



“In the beginning, I said I wouldn’t get it.”: Hesitant adoption of the COVID-19 vaccine in remote Alaska between November 2020 and 2021

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ABSTRACT

Achieving sufficient COVID-19 vaccination coverage has been hindered in many areas by vaccine hesitancy. Many studies based on large survey samples have characterized vaccine refusal, but there are fewer in-depth qualitative studies that explore hesitant adoption: the middle-ground between vaccine acceptance and refusal, and how individuals may move across this continuum depending on their lived experience. For this paper, we use the narratives of 25 adults living in off-road, predominately Alaska Native communities to describe the complex decision-making processes undertaken by ‘hesitant adopters’, defined in our study as those who completed their initial COVID-19 series despite reporting hesitancy. Interviewees’ stories help illustrate how hesitant adopters’ decision-making processes involved making sense of information through interactions with trusted individuals, lived experiences, observations, emotions, and personal motivations. For the majority of these hesitant adopters’ (n = 20, 80%) interpersonal interactions were key in helping to make the decision to get vaccinated. Over half of the interviewees (n = 14, 56%) described how conversations with individuals they trusted, including healthcare providers, family, friends, and interactions through their professional network made them feel safe. One third of the hesitant adopters (n = 7, 28%) attributed their decision to get vaccinated based on the influence of Alaska Native Elders including their knowledge, personal experiences, as well as being motivated by the desire to protect them. Independent research was also important to about a quarter of hesitant adopters (n = 6, 24%), and for these interviewees it was the process of gathering information on their own and learning from others, especially healthcare providers who could answer their questions and alleviate their concerns. This paper illustrates the temporality of vaccine decision-making: vaccine acceptance for those who are hesitant may be an ongoing process that is influenced by personal experience, relationships, and context.

1. Introduction

“In the beginning, I said I wouldn’t get it. [But] I felt like I really needed to with things opening up, and with my job when I’m going to be around a large group of people. It was more beneficial for me to have it.”

- Alaska Native mother and remote hub resident

In early March 2021, Alaska led the nation per capita in COVID-19 vaccinations (Boher, 2021; Cirruzzo, 2023). By early May 2021, vaccination rates began to plateau; by the end of September 2021, the state had fallen to 35th in the nation (Covid-19 Vaccinations). Vaccine

coverage rates at the end of 2021 ranged widely by region, from 92% of residents over the age of 12 years in the remote (off the road system) Bristol Bay/Lake and Peninsula region, 65% in remote Northwestern Alaska, and 38% in the rural Southeast Fairbanks Census Area. Substantial variation in coverage occurred between individual remote communities, with some communities having reached more than 80%, while others are consistently below 25% (K Shroyer, personal communication).

Many within public- and tribal health organizations believe that this decline and variation among communities may have been influenced by vaccine hesitancy, defined by the World Health Organization (WHO) as a “delay in acceptance or refusal of vaccination despite the availability

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of vaccination services” (MacDonald and SAGE Working Group on Vaccine Hesitancy, 2015). Vaccine hesitancy, as defined by the WHO, exists across a spectrum, from full acceptance/high demand, delay, to refusal of some vaccines, to complete refusal of all vaccines.

Although many scholars have explored vaccine refusal, the middle ground of vaccine acceptance is less understood: those who practice hesitant adoption. Scholars define hesitant adopters (sometimes referred to as “watchful waiters”, “fence sitters”, or “hesitant compliers”) as individuals who accept some vaccines but not others, or who accept a vaccine despite showing hesitancy toward it (e.g. (Enkel et al., 2018; Koskan et al.; Lin et al., 2022a; Moore et al., 2022a)).

In this paper, we use narratives to describe the complex decision-making processes undertaken by hesitant adopters, defined in our study as those who completed their initial COVID-19 series despite indicating hesitancy or still having concerns about the vaccine. Based on the anthropological concepts of *biocommunicability* (Briggs and Nichter, 2009; Briggs and Hallin, 2010; Hall and Berube, 2021) and *cultural models of disease* (Briggs and Hallin, 2010; Hall and Berube, 2021; Farmer, 1994; Hall and Wolf, 2021), we focus on the interplay between various factors leading to an individual’s acceptance of the initial COVID-19 vaccine series: intention, concerns, trusted information sources, facilitators, and motivations.

Under this anthropological framework, we begin with the assumption that an individual’s perceptions of risk and the benefits of vaccines are explanatory models that are produced, circulated, and received at various levels of positionality, subjectivity, and personal experience. In doing so, we seek to draw attention to the temporality of vaccine decision-making: vaccine acceptance for those who are hesitant may be an ongoing process that is influenced by personal experience, relationships, and context. Our study thus contributes an anthropological perspective to the small literatures on hesitant adoption and vaccine decision-making by examining the lived experience of hesitant adoption among 25 adults living in off-road, predominately Alaska Native communities (referred to here as *remote Alaska*).

