*Review article*

# Knowledge, Awareness, and Perception on Childhood Vaccination Among Indigenous and Ethnic Minority Parents: A Mini Review

Sakina Roslan, Izzati Abdul Halim Zaki*

Department of Clinical Pharmacy, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) Selangor Branch, 42300 Bandar Puncak Alam, Selangor, Malaysia.

## ABSTRACT

Immunisation is imperative because it prevents two to three million deaths annually. World Health Organisation (WHO) defines immunisation as the process that makes people immune to infection by administering the vaccine. However, indigenous and ethnic minority peoples report low vaccination coverage. To date, there are no reviews in this area to the best of our knowledge. Therefore, this research aims to conduct a review of knowledge, awareness, and perception of childhood vaccination among indigenous and ethnic minority parents. Six databases were searched for appropriate quantitative and qualitative primary research. Studies were selected if they were peer-reviewed, in English, available in full text, and focused on the knowledge, awareness, and perception of the childhood vaccine among indigenous and ethnic minority parents. This review includes eight qualitative research, four quantitative studies, and one mixed-methods study. Twenty-one research examined a variety of children's vaccinations. We observed that participants had limited knowledge, low awareness, and negative attitudes about childhood immunisation based on our findings. It was clear that the indigenous and ethnic minority parents were not aware of childhood vaccination. Therefore, we recommend that the governments of every nation take the initiative and consider continuing education programs and health campaigns to increase their acceptance of childhood vaccinations.

**Keywords:** Knowledge, Awareness, Perception, Childhood vaccination, Ethnic minority

***Corresponding author***
*Izzati Abdul Halim Zaki*
*Faculty of Pharmacy, Universiti Teknologi MARA (UITM) Selangor Branch,*
*Puncak Alam Campus, 42300, Bandar Puncak Alam, Selangor, Malaysia*
*izzatihalim@uitm.edu.my*

*Received: 05 March 2023; accepted: 26 June 2023*
*Available online: 30 June 2023 http://doi.org/10.24191/IJPNaCS.v6i1.05*

## 1.0 Introduction

Immunisation is essential to prevent many diseases like diphtheria, tetanus, pertussis, influenza, and measles, saving 3 million lives each year (1). The World Health Organisation (WHO) defined immunisation as the process that makes people immune or resistant to infection by administering the vaccine. The idea is that, through herd immunity, immunisation protects not only one vaccinated child but also others by preventing the transmission of vaccine-preventable diseases (VPD) (2). Vaccination is defined by the Centres for Disease Control and Prevention (CDC) of the United States as the act of administering a vaccine into the body to get immunity for a particular disease (3). WHO defined vaccination coverage as the proportion of children who have received the recommended vaccines (4). They estimated that about 1.5 million children worldwide die due to VPD every year. However, vaccination coverage globally is still low among indigenous people and ethnic minorities. For instance, the coverage for measles-containing vaccines among them is 58% lower than among urban dwellers (5).

In Malaysia, most of the indigenous children have not received the same complete vaccinations as other children. According to The Star, Dr. Lee Kim Se, who leads the *Persatuan Kebajikan Saudara Perak* team, said that indigenous children only received the first dose of Bacille Calmette-Guerin (BCG) and hepatitis B vaccine after birth in the hospital (6). After that, they could not follow up anymore with other vaccines because of their inability to go to the hospital. Therefore, they could not be protected by herd immunity, as most of them were not vaccinated (7). To decrease the occurrence of VPD, WHO set a goal of 90% national childhood immunisation coverage. However, in 2019, immunisation coverage had reached 85% but could not achieve the 90% goal. WHO has initiated the Expanded Program on Immunisation (EPI) and worked with other public health programmes to control diseases and increase childhood vaccination coverage. Most countries have provided free vaccination services and programmes for indigenous people and ethnic minorities (9–13).

