

School-Delivered HPV Immunization in Indigenous Communities: A Scoping Review

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Abstract

Globally, Indigenous communities are challenged with a high burden of human papillomavirus-related diseases like cancer of the cervix. Despite the availability of a highly protective vaccine for HPV, it is evident that immunization levels with this vaccine are still low among these communities. Indigenous communities in several countries continue to experience poor health outcomes due to HPV infections. The HPV vaccine is administered to school-aged children in grades 6 to 10 depending on the province or territory in Canada. Since HPV immunizations are delivered via schools, a scoping review was conducted on published and grey literature in the US, Canada, and Australia to explore how school-based HPV immunization has been conducted and to delineate the causes of low HPV vaccine uptake in Indigenous communities. We found that schools located in remote areas with a high proportion of Indigenous students, high absenteeism rates, and lower socioeconomic brackets had the lowest uptake of HPV vaccine. When compared to their non-Indigenous peers, Indigenous students had lower initiation and completion rates for the HPV vaccine. Countries that captured the Indigenous status of individuals at vaccination points had better quality data of the immunization status of Indigenous communities. For the US and Canada, school and HPV immunization data in Indigenous communities is lacking.

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Introduction

There are about 400 million people of Indigenous ancestry in the world (Sarivaara et al., 2013). Indigenous communities are the original inhabitants of a region or country, who have continuously occupied that part of the world, usually before the onset of settler colonialism, and are distinct from the people currently living in their ancestral lands (Poirier et al., 2021; Sarivaara et al., 2013; Wildcat & Voth, 2023). They are the keepers of their special cultures and practices as well as being the expert environmental stewards of the land, water, and air resources of their territorial regions (Sarivaara et al., 2013). There are unique languages and cultures that define each Indigenous community, and even within these communities there are distinct intra-community differences.

The US, Canada, and Australia have different healthcare systems that determine how health services, including immunization, are delivered. Canada's health system is predominantly public paid, provided by the provinces and territories, or publicly delivered through local public health departments, while in the US there is a mix of both private and public healthcare delivery, with private health services being predominant (Cacace & Schmid, 2008). In Australia, health services are free, paid federally from public taxes and provided in public health facilities through the Medicare system (Dixit & Sambasivan, 2018). Childhood immunizations are provided free of charge to patients in Canada and Australia (Deslauriers et al., 2024). In the US, free vaccines are not universally available, as they are only given to eligible children (Salous et al., 2020). Eligibility for the US Vaccines for Children (VFC) include being American Indian or Native Alaskan, having no insurance or insufficient insurance, and being registered with Medicaid (Salous et al., 2020; US Centers for Disease Control, 2024).

Human papilloma virus (HPV) is the most common sexually transmitted infection, and it is the main causative agent of cervical cancer in women (Kashani et al., 2019; Kombe Kombe et al., 2020; Okunade, 2020). In addition, it is associated with many other cancers like penile, anal, vulval, vaginal, and some oropharyngeal cancers (Kombe Kombe et al., 2020; Salous et al., 2020), with cervical cancer being the most common of the HPV-related cancers (Okunade, 2020). There are over 200 HPV subtypes, with 15 subtypes considered high-risk. These high-risk subtypes are HPV-16, -18, -31, -33, -35, -39, -45, -51, -52, -56, -58, -59, -68, -73, and -82 (Okunade, 2020). HPV-16 and 18 are implicated in 70% of cancer cases, while the rest of the high-risk HPV subtypes cause another 30% of cervical cancer cases across all age groups globally (Caird et al., 2022).

About 70–90% of people become infected with HPV at least once in their lifetime, but most of these infections are promptly cleared by the body's immune system, with cancer risk increasing with longer exposure to high-risk HPV subtypes (Davies et al., 2021; Okunade, 2020; Poirier et al., 2021). The risk factors associated with incidence and prevalence of HPV infections and its related cancerous and non-cancerous diseases include early age at sexual debut, poverty, smoking, multiple sexual partners, men having sex with men, poverty, and low educational attainments (Kombe Kombe et al., 2020; Okunade, 2020).

