WebEx with the option for participants to call in to the meeting to improve accessibility. Community advisory board members provided their opinions, insight, and approval on project decisions, including creating and reviewing the survey items, implementation plans, and data distribution methods in order to ensure that all project plans were culturally tailored and properly implemented.

Participants were provided a link to a secure online REDCap survey where they independently completed a consent form, the COVID-19 survey, and a separate incentive form. As at least 36% of Tribal residents living on the three Reservations do not have access to a computer or internet at home, the survey was also distributed in a paper format at Tribal offices for participants to complete at home and return to the study team with a provided stamped and addressed envelope [28]. In-person surveys were not feasible during this time period due to pandemic restrictions on the Reservations. Telephone surveys relying on random digit dialing typically have low response rates and telephone coverage is not reliable on Reservations. The study team and Community Advisory Board agreed that online and supplement paper surveys were the most effective option due to pandemic limitations. Most participants completed the survey online ($n=626$) with the remaining participants ($n=53$) completing the paper version. Paper surveys were provided to all three Reservations;

however, only participants from one Reservation returned paper surveys. All surveys were completed independently by the participants.

In order to participate, participants were required to hold a Tribal affiliation, reside on one of three included Reservations in the Great Plains, and be 18 years old or older. People who were unable to provide informed consent, were under the age of 18 years, or did not live on one of the Reservations were excluded from participating. Individuals who completed the survey received a $50 VISA gift card through certified mail. Anonymity of the survey was maintained by collecting personal information through a separate data collection form that was available only when the COVID-19 survey was completed and not linked to the survey data. All survey responses were voluntary and the results from the three Reservations were pooled.

The survey instrument included 8 domains with 55 questions. The primary outcome for this analysis was to determine whether the participant had ever been tested for COVID-19. Independent variables analyzed included age, gender, employment status, educational attainment, health insurance status, medical conditions, household income, marital status, living status, and the ability to isolate. The dependent variable was if the participant had ever been tested for COVID-19. Other domains included distrust (a 9-item scale measuring distrust of the healthcare system developed by Shea et al. and single items assessing trust in social media contacts, the US government, and Tribal leadership) [44, 50], factors influencing testing decisions (encouragement and discouragement factors from RADx-UP provided common data elements [CDEs]) [39], stigma surrounding COVID-19 (adapted from Nyblade et al.'s standardized tool for measuring HIV-related stigma) [51], socioeconomic hardship (employment status, household income, and ability to isolate), and demographic characteristics (age, gender identity, marital status, comorbidities, and educational attainment) [52, 53]. The RADx-UP CDEs are a standard set of study questions that all RADx-UP projects were required to use in the COVID-19 testing studies [39]. The survey and additional survey question sources are available as Online Resource 1 in the Supplements.

This study received an exempt status from the Massachusetts General Brigham Institutional Review Board and approvals from Tribal Review/Health Boards prior to survey dissemination. Consent was obtained from all study participants.

Statistical Analysis

After ensuring data quality, we conducted bivariate analyses of the association between each variable and a participant's COVID-19 testing status using chi-squared tests and *t*-tests. Independent variables analyzed included age, gender, employment status, educational attainment, health insurance status, medical conditions, household income, marital status, living status, and the ability to isolate. The dependent variable was if the participant had ever been tested for COVID-19.

Multivariate analyses were conducted using logistic regression to assess the association between key independent variables and COVID-19 testing uptake after adjusting for confounding. Stepwise regression with forward selection was used to construct the final model, testing all variables that were found to have significant associations with testing in bivariate analyses. Because measures of socioeconomic hardship were highly correlated, community advisory board input and clinical experience were included in the selection of variables for the final model. Most socioeconomic hardship variables were not found to have statistical significance in the bivariate analysis, so they were excluded for the regression model. A participant's current living situation was not included in the regression model due to high correlation with other variables, specifically employment status which remained in the model. The final regression model included participants' age, gender, employment status, type of health insurance, ability to isolate, and testing encouragement/discouragement factors to determine their association with whether participants had ever received COVID-19 testing. Testing encouragement and discouragement factors were not strongly correlated with each other, so all options were included in the final analysis. The variable option "Don't Know" was dropped and any categories with sample sizes smaller than 10% were combined to improve analysis. For example, the variable of employment status was restructured into two categories: Full-time and Not full-time rather than Full-time, Part-time, Seasonal, Self-employed, Retired, and Unemployed. Five regression models were run with one to two additional variables in each model in order to analyze the change in association as additional covariates were included.