1.1. COVID-19 vaccination remote Alaska

Most Alaskan communities have fewer than 1500 people and are located off the road system with access only by plane, boat, ATV, snowmobile, or sometimes dog sled teams (Hahn et al., 2021). These communities are collectively referred to in this paper as “remote Alaska,” as they are geographically distinct with less access to resources, such as food and healthcare, than communities on the road system. Although these small communities have a large proportion of Alaska Native residents, remote Alaska is culturally distinct, with significant variation between communities. Northern Alaska, for example, is the ancestral home of the Inupiat. Modern culture there has been heavily influenced by the Friends Church. In contrast, Southeast Alaska (the ancestral home of the Tlingit, Haida, and Tshimian) experienced contact earlier, and still carries many traditions from both Indigenous peoples and Russia. The COVID-19 vaccine rollout in remote Alaska initially faced unique logistical challenges. These included storage requirements of the vaccine being kept at minus 95 °F, along with the expiration of the vaccines after five days of being opened and refrigerated (Anchorage NH Alaska Public Media, 2021a). The lack of ultra-cold freezers in communities, along with weather-related travel delays prompted the State of Alaska and partnering tribal health organizations to get creative with vaccine distribution. Tribal health providers and public health officials mobilized massive efforts to deliver vaccines using a fleet of chartered planes, water taxis, and ferries driven through choppy seas, as well as shuttling healthcare workers around villages on snowmobiles and by dog sled (Anchorage NH Alaska Public Media, 2021a).

Even with the lack of hospitals, infrastructure, and road systems, Alaska was still highly successful in delivering COVID-19 vaccines to its most remote communities. Data from the Centers of Disease Control and Prevention indicate there was little disparity between the percentage of

rural Alaskans who received at least one dose of their initial COVID-19 vaccine, compared to urban residents (Saelee et al., 2022). This success was due in large part to being able to use vaccine allocations from both the Indian Health Service (IHS) and the State of Alaska (Cirrizzo, 2023). Tribal sovereignty also enabled tribal health organizations to expand vaccine eligibility to anyone above the age of 16 years, including non-tribal members (Anchorage NH Alaska Public Media, 2021b). Indeed, Alaska was also the first state in the nation to make vaccines available for all residents 16 years old and older (Boher, 2021).

1.2. Vaccine hesitancy and hesitant adoption

Despite this initial success, by the end of 2021 Alaska’s per capita vaccine rate was among the lowest nationwide (Covid-19 Vaccinations). Within public- and tribal health organizations, vaccine hesitancy, not access and availability, is largely believed to be behind this drop in acceptance. The WHO characterizes vaccine hesitancy as “complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence” (MacDonald and SAGE Working Group on Vaccine Hesitancy, 2015). In the literature, vaccine acceptance and hesitancy are often described in terms of a variety of categories of intention (Trent et al., 2022), including “vaccine ready”, unvaccinated with high- and low-intention (Alzubaidi et al., 2021a), confident, hesitant, complacent, reluctant, refused and rejectors. Some have found that stated intention is not a sound predictor of eventual adoption (Koskan et al.; Maciuszek et al., 2023; Kikut et al., 2022), and there is a growing interest in understanding hesitant adoption among those who accept a vaccination despite expressing hesitancy (Enkel et al., 2018; Moore et al., 2022a; Hallgren et al.; Reece et al., 2023). Scholars have identified the stated motivations of hesitant adopters (Lin et al., 2022a; Moore et al., 2022b), trusted information sources (Purvis et al., 2021; Zarbo et al., 2022), barriers and facilitators (Hallgren et al.; Elwy et al., 2021) and knowledge, attitudes, and behaviors (Zarbo et al., 2022; Purvis et al., 2022; McElfish et al., 2022; Tatar et al., 2019). Prior to the COVID-19 pandemic, much of the literature on hesitant adoption focused on parents’ attitudes towards childhood immunization (Enkel et al., 2018; Tatar et al., 2019; Leask et al., 2012; Gust et al., 2008).

Some scholars have criticized the term “vaccine hesitancy” for lacking a clear definition and measures. Several have noted the need to recognize psychological antecedents and socio-structural determinants of vaccine acceptance and access (Betsch et al., 2018; Bedford et al., 2018; Larson, 2022). Vanderslott et al. (2022), note that the term “hesitancy” bolsters a dominant narrative that hesitancy or refusal to an individual’s lack of knowledge and/or poor attitudes often perceiving those who are hesitant as an ‘ignorant public’ (Vanderslott et al., 2022). Betsch et al. (2018), suggest instead that scholars measure the psychological antecedents of vaccine acceptance (Betsch et al., 2018). They propose adding *calculation* to widely used models of vaccine acceptance, in order to understand how individuals, seek out and make sense of information.

These critiques and the growing literature on hesitant adoption illustrate how vaccine adoption and refusal occur on a spectrum, and that individuals may move across that spectrum depending on their lived experience. We therefore use the term “vaccine decision-making” to refer to the complex and variable patterns across the spectrum of confident adoption, hesitant adoption, ambivalence, and refusal. By focusing the lived experience of hesitant adoption, this paper draws attention to how individuals actively engage with multiple ideas around COVID-19, vaccines, responsibility, and benefits, as well as the emotions and socio-cultural factors that facilitate vaccine adoption.

1.3. Biocommunicability and cultural models of disease

Rather than viewing vaccine hesitancy as an issue of “public ignorance” (Vanderslott et al., 2022), our analysis is based on the concepts of

biocommunicability (Hall and Berube, 2021) and cultural models of disease (Farmer, 1994). These draw attention to the individual, relational, and structural contexts in which people make decisions around whether to get vaccinated against COVID-19. Biocommunicability refers to “the production, circulation, and reception of knowledge” related to medical and medicalized domains (Briggs and Nichter, 2009; Hall and Berube, 2021; Hall and Wolf, 2021; Briggs and Hallin, 2016) this knowledge may be shared-large proportions of a population may be aware of the dominant explanations of a disease and prevention – but it is also contested. Writing about the H1N1 pandemic, Briggs and Nichter (2009), note that the media and public health system choose, adapted, and transformed particular forms of knowledge in ways that sought to empower individuals in specific ways (Briggs and Nichter, 2009). In this paper, we build on their observation to examine how individuals choose, adapted, contested, and transformed knowledge around COVID-19 and related vaccines as part of their decision-making process around whether to complete their initial vaccine series.

