



Strategies to address COVID-19 vaccine hesitancy in First Nations peoples: a systematic review

Adeline Tinessia, Katrina Clark, Madeleine Randell, Julie Leask & Catherine King

To cite this article: Adeline Tinessia, Katrina Clark, Madeleine Randell, Julie Leask & Catherine King (2024) Strategies to address COVID-19 vaccine hesitancy in First Nations peoples: a systematic review, *Global Health Action*, 17:1, 2384497, DOI: [10.1080/16549716.2024.2384497](https://doi.org/10.1080/16549716.2024.2384497)

To link to this article: <https://doi.org/10.1080/16549716.2024.2384497>



© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 04 Sep 2024.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

Strategies to address COVID-19 vaccine hesitancy in First Nations peoples: a systematic review

Adeline Tinessia ^a, Katrina Clark^{b,c}, Madeleine Randell ^a, Julie Leask ^a and Catherine King ^{a,b}

^aSchool of Public Health, Faculty of Medicine and Health, University of Sydney, Sydney, Australia; ^bNational Centre for Immunisation Research and Surveillance (NCIRS), Kids Research, Sydney Children's Hospital Network, Sydney, Australia; ^cPopulation Health - Hunter New England Health, Wallsend, Australia

ABSTRACT

Background: First Nations peoples face disproportionate vaccine-preventable risks due to social, economic, and healthcare disparities. Additionally, during the COVID-19 pandemic, there was also mistrust and hesitancy about the COVID-19 vaccines among First Nations peoples. These are rooted in factors such as colonial histories, discriminatory medical practices, and unreliable information.

Objective: To examine strategies to address COVID-19 vaccine hesitancy among First Nations peoples globally.

Methods: A systematic review was conducted. Searches were undertaken in OVID MEDLINE, OVID EMBASE, OVID PsycINFO, CINAHL, and Informit. Searches were date limited from 2020. Items included in this review provided primary data that discussed strategies used to address COVID-19 vaccine hesitancy in First Nations peoples.

Results: We identified several key strategies across four countries – Australia, the USA, Canada, and Guatemala in seventeen papers. These included understanding communities' needs, collaborating with communities, tailored messaging, addressing underlying systemic traumas and social health gaps, and early logistics planning.

Conclusion: The inclusion of First Nations-centred strategies to reduce COVID-19 vaccine hesitancy is essential to delivering an equitable pandemic response. Implementation of these strategies in the continued effort to vaccinate against COVID-19 and in future pandemics is integral to ensure that First Nations peoples are not disproportionately affected by disease.

PAPER CONTEXT

Main findings: In this review, we identified seventeen studies detailing five key strategies to reduce COVID-19 vaccine hesitancy among First Nations Peoples.

Added knowledge: First Nations-centred strategies to reduce COVID-19 vaccine hesitancy were: understanding communities' needs, collaboration with communities, tailored messaging, logistics planning and addressing the underlying systemic trauma experienced by First Nations peoples when accessing healthcare.

Global health impact for policy and action: First Nations-centred strategies must be included in the continued effort to vaccinate against COVID-19 and other future outbreaks to ensure that First Nations peoples are not disproportionately affected.

ARTICLE HISTORY

Received 6 May 2024
Accepted 22 July 2024

RESPONSIBLE EDITOR

Maria Nilsson

KEYWORDS

Indigenous populations;
vaccine interventions;
vaccine equity; mistrust;
vaccine hesitancy

Background

Management of COVID-19 was contingent upon ensuring high vaccine uptake to minimise serious illness, hospitalisation, and death [1]. While vaccine supply, distribution, and access were important to enhance community protection, vaccine hesitancy, and confidence were key determinants of vaccine uptake [2]. Vaccine hesitancy is defined as a 'motivational state of being conflicted about, or opposed to, getting vaccinated; [and] includes intentions and willingness' [3].

Globally, First Nations peoples face significant social, political, and economic disparities which can increase COVID-19-related mortality and hospitalisation. For

example, in Australia, Aboriginal, and Torres Strait Islander peoples in remote communities are at high risk of death and hospitalisation from COVID-19 due to a high burden of chronic disease, high mobility between communities, inadequate housing conditions, and lack of access to healthcare [4–6]. This is similar to the USA, where COVID-19 disproportionately affected racial and ethnic minorities, including First Nations peoples with a higher risk of severe illness, hospitalisation, and death [7–9]. Increasing COVID-19 vaccination uptake, including receipt of booster doses, reduces the risk of severe illness, hospitalisation, and death.

CONTACT Adeline Tinessia  adeline.tinessia@sydney.edu.au  School of Public Health, Faculty of Medicine and Health, University of Sydney, A27 – Edward Ford, Sydney, NSW 2006 Australia

© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

Vaccine hesitancy contributed to lower vaccine uptake within some First Nations peoples [10]. For example, in 2021 as the COVID-19 vaccination programme was being first rolled out, a survey indicated that a lower proportion of Aboriginal and Torres Strait Islander peoples intended to get the vaccine (37.5%) than non-Indigenous peoples (57.1%) [11]. The survey found that a combination of mistrust in government, community fears over vaccine safety, and exposure to misinformation were likely factors contributing to lower vaccination uptake [12–17]. Australian First Nations peoples' experiences with vaccine hesitancy are echoed in the USA, where surveys have found that American Indian/Alaskan Native peoples reported lower trust in the COVID-19 vaccine compared to the general population [18–20]. Studies suggested that vaccine hesitancy or refusal was influenced by unreliable information, historical mistrust of medical professionals, desire for autonomy, and fear of political or pharmaceutical industry influences [21]. Similarly, in New Zealand, respondents who identified as Māori have reported lower COVID-19 vaccine acceptance rates [22]. In Canada, the Royal Society of Canada Working Group on COVID-19 Vaccine Acceptance also indicated that vaccine confidence amongst Indigenous peoples in Canada is complex, with distrust linked to the violence of colonialism [23].

These factors are rooted in the colonial history of some countries that has shaped the discrimination of First Nations peoples experience today. The relationship between First Nations peoples and colonising governments has been fraught at times because of policies designed to assimilate them into white society, such as the Stolen Generations in Australia (the practices of removing Aboriginal children from their parents and placing them with white families or institutions in an effort to achieve 'assimilation') [15–17]. Colonial mistreatment has also profoundly affected health disparities in other countries, where historical injustices, including forced displacement, cultural assimilation policies, and systemic racism, have led to long-lasting socioeconomic and health inequalities [18,19]. These injustices have fostered a pervasive mistrust in healthcare systems and institutions, which have struggled to provide adequate and culturally sensitive care [18,19].

These injustices are the backdrop against which we locate this systematic review that aimed to examine strategies to address COVID-19 vaccine hesitancy among First Nations peoples. It identified strategies to address vaccine hesitancy, examined delivery methods and formats and investigated if and why certain strategies were successful. We did not use the term 'vaccine hesitancy' as a way to blame individuals for their doubt, but respectfully, acknowledging the complex origins of COVID-19 vaccine

hesitancy in First Nations peoples, along with efforts to address it. As First Nations peoples are often disproportionately affected by infectious diseases, such as COVID-19, it is important to understand the strategies to address vaccine hesitancy among First Nations peoples. Lessons learned from the COVID-19 pandemic can, and should inform future pandemic planning efforts.