All analyses were conducted using STATA/SE 17.0.

Results

A total of 679 unique individuals completed the survey. The majority (70.5%) of participants identified as female and over half (52.2%) of participants were between the ages of 30–49. Most respondents were either working full-time (46.9%) or were unemployed (34.2%) at the time of the survey. A majority (84.7%) of participants reported that they currently live in a place that has multiple bedrooms; however, 9.6% live in a place that is a single room and 5.6% do not have a stable place to live. After receiving a positive COVID-19 test, 91.5% of participants reported that they would be able to isolate. Of the participants, 83.4% reported being tested for COVID-19 since March 2020 and 32.2% had tested positive during this time frame.

Between 5 and 33% of respondents endorsed each negative factor that would discourage testing and between 25 and 62% endorsed each positive factor that would encourage testing (Table 2). The negative factors with the highest level of endorsement were that "the test might be uncomfortable" (32.6%) and "even if I don't have it when I get tested, I can still get COVID-19 later" (30.0%). The positive factors with the highest level of endorsement were "knowing that you are safe to not spread COVID-19 to friends and family" (61.6%) and "it reduces worry that I might have COVID-19" (55.6%).

In bivariate tests, several factors were associated with if a participant had been tested for COVID-19, which are included in Table 1. Significant associations included educational attainment, employment status, high blood pressure or diabetes diagnosis, current living situation, several trust factors (doctor or healthcare provider, people you go to work or school with, the US government, Tribal leadership), and the ability to isolate. Shown in Table 2, several encouragement and discouragement factors were significantly associated with having been tested for COVID-19, including the encouragement factors "believing that I was exposed to someone who has COVID-19," "knowing that you are safe to not spread COVID-19 to friends & family," "know that you are safe to not spread COVID-19 to anyone," and "it lets my employer know that I am safe to work," as well the discouragement factor "I don't have COVID-19 symptoms, so I don't need to be tested." After the bivariate analysis, we restructured several variables, by removing the "Don't know" selections and combining groups that contained sample sizes smaller than 10%, in order to conduct the multivariate adjustment with the associations found. A participant's current living situation was not included in the regression model due to high correlation with other variables.

After multivariate adjustment, a respondent's employment status, ability to isolate if diagnosed with COVID-19, and endorsing that COVID-19 testing is only needed if one has symptoms were significantly correlated with having been tested for COVID-19 as reflected in Table 3. Participants without a full-time job (i.e., part-time, retired, or unemployed) were about half as likely to be tested for COVID-19 compared to those with full-time jobs (odds ratio [OR] = 0.47, $p = 0.019$). Participants who reported not being able to isolate if they were to test positive for COVID-19 and participants who did not think testing was needed for asymptomatic people were also half as likely to be tested for COVID-19 (OR = 0.43, $p = 0.043$; OR = 0.46, $p = 0.005$). Some college level education, private insurance, and three or more comorbidities were also associated with higher rates of COVID-19 testing (OR = 1.47, $p = 0.182$; OR = 1.46, $p = 0.348$; OR = 1.91, $p = 0.086$), but these associations did not meet statistical significance.

Table 3 depicts all five regression models to demonstrate the relationship change as more covariates are included in the model. In Regression 1, age, gender, and educational status were included and some college level was the only significant variable (OR = 1.91, $p = 0.010$). With employment status added into Regression 2, the only variable that was significant was not having a full-time job (OR = 0.35, $p \leq 0.001$). Not having a full-time job remained significant in Regression 3 after a participant's health insurance status and comorbidities were accounted for (OR = 0.40, $p = 0.002$). In Regression 4, not having a full-time job remained significant (OR = 0.44, $p = 0.010$) and the inability to isolate was also significant (OR = 0.42, $p = 0.033$).

Discussion

Uptake of COVID-19 testing is important to assist in the prevention of viral transmission and has been a focus of pandemic response efforts among marginalized communities, like Tribal Reservations [5, 14–18]. Within Tribal Reservations of the Great Plains, an effective response to COVID-19 may be better facilitated with a community-driven effort to understand the perspectives of tribal members on testing [18, 19]. Understanding the perspectives of tribal members can ensure that future testing strategies are grounded in the cultural values, traditions, and experiences of the Tribal community. Study results highlight three main factors that influenced a person's decision to utilize COVID-19 testing: ability to isolate, work status, and knowledge of asymptomatic COVID-19 cases. Participants had an increased likelihood of receiving a COVID-19 test if they reported an ability to isolate if diagnosed with COVID-19, a full-time work status, and knowing the importance of COVID-19 testing even when asymptomatic.

