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### Authors

Epperson, Anna E  
Carson, Savanna L  
Garcia, Andrea N  
[et al.](#)

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## A qualitative study of COVID-19 vaccine decision making among urban Native Americans



Anna E. Epperson<sup>a,\*</sup>, Savanna L. Carson<sup>b</sup>, Andrea N. Garcia<sup>c</sup>, Alejandra Casillas<sup>b</sup>, Yelba Castellon-Lopez<sup>b</sup>, Arleen F. Brown<sup>b,d</sup>, Nanibaa' A. Garrison<sup>b,e,f</sup>

<sup>a</sup> Department of Psychological Sciences, School of Social Sciences, Humanities and Arts, University of California, Merced, Merced, CA, 95343, USA

<sup>b</sup> Division of General Internal Medicine and Health Services Research, Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA 90095, USA

<sup>c</sup> Los Angeles County Department of Mental Health, Los Angeles, CA 90020, USA

<sup>d</sup> Olive View-UCLA Medical Center, Sylmar, CA 91342, USA

<sup>e</sup> Institute for Society & Genetics, College of Letters and Science, University of California, Los Angeles, Los Angeles, CA 90095, USA

<sup>f</sup> Institute for Precision Health, Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA 90095, USA

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### ABSTRACT

**Background:** Significant disparities in COVID-19 morbidity and mortality exist for Native American (NA) people, the majority of whom live in urban areas. COVID-19 vaccination is a key strategy for mitigating these disparities; however, vaccination disparities affect NA communities. The current study investigated COVID-19 vaccine decision-making before widespread vaccine rollout occurred, among urban NA communities. We aimed to understand vaccine decision-making factors to develop recommendations about COVID-19 vaccine outreach.

**Methods:** We conducted three in-depth virtual focus groups with 17 NA adults living in an urban community (Los Angeles County) between December 2020 and January 2021. Participants were recruited through NA community-based organizations and community stakeholders. Reflexive thematic analysis was conducted using Atlas.ti.

**Findings:** Participants in this study identified two overarching themes with implications for health vaccination campaigns. First, participants described a need for tailored information and outreach, including NA vaccine outreach that addresses misconceptions about vaccine development to calm fears of experimentation and support communication of vaccine evidence specific to NA people. Second, participants suggested strategies to improve public health resources in the urban NA community, such as the need for unified, proactive communication across trusted NA entities, navigation support to improve vaccine accessibility, and adequately resourcing health partnerships with and among trusted NA community agencies for improved reach.

**Conclusion:** In this qualitative study, we found that urban NA participants reported several factors that affected their vaccine decision-making, including a lack of tailored information for their communities. Our findings also underscore the need to work with tribes, tribal leadership, and urban NA serving organizations to coordinate vaccine communication and distribution to urban communities where the majority of NAs now reside. Further, these findings have implications for COVID-19 vaccine outreach among urban NA communities and demonstrate the need for clear and tailored engagement about the COVID-19 vaccine.

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\* Corresponding author at: Department of Psychological Sciences, School of Social Sciences, Humanities, & Arts, University of California, Merced, 5200 N. Lake Road, Merced, CA 95343, USA.

E-mail address: [aeperson@ucmerced.edu](mailto:aeperson@ucmerced.edu) (A.E. Epperson).

### Introduction

Native American (NA; also referred to as American Indian) populations have disproportionate rates of COVID-19 infection, hospitalization, and death [1–3] compared to other racial and ethnic groups in the U.S. due to the historical and contemporary structural and socioeconomic inequities [4–9]. COVID-19 vaccines are

crucial to combating the excess morbidity and mortality observed in NA populations and provide a potential pathway to address disparities [10–12]. Among U.S. racial and ethnic minority groups, early reports suggested that initial vaccination uptake for NAs was relatively high [13], however, NAs now have one of the lowest vaccination rates [14], placing them at high risk for COVID-19-related morbidity and mortality [14,15].