Methods

An initial rapid review of strategies to address COVID-19 vaccine hesitancy among First Nations peoples was conducted in December 2021–February 2022, with findings reported in February 2022 [20]. This subsequent systematic review was undertaken to synthesize all relevant studies between 2020 and 2023. During the pandemic, a review team was assembled containing members with a variety of methodological and content expertise. A key review member (KC), who has extensive knowledge of administering, managing, and strategically planning culturally safe, strength-based immunisation programmes for Aboriginal and Torres Strait Islander peoples was involved to ensure that First Nations views were represented throughout the review. The protocol for this review was prospectively registered in PROSPERO [CRD42022350739].

Information sources

The following key bibliographic databases were searched by an information specialist (CK) to locate items for this review: OVID MEDLINE (including Epub Ahead of Print, In-Process & Other Non-Indexed Citations) (1946–23 August 2023), OVID EMBASE (1974–28 August 2023), OVID Global Health (1910–Week 34 2023), OVID PsycINFO (1806–August Week 3 2023), CINAHL via EBSCO (1982–1 September 2023) and the Informit Health Collection September 2023 (including A+Education, AGIS Plus Text, Asia Collection, Australian Public Affairs (APAF), Business Collection, EduTV, Engineering Collection, Families & Society Collection, Health Collection, Humanities & Social Sciences Collection, Indigenous Collection, Literature & Culture Collection, New Zealand Collection and TVNews).

As per suggested practice [24], a series of initial scoping searches were undertaken and the retrieval from these was assessed to locate additional searching terms. This process identified the specific First Nations peoples terms used in the review, which were used in combination with broader terms representative of all First Nations peoples to ensure comprehensive retrieval. Search terms included both controlled vocabulary terms (where available) and textwords representing the following key conceptual domains: COVID-19/SARS-COV 2, Immunization,

Vaccines, Patient Acceptance of Health Care, Health Knowledge, Attitudes and Practice, Vaccination Refusal, Health Promotion, Health Education, Patient Education, Continuing Education, Communication, Leadership, Peer Influence, Indigenous Health Services and Government and Healthcare Financing. For this study, First Nations peoples refer to Indigenous communities that predate colonial influences on their territories globally. These communities are characterised by unique cultural traditions, languages, and historical continuity with their ancestral lands. A broad approach to searching was used to account for over 5000 distinct Indigenous groups across the world. The full search strategy including all variant terms used is available in [Appendix A](#). No language limits were applied. The searches were date limited from 1 January 2020.

The reference lists of included articles were also searched to identify any additional items for inclusion. Grey literature reports and key websites were identified through Google Scholar and in consultation with content experts. The final search was conducted on 1 September 2023.

Study selection (inclusion/exclusion)

Before starting the article selection process, duplicate citations obtained from different databases were removed. Items were included in this review if they included primary data that discussed COVID-19 vaccine hesitancy in First Nations peoples combined with strategies used to tackle COVID-19 vaccine hesitancy within the defined populations. All study types were included. No language limits were applied, and any non-English items were translated using Google Translate. No country limits were applied.

Studies were excluded if they did not discuss COVID-19 vaccine hesitancy, First Nations peoples or strategies used to address vaccine hesitancy. Descriptive studies that looked at risk factors for hesitancy and provided recommendations about possible strategies but did not implement strategies were excluded. Commentaries, letters, and news items were excluded. Studies were only included if they contained sufficient data for extraction.

Data collection process

Two independent screeners (AT and MR) screened titles and abstracts against the study selection criteria. Full-text papers of citations of interest were then read to select papers suitable for inclusion. Two independent reviewers (AT and MR) screened the items and independently recorded reasons for inclusion and exclusion. Individual judgements and disagreements were discussed and resolved in regular meetings between AT, MR, CK, and KC.

Data extraction

Two researchers (AT and MR) independently extracted the following data from the studies: First author, year of publication, publication date, the study aims, study design, study setting, study population, the date range for study data collection, strategies, the author identified limitations, and funding source. Snowballing to identify further studies for inclusion was conducted. Extracted data were tabulated, and results were presented as reported in the studies.

Quality assessment

The quality of all included studies was initially assessed by one reviewer (AT) using the Joanna Briggs Institute Critical Appraisal tools appropriate to the methodologies used in the included studies [25]; the checklist for qualitative research, quasi-experimental studies, and textual evidence: narrative [21]. This was further reviewed by two other reviewers (MR and CK). Data were not excluded based on study quality.

Data analysis

All data were synthesised narratively to identify strategies for addressing COVID-19 vaccine hesitancy, specifically within First Nations populations. One reviewer (AT) conducted data analysis in consultation with two reviewers (MR and CK). JL assisted with initial review of themes. KC and JL provided further feedback, oversight, and inputs into the analysis.

Results

Identification and selection of studies

The search yielded 1,828 records; of these 831 were duplicates and subsequently removed. The remaining 997 records were screened, and 918 records were excluded. We assessed the full text of 79 articles, with 62 excluded after applying inclusion and exclusion criteria. There were 17 included studies. As per PRISMA guidelines, the flow diagram is shown in [Figure 1](#).

Characteristics of the studies

Of the seventeen included studies, nine were from the USA, three were from Australia, three were from Canada, and two were from Guatemala. Four were mixed-methods studies, three were observational studies, seven were qualitative studies, two were pre-post studies, and one was a case study. These are summarised in [Table 1](#).

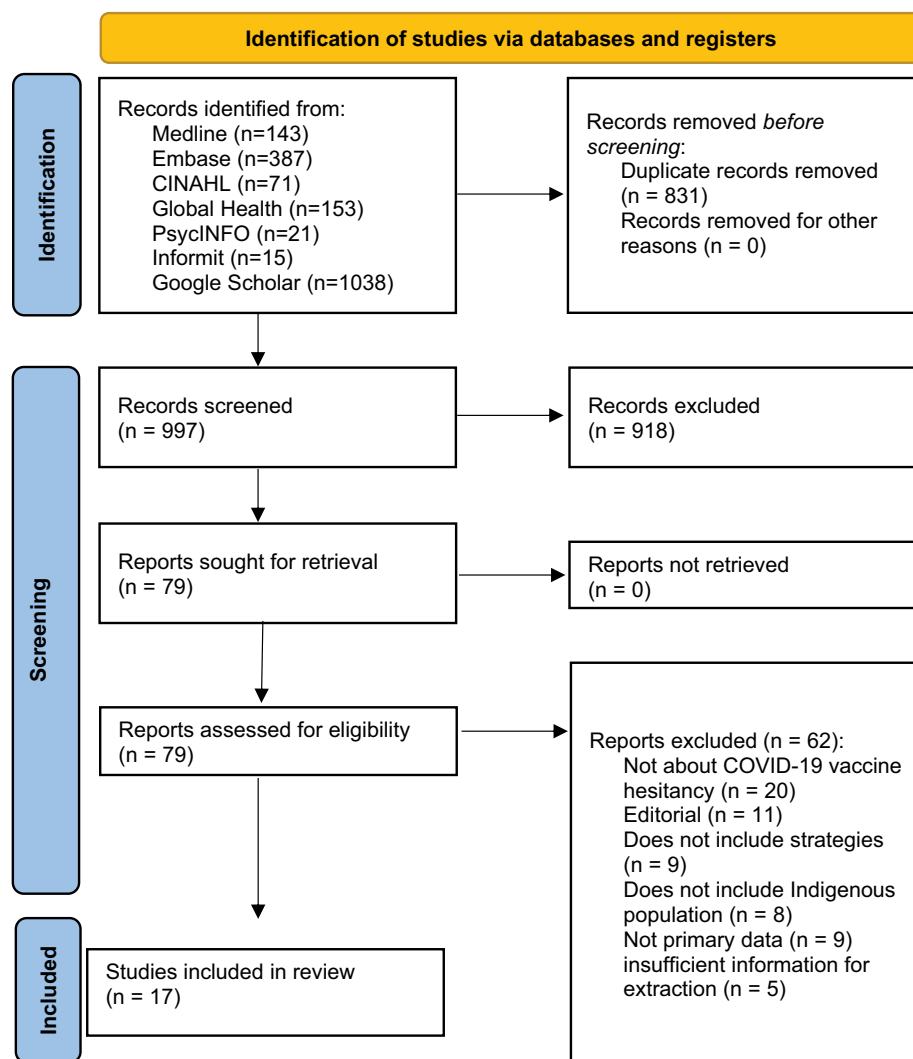


Figure 1. Flow diagram of the selection process.