The idea of biocommunicability builds on Paul Farmer’s ethnographic work on the emergence and evolution of cultural models of novel pandemics, specifically HIV-AIDS, and how these inform individuals’ responses. This knowledge circulates among people as various and contested models that explain the origins, risks, preventative actions, and appropriate responses to a disease (Farmer, 1994). By focusing on shared narratives, Farmer illustrates how understandings of risk, blame, and responsibility are dynamic; changing over time based on factors such as personal experiences, stress, rumors, and large-scale political events (Farmer, 1994). Along with these individual and contextual influences, pandemic narratives (including those around vaccines) emerge from “preexisting meaning structures” (Farmer, 1994) of causality, etiology, and bio-subjectivity. These narratives frame ideas of expertise, trust, and individual responsibility to self and community (Briggs and Nichter, 2009; Good, 1977; Kasstan, 2021a).

Using the understanding of *biocommunicability* as the process through which *cultural models of disease* circulate and are received vis-a-vis ones lived experience, we focus on the interplay between various factors leading to an individual’s acceptance of the initial COVID-19 vaccine series: intention, concerns, trusted information sources, facilitators, and motivations. Under this framework, we begin with the assumption that an individual’s perceptions of risk and the benefits of vaccines are explanatory models that are produced, circulated, received, and contested at various levels of positionality, subjectivity, and personal experience, including emotional responses (Betsch et al., 2018). In doing so, we seek to draw attention to the temporality of vaccine decision-making: vaccine acceptance for those who are hesitant may be an ongoing process that is influenced by personal experiences, emotions, relationships, and context.

By applying these concepts, we add to the limited literature on how individuals engage with both global and local explanatory models of immunization through lived experience and local contexts (Jamison et al., 2019; Quinn et al., 2017; Kasstan, 2021b). Viewing vaccine-related perceptions as explanatory models enables us to glimpse at the complex lived experiences of risk and decision-making that intersect with “notions of subjectivity, authority, knowledge, intertextuality, space, time, and knowledge/actions relations” (Briggs and Nichter, 2009). In doing so, we seek to demonstrate the utility of anthropological approaches for public- and tribal health professionals to understand and address vaccine hesitancy from less authoritative perspectives.

2. Methods

2.1. Co-production and positionality statement

Our project is rooted in the principles of co-production: equity, reciprocity and trust, respect for and integration of different knowledge systems, and tribal sovereignty (Yua et al., 2022). Our team is led by a

multi-ethnic group of Alaska Native and white researchers of mixed ancestral backgrounds, three of whom grew up in Alaska, all of whom are Alaska residents. Perhaps the biggest difference in our backgrounds compared to the population we surveyed and interviewed is that we reside in the largest city in Alaska: Anchorage. Unlike remote Alaska, Anchorage is on the road, rail, and ferry systems, has multiple grocery stores and schools, three hospitals, an international airport, and the Port of Alaska. To account for that difference in context, as well as any additional differences in cultural or geographic perspectives, we worked with Alaska Native and Non-Native leaders and service providers in remote communities to develop study methods, and to review interview and survey questions. All six individuals who conducted the interviews were women, including four Alaska Native/American Indian interns and research associates. Findings were first reviewed by the research team leaders, and then by anonymous reviewers and Alaska Native board members for both scientific rigor and cultural appropriateness. In addition, we circulated findings to tribal leaders at regional health organizations for their input, and to inform immunization efforts. We have incorporated community and tribal leader feedback throughout research implementation and dissemination processes.

2.2. Project development and data collection

The analysis reported in this paper comes from a mixed methods study to examine the impacts and responses of the COVID-19 pandemic in remote Alaskan communities. All methods described in [removed for blind review] were reviewed and approved by the Alaska Area Institutional Review Board and relevant Tribal entities. Briefly, we used a community-based remote ethnographic approach to develop and implement this study, which included remote participant observation (i. e., observing social media posts, and participating in pandemic response meetings with leaders from remote Alaska), and conducting phone interviews with tribal leaders and service providers in off-road Alaskan communities.

From these observations and interviews, we developed a statewide online survey with key informant input described in a previous manuscript [removed for blind review] to assess the impacts of and responses to the COVID-19 pandemic in remote Alaska (communities located off the road system). Survey respondents (N = 1020) could indicate interest in participating in a semi-structured follow-up interview.

Following each round of surveys, we used a purposeful sampling approach to select the participants for the semi-structured interviews and to include populations who were under-represented by our survey sample. We therefore specifically identified individuals of a wide age range from within survey respondents, and oversampled for men and individuals who were not vaccinated or who indicated hesitancy on their survey [removed for blind review].

We conducted in-depth semi-structured interviews with 58 survey respondents (5.7% of the 1020 survey respondents). This population is described in a separate paper [removed for blind review]. Follow-up interviews lasted between 30 and 60 min, were conducted by phone or Zoom, and informed verbal consent with participants was obtained prior to conducting each interview. These interviews occurred after the approval of COVID-19 vaccines for emergency use. Fig. 1 shows the timeline of surveys and follow-up interviews within the context of COVID-19 vaccine availability and major pandemic-related events in Alaska.