First, people need to have the ability to isolate if they are diagnosed with COVID-19. At the time of the survey's distribution, people diagnosed with COVID-19 had been recommended to isolate as much as possible for 5 to 10 days [54, 55]. In this survey, people who had the ability to isolate if needed were much more likely to have undergone COVID-19 testing. Being able to isolate is central to taking the proper precautions if one tests positive. Prior studies in European adults have found that people who were prepared and provided resources to isolate were more likely to report adherence to guidelines and that the ability to identify COVID-19 symptoms, receive a COVID-19 test, and isolate are highly linked to each other [54]. Individuals who perceived great barriers to COVID-19 testing and isolation were less likely to identify symptoms as being potential signs for COVID-19, which would reduce their perceived need to isolate or test [56].

On Reservations in the Great Plains, many people live in multifamily homes which makes properly isolating from others difficult [19]. In addition to this, people who are the

primary caregivers for children or elderly family members may not be able to isolate due to the need to watch their dependents and complete necessary household tasks [57]. Around 15% of participants reported living in a place that is a single room or not having a stable place to live, which would also limit their ability to isolate or quarantine if needed. Around the Great Plains, organizations took several actions to assist people in isolating effectively [21, 30]. This included education of community members about isolation practices and care for others with COVID-19, distribution of supplies to have in case of exposure to COVID-19, and provisions to people who were diagnosed with COVID-19 of food and other basic needs [22, 58]. Further efforts to reduce the impact of COVID-19 within the Great Plains Reservations included supplying pulse oximeters and thermometers to help people know when to leave isolation for a medical evaluation [26]. Also, community- and non-community-operated health programs provided telemedicine care to assist people in isolation [22]. Reservations set up trailers equipped with personal protective equipment (PPE) and other supplies to provide people with a proper space to quarantine or isolate in case they were unable to properly isolate at home [27]. In addition to this, some organizations encouraged people to work or attend school virtually by providing internet and cell phone access more broadly across Reservations [29]. Several Reservations enacted curfews within the community and issued legal sanctions for those who broke isolation or quarantine [29]. Services that reduce the spread of COVID-19 should be expanded and continued to help counteract the negative impacts of the pandemic.

Second, COVID-19 testing uptake is greater among respondents who worked full-time. There are several possible reasons for this association. Testing was often required to go back to work when someone had symptoms consistent with COVID-19 or had been exposed to someone who had tested positive [54, 56]. People working full-time may have been more likely to be exposed to COVID-19 and more likely to need testing because of increased exposures. Also, individuals who work full-time have higher rates of health insurance coverage, expanding their access to sites and modalities of COVID-19 testing [59]. Moreover, participants who work full-time may have more public health knowledge and be more aware of the necessity for testing.

Third, respondents who believed that people without COVID-19 symptoms do not need to be tested were less likely to be tested themselves. In one study, people identified symptom ambiguity as a reason that they avoided testing [56]. People may not think that they require a test due to being unaware of the symptoms of COVID-19 or that they are still infectious even if they have an asymptomatic case [60]. This highlights potential areas to target in educational or media campaigns. As many people with COVID-19 do not have any symptoms, the Center for Disease Control and Prevention (CDC) recommends that people get tested even when they do not feel sick or have minor symptoms, especially after exposure to someone who has recently tested positive for COVID-19 and prior to traveling or visiting family [18]. Tribal leaders and public health professions worked together to dispel the misconception that people who do not have symptoms do not need to be tested; however, further health communication and education is needed as 26.80% of participants reported that they did not need COVID-19 testing if they were not experiencing symptoms [30].

This study had several significant limitations that should be kept in mind. Most importantly, because of restrictions on travel and community events, our primary approach to data collection was an online survey. Individuals who do not have access to or are less adept with the internet are less likely to complete online surveys and will be underrepresented in our data. We increased the representativeness of the sample by providing supplemental print versions of the survey to Tribal Health Directors and posting the flyers on multiple platform types. It is reassuring that the age, educational attainment, and income distribution of our participants is similar to that of the AI/AN population within the Great Plains Area from 2016. Data from GPTLHB's Great Plains Area Demographics Data Dashboard and Community Health Profile are reported in Table 4 for comparison [61, 62]. However, 70.5% of our sample identified as female compared to the 51.7% of the Great Plains AI/AN population, suggesting that women were more likely to have completed the survey [60]. Use of testing was measured by self-report and may have overestimated actual testing use if participants perceived having undergone COVID-19 testing as socially desirable. Our sample population may have been more or less likely to have been tested for COVID-19 than the overall population the Reservations. Recall or response bias is also possible as participants were asked to report on past behaviors and may have incorrectly remembered or reported their use of COVID-19 tests, factors that influenced testing, or their COVID-19 test results. In addition, we were only able to measure a limited number of factors that may have determined testing use and further studies are needed to examine the contribution of other factors, like distance from a health care facility, when participants were tested for COVID-19, or participant knowledge on COVID-19 transmission.