Based on a study by Taylor Morris et al. in Brazil, the government implemented the campaign "Indigenous People's Vaccination Month", which requires healthcare workers to go to indigenous communities with vaccination supplies (14). In Australia, the government implemented the "No Jab, No Pay" policy to promote immunisation among unvaccinated children, including indigenous children (15). Even though vaccination has been proven to be effective against many infectious diseases, many indigenous and ethnic minority children have not completed the vaccination programme (2). Parents with good practises regarding vaccination will be able to decrease the incidence of VPD. A study reported that the vaccination practice is highly related to knowledge, awareness, and perception by parents (16). To summarise, a few factors affect the practise of vaccinating their children: lack of information about vaccination, miscommunication between healthcare workers and parents, the lack of healthcare providers going to rural areas, low economic status, and parents' low educational levels (17, 18).

However, many studies have shown poor knowledge, awareness, and perception of vaccination among indigenous and ethnic minority parents. For example, in a study conducted by Burghouts et al., indigenous parents in Venezuela exhibited poor vaccination

knowledge and perception. 35% of respondents said that vaccination had adverse effects; 55% stated that the child was too young to be vaccinated; and 3.2% said that it was unsafe to give it more than once (19). As for awareness, the study discovered that healthcare workers failed to communicate with local parents about the functions and positive impacts of vaccinations.

To date, reviews in this area have been primarily focused on people from underdeveloped countries or one specific country or state (20–25). For example, a systematic review by Aaron Wallace et al. assessed parents' beliefs on childhood vaccination for Ghanaians, while the review by Alshammari et al. focused on the whole population of Saudi Arabia (24, 25). However, there is a lack of review that focuses on indigenous people and ethnic minorities. Therefore, the findings from this study will be able to contribute significantly to a new review of childhood vaccination. The purpose of this study is to assess the knowledge, awareness, and perception of indigenous and ethnic minority parents toward childhood vaccination.

## 2.0 Methods

The review aims to identify papers published in electronic databases such as PubMed, Science Direct, Scopus, Web of Science, Cochrane Library, and Google Scholar. The keywords used were related to knowledge, awareness, perception, vaccination, childhood vaccination, indigenous people, ethnic minorities, and parents. The search strategy used PICO adaptation, with Boolean operators AND and OR to ensure relevant articles were included. Data was extracted from the included articles, including author, study year, study country, population target, sample characteristics, evaluation tools, and outcomes.

The studies included in the review met specific criteria, including no limit on study years, occurring in any country, focusing on vaccines provided during childhood, including parents and guardians, focusing on indigenous and ethnic minority peoples, examining at least one or more key themes, and being an English article. Two authors screened the titles and abstracts of the search records, identified eligible studies, retrieved the full text, independently examined them for eligibility, and made a list of studies that met inclusion and exclusion criteria. The authors compared and discussed the final studies to be included in the review.

## 3.0 Discussion

Our search yielded 157 articles from all databases. After removing 18 duplicates, we screened 139 articles' abstracts, and 118 articles were excluded based on inclusion criteria evaluated from titles and abstracts. As a result, we retrieved 21 articles. Of 21 articles, 13 articles met our eligibility criteria. The main findings from each article included in this study are summarised in Table 1.

Eight of these articles were qualitative studies (19, 28, 29, 31, 32, 34, 36, 37), four quantitative studies (18, 30, 35, 38), and one mixed-method study (33). The studies included indigenous or ethnic minority parents, and they were all written in English. These studies looked at different outcomes; thus, the results were combined systematically and synthesised narratively. We found more qualitative studies than quantitative studies on this topic because indigenous and ethnic minorities have a small population.

**Table 1:** Summary of included studies – Knowledge, awareness, and perception outcomes

| First author, Year | Aim of the study | Outcomes | | |
|---|---|---|---|---|
| | | Knowledge | Awareness | Perception |
| **Indigenous population** | | | | |
| **Burghouts et al., 2017** | To identify the reasons for vaccine acceptance or rejection among Warao Amerindians | Limited knowledge about vaccination:<br>1) Lack of knowledge regarding the function of vaccination. | Lack of awareness from:<br>1) Health care providers<br>-They rarely visited them because the village was in remote areas and hard to reach.<br>2) Media sources<br>-They did not have television, radio, newspapers, and the internet. | Negative perception:<br>1) Getting unwanted side effects from vaccination.<br>2) Vaccination can lead to other diseases.<br>3) Perceived limited vaccine tolerance of young and sick children.<br><br>Positive perception:<br>1) Participants believed that vaccination could prevent diseases.<br>2) Prevent diseases from deteriorating or cure diseases. |
| **Burnett et al., 2020** | To explore indigenous people's beliefs about vaccination | N/A | Lack of awareness from:<br>1) Healthcare provider.<br>- Lack of trust relationship.<br>-Poor communication with indigenous people.<br>-Difficult to access the hospital.<br>2) School.<br>-Forced children to take vaccinations without explanation. | Negative perception:<br>1) General concerns about vaccines.<br>2) Lack of information.<br>3) Healthcare workers provided "rough" services. |