Access to health care (particularly during a pandemic) among NAs is complicated and nuanced. NAs are one of the few groups of people entitled to health care in the U.S. The Indian Health Service (IHS) is responsible for carrying out that federal trust responsibility. However, not all NAs have access to the IHS, especially in urban areas, and IHS is underfunded by nearly half for meeting the health needs for all NAs [16–18]. Moreover, although nearly three-quarters of the NA population [19] now live in urban areas as a result of federal policy [20] and job opportunities, only 1% of the IHS budget is allocated to the 34 existing Urban Indian Health Organizations (UIHOs) [18]. For example, in Los Angeles County, which has the largest NA population in the U.S., one UIHO serves over 140,000 people. Urban NAs may seek health care elsewhere, but nearly one-third of NAs do not have health insurance coverage, the highest of any racial-ethnic group [15,17].

This qualitative study explores COVID-19 vaccine decision-making among NAs living in Los Angeles. At the time of this study, COVID-19 vaccines had just received Emergency Use Authorization (EUA) [18,21]. The goal of this work is to better understand COVID-19 vaccine perceptions to develop and propose solutions that improve vaccine confidence and uptake and mitigate COVID-19 morbidity and mortality among NAs living in urban communities.

## Methods

As part of a more extensive qualitative study in urban multiethnic groups [22], we conducted three 2-hour virtual focus groups with Los Angeles County NA residents using the Zoom platform from December 3, 2020, to January 21, 2021. We prioritized outreach to and recruitment of individuals from groups with a high risk of COVID-19 morbidity and mortality: older age, essential worker status, and zip code (median household income <\$40,000, 2010 U.S. Census) [23]. NA focus groups were grouped by age (>50 years, <50 years, and mixed-age) to allow for more even numbers of age groups, to ensure conversations about different levels of risk, and to accommodate cultural communication preferences (e.g., younger NAs deferring to Elders). All participants provided informed consent. We report our findings using the Standards for Reporting Qualitative Research [19,24].

Prior vaccine hesitancy studies informed a semi-structured focus group discussion guide, which was then tailored with input from community organizations [25–28]. Questions focused on concerns, risks, benefits, information sources, trusted entities, barriers, and recommendations for improving vaccine access (Table 1). Par-

ticipants were asked to contribute both as individuals and as experts of their families and communities. We recruited participants via outreach sessions to a network of NA community-based organizations and community stakeholders, in which we described the study and discussed COVID-19 community efforts. While efforts were made to recruit both American Indian and Alaska Native community members, only adults identifying as American Indian participated. While we acknowledge that American Indian/Alaska Native (AIAN) is the term that denotes AIAN political status and is often used within research, American Indian participants also used the terms “Natives” or “Native Americans” to refer to themselves in focus groups (focus group quotes in the Results section). Thus, we use Native American (NA) throughout to represent the study sample (not explicitly naming Alaska Native), and to be inclusive within sections that may apply to American Indians and Alaska Natives more broadly. Two trained researchers, one self-identified as NA (NAG), facilitated all three focus groups; all sessions were recorded, and recordings were transcribed. Participants also completed an online survey on their attitudes about obtaining a COVID-19 vaccine and demographics directly before or after the focus group ended. Participants received a \$100 gift card for research participation.

Transcripts were analyzed using Atlas.ti qualitative analysis software (ATLAS.ti Scientific Software Development GmbH) to identify and compare prominent themes across all three focus groups and as part of the more extensive overall study [22]. Two experienced coders (SLC, LNM) reviewed the transcripts and field notes to develop a preliminary codebook, then tested and amended the codebook following the coding of two transcripts. The coders reached an iterative consensus on the evolving codebook, code definitions, and coding approach and used memos to document thematic evolution throughout the analysis. Triangulation was achieved by reviewing the field notes, holding iterative discussions with all moderators/facilitators, and sharing preliminary results at community partnered meetings to validate perspectives. The results presented herein focus on salient themes prominent in the NA focus groups before widespread vaccine rollout.