Conclusions

Our results can assist in the creation and implementation of future COVID-19 testing strategies among Tribal populations. Ensuring that everyone has the ability to isolate, that people who are not working have easy access to testing, and

that everyone understands the value of testing after exposure or when asymptomatic to prevent transmission are key steps to maximizing the uptake of COVID-19 testing. Of course, such efforts will only be successful if there is continued investment in programs that provide expansive access to testing for everyone on the Reservations. Since October 2021, there have been substantial drops in health system-based testing. As at-home COVID-19 testing becomes increasing available and affordable, the authors hypothesize that the aforementioned factors will continue to be of importance. The impact of COVID-19 on AI/ANs has not been sufficiently studied and more research must be completed in order to reduce the burden of COVID-19, as well as other serious illnesses and future emergency situations.

Appendix

Table 1 Participant demographics and COVID-19 testing ($n = 679$)

	Total		Ever tested for COVID-19[1]				
			Yes		No		
	n	%	*n*	%	*n*	%	*p*-value
Age							
18–19	14	2.06	10	71.43	4	28.57	0.334
20–29	114	16.79	87	76.99	26	23.01	
30–39	186	27.39	157	84.41	29	15.59	
40–49	171	25.18	147	85.96	24	14.04	
50–59	120	17.67	104	87.39	15	12.61	
60–69	56	8.25	47	83.93	9	16.07	
70–79	17	2.50	13	76.47	4	23.53	
80+	1	0.15	1	100	0	0	
Gender							
Woman	479	70.54	403	84.49	74	15.51	0.320
Man	194	28.57	158	81.44	36	18.56	
Non-binary	1	0.15	1	100	0	0	
Transgender man	0	0.00	0	0	0	0	
Transgender female	1	0.15	1	100	0	0	
Gender non-binary/queer/non-conforming	1	0.15	1	100	0	0	
Agender	1	0.15	0	0	1	100	
Bi-gender	2	0.29	2	100	0	0	
Education							
Have never gone to school	0	0.00	0	0	0	0	< 0.001
5th grade or less	0	0.00	0	0	0	0	
6th to 8th grade	13	1.91	6	46.15	7	53.85	
9th to 12th grade or GED completed	236	34.76	187	79.24	49	20.76	
Some college level/technical/vocational degree	294	43.30	258	88.05	35	11.95	
Bachelor's degree	85	12.52	73	85.88	12	14.12	
Other advanced degree (master's, doctoral degree)	42	6.19	37	88.10	5	11.90	
Don't know	9	1.33	5	62.50	3	37.50	
Employment status							
Full-time	318	46.90	289	91.17	28	8.83	< 0.001
Part-time	49	7.23	37	75.51	12	24.49	
Seasonal	18	2.65	13	72.22	5	27.78	
Self-employed	21	3.10	16	76.19	5	23.81	
Retired	40	5.90	30	75.00	10	25.00	
Unemployed	232	34.22	180	77.92	51	22.08	
Health insurance							

Table 1 (continued)