People in low-income countries have a higher HPV prevalence than their counterparts in high-income countries, but intra-country variations in incidence and disease causation do exist within developed countries (Kombe Kombe et al., 2020; Poirier et al., 2021; Whop et al., 2021). Indigenous communities in the developed world have a higher burden of HPV-related lesions, but HPV vaccine has been shown to reduce the prevalence of these diseases in these communities, particularly genital warts, showing evidence that HPV vaccines confer equity in HPV-related disease control (Patel et al., 2018). HPV vaccines are delivered through schools in Canada and Australia (Davies et al., 2021; Stuart et al., 2008; Whop et al., 2021), while in the US it is through health facilities, with school immunization being delivered through school clinics in low-income localities (Paul & Fabio, 2014; Shakarchi & Collins, 2019; Zwiebel & Thompson, 2022).

Cervical cancer caused an average of 405 deaths per annum in Canada between 2015 and 2019, with women aged 50–54 years being the most affected, accounting for 21% of these deaths annually (Caird et al., 2022). There have been notable declines in cervical cancer mortality, due to increased utilization of screening and treatment services for cervical cancer (Caird et al., 2022) before HPV vaccines became available. In the US, as of 2020, there were 13,800 cervical cancer cases annually, resulting in 4,290 deaths every year (Buskwofie et al., 2020). At the same time, an estimated 942 new cervical cancer cases were diagnosed in Australia, leading to the death of 222 women (Government of Australia, n.d.).

Different ethnic groups in the US are exposed to sexually transmitted infections (STI). However, Blacks, Hispanic whites, and other racial minorities suffer a disproportionately higher incidence of STIs. Cultural and personal practices like new sexual partners, multiple sexual partners, and lack of condom use during sex increase the risk of STI acquisition, but there is no evidence that cultural differences explain the increased risk in ethnic minority groups (Moscicki et al., 2010). In addition, repeat infections by other STIs like chlamydia and gonorrhea, illicit drug use, younger age (15–21 years among Blacks), and having a symptomatic partner (Einwalter et al., 2005). Social determinants of health, particularly access to health services, are postulated to be the main driver of high incidence of STIs, including HPV, in ethnic minorities, as well as the role of the sexual networks of these individuals (Einwalter et al., 2005; Moscicki et al., 2010). In Australia, sexual behaviours and risks are affected by poverty, lack of access to health services, low academic achievement, and substance use, among other social determinants of health (MacPhail & McKay, 2018).

Adolescent sexual health in Indigenous communities is an area of recent research focus. Of note is the need to design sexual health education and intervention strategies that align with culturally accepted strategies like storytelling and privileging Indigenous knowledge. Respect, trust, and safety are the key tenets in Indigenous sexual education. A sexual education strategy and teen pregnancy prevention sexual education project called “Circle of Life Teen Pregnancy Prevention Intervention,” targeting Indigenous adolescents in British Columbia, Canada, resulted in increased condom use, use of contraceptives, and sexual education knowledge (Tingey et al., 2022). Delaying of sexual initiation among Indigenous youth as a strategy for combating STIs, and by extension teenage pregnancy, was shown to increase with the training (Tingey et al., 2022).

Australia began reporting the status report on HPV immunization in the Australian Immunization Register (AIR) in 2017 (Hull et al., 2019). Each person in the AIR register has a record of Indigenous status, including non-Indigenous, Indigenous, or unknown (Hull et al., 2019), allowing health record segregation according to ethnicity.

Research on school immunization for HPV among Indigenous communities is necessary to further understand the strategies and the ways they are structured and implemented. In addition, knowledge about the depth and scope of available research and policy documents will inform what further research is needed to fully explore HPV school immunization programs in Indigenous communities. Further, the findings of this scoping study can form the basis on how research in Indigenous school immunization in areas outside the US, Canada, and Australia can be improved.

Methods

Research questions for this review included:

1. What amount of literature is available on Canadian, US, and Australian school immunization among Indigenous communities?
2. What are the major themes of successful HPV vaccination efforts in these studies?
3. What gaps are there in current research on Indigenous HPV school immunization in Canada, the US, and Australia?