2.3. Analytical framework and data sources

To identify hesitant adopters, the lead author analyzed interviews using MAXQDA Analytics Pro 2018 coding software using iterative inductive coding, first of specific questions using both *a priori* master themes identified through existing literature, and *invivo* coding (using participants’ actual words). We first examined responses to survey and interview questions concerning vaccine intention, concerns, information

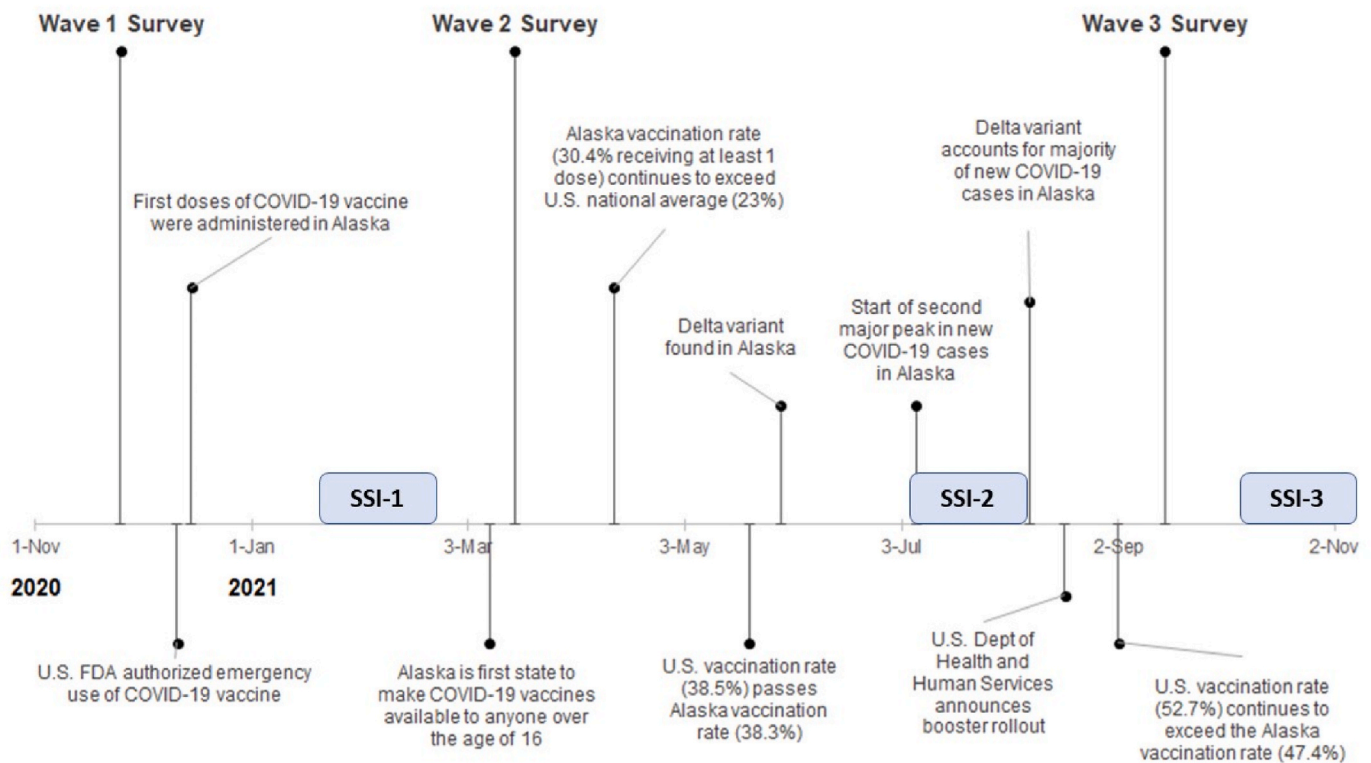


Fig. 1. Timeline of surveys and follow-up semi-structured interviews (SSI).

sources, facilitators, and motivations. On the survey, unvaccinated respondents reported whether they planned to get a COVID-19 vaccine (and why/why not). We then determined who completed their initial COVID-19 vaccine series despite either 1) (among unvaccinated survey respondents) indicating low- or deliberating intention to vaccinate on their survey, or 2) (among vaccinated survey respondents) reporting having concerns in either their survey or interview, and/or describing having changed their minds in their interview. We then conducted lexical searches for key words based on *invivo* codes, as well as re-reading interview transcripts to identify additional segments pertaining to hesitant adoption. We use quotation marks to designate *invivo* codes. For ease of reading, we define codes when reporting results below.

For this analysis, we examined responses of both Alaska Native and Non-Native interviewees to reflect the flows of information and interaction that occur within these multi-ethnic - but primarily Alaska Native - communities. The population included in this paper is defined by residence in a remote Alaskan community, not by ethnicity. Although the majority of our interviewees are Alaska Native (as is over 75% of the remote Alaskan population), we did not want to assume that their decision-making occurred in isolation from people of other ethnicities.

3. Results

We identified 25 (43%) individuals within our larger sample of 58 interviewees who expressed having or having had hesitancy around their initial COVID-19 vaccine. These “hesitant adopters” made up the largest proportion of interviewees (43% of all 58 interviewees, and 57% of vaccinated interviewees). As shown in Table 1, the majority of hesitant adopters we interviewed were female ($n = 15$, 60%), aged 25–54 years ($n = 20$, 80%). Most interviewees identified as AN/AI ($n = 16$, 65%) and 7 identified as white (28%). Ninety-six percent of our sample (24 individuals) had post-secondary education, including 10 (40%) who hold post-secondary degrees. A little over half ($n = 14$, 56%) of our interviewees were employed full-time. Fewer than half of the

participants ($n = 12$, 48%) identified having an income between \$10,000–49,999.