Principal findings

Five key strategies were identified to address hesitancy and attempt to address COVID-19 vaccination hesitancy and increase vaccine uptake among First Nations communities.

Understanding communities' needs

Implementors gathered information to understand the concerns of communities to tailor strategies. Methods included virtual town halls or community forums that ensured bidirectional communications where attendees could pose questions [22,23,25]; in-depth interviews, or focus group discussions with communities and key groups such as youths and parents [22,26]; surveys of trusted members of the communities; and community meetings or consensus panels [22,27]. For example, in California, a town hall session featured an Indigenous and Native American physician and physician-in-training to answer questions about the COVID-19 vaccines and SARS-CoV-2 variants. Bilingual and bicultural presenters received positive feedback from the community members, who felt comfortable and safe

to seek further information because they were communicating in their native language [22]. Similarly in Guatemala, researchers used a qualitative human-centred design approach via key informant interviews and focus groups to better understand COVID-19 vaccination barriers among Guatemalan Indigenous populations. Subsequently, the findings from the research informed the development of a social media campaign [26].

Collaborating with communities

The need to collaborate with targeted communities for planning and implementation was evidenced in several studies. Interagency collaboration was noted as a strategy [22,28–31]. Collaborating directly with communities and organisations provided better information access and ensured that strategies could be co-designed appropriately [28]. Community members spearheaded activities to integrate creative, respectful, and appropriate ways of information sharing, which built trust in the vaccine messages [22,32].

For example, in Australia, the National Aboriginal Community Controlled Health Organisation arranged

Table 1. Summary of studies.

Authors	Year	Country	Aims	Study design	Study population	Study settings	Data collection	Strategies
AuYoung et al.	2022	USA	To demonstrate successful approaches in communicating with diverse communities and address challenges for COVID-19 vaccination uptake.	Mixed-methods	Latino/x, Black/African Americans, Native Hawaiian and Pacific Islanders, Indigenous populations, Asian Americans and people in high-risk occupations.	Urban and rural	September 2020	Information gathering with bidirectional communication methods. Outreach in-person and via telephone using existing networks. Communication using trusted messengers in partnership with communities.
Aylsworth et al.	2022	Canada	To investigate challenges and solutions for obtaining COVID-19 vaccines among ethnic minorities in Canada.	Qualitative study	Ethnic minorities groups (Arab, Black, East Asian, Latin American, South Asian, and West Asian) or Indigenous identities (First Nations, Métis, and Inuit Peoples within Canada).	Unspecified	Spring 2021 (Canada)	Enhancing accessibility of information by offering translations of important information to Indigenous languages.
Blaxland et al.	2021	Australia	To offer evidence that backs community and other approaches using strength-based approaches among First Nations peoples in Australia.	Qualitative method	People who identify as Aboriginal or Torres Strait Islander in the urban study area.	Urban	February 2021	Vaccine messages specific to Aboriginal audiences that focused on: - Building confidence in the scientific technology of the vaccine - Clarifying the viral genetic material used in the vaccine - Providing accurate information about the risk of vaccine side effects.
Chan et al.	2022	USA	To assess the feasibility of using various community interventions to increase COVID-19 vaccine uptake.	Observational study	Unvaccinated/partially vaccinated Indigenous employees in the state's health system.	Unclear	August 2021–October 2021	Vaccine education and outreach team with similar cultural backgrounds. Virtual town halls to provide credible information and allow for questions to be answered. Staff huddles to educate employees, with departments with low vaccination rates identified and targeted. Written educational material to address concerns raised in the town hall. Vaccination stations with walk-up options.
Epperson et al.	2022	USA	To investigate COVID-19 vaccine decision-making with First Nations peoples in Los Angeles to gain deeper insights into vaccine perceptions and formulate effective strategies.	Qualitative study	Native American residents in Los Angeles County. Prioritised outreach to and recruitment of individuals from groups with high risk of COVID-19 morbidity and mortality.	Urban	3 December 2020–21 January 2021	Tailoring information and outreach for urban Native American communities.
Fredericks et al.	2022	Australia	To explore the influence of conspiracies on vaccination rates among some First Nations peoples in Australia and find effective ways to stop misinformation.	Mixed-methods	Indigenous and non-Indigenous stakeholders from the Indigenous health sector and Aboriginal Controlled Community Health Organisations.	Urban	2021	Collaborating with trusted community sources to disseminate credible information. Supporting Indigenous workforce with greater resourcing. Strengthening interagency collaboration. Addressing systemic, underlying social and health gaps. Ensuring Indigenous representation across all levels overseeing the implementation of strategies.

(Continued)

Table 1. (Continued).

Authors	Year	Country	Aims	Study design	Study population	Study settings	Data collection	Strategies
Ignacio et al.	2022	USA	To describe the outcome of community engagement for COVID-19 vaccination using focus groups to understand vaccine hesitancy and confidence.	Mixed-methods	Adults aged 18 years or older who identify as a member of the African-American/Black American, Indian/Alaska Native, and Hispanic/Latinx communities residing in Arizona.	Urban and rural	February 2021–August 2021	Using community-based testimonials from community and religious leaders who have received the COVID-19 vaccine. Tailoring messaging for each community. Grounding vaccine messages in the acknowledgement of harmful legacies from the past and current medical and research-related abuses.
Kerrigan et al.	2023	Australia	To investigate the methods used to produce COVID-19 videos for First Nations peoples and provide an assessment of their effectiveness.	Qualitative study	First Nations leaders and Elders in Northern territory. Clinical professionals, health promotion workers, interpreters, artists, language centre workers, members of an Infectious Diseases Indigenous Reference Group, and First Nations trainees aged between 19 and 26 years old.	Urban and rural	3 March 2021–28 October 2021	Messages developed were tailored to address First Nations perspectives. Ensuring information provided was consistent across diverse communities. Tailored briefing documents in plain English. Providing locally relevant vaccine resources, in eight languages, with speakers who were recognisable to the community. Co-design process with Elders in the development and review of materials. Materials distributed through community partnership.
King et al.	2022	Canada	To explain the strategy employed in a collaboration between a provincial healthcare provider and an immunisation clinic led by Canada's First Nations peoples.	Observational study	First Nations communities and Métis settlements.	Urban	March 2021	Virtual community forum for information and question-answer session with Indigenous health professionals. Local Indigenous-led COVID-19 vaccine clinic with low-barrier and locally controlled.
Le-Morawa et al.	2022	USA	To describe the COVID-19 epidemic and vaccine rollout of the San Carlos Apache Tribe.	Observational study	Sam Carlos Apache Tribe.	Rural	May 2020 – February 2021	Preparing in advance for vaccination roll-out prior to vaccine approval. Featuring Tribal leaders who have been vaccinated on social media. Delivering educational materials in various languages. Enhancing vaccine accessibility through offering different locations.
Miguel et al.	2022	Guatemala	To assess the effect of a social media initiative on vaccination acceptance in First Nations peoples in rural areas of the Guatemalan Central Highlands.	Pre-post intervention design	Guatemalan Indigenous populations.	Urban and rural	March–April 2022	Using qualitative human-centred design to better understand COVID-19 vaccination barriers. Findings from qualitative research informed development of social media campaign. Narration of videos provided by local voice talent. Community engagement through partnership with Wuqu' Kawoq communities.
Sears et al.	2022	USA	To assess First Nations peoples' understanding, familiarity, concerns, and perspectives on COVID-19 vaccine acceptance in Arizona, develop culturally appropriate strategies, and evaluate its impact on awareness, trust, and willingness to vaccinate.	Pre-post test	Community members from three Arizona Native nations.	Urban and rural	April–November 2021	Employing reliable communicators for COVID-19 health information. Employing consensus panel approaches to customise and refine educational resources.