| | | | | |
|---|---|---|---|---|
| | | | -Lack of giving information about vaccination. | |
| **Cerigo et al., 2012** | To describe the attitudes and experiences with cervical cancer, Pap smear screenings, and HPV vaccine | Limited knowledge about vaccination:<br>1) 27% of parents had heard of the HPV vaccine.<br>2) 19% of participants were aware of the vaccine and knew the potential benefits of the vaccine were protection from cervical cancer. | Gained awareness from:<br>1) Health care practitioner.<br>- 68% of participants received information about HPV and the HPV vaccine from healthcare practitioners. | Positive perception:<br>1) 81% of participants reported that health professionals influenced their decision to get a vaccine.<br>2) 68% believed that vaccines should be given to teenagers before the onset of sexual activity. |
| **Henderson et al., 2017** | To identify and validate known barriers and supports to HPV vaccination among First Nation people in Alberta | Some parents did not know about vaccination, but most parents had limited knowledge of HPV vaccination. | Gained awareness from:<br>1) School. | Negative perception:<br>1) Some of the parents believed that HPV vaccination has more risks than benefits.<br>2) The parents said that their children were afraid of getting immunised.<br>3) The parents believed that vaccines are not natural, and the government gives more chemicals to hurt them. |
| **Tarrant et al., 2001** | To examine mothers' perception of childhood immunisations and the factors that influence uptake. | Limited knowledge about vaccination:<br>1) Did not know how vaccinations work or what diseases they cover.<br>2) Unsure of the side effects after vaccination. | Lack of awareness from:<br>1) From the healthcare provider.<br>Only obtained the information from other community members who had vaccinated their children. | Negative perception:<br>1) Barriers to vaccine uptake<br>-It was difficult for them to go to the clinic for vaccination as they were busy with work.<br>-Struggling to access immunisation services as they needed to bring their other children to the clinic. |

| | | | | |
|---|---|---|---|---|
| | | 3) Only knew that vaccination helps in preventing diseases. | | -Hard to find a babysitter for their other children.<br>-Bad experience from other community members who had vaccinated their children. |
| **Tarrant et al., 2003** | To explore First Nations parents' beliefs about childhood immunisations and examine factors influencing immunisation uptake. | Limited knowledge about vaccination:<br>1) 90% of participants only knew that vaccines could help to prevent diseases. | Lack of awareness from:<br>1) Health care providers. | Negative perception:<br>1) Vaccination had adverse effects.<br>2) Bad experience from vaccinations.<br>3) Barriers to vaccine uptake.<br>4) Bad experience from other community members who had vaccinated their children. |
| **Toffolon-Weiss et al., 2008** | To describe Alaskan Native parents' knowledge of and attitudes towards cervical cancer, the human papillomavirus, and the HPV | Limited knowledge about vaccination:<br>1) Only 39% of parents knew the purpose of the vaccine.<br>2) Most parents (65%) knew that vaccines for preventable diseases could stop the spread of the disease.<br>3) 56% of parents knew there was a vaccine for HPV.<br>4) 20% of parents knew the association of the vaccine with the prevention of cervical cancer. | N/A | Positive perception:<br>1) Belief in the usefulness of vaccines.<br>2) Belief that a child is susceptible to HPV.<br>3) Concern for the health and safety of children.<br>4) Personal experience with cancer/HPV.<br>5) Sexual assault exposure children will be protected.<br><br>Negative perception:<br>1) General concerns about vaccines.<br>2) Need more information.<br>3) Fear of side effects.<br>4) Not enough research has been done.<br>5) Will wait until the problem arises.<br>6) Did not want to use as a "guinea pig". |