3.1. Narratives of hesitant adoption

The following narratives illustrate vaccine decision-making as a biocommunicable process: how hesitant adopters in our sample made sense of often contradictory cultural models around COVID-19 and vaccines in their decision-making. Their stories reveal how vaccine decision-making occurred within the lived experience of the pandemic in remote Alaska, how hesitant adopters received and/or sought out information, and the interplay between concerns and emotions, motivations, information sources, and other drivers to get vaccinated. For these interviewees, deciding to get a COVID-19 vaccine was an iterative process involving learning from both media and interpersonal interactions and making sense of that information in the context of personal experiences and motivations.

3.2. Conversations with trusted individuals increased vaccine confidence

Twenty hesitant adopters (80%) reported that the information they received through interpersonal interactions figured strongly into their decision-making, including healthcare providers, family, friends, and interactions through their professional network.

When “Valerie” (pseudonym), an Alaska Native mother of three from northern Alaska, took the survey in November 2020 she responded “definitely not” to the question of whether she planned to get vaccinated, and noted that she did not trust the vaccine. By the time we interviewed her in March 2021, she had completed her initial series of shots, despite her husband and some friends still distrusting the vaccines. She described the difficulties of isolation for her and her children and contextualized her decision as one of wanting to return to work, travel, and protect herself as a person with an autoimmune disease. For “Valerie”, deciding to get vaccinated was an iterative

Table 1
Population characteristics of hesitant adopter interviewees (N = 25).

Demographic	Number of participants	%
Gender		
Male	7	28%
Female	15	60%
Non-binary	3	12%
Age		
18–24	0	0
25–54	20	80%
55–64	1	4%
65+	4	16%
Race		
African American	0	0
Alaska Native or American Indian	16	64%
Asian	0	0
White	7	28%
Latino	0	0
Pacific Islander/Native Hawaiian	0	0
More than one race	2	8%
Education		
8th grade or less	0	0
Did not finish high school	1	4%
High school or GED	0	0
Some college, Associate's, or vocational program	14	56%
College degree, post-graduate, or professional school	10	40%
Annual Income		
<\$10,000	2	8%
\$10,000–\$29,999	7	28%
\$30,000–\$49,999	5	20%
\$50,000–\$69,999	3	12%
\$70,000–\$89,999	5	20%
\$90,000 and over	3	12%
Employment		
Working (full-time, year-round)	14	56%
Working (part-time, year-round)	5	20%
Seasonal employment	1	4%
Unemployed (not due to COVID-19)	2	8%
Laid off or looking for work due to COVID-19	0	0
Unable to work due to disability	1	4%
Homemaker	1	4%
Retired	1	4%

process involving conversations with providers, observations, and personal motivations.

“In the beginning, I said I wouldn't get it. But I felt like I really needed to with things opening up, and with my job, and we are getting ready to host a large outdoor event so if I am going to be around a large group of people, I want to have it just to protect myself and I have a compromised immune system as well [...]. I spoke to the doctors, and they made me feel more comfortable. There was also a doctor from Boston who was in charge of the COVID vaccinations teams, and she said that [her] cancer patients – [people with] suppressed immune systems - [have gotten vaccinated] and they've all done really well.”

Trusting the source of information was a dominant theme in narratives of hesitant adoption (n = 14, 56%). Chief among trusted sources interviewees named were healthcare providers (9, 36%), and family and friends (7, 28%) including Elders.

“Mary” is a single, Alaska Native mother of a toddler who lives in a small community in Western Alaska without running water along the Yukon River. When we interviewed her in July 2021, she described her decision to get vaccinated in the context of her remote community that experienced widespread fear, delayed healthcare, diminished ability to earn income or apply for unemployment, and an inability to fulfill the social and subsistence needs achieved through hunting, fishing and gathering.

“When it hit our village, the whole village was terrified. We were so scared to go out. Scared to travel, and we just wanted to stay home ... It changed me - drew me to God very close. I gave up drinking and smoking. That's how much it changed me. It made me want to live a good life by eating healthy foods. Even though it is a deadly disease, it brought some good things too. It made everyone wash their hands, and only go to clinic for big things. We only go when we're in great distress; only when it's really serious. It terrified us so bad that we started working from home. But in the village, we lack resources like computers, so we've been mostly using phones. It even discouraged the unemployed to apply for jobs because they didn't want to see people.”

Although Mary had heard that the vaccines were ineffective and caused people to “get very sick”, her uncle – an Elder and trusted family member – helped her and other family members overcome their fear and misinformation:

“[Some people had told me that they] read about or heard some people who took the shot and got very sick and that it wasn't working. Some were even saying that it was the sign of the beast, 666, anti-Christ marks. [...] I talked to my uncle who is a retired doctor and he told me to get [vaccinated]. I trust him medical-wise. He knows all the medical stuff. He was encouraging the whole family. Half of my siblings didn't want to take it, but because of him they took it. It was a ripple effect: some of our friends and relatives took it too even if they didn't want to before. And now it's almost our whole community that is vaccinated. Would you want to get COVID? [He told us that] if you're vaccinated, you have a higher survival rate. Sure enough- nothing happened to us. We were all good.”

Being vaccinated helped Mary and her family practice subsistence, a term that refers not only to hunting and gathering but also to the social relationships and cultural reproduction that occurs through being on the land:

“Subsistence is a highway of life. We usually would gather with friends and family members to go harvesting to get our Native food off the land, but since COVID hit we were discouraged from going. We had to live off of our freezer foods. Now that we're vaccinated, we go now, but we limit it to a small number - 5 or less of us - to get the food.”