The purpose of this scoping review was to find out the available literature on HPV immunization among Indigenous communities provided through schools in the US, Canada, and Australia. These three countries were chosen because they are inhabited by Indigenous communities whose population at the end of colonialism is smaller than that of the settler, colonialist, and immigrant peoples and their descendants. In addition, this study seeks to discover key concepts and themes within the field of Indigenous school immunization practices and HPV vaccination, and to identify any knowledge and research gaps as per the framework proposed by Arksey and O'Malley (2007).

The following search terms were used in the search for articles in select databases: HPV vaccine; HPV; papillomavirus; school immunization; school clinics; school-based immunization; Indigenous communities; Metis; First Nations; Inuit; Indian immunization; Aboriginal; Torres Strait Islander; American Indian; Native American; Alaska Native; Canada; America; Australia; United States; and US.

Using the same search words, a manual search was also conducted to locate grey literature from research organizations, policy organizations, think tanks, and local government institutions. A librarian at the University of Saskatchewan helped in designing search terms to fit with the various databases. The databases searched were PubMed, Medline, CINAHL, and Embase.

The inclusion criteria were studies describing school immunization involving Indigenous communities in Canada, USA, and Australia, where the HPV vaccine is included in the data under consideration.

Exclusion criteria included studies that did not mention Canada, USA, and Australia in their study population or policy consideration, studies that did not have an HPV and a school immunization component, literature reviews, scoping reviews, systematic reviews, meta-analyses, study protocols, and/or letters to editors. No exclusions were applied to the year of publication. The reference lists of selected papers were also scanned for eligible papers. The literature search was conducted from July 2023 to September 2023.

Data screening was done manually. The titles and abstracts were read by the author, and a determination of eligibility was made. The full text was further read to find out if it meets the criteria for inclusion as spelt out.

Data analysis was done manually using a content analysis approach. The research texts were coded and categorized to identify themes and patterns which were then grouped and presented together.

Results

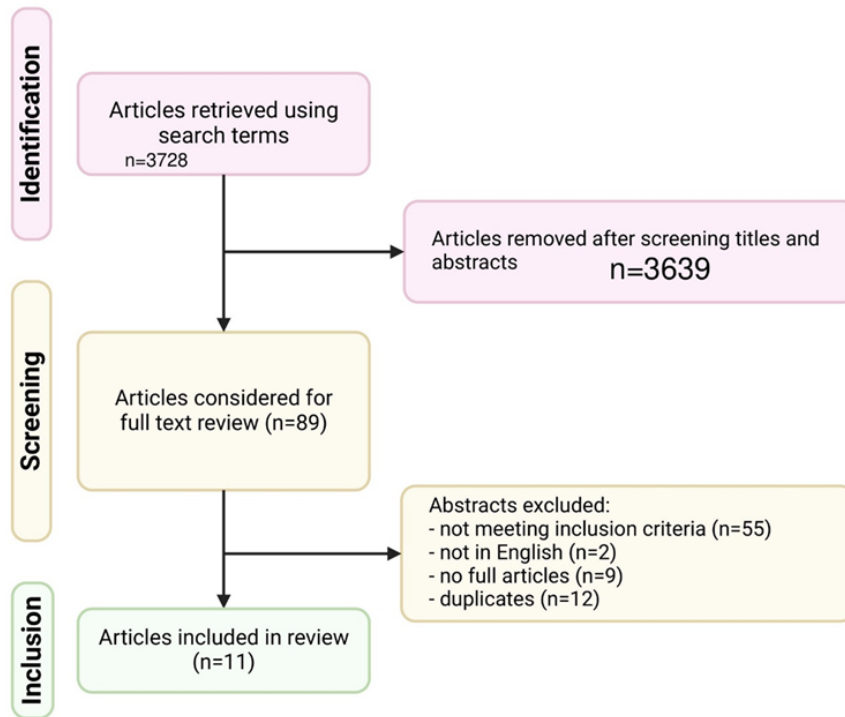
Following the application of the search strategy, 3,728 articles were manually retrieved. Titles and abstracts were screened for all the articles, whereby 89 articles were selected for further review. The number of articles reduced, as 55 articles did not meet the inclusion criteria. Of the remaining articles, twelve duplicates were removed, and nine studies did not have full articles, while two full

articles were not in English. Eleven articles were included in the final study list. Most of the papers are from Australia (7), while the rest are from Canada (3), and the US (1).