## Results

Of 20 eligible NA adults, we recruited 17 individuals to participate in three focus groups of 5–6 each. Most participants resided in low-income zip codes (53%), and were employed full-time (71%). Some NA participants also worked in communities serving both American Indian and Alaska Native people and commented more broadly on the impacts on the larger NA community. Almost half (47%) reported they were likely or very likely to receive the vaccine when it became available to them. Demographics and survey responses are shown in Tables 2 and 3.

Prominent themes that emerged in focus groups with NA participants fell into two broad areas. First, participants described a

**Table 1**  
Focus Group Question Guide.

- 
- Icebreaker: Please state your name, tribal affiliation (if applicable), current feelings on the pandemic, and one word to describe your racial/ethnic community.
  - What have you or members from your community heard about any vaccines to protect against COVID-19?
  - What concerns do you, your family, or your community have about receiving the COVID-19 vaccine? What additional information do you need to feel comfortable to receive the COVID-19 vaccine?
  - When a COVID-19 vaccine is available, who and where would you feel most comfortable getting the vaccine?
  - What do you think are some risks and benefits of the COVID-19 vaccine?
  - Situational questions: It could be the case that some of the vaccines offered may not 100% protect against COVID-19 infection. The vaccine may lower the chances of being infected by COVID-19. Or, if you do get COVID, the vaccine may lower your chances of getting very sick from it (reduce the severity of the disease or reduce additional health complications). However, it may not be perfect, and it may not prevent 100% of people from COVID-19. How would you feel about the information (that getting the vaccine does not 100% protect against being infected)?
  - What challenges do you, your family, or people you know may face in getting the COVID-19 vaccine?
  - What are some ways to get the COVID-19 vaccine to the people who need it most when it becomes available?
-

**Table 2**  
Focus Group Participant Demographics (N = 17).

	No. (%)
<b>Age</b>	
20–34	1 (5.9)
35–49	6 (35.3)
50–64	9 (52.9)
65+	1 (5.9)
<b>Gender</b>	
Female	12 (70.6)
Male	5 (29.4)
<b>Education</b>	
High School/GED or less	2 (11.8)
Associate’s/technical degree	5 (29.4)
Bachelor’s degree	6 (35.3)
Graduate degree	4 (23.5)
<b>Number of People in Household, Mean (SD)</b>	2.1 (1.2)
<b>Employment Status</b>	
Full time	12 (70.6)
Part-time	3 (17.7)
Unemployed	2 (11.8)
<b>Resides within a low-income zip code</b> (Median household income <\$40 K, per US Census 2010)	9 (52.9)
<b>Very Important or Important for all people in your community to receive the COVID-19 vaccine</b>	13 (76.5)
<b>Very Likely or Moderately Likely to get an approved COVID-19 vaccine when available</b>	8 (47.1)
<b>COVID History</b>	
Previously tested positive for COVID-19, believes had COVID-19, or had COVID-19-like symptoms	2 (11.8)
No symptoms of COVID-19 (at time of focus group)	13 (76.5)
Unsure	2 (11.8)

**Table 3**  
Focus Group Participant Survey, Reasons For and Against Obtaining Vaccination (N = 17).

	No. (%)
<b>Top reasons for obtaining a COVID-19 vaccine</b> (check all that apply)	
I want to keep my family safe	10 (58.8)
I want to keep my community safe	10 (58.8)
I want to keep myself safe	9 (52.9)
I want to feel safe around other people	8 (47.1)
I believe life won’t go back to normal until most people get a COVID-19 vaccine	8 (47.1)
I don’t want to get really sick from COVID-19	6 (35.3)
I have a chronic health problem, like asthma or diabetes	5 (29.4)
My doctor told me to get a COVID-19 vaccine	1 (5.9)
Other	2 (11.8)
N/A	0 (0)
<b>Top reasons for not obtaining a COVID-19 vaccine</b> (check all that apply)	
I’m concerned about side effects from the vaccine	10 (58.8)
I don’t trust that the vaccine will be safe	10 (58.8)
I don’t know enough about how well a COVID-19 vaccine works	9 (52.9)
Other	3 (17.7)
I’m allergic to vaccines.	1 (5.9)
I don’t want to pay for it	0 (0)
I don’t think vaccines work very well	0 (0)
I’m not concerned about getting really sick from COVID-19	0 (0)
I don’t believe the COVID-19 pandemic is as bad as some people say it is	0 (0)
I don’t like needles	0 (0)
N/A	0 (0)

need for COVID-19 information and outreach tailored for the urban NA community. Second, participants described the need for building capacity and identifying resource needs by working in collaboration with trusted urban NA community entities.