Elders and their knowledge can influence the decisions community members make.

Beyond being a trust source of information, Elders both directly and indirectly influenced almost one third of hesitant adopters (n = 7, 28%) in our sample to complete their initial vaccine series. They described their decision as being influenced by Alaska Native Elders, including their knowledge, personal experiences, and being motivated by the desire to protect them.

“Raymond” is an Inupiaq father in his mid-60's, with some college education living in a hub community. When he took the survey in March 2021, he responded that he was not vaccinated and was not planning on getting a COVID-19 vaccine. When we interviewed him in July of 2021, he described himself as “pro-vaccine.” The stories his parents told him from the 1918 influenza pandemic were a major reason he decided to get vaccinated.

“I read a lot about the 1918 pandemic because my parents were children during that pandemic. So, I did research on that pandemic, that it started from animals overseas and then spread throughout the whole world. [...] The 1918 one was much more worse than what we have now. Because right now, our social media and instant news, instant live feeds, the whole world can know about being careful. In 1918 there were radios, but even those were scarce in this region. [...] People were a lot more strict that time. [...] [...] I read a lot about some villages - they had rifles and wouldn't allow anyone to

come in. They had a higher rate of survival. Other villages were lax, and those people had higher rates of tetanus and Spanish flu. A lot of the elders- it affected their lives very closely in that their parents were involved in that. Our people are into oral tradition, so people are still talking about that. It affected everybody in the area one way or another."

Seeing that Elders were getting vaccinated and attending community-centered vaccine events helped some interviewees to overcome their hesitancy and concerns about safety. This was true for Valerie. When asked what made her feel confident about getting the vaccine, she described the positive environment of vaccine clinics – including the presence of Elders:

"They made it fun, like the whole vaccination process, like free coffee you know, free cookies, like come and hang out and get your vaccination. Like they, they were really proactive about it, and they had like music playing, and it was a positive process. And there was a lot of Elders there, you know every time you went to the hospital, they had a section where it was a vaccine clinic where people were just getting vaccinated."

In addition to being directly influenced by Elders, two hesitant adopters (8%) mentioned that one of their motivations to get vaccinated was to protect Elders, as well as other vulnerable family members.

"We've done a lot of independent research on it": Having a sense of control in gathering and interpreting information increased vaccine confidence, especially amid distrust.

Scientific understanding was not a dominant theme mentioned by hesitant adopters in our sample. Very few ($n = 4$, 16%) specifically referenced "science" as a factor that increased their sense of safety for getting vaccinated, and these statements were usually framed in terms of trust. However, about one third of hesitant adopters ($n = 8$, 32%) described how "research" they conducted themselves was important in making them feel confident in getting vaccinated. Raymond's narrative, reported above, is one example of an individual seeking out information on past pandemics to understand the COVID-19 pandemic. The sense that information was independent was also important for Douglas. When asked what made him feel safe about getting his vaccine, he attributed his confidence to both independent research and interactions with healthcare providers:

"There's still a lot of fear here around the vaccination, and so there's a lot of people here that really don't want it. To be honest, there's people that have compared it to the government's blanket program. There's just so much historical trauma and intergenerational trauma in this community, and I think that we've done our best, our absolute best, to be strong advocates, especially for our medical department. They all have done their own research, independent research on the different vaccines on the MRNAs or whatever and how it breaks down. All of them, um, they're, they, they each are our PAs, our MDs, our RNs, all of them they did their own research, and all of them have been strong, strong advocates in the community [...] and them being so passionate and sharing their research, because I don't even understand half that stuff to be honest, the biochemistry kind of stuff, but they made me believe."

Douglas's narrative hints at the importance of trusting vaccine advocates but also that their information gathering is independent of state influence. His account points to a specifically-Indigenous cultural model of distrust and infectious disease etiology (the distribution of smallpox-contaminated blankets by colonists to Native Americans) that in this case influences perceptions around COVID-19 vaccines (Mayor, 1995).

Douglas's story also illustrates the iterative process of engagement with various sources of information. Indeed, almost all interviewees who cited independent research as important also described their decision-

making as an iterative process of individual information-seeking and talking to others, especially healthcare providers, to allay their concerns.

"Julie", who identifies as White, is a grandmother living in Southeast Alaska. She describes herself as being "into Eastern medicine, I believe the body can heal itself when given the good stuff." Her hesitancy to receive a COVID-19 vaccine was rooted in distrust of the pharmaceutical industry, a concern she still has.

"I'm still concerned about it. In general, things have been taken over by for-profit. I think a lot of it has to do with the vaccine industry. Because vaccines do hurt people, even the normal vaccines. There's always collateral damage - a very small percentage, but still. So the industry has set up the vaccine court, so technically you can't sue the manufacturer for something that happens from getting the vaccine. [...] The protections make it so they won't clean up their vaccine as much as they should. The kids in my community would get their shots and be dysfunctional for a day or two. Doctors question what vaccines do to their immune systems. There's been a lot of money made, and there needs to be more done."

Although her narrative references elements of cultural models around nefarious vaccine development, she still decided to get vaccinated after doing her own research and talking to her sister, who is a doctor.

"This is not a normal flu, it's different. I read the articles, the studies, etcetera. My sister is a doctor. [...] I just want to make sure they're following the science. [...] I just didn't want to die of this virus. If there is a vaccine out there, then why die from it?"