The article screening process is shown in Figure 1:

Figure 1

PRISMA Figure Flow chart on search and selection of articles



The key themes arising from this review are now described in the following section.

Strategies to Increase Immunization in Indigenous Communities

The Saskatchewan Health Authority mentions that its immunization policy is fit for use in Indigenous communities (Government of Saskatchewan, 2017), but does not have customized immunization programs for Indigenous communities. Access to government resources like the Family Tax Benefit, Childcare Rebate, and Childcare Benefit have been tied to consumption of immunization services. These benefits cannot be claimed for an unimmunized child unless exempt due to medical reasons, and not due to reasons related to conscience (Hull et al., 2019).

Some of the proposed means of increasing HPV immunization among American Indians and Alaska Natives include use of physical and electronic records to track immunizations and to check the immunization status of each client during clinic visits at health facilities and in school-based clinics. Additionally, mailing immunization reminders to clients and the use of postcards were also put in place (Jim et al., 2012). This would easily reach those clients whose main source of correspondence was mail.

HPV Immunization Rates

There were lower completion rates in 2017 for HPV vaccine amongst Australian Indigenous boys and girls at 77% and 79% respectively, compared to non-Indigenous counterparts at 90% and 91% (Hull et al., 2019).

The HPV coverage in Queensland, Australia for adolescent girls ages 12 to 17 was 80%, 69%, and 64% for dose 1, 2, and 3, while it was 76%, 71%, and 64% in Northern Territory, respectively (Brotherton et al., 2013). The completion rates in the Northern Territory for both Indigenous and non-Indigenous girls were similar; however, the initiation rate for Indigenous girls was 17% lower than that of non-Indigenous girls (Brotherton et al., 2013). The main cause for lower initiation rates for HPV vaccine was consent form return challenges, which led to affected children missing their HPV immunization, contributing to low HPV vaccine uptake (Brotherton et al., 2013).

Coordination of Immunization Services

The coordination for the HPV vaccine program in Australia is run nationally, while the territories and provinces engaged in the vaccine delivery and administration (Brotherton et al., 2013). The provinces and territories were responsible for vaccine procurement, vaccine transportation, consent forms, and the implementation of school-based immunization of HPV and other vaccines (Brotherton et al., 2013). The promotion of the HPV vaccine in Australia was done at the national level, with the provinces and territories involved in the vaccine delivery process (Brotherton et al., 2013). Data on Indigenous status of immunized students, though not mandatory, is collected in Australia (Vujovich-Dunn et al., 2022). Only two areas (Northern Territory and Queensland) collected data on Indigenous people in a quantity sufficient for reporting (Vujovich-Dunn et al., 2022).

School Immunization and Teacher Factors

According to a government study in Australia, schools that are small, in remote areas, in areas of low socioeconomic status, with low attendance rate, and with a sizable percentage of Indigenous students had a low HPV vaccine uptake, at less than 75% (Vujovich-Dunn et al., 2022). The study by Vujovich-Dunn and colleagues (2022) did not report which factors (e.g., high Indigenous student population and low levels of school enrolments) were present in the same school(s). Likewise, there were low completion rates in schools that had a high proportion of Indigenous student enrolment, as well as schools in Western Australia and Tasmania (Sisnowski et al., 2021; Vujovich-Dunn et al., 2022). There were no studies describing school factors in the US and Canada.

The HPV completion rates for Indigenous girls in Australia was lower (79%) than for non-Indigenous girls (91%), and considering the length of time taken to complete an HPV immunization course, it was found that Indigenous adolescents took a considerably longer time than their non-Indigenous age mates, at 8.8 months and 7.5 months respectively (Hull et al., 2019).

Immunization for school-going children under seven years old in British Columbia, Canada, was described as delivered primarily via schools in a study by Sarai Racey and colleagues (2023). As of 2019, it is reported that HPV vaccine coverage was 67% in Alberta, Canada among eligible children, compared to 80–90% for other vaccines, among grade 9 students (Sarai Racey et al., 2023).

The number of teachers whose own children's immunization was delayed and not up to date were 9.6% (Sarai Racey et al., 2023). Likewise, 88.3% of teachers were knowledgeable on vaccines, and the most common source of information was public health, health personnel, government websites, and mass media like TV and radio. Social media was the least sought source of vaccine information (Sarai Racey et al., 2023).