| | | | | |
|---|---|---|---|---|
| **Ethnic minorities** | | | | |
| **Glenn et al., 2014** | To understand demographic factors associated with HPV awareness among low-income, ethnic minority mothers in Los Angeles County. | Know about vaccination:<br>1) 67% of respondents who were aware of HPV were knowledgeable that HPV causes cervical cancer,<br>2) 71% knew that HPV is a sexually transmitted disease,<br>3) Only 4% knew that HPV usually resolves without treatment. | Gained awareness from:<br>1) 66% from doctors and nurses.<br>2) 3% from the web. | N/A |
| **Henderson et al., 2008** | To assess reasons for the low uptake of immunisation among orthodox Jewish families | N/A | Lack of awareness of HPV vaccine from:<br>1) Media sources.<br>-They did not have newspapers, TV, and radio. | Negative perception.<br>1) Limited practice opening times.<br>2) Having to rearrange appointments because of a sick child.<br>3) Lengthy waiting times.<br>4) Anxiety about the wide variety of adverse effects.<br>5) Religiously inspired fatalism influenced the decision not to immunise. |
| **Kim et al., 2014** | To explore knowledge, perception, and decision-making about HPV vaccination among KA women. | Limited knowledge of HPV vaccine:<br>1) Did not know when to vaccinate their children. | Lack of awareness of the HPV vaccine | Positive perception.<br>1) Prevention from unexpected situations.<br><br>Negative perception:<br>1) Safety concerns.<br>2) Concerns about promiscuity.<br>3) Concern about costs. |

| | | | | |
|---|---|---|---|---|
| **Lee et al., 2020** | To investigate the correlation between diverse demographic factors and vaccine safety agreements among Maori, Pacific, Asian and European New Zealanders. | N/A | N/A | Maori:<br>1) 59% had high vaccine safety agreements.<br>2) 32% had moderate vaccine safety agreements.<br>3) 8% had low vaccine safety agreements.<br><br>Pacific people.<br>1) 66% had high vaccine safety agreements.<br>2) 29% had moderate vaccine safety agreement.<br>3) 5% had a low vaccine safety agreement.<br><br>Asian:<br>1) 72 % had high vaccine safety agreements.<br>2) 25% had moderate vaccine safety agreements.<br>3) 5% had low vaccine safety agreements. |
| **Perkins et al., 2013** | To characterise the attitudes of low-income and minority parents/guardians toward vaccinating sons against HPV. | Limited knowledge of HPV vaccination | N/A | Positive perception:<br>1) Help protects from disease.<br>2) Vaccination is part of good parenting.<br>3) Vaccines as an educational tool.<br>4) Trusted physician.<br>5) Vaccinate well in advance of sexual debut.<br><br>Negative perception:<br>1) Safety and efficacy concerns. |

| | | | | |
|---|---|---|---|---|
| | | | | 2) Promoted irresponsible sexual behaviour.<br>3) Denial of child's sexual behaviour.<br>4) Culture of alternative medicine (antivaccine).<br>5) Religion.<br>6) Feared of negative consequences. |
| **Zhang et al., 2015** | To assess knowledge, attitude, and practice of childhood vaccination in Xunhua Salar Autonomous County, particularly regarding vaccination to prevent measles. | Limited knowledge of vaccination:<br>1) 42% of participants got the immunisation book one month after the baby was born.<br>2) 80% did not know their children could be immunised for free.<br>3) 95% believed that vaccines are effective.<br>4) 60% knew measles is a highly contagious infection.<br>5) 72% knew measles causes the child skin rashes and fever.<br>6) 31% knew mosquito bites could transmit measles. | Gained awareness from:<br>1) 70% of caregivers acquire immunisation information from village doctors or local religious leaders. | Negative Perception:<br>1) Inadequate supply of vaccine services.<br>2) Caregivers were busy on the day of immunisation.<br>3) Caregivers did not know when or where to have their children immunised.<br>4) Believed that the vaccine was not effective.<br>5) The immunisation station was too far. |

Consequently, little research has been conducted on them. The only way researchers are able to access and collect data for their study is by conducting a qualitative study, where they can gain an in-depth understanding of the data. By conducting a qualitative study, the researcher is able to focus on the lived experience of the individual participant in order to gain an in-depth understanding of the feelings and perceptions of the population regarding the topic (39). Therefore, the qualitative study's findings can be utilised to develop the quantitative study's questionnaire.