*Tailored information and outreach are needed for the urban NA community*

Need for cultural tailoring of messaging to achieve equitable and effective NA vaccine outreach. Participants expressed concern about community-centered vaccine communication (i.e., relatable NA culturally tailored messaging promoting knowledge, self-efficacy, community supports, and decision-making), particularly as COVID-19 information and vaccine development rapidly evolved. Tailored and translated vaccine information for NA communities was recommended to reduce vaccine misconceptions. As one participant indicated:

*“Gathering flyers and information about COVID in their tribal languages. . . I think just having the correct marketing materials that are catered to the Native American community.”* (Participant 1, focus group 2).

Transparent and contextually tailored messaging of scientific information was seen as critical to efforts to promote vaccine uptake. COVID-19 vaccine implementation decisions may be misconstrued due to historical distrust of biomedical research, which can influence NA vaccine decision-making. Communication transparency for vaccine availability in rural communities and conveying efficacy for vaccine types is critical in vaccine distribution to avoid miscommunication and perpetuation of misinformation. One participant explains: *“AstraZeneca doesn’t need the deep freeze. It can be available to our communities on reservations and rural communities. And if it’s tagged as ‘the cheap one,’ they might not understand that they’re not getting the Pfizer one because they don’t have the resources to maintain the deep freeze, and they don’t have the resources to have that process work for them. And so if that communication isn’t readily available and adequate and appropriate for them, there’s going to be a misunderstanding. . . We have to go back and undo whatever it is that they heard because we know they heard it wrong and then give them the appropriate information that they need.”* (Participant 1, focus group 1).

At the time of the focus groups, the AstraZeneca vaccine trial was underway in the US with a site in Los Angeles. Another participant underscored the importance of relaying understandable information:

*“There’s a lot of learning to be had, not only within the science community, but how is the science community then going to appropriate[ly] and adequately relay that to our Native communities and give it to them in the way that they can consume it and be okay with it?”* (Participant 1, focus group 1).

Vaccine development and experimentation misconceptions. Participants expressed concern that vaccine development and approval seemed *“rushed through”* (Participant 3, focus group 2) and that the vaccine process was potentially influenced by politicians. As one participant explained, *“Why is it that in all other vaccinations, they have studied it for years and years until they perfected it? So who’s to say that this is not, or is, perfected at this point? . . . But will I take it? More than likely. Why? Because I’m 65, I’m a diabetic, and I don’t want to get COVID. . . So you’ve got all of these crazy emotions going on.”* (Participant 2, focus group 1).

Many participants worried about “experimentation,” even when vaccine trials were endorsed by tribal leaders. In response to another participant’s comment about not wanting the government to “try it out first on Natives and see how it worked” one participant stated:

*“I just wanted to piggyback on the practicing on Natives. . . . I heard rumors in the beginning, but I just heard this like two weeks ago: some tribe, their governor, or their chief. . . okayed it for their tribe. . . I don’t want to be a guinea pig. Is there a definite cure yet?”* (Participant 3, focus group 3).

While several participants described understanding vaccine science and the process of granting emergency use authorization,

they also expressed having different levels of personal trust in science, health, and medical systems. For instance, one participant described how working at a university gave them insight into the vaccine development process.