(Continued)

Table 1. (Continued).

Authors	Year	Country	Aims	Study design	Study population	Study settings	Data collection	Strategies
Skinner et al.	2023	Guatemala	To understand the First Nations Maya population's perceptions of the COVID-19 vaccine in Guatemala's Central Highlands and explore appropriate strategies to increase uptake.	Qualitative studies	Indigenous men and women and physicians.	Urban and rural	November 2021	Story telling by vaccinated community members to enhance vaccine safety. Appropriate religious and cultural messages employed using trusted faith and religious leaders. Linguistically and culturally appropriate messages with tailored images for First Nations communities. Appealing messages designed to resonate with individuals with limited literacy skills. Using trusted sources for health messaging for Indigenous community members.
Sullivan et al.	2023	Canada	To explore vaccine hesitancy among First Nations peoples in Saskatchewan, strategies to address it, and the impact of historical colonialism and contemporary societal influences.	Mixed-methods	First Nations community in Saskatchewan.	Unclear	January and February 2022	Engaging community Elders to participate in ceremonial blessings for the vaccine. Partnering with communities to advocate for vaccination and co-create messaging strategies. Supporting Indigenous communities in developing their own solutions. Creating messaging that is not polarising vaccine confident and vaccine hesitant people.
Tutt et al.	2022	USA	To develop intervention that was designed to utilise trusted health messengers in Navajo Nation as an effective means to address COVID-19 vaccine concerns and hesitancy.	Qualitative study	Native American residents in Los Angeles County. Prioritised outreach to and recruitment of individuals from groups with high risk of COVID-19 morbidity and mortality.	Rural	N/A	Employing a consensus panel comprising of community health representatives and Indigenous students to create and evaluate education materials. Educating Indigenous college students with culturally relevant materials to empower them as health advocates delivering vaccine safety information.
Wong et al.	2023	USA	To describe the partnership between the Mashpee Wampanoag Tribe and CDC I epidemiology, case probing, contact tracing, infection prevention, community prevention tactics, and vaccination efforts.	Case Study	Mashpee Wampanoag Tribe.	Unclear	June 2020-December 2021	Starting preparatory measures to enhance vaccination initiatives and public awareness campaigns. Issuing proactive public announcements ahead of vaccine availability. Collaborating with community to conduct COVID-19 vaccine education sessions.
Zhou et al.	2022	USA	To perform formative research to guide the creation of a public health initiative designed to advocate for preventive actions and enhance COVID-19 vaccinations among ethnic minorities in the USA.	Qualitative studies	Participants between 18–89 years old, self-identified as Latino American, African American or Black, American Indian or Alaska Native that speak either English or Spanish.	Urban	29 October and 24 November 2020	Including different cultural practices in prevention messages. Preferring positive messaging to give hope that pandemic would end eventually. Translating messages into tribal language to make messages more relevant to their culture.

meetings with Aboriginal church leaders to discuss vaccine misinformation and strategies to unite faith-based medical messaging [29]. In California, trusted messengers communicated with the community in person and via phone through existing networks to share resources and information, demonstrate that vaccines are part of the pandemic mitigation plan, and help make vaccine appointments [22]. In Massachusetts, the US Centers for Disease Control and Prevention (USCDC) and community leaders from the Mashpee Wampanoag Tribe worked together in organising and running a COVID-19 vaccine information session to tackle misinformation and misunderstanding [28]. In Arizona, researchers worked together with Indigenous college students to provide training with culturally centred materials to become health messengers providing vaccine safety education [27].

Another strategy was ensuring that vaccination clinics were locally available and controlled by the community to ensure a respectful, and culturally appropriate vaccination experience [25,28]. For example, in Alberta, Canada, COVID-19 vaccine clinics were led by Métis health professionals and were locally controlled by this community. Métis health professionals were available throughout the clinics to answer questions and ensure the vaccination clinics were culturally safe [25]. Communities highlighted that the provision of a locally run COVID-19 vaccine clinic made a positive contribution to vaccine-decision-making [25].

Tailored messaging

Tailored messaging within vaccination campaigns was an integral strategy highlighted within the studies. Tailored messaging focused on vaccine acceptability, efficacy, and safety by providing accessible scientific information [32]. Testimonials from trusted community members such as local leaders, elected officials, elders, religious leaders, or other community members who received the COVID-19 vaccine substantiated this messaging [22,23,28,33]. Messaging strategies also addressed any practical barriers to vaccination experienced by the community, including eligibility, access, and cost [32].

Implementors also tailored the content of the messaging according to the needs and preferences of different First Nations peoples. This involved using familiar faces, cultural practices, and cultural references integrated into the messaging [22,34]. This also included dissemination using trusted health messengers or using media platforms that resonated with the community. A common strategy was to create messaging in the language of the First Nations communities [31,34–36]). Different modes of communication were used, with audience segmentation to tailor messaging

according to the needs and preferences of different First Nations communities [23]. For example, in Alberta, Canada, question-and-answer sessions were held with Métis health professionals as trusted messengers in the community [25]. Messages from First Nations health professionals which were tailored to specific regions or settlements were an effective means to disseminate credible and appropriate information about the vaccine [25].

Acknowledging underlying systemic traumas and social and health gaps

First Nations peoples are disproportionately affected by chronic disease, inadequate housing conditions, and a lack of access to healthcare. Historical and contemporary abuse and trauma experienced by First Nations peoples has contributed to a culture of mistrust and vaccine hesitancy [28,33]. Thus, any strategy should include consideration of the experiences of racism and historical mistreatment of First Nations peoples in the active colonisation process. One strategy highlighted by an included study in Aboriginal communities in New South Wales (NSW) was anchoring vaccine messages in the acknowledgement of the harmful legacies from past and current medical and research mistreatments that communities may have experienced [33]. This was echoed in another study in Western Australia whereby a First Nations community leader talked through community concerns in a manner that acknowledged the impact of trauma from historical policies such as the Stolen Generations and the understandable mistrust that has come from it while reiterating the importance of COVID-19 vaccination [28].

Early logistics planning

Along with other interventions, two studies noted effective planning of interventions and logistics as a strategy. They described how careful planning is needed to ensure that strategies with the aim of reducing vaccine hesitancy are developed and ready for when the roll-out begins, and that planners anticipate operational issues that may otherwise hinder or create difficulty in accessing vaccination [29,35]. Wong et al. described how the Mashpee Wampanoag Tribe collaboration with the USCDC involved early planning between tribal, local, and state vaccination activities. They pre-emptively released public statements and began their campaign before the COVID-19 vaccine was available, thereby pre-empting vaccine hesitant messaging [29]. A similar strategy was described in Le-Morawa et al., where there was advance planning for the vaccine roll-out before it was approved. Community education began six weeks before the COVID-19 vaccine introduction in the San Carlos Apache Tribe

[35]. Services were made more convenient through the use of on-site, drive-through, pop-up, and door-to-door vaccination [35].