All studies addressed the dependability of the study with a clear description of data analysis and discussion where they used participants' words to prove the interpretation of the data. Studies should have ethical considerations when conducting an interview or a questionnaire that involves humans. Six studies noted that either verbal or written consent was obtained from participants. In addition, ethical approval was obtained from the Board of Managers within the included hospitals or the sponsoring university review board (19, 28–31, 35).

### *3.1 Knowledge*

All the studies for indigenous people revealed that parents had limited knowledge of vaccination (19, 28–32). Most parents were aware that vaccines may further help prevent diseases, according to three Canadian studies, one Venezuelan study, and one American study. However, they were unaware of the underlying reason for vaccination (19, 28, 30, 32, 33). In a study by Burghouts, all 31 Warao parents in Venezuela agreed that vaccines helped prevent the disease, but nobody knew the mechanism of action of vaccines that help develop the immune response to kill or inactivate the pathogen (19). Moreover, two studies from Canada and the United States stated that parents did not know the function of vaccines, the disease, or the side effects after vaccination (28, 32).

Three studies on ethnic minorities showed that the parents had limited knowledge of vaccination (18, 34, 36). For example, in a study by Zhang et al. (18), the parents knew that vaccines were effective in preventing the disease, but they did not know their children could be immunised for free or about immunisation books. Moreover, Kim et al. (31) stated that the parents have limited knowledge of where to get a vaccination, its function, disease, and side effects. However, one study from Canada showed that ethnic minority parents were knowledgeable about vaccination as they knew about the disease and its vaccine (35). Our findings showed that indigenous and ethnic minority parents have limited knowledge of childhood vaccination (18, 19, 28, 30, 32–34, 36). The parents knew that vaccination could prevent diseases, but they did not know the vaccine's action on their body, function, diseases, or side effects (19, 28, 30, 32, 33). They also had no information on where and when to get the vaccine for free from the healthcare provider (18, 34, 36).

### *3.2 Awareness*

We found that parents were not fully aware of the importance of vaccination for their children due to the lack of information given by healthcare providers, media sources, and schools. Sometimes, they received incomplete information from their religious leader.

*Healthcare provider*

Four studies indicated the ongoing lack of awareness among indigenous parents, which can be attributed to healthcare providers (19, 28, 29, 32). Burghouts et al.

stated that Warao people lack the awareness raised by healthcare providers as they rarely visit them because of the village's remote location and inaccessibility (19). In a study by Burnett (29), the parents had difficulty accessing the hospital as it is far from their place, making it harder for the healthcare provider to provide the information (2). Other than that, two studies from Canada and Alaska stated that parents refused to go to immunisation visits due to healthcare providers' poor communication. In Canada, 23% of parents reported receiving criticism from healthcare providers about treatments for their children's diseases, frequent clinic visits, and even childcare. Due to that, the parents did not visit for a long time, making it hard for the medical professionals to raise awareness about immunisation (29, 32). However, three studies noted that parents mostly gained awareness regarding immunisation from healthcare providers (18, 30, 35).

*Media sources*

Three studies found that the parents had low awareness of media sources (19, 35, 37) and depended mainly on information from other community members who had vaccinated their children (28). One study from Venezuela and two studies from the UK stated that the parents did not have newspapers, TV, radio, and internet. Therefore, they lacked knowledge about the outside world; thus, it was harder for them to get information about vaccination. (19, 35, 37).

*School*

School teachers play an important role in spreading information. For example, Henderson et al. (31) stated that the participants obtained awareness from the school through their children. However, Burnett et al. (29) stated that the teachers lacked information about vaccination and forced the children to take vaccinations without educating them first.

*Local religious leaders*

Local religious leaders also play an essential role in giving information about vaccination. From the study by Shengliang Zhang (21), more than 70% of caregivers in Xunhua County received information from local religious leaders. Therefore, the information obtained will be based on the perception of the religious leader rather than accurate scientific explanations from healthcare providers.