	Total		Ever tested for COVID-19[1]				
			Yes		No		
	n	%	*n*	%	*n*	%	*p*-value
No health insurance	284	41.83	234	82.69	49	17.31	0.019
Private (purchased directly or through employment)	151	22.24	138	91.39	13	8.61	
Public (Medicare, Medicaid, Tricare)	225	33.14	180	80.36	44	19.64	
Don't know	19	2.80	14	73.68	5	26.32	
Medical conditions[2]							
High blood pressure	234	34.51	204	87.55	29	12.45	0.043
Diabetes	169	24.93	150	89.29	18	10.71	0.021
Kidney disease	17	2.52	14	82.35	3	17.65	0.885
Cancer	13	1.93	12	100	0	0	0.121
Heart disease	38	5.66	33	86.84	5	13.16	0.574
Asthma	137	20.39	119	87.50	17	12.50	0.167
Other lung disease	20	2.99	18	94.74	1	5.26	0.181
Other chronic condition	80	11.94	69	88.46	9	11.54	0.212
Arthritis	138	20.47	121	87.68	17	12.32	0.136
Another immune disease	39	5.83	31	81.58	7	18.42	0.741
2019 household income							
Less than $15,000	240	35.56	184	76.99	55	23.01	0.004
$15,000–$19,999	49	7.26	43	87.76	6	12.24	
$20,000–$24,999	56	8.30	49	89.09	6	10.91	
$25,000–$34,999	92	13.63	80	86.96	12	13.04	
$35,000–$49,999	89	13.19	82	92.13	7	7.87	
$50,000–$74,999	52	7.70	47	90.38	5	9.62	
$75,000–$99,999	17	2.52	16	94.12	1	5.88	
Over $100,000	12	1.78	11	91.67	1	8.33	
Don't know	68	10.07	51	75.00	17	25.00	
Marital status							
Married or living with a partner	338	49.78	287	85.42	49	14.58	0.353
Single	339	49.93	277	81.71	62	18.29	
Don't know	2	0.29	2	100	0	0	
Current living situation							
A place that is a single room or bedroom	66	9.73	52	80.00	13	20.00	< 0.001
A place that has multiple bedrooms	574	84.66	490	85.51	83	14.49	
I do not have a stable place to live	38	5.60	23	60.53	15	39.47	
Ability to isolate							
Can isolate	621	91.46	527	85.14	92	14.86	< 0.001
Cannot isolate	38	5.60	27	71.05	11	28.95	
Don't know	20	2.95	12	60.00	8	40.00	
Have you ever been tested for COVID-19?							
Yes	566	83.36					
No	111	16.53					
Don't know	2	0.29					
Have you ever tested positive for COVID-19?							
Yes	182	32.21					
No	380	67.26					
Don't know	3	0.53					

[1]The "Ever tested for COVID-19" columns list the results from a chi-squared test analyzing the influence of each variable on if a participant had ever been tested for COVID-19. The *p*-value depicts the strength of this association

[2]For this question, participants were prompted to select all that apply

Table 2 Testing encouragement and discouragement

	Total		Ever tested for COVID-19[1]				
			Yes		No		
	n	%	*n*	%	*n*	%	*p*-value
Which of the following discourage you from getting tested?[2]							
The test might be uncomfortable	221	32.55	182	82.27	39	17.73	0.516
Even if I don't have it when I get tested, I can still get COVID-19 later	201	29.60	168	84	32	16.00	0.857
I don't have COVID-19 symptoms, so I don't need to be tested	182	26.80	140	77.78	40	22.22	0.014
If I'm positive, officials will need to contact the people I've been in contact with	102	15.02	85	84.16	16	15.48	0.870
I don't want to know if I have COVID-19	34	5.01	25	73.53	9	26.47	0.104
There is not much they can do for me if I have COVID-19	108	15.91	90	83.66	18	83.33	0.934
It is difficult to get needed healthcare if I test positive	89	13.11	77	87.5	11	12.50	0.290
Which of the following encourage you to get tested?							
It reduces worry that I might have COVID-19	378	55.59	320	83.88	57	15.12	0.315
Believing that I was exposed to someone who has COVID-19	231	33.97	203	8788	28	12.12	0.031
Knowing that I am safe to not spread COVID-19 to friends and family	419	61.62	360	86.12	58	12.88	0.024
Knowing that I am safe to not spread COVID-19 to anyone I am around	313	46.03	272	87.18	40	12.82	0.020
It lets my employer know that I am safe to work	229	33.68	201	88.16	27	11.84	0.023
If I test positive, I can get treated earlier	168	24.71	145	86.31	23	13.69	0.275

[1]The "Ever tested for COVID-19" columns list the results from a chi-squared test analyzing the influence of each discouragement/encouragement factors on if a participant had ever been tested for COVID-19. The *p*-value depicts the strength of this association