3.3. Images and conversations reinforced narratives of safety and efficacy

Learning from others' vaccine-related experiences were mentioned by seven hesitant adopters (28%) as a factor leading them to get vaccinated. Images played a role in this iterative process, by allowing individuals to observe the experiences of others in distant locales. Seeing pictures of people in news media or friends and family on Facebook who got vaccinated without serious side effects helped calm fears. In addition, pictures of friends and family who were able to travel again illustrated the benefits of getting vaccinated.

When asked what made her feel safe, Valerie described how seeing others get vaccinated without serious side effects combined with her personal motivations:

"I mean I saw a lot of people getting it. They were taking their photos, everybody seemed to be doing well after their shot. And then I, I was also thinking, you know, about me wanting to travel again soon and it would probably be best if I had it, especially if they were gonna be planning on coming out with maybe a passport for it eventually. So yeah, I mean it was mostly because of my job and traveling is the reason why I wanted to get it."

Images of public figures getting vaccinated also helped boost confidence among interviewees. "Douglas" an Alaska Native father of two small children, and a behavioral health aide in a small coastal community in Southeast Alaska. We interviewed him in July 2021, during Alaska's Delta surge when hospitals had to move to crisis standards of care. At that time, he described the biggest problems related to the pandemic being uncertainty, panic shopping, childcare, economic inequalities, fear and anxiety among Elders and children, and food access. Although he was nervous about the safety of the vaccine, getting vaccinated provided the possibility of reducing these problems, and he attributes his decision to his community, healthcare providers, and images of high-profile individuals in increasing his vaccine confidence:

"Our community is really leading the charge. Almost one third of the community is vaccinated ... I was nervous about the vaccine initially

- it was new, and you saw in the newspaper that they rushed the trial ... that they were doing everything so fast. It wasn't until months later learning that they didn't rush the trial. [...] But it was having the medical providers and the primary providers talk about the risks involved and the benefits. And it was seeing Biden and different people in Trump's cabinet, sport stars and celebrities get the shot. It was encouraging just to see all that and know that so many people were nervous about it and that they were doing it [getting vaccinated] too."

4. Discussion

For this paper, we used a qualitative framework based on the concepts of biocommunicability (Hall and Berube, 2021) and cultural models of disease (Farmer, 1994) to analyze survey responses and in-depth follow-up interviews gathered between November 2020 and November 2021 to describe the lived experience of hesitant adoption in remote Alaska. We identified hesitant adopters ($n = 25$, 43% of all interviewees) as individuals who completed their initial COVID-19 vaccine series despite initially indicating low intention and/or still having concerns at the time of vaccination. The narratives reported here illustrate hesitant adopters' iterative process of vaccine-related decision-making, which involved engaging with often-competing explanatory models of disease and risk and making sense of that information through interactions with trusted individuals, lived experiences, observations, emotions, and personal motivations.

Interpersonal interactions were key in the majority of hesitant adopters' decisions to get vaccinated ($n = 20$, 80%), and trust was a key theme. Over half of the hesitant adopters ($n = 14$, 56%) interviewed specifically described how conversations with individuals they trusted, including healthcare providers, family, friends, and interactions through their professional network made them feel safe.

Other scholars have also found that trust and social networks play an important role in vaccine acceptance, especially regarding a newly launched vaccine (Lin et al., 2022a; Hallgren et al.; Moore et al., 2022b; Elwy et al., 2021; Purvis et al., 2022). Almost half of the hesitant adopters in one study identified social networks playing a critical role in overcoming barriers to receiving the COVID-19 vaccines which included family, friends, and broader social networks (Hallgren et al.). This was especially true for those who sought vaccination information from providers whom they knew personally who provided both expertise as well as a valued social connection (Hallgren et al.). Indeed, multiple studies have found that conversations with trusted healthcare providers have been found to be helpful for those who deliberated the decision to receive a COVID-19 vaccine (Hallgren et al.; Moore et al., 2022b; Purvis et al., 2021; Elwy et al., 2021). However, it is important to note that when these conversations did not address an individual's specific concerns, especially related to safety, vaccine deliberation continued (Elwy et al., 2021).

One third of the hesitant adopters we interviewed (all Alaska Native) attributed their decision to get vaccinated to Elders. Elders hold a significant role in many Alaska Native communities. They are language holders and culture bearers and help care for children. The stories told by Mary, Raymond, and Valerie indicate the power of Elder knowledge in influencing vaccine decision-making in these predominantly Alaska Native communities. Douglas's description of the historical context of distrust - "the government's blanket program" in which the United States Army purposely distributed blankets contaminated with smallpox to American Indian families - further illustrates the importance of engaging Elders and respecting Elder knowledge in any public health effort.

Almost one third of interviewees described how learning from others' vaccine-related experiences were key to their decision to complete their initial vaccine series. This learning occurred both verbally, and through observations interviewees made in-person and online.

Although scholars have identified social relationships as a factor in hesitant adoption (Moore et al., 2022b; Elwy et al., 2021; Purvis et al., 2022; Hallgren et al.; Lin et al., 2022b), the ways in which people observe and learn from others appear understudied.

Independent research was important to about a quarter of hesitant adopters ($n = 6$, 24%) we interviewed. For these interviewees, their decision-making was an iterative process of gathering information on their own and learning from others, especially healthcare providers who could answer their questions and allay their concerns. Similarly, Purvis et al. (2021), characterized independent research as a trusted information source among some hesitant adopters of COVID-19 vaccines (Purvis et al., 2021). This may be related to a sense of control in gathering information related to one's own uncertainty around vaccination. In a systematic review of communication interventions, Whitehead and colleagues (2023), found that those that acknowledged uncertainty around a vaccine's risks and efficacy were more effective than those that did not (Whitehead et al., 2023).