### *3.3 Perception*

Most parents shared negative perceptions, such as vaccination leading to adverse effects and other diseases, bad experiences with vaccination, bad experiences from other community members, and barriers when vaccinating their children (19, 32, 33). However, parents' positive perceptions, such as vaccinations, can be an educational tool and prevent infectious diseases (19, 30, 36).

*Positive Perception*

*Vaccination can prevent diseases*

According to a study by Burghouts et al., 12 parents believed vaccination prevents disease (19). Seven parents believed that vaccination could prevent the progression of diseases, while one parent believed that vaccination would cure diseases. Cerigo et al. stated that 68% of parents believed that vaccination should protect their children from getting sick (30). One study from Alaska and two studies from the United States stated that parents believed vaccines are helpful in

preventing diseases as they concern the health and safety of children (33,34,36).

*Vaccination as an educational tool*

In a study by Perkins et al. (36), the parents stated they should provide the necessary protection to their children as they considered vaccination one of their roles as parents. Additionally, they said educating their children about vaccination before taking it was necessary.

*Negative Perception*

*Adverse effects of vaccination*

Three studies indicated that parents were concerned about the adverse effects of vaccinating their children (19, 32, 33). Burghouts et al. stated that parents mentioned many unwanted side effects (19). 84% responded for fever, 26% swollen skin, 23% diarrhoea, 13% vomiting, 13% dermatitis, 6% pain, 6% impaired physical mobility, 3% abscess, and 3% tumour. Even worse, 13% of parents thought their children could die from vaccination. Moreover, they considered young children weak and more prone to side effects. In a study by Tarrant, 42% of parents reported that their children experienced a few days of fever and irritability following vaccination (32).

*Vaccination leads to other diseases*

The side effects of vaccination were interpreted by the parents as diseases that might harm their children. In the study from Burghouts et al., 55% of Warao parents responded that their children became ill after vaccination, making them refuse to vaccinate their children (19). They interpreted the illness after vaccination as fever (48%), diarrhoea (23%), runny nose (13%), vomiting (6%), abdominal pain (3%), headache (3%) and even the appearance of teeth (3%). Henderson (37) stated that the caregivers in the Jewish Orthodox said the vaccination could lead to another disease. They were worried that immunisation could only affect their children negatively as they had only heard dreadful stories about vaccination.

*Bad experience from vaccination*

Three studies demonstrated that terrible
experiences strongly influenced the parent's decision to vaccinate their children (28,29,31). In the study conducted by Tarrant (28), the children's fear of needles (11%) developed upon vaccinations, and long waiting times (35%) in the clinic made them refuse vaccination. These issues affected some parents who also shared a similar fear of needles. Burnett et al. (29) stated that healthcare providers gave aggressive services toward children when giving vaccinations and displayed a very unpleasant attitude toward the parents, which made them reluctant to vaccinate their children.

*Barriers to vaccine uptake*

There are many difficulties in accessing immunisation services. Tarrant et al. (28) stated that parents who were busy with work found it difficult to go to the clinic for vaccination. They also struggled to access immunisation services as they needed to bring their other children. 96 % of parents stated that it was hard to find a babysitter for the other children. Moreover, two studies from the United States and one study from New Zealand and Alaska stated that parents were concerned about the safety and efficacy of the vaccines. Therefore, they wanted to wait until problems arose to reconsider vaccinating their children (33, 34, 38). In a study by Henderson et al.,

limited vaccination services' opening times made it challenging to rearrange appointments and required parents to wait a long time before getting a vaccination; hence, it was hard for parents to vaccinate their children (37). Other than that, ethnic minority parents in the United States worrying over the cost of vaccination has become one of the barriers to vaccine uptake (34). A study by Zhang et al. found that 42.3% of caregivers did not immunise their children because they were busy on the day for immunisation, 21.2% of caregivers did not know where to get their children immunised, and 1.9% stated that the healthcare facilities were too far from the village (18).