Discussion

This systematic review synthesised available evidence of strategies to address hesitancy and increase COVID-19 vaccination uptake among First Nations peoples. To our knowledge, this is the only systematic review examining this topic and builds on our initial rapid review. We identified several strategies across Australia, the USA, Canada, and Guatemala: understanding communities' needs, collaborating with communities, tailored messaging addressing underlying systemic traumas and social health gaps, and early planning and early logistics planning. This review provides valuable insights into strategies policymakers, practitioners, and community leaders can implement to work with First Nations peoples for the long-term management of COVID-19 and other new vaccine programmes in the future. It is particularly relevant to pandemic planning and could be considered as a form of community engagement as per the activities of Joint External Evaluations [37] and Global Preparedness Monitoring Board [38].

Importantly, the findings in this review highlight the need to address the systemic causes of health inequities that resulted in First Nations peoples' vulnerability to the disease and vaccine hesitancy [39]. Stemming from the longstanding and continuing impacts of colonisation, physical, social, and mental health inequalities are amplified by the exclusion of First Nations peoples from mainstream health services [40]. Even prior to the pandemic, First Nations peoples often reported being unable to access adequate healthcare or have their health needs effectively met [25,41]. Addressing systemic issues and building trust in health services is key to improving health outcomes and ensuring the safety of First Nations peoples in health emergencies. Strategies to address hesitancy, often focusing on good communication, must also go hand-in-hand with those that ensure services are accessible and culturally respectful. Good communication should prioritise transparency, empathy, and respect for patient autonomy. Providing clear, evidence-based information while responsively addressing concerns can enhance trust and acceptance [42,43].

Indigenous-controlled healthcare services support this approach. They have played an important role in the treatment and management of disease, prevention, and health promotion, and addressing the social determinants of health to redress existing health inequities [25,28,39]. This service delivery model is characterised by accessible health services, community involvement, a culturally appropriate and skilled

workforce, self-determination, and empowerment, along with multidisciplinary collaboration [41]. This requires the investment of time, attention, and funding to ensure sufficient and sustainable resources to strengthen existing capacity in First Nations peoples [44].

Ensuring that First Nations peoples are empowered to have self-determination in healthcare decisions is key among the strategies identified through the systematic review, as it is a cross-cutting theme across the strategies. Locally led, holistic, comprehensive, tailored, and culturally appropriate strategies have effectively increased vaccination coverage among First Nations peoples [22–25,45,46]. Leadership from First Nations peoples has promoted better outcomes for First Nations peoples [22,23]. Such leaders are best placed to recognise the needs of the communities they serve, and to decide on, and develop culturally appropriate and effective strategies to increase vaccination coverage [45,46]. Further, they are also more likely to be able to mobilise support from their communities [45,46]. It is also important to couple self-determination with appropriate resourcing and equitable government policies [45].

Integral to the abovementioned strategies is the government's logistics planning. It is important to have early planning of the vaccine roll-out, combined with advanced preparation of messaging and community education. Issues around vaccine access and poorly planned vaccination campaigns invariably impact vaccine acceptance, as they allow for other messages to fill the void [47]. Barriers to vaccine access can be tackled in advance by implementing approaches to ascertain the unique barriers to vaccination experienced by First Nations peoples early in a vaccination campaign [47].

Recommendations

The COVID-19 pandemic presented considerable risk to First Nation peoples. Continued investment in strategies to address vaccine hesitancy will be beneficial for continued efforts in COVID-19 booster uptake [4,5] and to inform future pandemic planning efforts. Lessons learned from the COVID-19 pandemic will also have important implications for how First Nations peoples are supported in future public health crises. Strengthening First Nations-owned and led strategies to address vaccine hesitancy within their communities will require a paradigm shift to create an enabling environment in policy and practice. We highlight key strategies to support this structural change: active listening, collaboration with community, and tailored interventions, with self-determination as integral throughout.

This study has shown that research and policy-making in relation to First Nations peoples must

have an embedded relationship with First Nations peoples and advocates. This can involve a co-designing element implementing two-way communication and engagement with key representatives as partners rather than audiences to persuade or command [48]. Embedding First Nations voices in organisational decision-making is key to ensuring the longer-term goal of First Nations peoples in positions of power in government and health. One recent documented model in Australia involved reconstructing existing governance models to allow for respectful and meaningful space for Aboriginal peoples to co-design and co-share the governance of health service delivery [49]. Governments should also continue to invest in capacity building in First Nations health workforce. This could involve school-based traineeships and providing scholarship opportunities for university degrees. It could further involve supported processes for a more streamlined application.

Lastly, it will be important to ensure that lessons learned from implementing strategies can be documented, evaluated, and disseminated using First Nations-centred approaches [50,51]. Indigenous data sovereignty should also be placed at the heart of dissemination processes to ensure that the needs of First Nations stakeholders and practitioners are appropriately considered [52]. Many strategies to address vaccine hesitancy take place in community-based settings. Health practitioners are often met with challenges in writing for publication which can limit the reach of lessons learned [53–55]. Collaboration with academic institutions may help to build capacity and support dissemination processes, along with having sufficient time to do so.

Central to all strategies is to both acknowledge and address the underlying systemic traumas and social and health gaps in the design of strategies to overcome vaccine hesitancy. Health systems issues must be addressed so that First Nations peoples are not disproportionately affected by COVID-19 or other emerging infectious diseases.

Strengths and limitations

A strength of this review is that First Nations perspectives ground the findings and recommendations. At the time of writing this review, KC was the National Indigenous Immunisation Coordinator at the National Centre for Immunisation Research and Surveillance (NCIRS), Australia. KC has extensive knowledge of administering, managing, and strategically planning immunisation programmes for Aboriginal and Torres Strait Islander peoples in Australia. KC has expertise in programmes that benefit Aboriginal and Torres Strait Islander peoples using community methodologies and qualitative research methodologies.

A limitation of this review is that our inclusion and exclusion criteria limit the findings to peer-reviewed and grey literature. The emergency nature of the COVID-19 vaccination roll-out may have affected the time and ability of researchers, policy-makers, and implementers to write publications that fit within the systematic review methodology [53]. Strategies not written into a peer-reviewed publication or grey literature reports may have been developed and employed. Thus, whilst we employed a systematic approach to best find relevant studies, there may be other undocumented strategies to reduce vaccine hesitancy in First Nations peoples. Further, despite a robust search approach including the use of variant search terms, specific terms for every one of the over 5,000 First Nations peoples globally were not included, thus the study may possibly have missed articles that did not define the study population broadly within the search terms set out in [Appendix A](#). It is also possible that First Nations peoples are not a policy priority in certain countries, and therefore studies are not conducted or published.

The review found mostly observational and qualitative studies. These provided valuable insights, often rich in detail and context, but were less able to quantitatively evaluate the effectiveness of interventions. The heterogeneous nature and methodological limitations of these studies may restrict the extent to which conclusions can be generalised. The heterogeneity of First Nations peoples limits generalisation because, despite shared experiences of colonisation, each community maintains its distinct identity, stories, strengths, and challenges. Recognising this diversity is crucial for understanding the unique cultural, social, and historical contexts of First Nations peoples globally. Nevertheless, the findings tie in with broader evidence on strategies to address hesitancy. It finds that, while direct communication or informational interventions alone have limited effects on uptake, community engagement is effective. Moreover, such an approach is imbued with justice, respect, and self-determination, which are key elements of justice for First Nations peoples.