[2]For both questions, participants were promoted to select all that apply

Table 3 Regression model

	Regression 1 OR [CI]	Regression 2 OR [CI]	Regression 3 OR [CI]	Regression 4 OR [CI]	Regression 5 OR [CI]
Age	1.03 [0.86, 1.24]	1.06 [0.88, 1.27]	0.97 [0.79, 1.18]	0.98 [0.79, 1.21]	0.96 [0.78, 1.19]
Gender					
Female	Reference	Reference	Reference	Reference	Reference
Male	1.12 [0.69. 1.82]	1.06 [0.65, 1.73]	1.11 [0.66, 1.85]	1.17 [0.68, 1.99]	1.23 [0.71, 2.12]
Education					
9th to 12th grade or GED completed	Reference	Reference	Reference	Reference	Reference
Some college level/technical/vocational degree	1.91** [1.17, 3.13]	1.48 [0.88, 2.47]	1.45 [0.85, 2.47]	1.54 [0.88, 2.69]	1.47 [0.83, 2.61]
Bachelor's degree or other advanced degree	1.63 [0.85, 3.12]	1.05 [0.52, 2.10]	1.00 [0.49, 2.04]	0.91 [0.43, 1.89]	0.88 [0.41, 1.86]
Employment					
Full-time		Reference	Reference	Reference	Reference
Not full-time		0.35*** [0.21, 0.57]	0.40** [0.22, 0.72]	0.44** [0.23, 0.82]	0.47* [0.25, 0.88]
Health insurance status					
No health insurance			Reference	Reference	Reference
Private			1.25 [0.58, 2.68]	1.30 [0.60, 2.82]	1.46 [0.66, 3.23]
Public			0.95 [0.58, 1.57]	0.97 [0.58, 1.64]	0.97 [0.57, 1.65]
Comorbidities					
2 or less medical condition			Reference	Reference	Reference
3 or more medical condition			1.86 [0.93, 3.73]	1.99 [0.96, 4.13]	1.91 [0.91, 3.98]
Isolate ability					
Can isolate				Reference	Reference
Cannot isolate				0.42* [0.19, 0.93]	0.43* [0.19, 0.97]
Testing encouragement					
It reduces worry that I might have COVID-19				1.21 [0.75, 1.97]	1.25 [0.76, 2.05]
Believing that I was exposed to someone who has COVID-19				1.53 [0.86, 2.72]	1.64 [0.91, 2.96]
Knowing that I am safe to not spread COVID-19 to friends and family				1.14 [0.69, 1.90]	1.16 [0.69. 1.94]
Knowing that I am safe to not spread COVID-19 to anyone I am around				1.28 [0.75, 2.20]	1.35 [0.78. 2.33]
It lets my employer know that I am safe to work				0.93 [0.50, 1.73]	0.99 [0.53, 1.87]
If I test positive, I can get treated earlier				0.72 [0.38, 1.38]	0.67 [0.35, 1.30]
Testing discouragement					
The test might be uncomfortable					0.79 [0.46, 1.35]
Even if I don't have it when I get tested, I can still get COVID-19 later					0.77 [0.45, 1.31]
I don't have COVID-19 symptoms, so I don't need to be tested					0.46** [0.26, 0.79]
If I'm positive, officials will need to contact the people I've been in contact with					1.24 [0.57, 2.68]
I don't want to know if I have COVID-19					0.94 [0.31, 2.84]
There is not much they can do for me if I have COVID-19					0.99 [0.52, 1.92]
It is difficult to get needed healthcare if I test positive					1.10 [0.50, 2.40]

*p-value ≤ 0.05

**p-value ≤ 0.01

***p-value ≤ 0.001

Table 4 Supplemental Great Plains Area American Indian Demographics, 2016

Demographics	*n*	%
Age		
15–24	21,259	27.82
25–34	15,683	20.52
35–44	13,059	17.09
45–54	12,503	16.36
55–64	7975	10.44
65–74	3881	5.08
75–84	1620	2.12
85+	442	0.58
Gender		
Female	59,441	51.65
Male	55,363	48.35
Education		
Less than high school	11,344	20.04
High school graduate/some college	31,732	56.07
Undergraduate degree	11,426	20.19
Graduate or professional degree	2093	3.70
Unemployment rate	12,898	11.69
Uninsured	35,464	30.97
Income		
Less than $14,999	12,605	28.57
$15,000–$24,999	6668	15.11
$25,000–$34,999	5144	11.66
$35,000–$49,999	6717	15.22
$50,000–$74,999	6195	14.04
$75,000–$99,999	3342	7.57
Over $100,000	3450	7.82

Data from GPTLHB Great Plains Area Demographics [61] and Community Health Profile: 2016[62]

This table includes demographic information for American Indians in the Great Plains Area (South Dakota, North Dakota, Nebraska, and Iowa)

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Data Availability The study data is not available according to established Tribal sovereignty practices.

Declarations

Ethics Approval This study was deemed exempt by the Massachusetts General Brigham IRB (#2020P003423) and approved by all required Tribal Review/Health Boards.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare no competing interests.

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