*The experience of other community members*

The experience of other community members might influence the vaccination decision of parents. In the study by Tarrant, indigenous parents in Canada also lacked information about vaccination (28). They only relied on information from other community members who had vaccinated their children. Negative words, such as death from vaccination, were quickly circulated within the community, influencing their decision to accept childhood vaccination.

## 4.0 Conclusion

This review identified three key themes. Firstly, it is evident from the review that participants had limited knowledge of vaccination. Secondly, there was low awareness of the need to vaccinate their children, and lastly, most participants had negative perceptions towards childhood vaccination. Thus, continuous educational programs and health campaigns tailored to the local culture should be conducted to improve their knowledge and acceptance of childhood vaccination – such initiatives would prove to be a valuable health investment by the governments. Additionally, more research should be conducted globally in this field to obtain more concrete evidence on vaccination knowledge, awareness, and perception among ethnic minorities. We hope that the findings of this review will assist others in comprehending the perspectives of indigenous and ethnic minorities on childhood vaccination.

## Acknowledgment

The authors acknowledge Dr. Siti Norlina, lecturers, and students of the Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) for their constant guidance, providing technical support, and planning the search strategy.

## Conflict of interests

The author declares that there are no conflicts of interest.

## References

1. World Health Organisation. Vaccines and immunization [Internet]. www.who.int. 2019. Available from: https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1.

2. Fine P, Eames K, Heymann DL. “Herd Immunity”: A Rough Guide. Clin Infect Dis 2011; 52: 911–916.

3. CDC. Immunization Basics | Vaccines and Immunizations [Internet]. CDC. 2018 [cited 2021 Jan 23]. Available from: https://www.cdc.gov/vaccines/vac-gen/imz-basics.htm

4. World Health Organization. Immunization coverage and vaccine-preventable diseases [Internet]. WHO. 2020 [cited 2021 Jan 23]. Available from: https://www.who.int/data/gho/data/themes/immunization

5. World Health Organization (WHO). Global Vaccine Action Plan 2011-2020. Geneva: WHO; 2013. [Internet]. Available from: https://www.who.int/publications/i/item/global-vaccine-action-plan-2011-2020

6. CHU MM. Orang asli children are not being vaccinated | The Star [Internet]. The Star News. 2019 [cited 2021 Jan 23]. Available from: https://www.thestar.com.my/lifestyle/family/2019/05/05/orang-asli-vaccination

7. Oxford U of. Herd immunity (Herd protection) | Vaccine Knowledge [Internet]. University of Oxford. 2019 [cited 2021 Jan 23]. Available from: https://vk.ovg.ox.ac.uk/vk/herd-immunity

8. WHO. Immunization coverage [Internet]. World Health Organization. 2020 [cited 2021 Jan 24]. Available from: https://www.who.int/news-room/fact-sheets/detail/immunization-coverage

9. Marlow LAV. HPV vaccination among ethnic minorities in the UK: knowledge, acceptability and attitudes. Br J Cancer 2011; 105: 486–492.

10. Ministry of Health. Immunisation – Māori health statistics | Ministry of Health NZ [Internet]. Ministry of Health Maori. 2016 [cited 2021 Jan 23]. Available from: https://www.health.govt.nz/our-work/populations/maori-health/tatau-kahukura-maori-health-statistics/nga-mana-hauora-tutohu-health-status-indicators/immunisation

11. Malaysian Paediatric Association. Strategies to help Orang Asli - The Malaysian Paediatric Association [Internet]. Malaysian Paediatric Association. 2019 [cited 2021 Jan 23]. Available from: https://mpaeds.my/strategies-to-help-orang-asli/

12. OMH. Immunizations and American Indians/Alaska Natives - The Office of Minority Health [Internet]. US Department of Health and Human Services Office of Minority Health. 2020 [cited 2021 Jan 23]. Available from: https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=37

13. Sarivaara E, Määttä K, Uusiautti S. Sensitivity in indigenous identity research. Eur. J. Soc. Sci. 2013;1(2):145 - 157.

14. Morris T, Tate J, Wait S, Scrutton J. Implementing a life-course approach to immunization. The Health Policy Partnership; 2019.

15. Nowlan M, Willing E, Turner N. Influences and policies that affect immunisation coverage - a summary review of literature. N Z Med J. 2019;132(1501):79-88.