Conclusion

The inclusion of First Nations-centred strategies to reduce COVID-19 vaccine hesitancy is essential to ensuring an equitable pandemic response. This systematic review found a common set of strategies around understanding communities' needs, collaboration with communities, tailored messaging, logistics planning, and addressing the underlying systemic traumas experienced by First Nations peoples when accessing healthcare. Implementing these strategies in the continued effort to vaccinate against COVID-19 and potentially for other outbreaks is integral to ensuring

that First Nations peoples are not disproportionately affected by infectious diseases. These strategies should be considered in future pandemic planning efforts.

Acknowledgments

An initial rapid review was brokered by the Sax Institute for the NSW Ministry of Health and reported in February 2022. The views expressed in this publication are those of the author(s) and not necessarily those of the Sax Institute or the NSW Ministry of Health.

Author contributions

CK, JL, KC, AT, and MR contributed to the review design. CK conducted searches. AT and MR independently screened title and abstracts, full-text, with any screening decision discrepancies resolved in consultation with KC and CK. AT and MR conducted data extraction. All authors were involved in the analysis of the data. AT prepared the initial draft manuscript and MR, KC, JL, and CK provided review comments. All authors approved of the final draft.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding information

The publication of this manuscript was supported by JL's National Health and Medical Research Council Investigator Grant 2010212: Behavioural and social science to close gaps in vaccination coverage.

ORCID

Adeline Tinessia  <http://orcid.org/0009-0001-2467-841X>
Madeleine Randell  <http://orcid.org/0000-0002-5264-5295>
Julie Leask  <http://orcid.org/0000-0001-5095-1443>
Catherine King  <http://orcid.org/0000-0002-1390-8013>

References

- [1] Paul E, Steptoe A, Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: implications for public health communications. *Lancet Reg Health - Eur*. 2021 Feb 1;1:100012. doi: [10.1016/j.lanepe.2020.100012](https://doi.org/10.1016/j.lanepe.2020.100012)
- [2] Larson HJ, de FA, Xiahong Z, et al. The state of vaccine confidence 2016: global insights through a 67-country survey. *EBioMedicine*. 2016 Oct 1;12:295–301. doi: [10.1016/j.ebiom.2016.08.042](https://doi.org/10.1016/j.ebiom.2016.08.042)
- [3] World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. [Internet.] World Health Organization. 2022 [cited 2022 May 29]. p. 98 Available from: <https://apps.who.int/iris/handle/10665/354459>
- [4] Choiseul JC, Emmerson PJ, Eslanloo Pereira T, et al. What can be learned from the early stages of the COVID-19 vaccination rollout in Australia: a case study. *Epidemiologia*. 2021 Dec;2:587–607. doi: [10.3390/epidemiologia2040040](https://doi.org/10.3390/epidemiologia2040040)
- [5] Donohue M, McDowall A. A discourse analysis of the Aboriginal and Torres Strait Islander COVID-19 policy response. *Aust N Z J Public Health*. 2021;45:651–657. doi: [10.1111/1753-6405.13148](https://doi.org/10.1111/1753-6405.13148)
- [6] Hengel B, Causer L, Matthews S, et al. A decentralised point-of-care testing model to address inequities in the COVID-19 response. *Lancet Infect Dis*. 2021 Jul;21:e183–90. doi: [10.1016/S1473-3099\(20\)30859-8](https://doi.org/10.1016/S1473-3099(20)30859-8)
- [7] Lau DT, Sosa P. Disparate impact of the COVID-19 pandemic and health equity data gaps. *Am J Public Health*. 2022 Oct;112:1404–1406. doi: [10.2105/AJPH.2022.307052](https://doi.org/10.2105/AJPH.2022.307052)
- [8] Yellow Horse AJ, Yang TC, Huyser KR. Structural inequalities established the architecture for COVID-19 pandemic among native americans in Arizona: a geographically weighted regression perspective. *J Racial Ethn Health Disparities*. [2022 Feb 1];9:165–175. doi: [10.1007/s40615-020-00940-2](https://doi.org/10.1007/s40615-020-00940-2)
- [9] Tai DBG, Sia IG, Doubeni CA, et al. Disproportionate impact of COVID-19 on racial and ethnic minority groups in the United States: a 2021 update. *J Racial Ethn Health Disparities*. 2021;9:2334–2339. doi: [10.1007/s40615-021-01170-w](https://doi.org/10.1007/s40615-021-01170-w)
- [10] Sullivan P, Starr V, Dubois E, et al. Where past meets present: Indigenous vaccine hesitancy in Saskatchewan. *Med Humanit*. 2023 Jun;49:321–331. doi: [10.1136/medhum-2022-012501](https://doi.org/10.1136/medhum-2022-012501)
- [11] Wang B, Nolan R, Marshall H. COVID-19 immunisation, willingness to be vaccinated and vaccination strategies to improve vaccine uptake in Australia. *Vaccines (Basel)*. 2021 Dec 11;9:1467. doi: [10.3390/vaccines9121467](https://doi.org/10.3390/vaccines9121467)
- [12] Kaufman J, Tuckerman J, Danchin M. Overcoming COVID-19 vaccine hesitancy: can Australia reach the last 20 percent? *Expert Rev Vaccines*. 2022 Feb 1;21:159–161. doi: [10.1080/14760584.2022.2013819](https://doi.org/10.1080/14760584.2022.2013819)
- [13] Gardner K, Bolt R, Doyle M, et al. Rapid qualitative assessment of COVID-19 health needs in urban sydney Aboriginal communities: report 1 Syd UNSW. 2021.
- [14] Dodd RH, Pickles K, Nickel B, et al. Concerns and motivations about COVID-19 vaccination. *Lancet Infect Dis*. 2021 Feb 1;21:161–163. doi: [10.1016/S1473-3099\(20\)30926-9](https://doi.org/10.1016/S1473-3099(20)30926-9)
- [15] McCalman J, Longbottom M, Fagan S, et al. Leading with local solutions to keep Yarrabah safe: a grounded theory study of an Aboriginal community-controlled health organisation's response to COVID-19. *BMC Health Serv Res*. 2021 Jul 23;21:732. doi: [10.1186/s12913-021-06761-1](https://doi.org/10.1186/s12913-021-06761-1)
- [16] Dimopoulos-Bick T, Follent D. Yarning with mob about COVID-19 vaccines [internet]. InSight+. 2021 [cited 2022 Mar 21]. Available from: <https://insightplus.mja.com.au/2021/39/yarning-with-mob-about-covid-19-vaccines/>
- [17] Australian Human Rights Commission. Bringing them home report (1997) | Australian Human Rights Commission [Internet.]. Canberra: Commonwealth of Australia; 1997 Apr [cited 2023 Feb 22]. <https://humanrights.gov.au/our-work/bringing-them-home-report-1997>
- [18] Schultz A, Nguyen T, Sinclair M, et al. Historical and continued colonial impacts on heart health of Indigenous peoples in Canada: What's reconciliation