*Need for communication of vaccine evidence among NAs.* Participants indicated that inadequate communication of vaccine evidence for the NA community reduced vaccine confidence. Participants wanted to know if the vaccine had been tested on and proven effective for NA populations in the vaccine clinical trials. They described a desire for vaccine evidence, including whether NA groups participated in the clinical trials, effectiveness by race and ethnicity, and side effects. In addition, due to known health disparities within NA groups, participants asked for information on vaccine contraindications, especially for older adults or those with specific chronic conditions or complex comorbidities. One participant described the need to know vaccine evidence by subpopulation,

*"We don't know what side effects are and how it may affect certain demographics. I mean, what works for one group may not work for another. I mean, have you checked, like the hantavirus. That's not something really bothers a lot of other people, but for [Tribe name redacted], that was a big issue, so that's part of my reluctance about medicine, is sometimes they don't seem to take into account how is this going to affect this population."* (Participant 2, focus group 3).

A participant endorsed the need to take a holistic view of the health of NA people concerning vaccine effectiveness and public health, *"We need to look at . . . what we know about Native American populations. . . there's a lot of alcoholism, there's a lot of mental illness that they're not aware of, they're not getting help for. Even when your mind isn't stable . . . , you're more susceptible as well. Your immune system is weakened in those, besides spiritually or physically. Just physically, mental illness, they connect biologically how it affects us because our immune systems go down when we're mentally ill, not just physical."* (Participant 5, focus group 3). Another participant worried about how NA dietary choices may affect the vaccine effectiveness,

*"A lot of Natives eat game, eat certain game, what if it affects them differently than it does anybody else because they're eating elk, moose, whatever? There's too many things that can affect us. So I'm scared to take the vaccine."* (Participant 3, focus group 3).

#### *Resource needs within trusted urban NA community entities for equitable vaccine distribution*

*Need for unified and proactive communication across trusted NA entities.* Participants expressed a desire and need for unified leadership to address the pandemic and COVID-19 vaccine information, particularly from trusted entities and leaders, including medical professionals, tribal leaders, and family members. One participant explained: *"Everybody's looking for leadership during this time. I'd love to see some unity in our community. Whether it includes Indian Health Service, whether it includes the state, whether it includes our local health programs, there needs to be some sort of unified message that goes throughout, either at the state level or at the local level where we get this community back in that we can get on out to our folks, get that information out to them."* (Participant 3, focus group 2).

Word of mouth was endorsed as an essential source of communication. As one participant indicated, the *"normal communication style, I think for the Native community, is she found out through somebody else."* (Participant 3, focus group 1) However, others identified challenges with this traditional approach:

*"I would hate to see information about the vaccine go through the usual channels in our communities, which is the extended families of news, which is always just really bad news. And so those are the concerns that I would have for our communities is how are they getting*

*the information and what rhetoric is being used?"* (Participant 1, focus group 1).

Another participant suggested that *"we need to make sure that we have the appropriate messengers"* (Participant 1, focus group 1) to address these communication challenges.

*Call for navigation support to improve vaccine accessibility.* Vaccine accessibility was seen as a barrier to vaccination for some NAs living in urban communities due to limited transportation and technology or internet access, housing insecurity, and long distances to vaccination sites. Participants also expressed concern about vaccine allocation through the federal government and being *"the last one[s] on the pedestal"* (Participant 5, focus group 3) to get the vaccine. Transportation and vaccine logistics were significant concerns. Participants worried about established processes, including online vaccine registration and obtaining rides or navigating public transportation for *"families with restricted access to transportation."* (Participant 4, focus group 2) The complexity of navigating public transportation for NAs was described as:

*"It's a matter of mom coming out with six kids, and trying to control everybody, and place everybody on the bus, and doing the transfers, and finally getting down. . . And then there's the wait. And especially if you have younger children, all of that plays in. And then it becomes that notion of am I jeopardizing myself to protect myself, or is it worthwhile."* (Participant 2, focus group 2).

Many hoped for accommodations and navigation support for disabled, injured, or bedridden individuals. One participant describes the importance of navigational support,

*"There has to be an outlet for them to be able to access a more palatable person, . . . some kind of a mentor or something. There really should be a lot of handholding here, especially for our Native communities. I think of the elders in my community, and I think about their accessibility to the digital world and making appointments and setting that up and arranging somebody to drive them back."* (Participant 1, focus group 1).