Given that trust is a key component of vaccine acceptance, understanding individual sense of agency in information gathering and interpretation is warranted. To our knowledge, this is an understudied area in vaccine hesitancy literature, one that pertains to the notion of *calculation* suggested by Betsch et al. (2018), as a key component of vaccine decision-making. In their paper, they describe calculation as "individuals' engagement in extensive information searching" and describe it as a process of comparing the risks of infections versus those of vaccination (Betsch et al., 2018). They suggest that those who engage in "extensive information searching" are more likely to be risk averse and encounter more sources against vaccination. Based on the narratives reported here, we suggest that calculation is also an emotional and relational process of seeking certainty through trust amid uncertain circumstances. Amongst hesitant adopters we interviewed, it appears that one trusted individual - such as an Elder or healthcare provider - could assuage concerns regardless of the multitude of information sources an individual encountered.

The importance of independent research stands in contrast to conceptualizations of hesitancy as stemming from ignorance (Vanderslott et al., 2022) and instead illustrates how individuals were engaging emotionally and intellectually with various, often contradictory, information around COVID-19 and vaccines. Indeed, as Mary and Douglas's stories illustrated, understanding the science behind the vaccines was not a dominant theme of confidence described by our hesitant adopters. Instead, most described their decision-making in social terms: receiving information from trusted individuals combined with seeing friends and relatives get vaccinated created the "ripple effect" of high community coverage. Information that facilitated adoption among these individuals was not exclusively focused on science or why they should trust the vaccines. Rather, it included observations of others and stories of past pandemics, as Raymond's story illustrates.

One element of vaccine acceptance not discussed in this paper are the structural and logistical barriers to vaccine access. Interestingly, not one of our interviewees attributed their hesitancy to a logistical barrier, such as needing time off of work to receive a vaccine and for potential side effects. According to data from the CDC, there was little difference between urban and rural rates of COVID-19 vaccination coverage for at least one dose for individuals at least five years old. Further, in our larger sample, almost all vaccinated respondents who participated in the second wave of the survey responded that it was very or somewhat easy to get a vaccine [removed for blind review]. However, logistical barriers may have been a barrier for unvaccinated interviewees not included in this analysis. Any campaign to promote vaccine acceptance should in tandem - if not after - ensure issues related to access are addressed.

4.1. Strengths and weaknesses

To our knowledge, this is the first study to describe hesitant adoption in remote Alaska. Few studies explore this topic, and therefore our

contribution of in-depth narratives from remote Alaska residents, the majority of whom are Alaska Native, is significant. These narratives, along with the contextual details of individuals' lived experiences of the pandemic, provide a rich qualitative understanding of vaccine decision-making.

One of the strengths of this study is that we asked all survey respondents and interviewees, regardless of vaccination status, whether they had or still have any concerns about the COVID-19 vaccines. We believe this question along with our in-depth interview data gave us a more accurate picture of vaccine decision-making and hesitant adoption within our sample.

However, this study has several limitations to note. Our sample is predominately female, Alaska Native individuals ages 25–54 years, and overwhelmingly educated with at least some post-secondary education. It therefore underrepresents men, other age groups and race/ethnicities, and education level. In addition, these findings are limited to the first year of the COVID-19 vaccine rollout prior to the availability and recommendations for boosters. The narratives included here illustrate how vaccine decision-making is an ongoing iterative process for many. Therefore, it should not be assumed that once an individual accepts a vaccine, that they will accept or seek out boosters. Importantly, the findings reported here should not be interpreted to represent all remote Alaska residents nor Alaska Native peoples. We recruited interviewees through an online survey, thus excluding those without internet or cell service. However, we believe the narratives and themes reported in this manuscript are reflective of many of the decision-making within remote Alaskan communities within which vaccine-related perceptions would circulate and interpersonal interactions would occur.

5. Conclusion

In both media and public health, vaccine hesitancy is often framed as a problem of knowledge and attitudes, contributing to a narrative of an 'ignorant public' in need of accurate, authoritative medical knowledge (Vanderslott et al., 2022). Yet this paper shows how hesitant adopters actively engage with various competing explanatory models related to COVID-19 vaccines. Further, our study adds evidence to studies from social science fields that illustrate how decision-making around vaccine uptake is influenced by context (Carson et al., 2021), personal experiences (Elwy et al., 2021; Lin et al., 2022b; Carson et al., 2021; Alzubaidi et al., 2021b; Mosby and Swidrovich, 2021), emotions (Betsch et al., 2018; Carson et al., 2021), and is a relational decision based on trust and relationships (Elwy et al., 2021; Jamison et al., 2019; Hallgren et al.; Lin et al., 2022b; Ledford et al., 2022). By viewing hesitant adoption as a process of engaging with information in these contexts, we can more clearly identify the drivers of acceptance in particular populations.

Ethics approval and consent to participate

All study methods were reviewed and approved by the Alaska Area Institutional Review Board, as well as the Alaska Native Tribal Health Consortium Health Research Review Committee. We conducted informed verbal consent with participants prior to conducting each interview. This paper was reviewed by the Alaska Native Tribal Health Consortium Health Research Review Committee, who provided feedback that we incorporated into the final draft. All errors are our own.

Consent for publication

Not applicable.

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Declaration of competing interest

The authors declare that they have no competing interests.

Data availability

Data may be shared only with tribal approval.

List of abbreviations

CDC Centers for Disease Control and Prevention
 COVID-19 Coronavirus disease 2019
 SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2
 WHO World Health Organization

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