- got to do with it? *CJC Open*. 2021 Sep 24;3:S149–64. doi: [10.1016/j.cjco.2021.09.010](https://doi.org/10.1016/j.cjco.2021.09.010)
- [19] Paradies Y. Colonisation, racism and Indigenous health. *J Popul Res*. 2016 Mar 1;33:83–96. doi: [10.1007/s12546-016-9159-y](https://doi.org/10.1007/s12546-016-9159-y)
- [20] Tinessia A, King C, Randell M, et al. The effectiveness of strategies to address vaccine hesitancy in Aboriginal and Torres Strait Islander peoples - Sax Institute - Sax Institute [Internet.]. 2022 [cited 2022 Aug 17]. (*An Evidence Snapshot brokered by the Sax Institute* (www.saxinstitute.org.au) for the NSW Ministry of Health). Available from: <https://www.saxinstitute.org.au/publications/evidence-check-library/the-effectiveness-of-strategies-to-address-vaccine-hesitancy-in-aboriginal-and-torres-strait-islander-peoples/>
- [21] Joanna Briggs Institute. Critical Appraisal Tools. Critical appraisal tools | JBI. 2023 [cited 2023 May 3]. <https://jbi.global/critical-appraisal-tools>
- [22] AuYoung M, Rodriguez Espinosa P, Chen WT, et al. Addressing racial/ethnic inequities in vaccine hesitancy and uptake: lessons learned from the Californiation alliance against COVID-19. *J Behav Med*. 2022;46:153–166. doi: [10.1007/s10865-022-00284-8](https://doi.org/10.1007/s10865-022-00284-8)
- [23] Chan DK, Alegria BD, Chadaga SR, et al. Rapid deployment of multiple tactics to address severe acute respiratory syndrome coronavirus 2 vaccine uptake in healthcare employees with a focus on those who identify as black, Indigenous, and people of color. *Open Forum Infect Dis*. 2022 Mar;9. doi: [10.1093/ofid/ofac012](https://doi.org/10.1093/ofid/ofac012)
- [24] Centre for Reviews and Dissemination. Systematic reviews: CRD's guidance for undertaking reviews in health care. The University of New York: Centre for Reviews and Dissemination; 2009
- [25] King KD, Bartel R, James A, et al. Practice report: an Alberta Métis model for COVID-19 vaccine delivery. *Can J Public Health*. 2022;113:81–86. doi: [10.17269/s41997-021-00603-7](https://doi.org/10.17269/s41997-021-00603-7)
- [26] Abascal Miguel L, Lopez E, Sanders K, et al. Evaluating the impact of a linguistically and culturally tailored social media ad campaign on COVID-19 vaccine uptake among Indigenous populations in Guatemala: a pre/post design intervention study. *BMJ Open*. 2022 Dec 13;12:e066365. doi: [10.1136/bmjopen-2022-066365](https://doi.org/10.1136/bmjopen-2022-066365)
- [27] Tutt M, Begay C, George S, et al. Diné teachings and public health students informing peers and relatives about vaccine education: providing Diné (Navajo)-centered COVID-19 education materials using student health messengers. *Front Public Health*. 2022 Dec 14;10:1046634. doi: [10.3389/fpubh.2022.1046634](https://doi.org/10.3389/fpubh.2022.1046634)
- [28] Fredericks B, Bradfield A, McAvoy S, et al. The burden of the beast: countering conspiracies and misinformation within Indigenous communities in Australia. *MC J*. 2022;25. doi: [10.5204/mcj.2862](https://doi.org/10.5204/mcj.2862)
- [29] Wong B, Andrews N, Hathaway A, et al. The mashpee wampanoag tribe COVID-19 pandemic response: a case study. *Health Secur*. 2023;21:222–232. doi: [10.1089/HS.2022.0158](https://doi.org/10.1089/HS.2022.0158)
- [30] Skinner NA, Sanders K, Lopez E, et al. Barriers to COVID-19 vaccine acceptance to improve messages for vaccine uptake in Indigenous populations in the central highlands of Guatemala: a participatory qualitative study. *BMJ Open*. 2023 Jan 27;13:e067210. doi: [10.1136/bmjopen-2022-067210](https://doi.org/10.1136/bmjopen-2022-067210)
- [31] Kerrigan V, Park D, Ross C, et al. Countering the “wrong story”: a participatory action research approach to developing COVID-19 vaccine information videos with first nations leaders in Australia. *Humanit Soc Sci Commun*. 2023 Aug 4;10:1–12. doi: [10.1057/s41599-023-01965-8](https://doi.org/10.1057/s41599-023-01965-8)
- [32] Blaxland M, Bryant J, Gardner K, et al. Rapid qualitative assessment of COVID-19 health needs in urban sydney Aboriginal communities: report 2. 2021.
- [33] Ignacio M, Oesterle S, Mercado M, et al. Narratives from African American/Black, American Indian/Alaska native, and Hispanic/Latinx community members in Arizona to enhance COVID-19 vaccine and vaccination uptake. *J Behav Med*. 2022;46:140–152. doi: [10.1007/s10865-022-00300-x](https://doi.org/10.1007/s10865-022-00300-x)
- [34] Zhou S, Villalobos JP, Munoz A, et al. Ethnic minorities' perceptions of COVID-19 vaccines and challenges in the pandemic: a qualitative study to inform COVID-19 prevention interventions. *Health Commun*. 2022 Nov;37:1476–1487. doi: [10.1080/10410236.2022.2093557](https://doi.org/10.1080/10410236.2022.2093557)
- [35] Le-Morawa N, Kunkel A, Darragh J, et al. Effectiveness of a COVID-19 vaccine rollout in a highly affected American Indian community, San Carlos Apache Tribe, December 2020–February 2021. *Public Health Rep Wash DC* 1974. 2023;138:23S–29S. doi: [10.1177/00333549221120238](https://doi.org/10.1177/00333549221120238)
- [36] Aylsworth L, Manca T, Dubé È, et al. A qualitative investigation of facilitators and barriers to accessing COVID-19 vaccines among racialized and Indigenous peoples in Canada. *Hum Vaccines Immunother*. 2022 Nov 30;18:2129827. doi: [10.1080/21645515.2022.2129827](https://doi.org/10.1080/21645515.2022.2129827)
- [37] World Health Organization. Joint external evaluation tool: international health regulations (2005) - third edition [Internet.]. Geneva: World; 2022 [cited 2023 Dec 15]. Available from: <https://www.who.int/publications-detail-redirect/9789240051980>
- [38] A Fragile State of Preparedness: 2023 Report on the State of the World's Preparedness [Internet.]. Global preparedness monitoring board. Geneva: World Health Organization; 2023 [cited 2024 Mar 25]. Available from: <https://www.gpmb.org/reports/m/item/a-fragile-state-of-preparedness-2023-report-on-the-state-of-the-worlds-preparedness>
- [39] Fitzpatrick K, Sehgal A, Montesanti S, et al. Examining the role of Indigenous primary healthcare across the globe in supporting populations during public health crises. *Glob Public Health*. 2022;18. doi: [10.1080/17441692.2022.2049845](https://doi.org/10.1080/17441692.2022.2049845)
- [40] Horrill T, McMillan DE, Schultz ASH, et al. Understanding access to healthcare among Indigenous peoples: a comparative analysis of biomedical and postcolonial perspectives. *Nurs Inq*. 2018;25:e12237. doi: [10.1111/nin.12237](https://doi.org/10.1111/nin.12237)
- [41] Harfield SG, Davy C, McArthur A, et al. Characteristics of Indigenous primary health care service delivery models: a systematic scoping review. *Glob Health*. 2018 Jan 25;14:12. doi: [10.1186/s12992-018-0332-2](https://doi.org/10.1186/s12992-018-0332-2)
- [42] Avelino-Silva VI, Ferreira-Silva SN, Soares MEM, et al. Say it right: measuring the impact of different communication strategies on the decision to get vaccinated. *BMC Public Health*. 2023 Jun 16;23:1162. doi: [10.1186/s12889-023-16047-2](https://doi.org/10.1186/s12889-023-16047-2)
- [43] Valley TS, Scherer AM, Knaus M, et al. Prior vaccination and effectiveness of communication strategies