Another participant elaborated by stating:

*"It's almost like we need a buddy system for people or a hotline or something that they can call if they have questions that you can walk them through the process."* (Participant 5, focus group 1).

*Demand for building public health partnerships with NA organizations to improve reach.* There was an expressed desire for public health entities and vaccine distributors to build partnerships with community-based organizations with existing trust and reach among the urban NA community. Many felt NA organizational networks would be better than public health systems at reaching vulnerable NA populations they already serve, including providing vaccine navigation for those without phones or internet access and those facing other accessibility barriers. However, there was concern that local NA organizations might lack the resources to participate in vaccine outreach, navigation, or distribution, and there were requests for partnerships, financial and material resources, additional infrastructure, and capacity building. One participant explained:

*"Our Native populations here in Los Angeles are a lot more comfortable working with our Native organizations. If we could fill that capacity so that they could properly administer immunizations like these, then I think that would be a preference for our community."* (Participant 3, focus group 2).

Another participant also emphasized the importance of trust: *"it's essential for whoever we're talking about—whether it's the government or whoever is partnering with the government—to really utilize the community agencies that have already built trust with people."* (Participant 4, focus group 2).

## Discussion

This study examined COVID-19 vaccine perceptions among an urban NA population shortly before vaccine approval and rollout. Participants identified several concerns, including issues about vaccine development, the need for vaccine evidence specific to NAs, vaccine accessibility, and the importance of clear communication. Participants indicated a need for unity between NA leadership (e.g., tribes, UIHOs, IHS, NA community-based organizations, etc.) and communication outlets (e.g., public health departments, NA newspapers, etc.), navigational support, and expressed a desire for increased partnerships and capacity building with NA networks and organizations to support vaccination uptake.

Previous research has shown that NA and Alaska Native people face vaccine disparities, including vaccines for influenza, human papillomavirus (HPV), and pneumococcal disease [20,29–31]. Factors associated with NA HPV and influenza vaccine hesitancy included not receiving a recommendation to get vaccinated from a healthcare provider, lack of knowledge about the vaccine, concern about the vaccine's safety or that it could cause the related disease, and low perceptions of risk of contracting the disease [20,29–31]. In the American COVID-19 Vaccine Poll, a national study conducted in May–June 2021 (after the current study was conducted), 40% of participants who identified as American Indian (i.e., Native American) reported they were hesitant to receive the COVID-19 vaccine, citing concerns about health harms from vaccine (e.g., Johnson & Johnson vaccine might cause blood clots) and the vaccine being rushed to production [32].

Communicating and understanding scientific information from clinical trials specifically related to the NA community is critical for COVID-19 recovery and mitigation of COVID-19 disparities. An opinion article published in *Indian Country Today*, a newspaper that serves the NA/Indigenous community, presented a misinterpretation of the data from the U.S. Food and Drug Administration (FDA) Emergency Use Authorization advisory meeting briefing of the Johnson & Johnson clinical trial [33], propagating vaccine misinformation and prompting a response by NA experts who worked to rapidly combat the misinformation and raised concerns about how demographic data were collected and disseminated [34,35]. Promoting racial- and ethnic-specific data collection and disaggregation can help build confidence and guide recovery efforts [36–39]. Additionally, when data by race and ethnicity exist, even if only by clinical trial participation rates (compared to population-specific effectiveness), proper communication to the public is essential for highlighting inclusion, and reducing the risk of misinterpretation.

Racial misclassification of NAs from other racial or ethnic groups and data omission have been an ongoing barrier to correctly identifying health disparities and policy changes that address these disparities [37]. NAs have also been prone to racial misclassification and omission in COVID-19 mortality data due to misclassification of race by funeral directors [40]. Data on COVID-19, including vaccination rates, may be captured by various health data systems, including tribal, state, county, and city health agencies. To elucidate NA COVID-19 illness, mortality, and vaccine disparities, there have been calls to include NA tribal, health survey, and other relevant data, in all of these health data systems [37,39]. Data completeness and reporting also ensure equitable policy and allocation of resources. The Urban Indian Health Institute (UIHI), one of the 12 IHS funded tribal epidemiology centers, issued a report card grading the U.S. quality of collecting and reporting NA COVID-19 data a D+, due to “woefully inadequate” data and the common practice of omitting NAs from national data analyses or categorizing data as statistically insignificant is part of the continued ‘data genocide’ of this population [37].