Knowledge of the mature minor policy, a policy that allows some older children to consent to their own immunization, was incredibly low, with 67% per cent of the teachers not being aware of the existence of this policy (Sarai Racey et al., 2023). Knowledge on childhood immunization schedule was also low among teachers (Sarai Racey et al., 2023). Regarding knowledge on mature minor consent, there was no measure as to whether Indigeneity influenced this (Sarai Racey et al., 2023). There was no notable difference on vaccine confidence between Indigenous and non-Indigenous teachers; the findings on the perceived risks of the HPV vaccine (Sarai Racey et al., 2023) showed that Indigenous status among teachers did not affect intentions to immunize.

Health Worker and Community Knowledge of HPV and HPV Vaccine

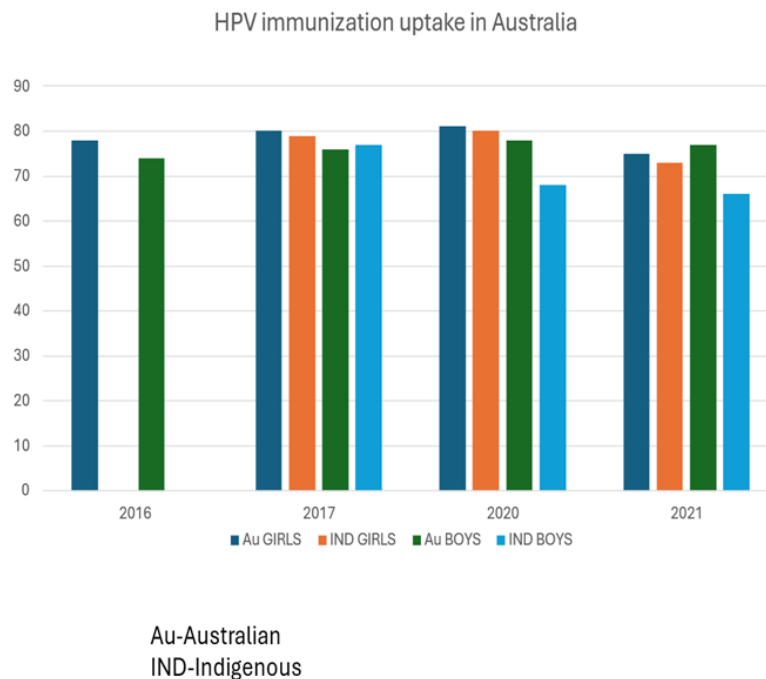
Dissemination of knowledge on HPV vaccines is necessary in ensuring that correct information is passed onto Indigenous communities. Health worker knowledge on the link between HPV infections and cervical cancer was high in the US at 87% (Jim et al., 2012). However, there was a misconception among the majority of obstetricians/gynaecologists, as 85% of them believed a pregnancy test was necessary before the HPV vaccine is administered (Jim et al., 2012).

Lack of knowledge on HPV vaccines resulted in the majority of male clients not requesting the HPV vaccine, despite the health workers being comfortable and confident in providing the vaccine and information surrounding it (Jim et al., 2012). Continuity of care for female adolescent clients was listed as a concern by health workers working with the American Indian and Alaska Native Peoples (Jim et al., 2012), although this was not described further.

Effect of COVID-19 on HPV vaccine coverage

The low HPV coverage among Indigenous communities dropped in 2021 because of the COVID-19 pandemic, though this drop was not more pronounced than for non-Indigenous students (Hull et al., 2021). Research by the Australian government showed that both boys and girls in the highest income areas of Australia had a higher uptake of the HPV immunization services compared to children who were either Indigenous or from places that were of lower socioeconomic status (Hull et al., 2021). Further, children in urban areas had better HPV coverage compared to those in rural areas (Hull et al., 2021).

There was a drop in HPV vaccine coverage for both overall Canadian boys and girls and Indigenous boys and girls, though Indigenous boys and girls had a bigger percentage drop for 2021 compared to 2020 (Hull et al., 2021). Indigenous Australian boys and girls had lower HPV vaccine uptake than non-Indigenous Australian boys and girls of a similar age bracket in 2020, due to the COVID-19 outbreak (Hull et al., 2021), as shown in Figure 2.