- used to describe infectious diseases. *Emerg Infect Dis.* 2019 Apr;25:821–823. doi: [10.3201/eid2504.171408](https://doi.org/10.3201/eid2504.171408)
- [44] Haroz EE, Kemp CG, O’Keefe VM, et al. Nurturing innovation at the roots: the success of COVID-19 vaccination in American Indian and Alaska native communities. *Am J Public Health.* 2022;112:383–387. doi: [10.2105/AJPH.2021.306635](https://doi.org/10.2105/AJPH.2021.306635)
- [45] Clark TC, Best O, Wilson D. COVID-19 among Indigenous communities: case studies on Indigenous nursing responses in Australia, Canada, New Zealand, and the United States. *Nurs Prax Aotearoa N Z.* 2021;71–83. doi: [10.36951/27034542.2021.037](https://doi.org/10.36951/27034542.2021.037)
- [46] Silberner J. Covid-19: how Native Americans led the way in the US vaccination effort. *The BMJ.* 2021 Sep 17;374. doi: [10.1136/bmj.n2168](https://doi.org/10.1136/bmj.n2168)
- [47] Attwell K, Hannah A, Leask J. COVID-19: talk of “vaccine hesitancy” lets governments off the hook. *Nature.* 2022;602:574–577. doi: [10.1038/d41586-022-00495-8](https://doi.org/10.1038/d41586-022-00495-8)
- [48] Schoch-Spana M. Equity in vaccination: a plan to work with communities of color toward COVID-19 recovery and beyond. Baltimore, Maryland: Bloomberg School of Public Health, Johns Hopkins University; 2021.
- [49] Crooks K, Tully B, Allan L, et al. Development and implementation of a shared governance model in a mainstream health unit: a case study of embedding aboriginal voices in organisational decision making. *Aust Health Rev.* 2021 Dec 23;46:178–184. doi: [10.1071/AH20369](https://doi.org/10.1071/AH20369)
- [50] Data Governance and Management Toolkit [Internet.]. Indigenous approaches to data and evaluation | DGMT - Data governance & Management toolkit. 2020 [cited 2023 Mar 8]. Available from: <https://indigenousdatatoolkit.ca/getting-started/indigenous-approaches-to-data-and-evaluation/>
- [51] Smith RL, Devine S, Preston R. Recommended methodologies to determine Australian Indigenous community members’ perceptions of their health needs: a literature review. *Aust J Prim Health.* 2020 Apr;26:95–103. doi: [10.1071/PY19078](https://doi.org/10.1071/PY19078)
- [52] Community First Development. Community First Development. Indigenous Data Sovereignty. Available from 2020 [cited 2023 Mar 8]. Available from: <https://www.communityfirstdevelopment.org.au/indigenousdatasovereignty>
- [53] Harvey H, Reissland N, Mason J. Parental reminder, recall and educational interventions to improve early childhood immunisation uptake: a systematic review and meta-analysis. *Vaccine.* 2015 Jun 9;33:2862–2880. doi: [10.1016/j.vaccine.2015.04.085](https://doi.org/10.1016/j.vaccine.2015.04.085)
- [54] Parsons M, Fisher K, Nalau J. Alternative approaches to co-design: insights from Indigenous/academic research collaborations. *Curr Opin Environ Sustain.* 2016 Jun 1;20:99–105. doi: [10.1016/j.cosust.2016.07.001](https://doi.org/10.1016/j.cosust.2016.07.001)
- [55] Coff K, Lampert J. Mentoring as two-way learning: an Australian first Nations/Non-Indigenous collaboration. *Front Educ.* 2019;4. doi: [10.3389/feduc.2019.00024](https://doi.org/10.3389/feduc.2019.00024)

Appendix A: Ovid MEDLINE search strategy

Database: MEDLINE(R) All including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) <1946-current>

Search Strategy:

```

1 exp COVID-19/
2 exp SARS-CoV-2/
3 ('2019 nCoV'2019 nCoV$'#8217; or 2019-nCoV$ or 2019nCoV$ or 'n CoV'n CoV$'#8217; or n-CoV$ or nCoV$).tw.
4 ('covid 19' or COVID-19 or covid19).tw.
5 ("Severe Acute Respiratory Syndrome Coronavirus 2" or "Severe Acute Respiratory Syndrome Coronavirus-2" or "SARS coronavirus 2" or
  "SARS coronavirus-2").tw.
6 ('SARS CoV2' or SARS-CoV2 or SARSCoV2 or SARS-CoV-2).tw.
7 1 or 2 or 3 or 4 or 5 or 6
8 exp Immunization/
9 exp Immunization Programs/
10 exp Vaccines/
11 (immuniz$ or immuniz$ or vaccin$).tw.
12 8 or 9 or 10 or 11
13 7 and 12
14 exp COVID-19 Vaccines/
15 13 or 14
16 exp 'Patient Acceptance of Health Care'/
17 exp Health Knowledge, Attitudes, Practice/
18 (attitude$ or knowledge$ or belie$ or view$ or opinion$ or thought$ or think$ or perceive$ or percepti$ or perspective$ or understand$ or
  prefer$ or practice$ or behav$ or trust$).tw.
19 exp Vaccination Refusal/
20 (hesitan$ or confiden$ or accept$).tw.
21 (strateg$ or plan$ or initiative$ or interven$ or effort$ or approach$ or polic$ or program$ or project$ or proposal$ or system$ or method$ or
  scheme$ or arrang$ or incentiv$ or implement$).tw.
22 exp Health Promotion/
23 exp Health Education/
24 exp Patient Education as Topic/
25 exp Education, Medical, Continuing/
26 (cme$ or cpd$).tw.
27 (promot$ or educat$ or inform$ or teach$ or taught).tw.
28 exp Communication/
29 communicat$.tw.
30 (messag$ or frame$ or framing or dialogue$).tw.
31 exp communications media/
32 exp video-audio media/
33 exp Webcasts as Topic/
34 (written or write or writing or text$ or audio$ or video$ or image or images or visual or visuals or visually or animat$ or cartoon$ or graphic$
  or tweet$ or post or posts or posting).tw.
35 (radio or radios or televis$ or tv or media or webpage$ or print$ or email$).tw.
36 (text adj1 messag$).tw.
37 (social adj1 media$).tw.
38 (podcast$ or webcast$ or webinar$ or broadcast$ or advertis$ or pamphlet$ or brochure$ or news or article$).tw.
39 inform$.tw.
40 yarn$.tw.
41 setting$.tw.
42 (safe$ adj4 place$).tw.
43 (clinic or clinics).tw.
44 exp Leadership/
45 (leader$ or champion$ or advocate$).tw.
46 exp Peer Influence/
47 peer$.tw.
48 exp Health Services, Indigenous/
49 exp Financing, Government/
50 exp Healthcare Financing/
51 (financial$ or fund$ or pay$ or paid).tw.
52 cash$.tw.
53 free$.tw.
54 reimburse$.tw.
55 allowance$.tw.
56 bonus$.tw.
57 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40
  or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56
58 15 and 17
59 exp Indigenous Peoples/
60 indigenous.tw.
61 (aborigin$ or torres strait or koori$).tw.
62 maori$.tw.

```

63 exp 'Native Hawaiian or Other Pacific Islander'/
64 exp Indians, North American/
65 exp Indigenous Canadians/
66 (eskimo\$ or inuit\$ or metis or aleut\$ or american indian\$ or native american\$ or tribal\$).tw.
67 (first adj1 (nation or nations)).tw.
68 (first adj1 people\$).tw.
69 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68
70 58 and 69
71 limit 70 to yr='2020 -Current'