The need for public health partnerships and resource provision with NA communities and organizations, including vaccine information and trusted messenger outreach efforts, supports previous findings from COVID-19 vaccine studies conducted with both NA and non-NA racial and ethnic minority populations [22,40,41]. Participants in our study articulated a need for increased unity in leadership and communication and expanded public health partnership, including financial and COVID-related resources and cultural tailoring, with NA networks to reach community members. Urban NA organizations play important roles in the lives of their communities, and serve as trusted sources for health information and healthcare services. Building sustainable partnerships with NA serving organizations with existing ties and established trust within the urban NA community would support bilateral knowledge exchange to inform best practices in outreach and increase vaccine knowledge and confidence. Finally, there is a need for increased attention to evaluation of policies and programs which contribute to NA health disparities, among them lack of sufficient funding for the IHS and other health organizations serving NA communities [42,43].

## Limitations

Findings from this study may not be generalizable to other urban (and rural) NA populations. The majority of the sample was female (71%), between the ages of 35 and 64 years old (88%), and on average had a smaller household size (average of 2 people); sample sizes for the focus groups were also small. Finally, as part of the more extensive study in multiethnic groups [22], additional themes and policy suggestions brought up by NA participants and other marginalized groups were described in more detail elsewhere. Due to pandemic restrictions, all focus groups were conducted virtually via Zoom. NA community members with limited internet, computer, and phone access may have been less likely to participate. This study was conducted during the early phases of the COVID-19 vaccine rollout (December 2020 to January 2021), a time when COVID-19 vaccine information was evolving. Focus groups were also held before the emergency use authorizations for several COVID-19 vaccines and during the initial vaccine distribution, which may have impacted participants knowledge, attitudes, and beliefs about the vaccine. As noted by participants in the study, the AstraZeneca COVID-19 vaccine was initially discussed as there were various active clinical trials during the time of the focus groups; however, the AstraZeneca vaccine was never made available in the U.S. Finally, compared to rural NA populations, the urban NA participants in our study may have substantial differences in access to vaccine-related information and resources.

## Conclusions

Our study demonstrates the need for clear and targeted communication about COVID-19 vaccines, including some tailoring of scientific information for NA health providers and leaders. Our findings also underscore the need to work with tribes, tribal leadership, and NA serving organizations to coordinate vaccine communication and distribution to communities, especially urban NA communities, where the majority of NAs now reside. Clearer data and tracking of COVID-19 infection, morbidity, mortality, and vaccine rates for NAs overall and by region are needed. Further research should explore perspectives from rural and tribal groups. Future research should also continue to explore factors associated with vaccine decision-making and both identify and implement strategies that increase vaccine confidence and vaccine uptake among NA adults. Our findings suggest that these strategies should include overcoming transportation and technology barriers. Fur-



ther research is also needed to understand vaccine decision-making among and for NA youth and children. Finally, future studies should also include NAs who live in rural areas, as there are unique challenges to living in rural communities. Findings from this study can inform public health efforts to increase vaccination among NAs by addressing the concerns outlined by participants and maintaining clear and accurate information.

### Authors' contributions

AEE conducted the analysis and interpretation of data and drafted the article. SLC conceptualized and designed the study, conducted the focus groups, analyzed and interpreted the data, and significantly revised article drafts. AG, ALC, and YCL contributed to the study's design, acquisition of data, and revised article drafts critically for important intellectual content. AFB led the conceptualization and design of the study and revised article drafts critically for important intellectual content. NAG designed the study, conducted the focus groups, and provided a supervisory overview of data analysis and interpretation, drafting the manuscript, and revisions. All authors have approved the final version of this manuscript and attest they meet the ICMJE criteria for authorship.

### Ethics Approval

The UCLA Institutional Review Board approved the study.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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