Figure 2*HPV vaccine uptake in Australia adapted from Hull et al., 2019 and Hull et al., 2021*

Discussion

Socioeconomic status has a huge bearing on access to health services. Those people who live in remote, rural, and poorer locations have been shown to have a lower uptake of HPV vaccines in Australia, with the majority of those adversely impacted being the Indigenous Islander and Torres Strait people. There is a similarly low trend with First Nations communities in Northern Saskatchewan, Canada, where the HPV immunization rate was low at 65% (Northern Inter-Tribal Health Authority, 2021).

Improving data on the uptake of vaccines including HPV is needed in the countries included in this study. Medical and immunization records need to provide the Indigenous status identification of Indigenous people, including their school immunization uptake. Lack of such immunization data and health records can impact accuracy of immunization reports in Indigenous communities. Australia's intentional recording of the Islander and Torres Strait status has improved data to identify low HPV vaccine uptake in these communities.

Countries like the US and Canada whose immunization records do not register the status of Indigenous individuals during immunization risk missing crucial data that can aid in the development of specific immunization programs for Indigenous communities. Additionally, for most Indigenous-based health authorities in these countries, whose clientele is strictly Indigenous people, such immunization records are not readily available on the internet, probably due to restricted access occasioned by Indigenous data sovereignty considerations.

Lack of records or incomplete records make it difficult to calculate the immunization rates of Indigenous communities like the First Nations in Alberta, Canada (Macdonald et al., 2023). For such communities, immunization records that capture the Indigenous status of individuals are necessary (Sell et al., 2022; Vass & Adams, 2021). Immunization in a dedicated First Nations health facility in Alberta led to better immunization uptake compared to taking the vaccine at a different facility (Macdonald et al., 2023). Data sharing between Indigenous health authorities and provincial authorities enables better reporting and assessment of Indigenous community immunization uptake for childhood vaccines (Macdonald et al., 2023), including school-delivered vaccines.

Global challenges like the COVID-19 pandemic have affected school immunization programs and have had a bigger impact on Indigenous immunization rates. This has the potential to further erode improvements made in immunization for Indigenous Peoples against HPV. For example, the pandemic effect on school immunization was similarly recorded in Alberta, Canada, where there was a decrease in school-based immunization of HPV from 66.4% in the pre-pandemic period of 2017–2018 to a low of 6.6% in 2020–2021 (Sell et al., 2022). Data on Indigenous communities were not included in this study in Alberta, since the province does not collect such data in sufficient amounts (Sell et al., 2022). Likewise, in a group of low- and middle-income countries including Ghana, Bangladesh, and Ethiopia, among others, a systematic review looking at childhood immunization services showed that these services were also negatively affected because of parental fear of COVID-19 and lack of transportation to the health facilities (Cardoso et al., 2023).

Teacher and healthcare worker knowledge play a crucial role in initiation of discussions and linking parents to HPV immunization plans. Most teachers in Indigenous schools are non-Indigenous, and many expressed lack of training and knowledge in Indigenous health (Francis-Cracknell et al., 2023) as an impediment. For example, this was expressed by teachers in Australia as an area that needs change in improving the Torres and Islander Strait (Francis-Cracknell et al., 2023). Therefore, teachers and health practitioners need more training—like general practitioners, who in several instances are ill-prepared to work with Indigenous Peoples—for example, on cultural safety (Francis-Cracknell et al., 2023; Vass & Adams, 2021). As well, the impact of these trainings should be evaluated in terms of supporting and delivering culturally safe health care, including Indigenous immunization services.

The impact of colonialism and racism in Indigenous communities and their effect on HPV immunization needs further evaluation. Part of the vaccine hesitancy that followed prioritization of Indigenous communities in the supply of COVID-19 vaccines and during the H1N1 outbreak in Canada in 2009 was the fear that the people in these communities were undergoing experimentation (Aylsworth et al., 2022; Driedger et al., 2015). Involvement of Indigenous people including leaders such as Elders in the planning, messaging, and communication of vaccine information and administration will be helpful in improving HPV vaccine uptake in the communities.

Several immunization programs and interventions that were successful during the COVID-19 pandemic led to elevated levels of COVID-19 vaccines among Indigenous communities in the US, Australia, and Canada. These strategies included conducting immunization sessions that coincide with cultural events, advance planning for immunization, privileging Indigenous communities in making immunization decisions and participating in vaccine research; training of community members on infection control, using social media for fostering connectedness and for preserving cultural practices, use of clear, unified and tailored vaccine information that addresses fears of vaccine experimentation in Indigenous communities, and involving these communities in the design and dissemination of immunization information (Epperson et al., 2022; Kerrigan et al., 2023; King et al., 2022; Le-Morawa et al., 2023; Silberner, 2021). These lessons are adaptable to the school-based setting for routine immunizations such as HPV.

For instance, COVID-19 vaccinations for Indigenous Peoples in the US were conducted in schools,

while additional vaccinations were conducted in casinos, Indigenous facilities, and Indigenous urban centers (Foxworth et al., 2021) (Foxworth et al., 2021). These efforts led to high vaccination rates, because the communities utilized innovative culturally sensitive messaging that was acceptable to American Indian/Alaska Native communities (Foxworth et al., 2021). In addition, community ownership of the program, a strong collaboration between the provincial health and the Indian Health Services, and the use of cultural ceremonies to promote vaccine acceptance were also instrumental in increasing the uptake of the COVID-19 vaccine (Foxworth et al., 2021).

Coordination of immunization programs affects the success of any immunization program. While Canada and USA have provincial- or state-run school immunization services, Australia too has province-led immunization programs, but coordination is conducted at the federal level. Indigenous perspectives and input are missing from these programs. An implementation roadmap on the improvement of rural health services has been suggested to improve the health of rural communities in Canada (Wilson et al., 2020). Rwanda is one of the countries to roll out a centrally coordinated HPV vaccine program, leading to a 93% vaccine coverage for eligible girls (Asempah & Wiktorowicz, 2023), one of the highest percentages in Africa and globally. Whether there are superior benefits to central HPV vaccination coordination compared to regionally led efforts needs to be investigated further, especially in countries with Indigenous Peoples who might be far removed from a centralized health system. It has been suggested that a people-centred approach that engages communities will lead to better immunization uptake (Blanc et al., 2022).

Limitations

Articles that were excluded based on the exclusion criteria like language and geographical area might have added more perspective on this subject. The lack of a considerable number of studies on the topic of Indigenous school immunization of HPV means that there is insufficient data upon which to gain an understanding of the school HPV immunization in the various Indigenous communities within the US, Canada, Australia, and other countries.

The generalization of Indigenous communities into broad groups like Métis, First Nations, Inuit, American Indian, Native Alaskan, Aboriginal, or Torres Strait Islander fails to capture the intricate differences between and within these communities, which have discrete social, economic, and cultural features that variedly affect how they interact with schools and HPV immunization services.

Additionally, there was a scarcity of grey literature on this topic. The grey literature sites that were searched were restricted to those known to the authors and only those with an online presence. Institutions that do not have a website or published data missed out in the search strategy. Some of the institutions that were contacted via email did not write back or provide feedback.

There was also lack of sufficient qualitative studies across the three countries that looked at knowledge, attitudes, and practices on HPV vaccine and school immunization.

Conclusion

School-based immunization services, particularly for HPV vaccine, have not received significant research focus. A high level of knowledge among teachers and healthcare workers on HPV immunization is a major strength of the HPV immunization efforts. For Indigenous communities, school remoteness, high student absenteeism rates, and a non-responsive consent to immunization process have been highlighted as the major barriers to immunization, which is demonstrated by the generally low HPV immunization rates compared to the general population.

There have been very few articles that capture the knowledge, attitudes, and practices of Indigenous people as relates to HPV school immunization. There is also a shortage of publications that specifically address school immunizations among Indigenous communities. More research needs to be conducted with Indigenous Peoples on effective school immunization strategies and on consent for school immunization programming that can reach Indigenous children and adolescents. More qualitative studies conducted with Indigenous communities are also needed to gain an understanding of their views on school immunization, consent process for school immunization and information on vaccines.

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