16. Government of Canada. Archived - Measuring Up: Results from The National Immunization Coverage Survey, 2002 - Canada.ca [Internet]. Public Health Agency of Canada. 2002 [cited 2021 Jan 24]. Available from: https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2004-30/measuring-results-national-immunization-coverage-survey-2002.html

17. Al-lela OQB, Baidi Bahari M, Al-abbassi MG, Salih MRM, Basher AY. Influence of Health Providers on Pediatrics' Immunization Rate. J Trop Pediatr 2012; 58: 441–445.

18. Zhang S, Pan J, Wang Z. A cross-sectional survey to evaluate knowledge, attitude, and practice (KAP) regarding measles vaccination among ethnic minorities. Ethn Dis. 2015;25(1):98-103.

19. Burghouts J, Del Nogal B, Uriepero A, Hermans PWM, de Waard JH, Verhagen LM. Childhood Vaccine Acceptance and Refusal among Warao Amerindian Caregivers in Venezuela; A Qualitative Approach. PLOS ONE 2017; 12: e0170227.

20. Abdullahi LH, Kagina BM, Cassidy T, Adebayo EF, Wiysonge CS, Hussey GD. Knowledge, attitudes and practices on adolescent vaccination among adolescents, parents and teachers in Africa: A systematic review. Vaccine. 2016 Jul 25;34(34):3950–60.

21. Netfa F, Tashani M, Booy R, King C, Rashid H, Skinner SR. Knowledge, Attitudes and Perceptions of Immigrant Parents Towards Human Papillomavirus (HPV) Vaccination:

A Systematic Review. J. Trop. Med. 2020; 5: 58.

22. Alabadi M, Aldawood Z. Parents' Knowledge, Attitude and Perceptions on Childhood Vaccination in Saudi Arabia: A Systematic Literature Review. Vaccines 2020; 8: 750.

23. Dalhatu S, Ghani NA, Bozkurt V. A systematic review on factors affecting community participation towards polio immunization in Nigeria. Mediterr J Soc Sci. 2015;6:407.

24. Wallace AS, Wannemuehler K, Bonsu G, Wardle M, Nyaku M, Amponsah-Achiano K, et al. Development of a valid and reliable scale to assess parents' beliefs and attitudes about childhood vaccines and their association with vaccination uptake and delay in Ghana. Vaccine. 2019 Feb 4;37(6):848–56.

25. Alshammari TM, Subaiea GM, Hussain T, Moin A, Yusuff KB. Parental perceptions, attitudes and acceptance of childhood immunization in Saudi Arabia: A cross sectional study. Vaccine. 2018 Jan 2;36(1):23–8.

26. Critical Appraisal Skills Programme (CASP). Screening Questions [Internet]. [cited 2021 Jun 28]. Available from: https://methods.cochrane.org/bias/sites/methods.cochrane.org.bias/files/public/uploads/6.%20Assessing%20risk%20of%20bias%20in%20included%20studies%20v1.0%20Standard%20author%20slides.pdf

27. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.4 (updated August 2023). Cochrane, 2023. Available from www.training.cochrane.org/handbook.

28. Tarrant M, Gregory D. Exploring childhood immunization uptake with First Nations mothers in north-western Ontario, Canada. J. Adv. Nurs. 2003; 41: 63–72.

29. Burnett K, Sanders C, Halperin D, Halperin S. Indigenous Peoples, settler colonialism, and access to health care in rural and northern Ontario. Health Place 2020; 66: 102445.

30. Cerigo H, Ellen Macdonald M, Franco EL, Brassard P. Inuit women's attitudes and experiences towards cervical cancer and prevention strategies in Nunavik, Quebec. Int J Circumpolar Health 2012; 71: 17996.

31. Henderson RI, Shea-Budgell M, Healy C, Letendre A, Bill L, Healy B et al. First nations people's perspectives on barriers and supports for enhancing HPV vaccination: Foundations for sustainable, community-driven strategies. Gynecol. Oncol. 2018; 149: 93–100.

32. Tarrant M, Gregory D. Mothers' Perceptions of Childhood Immunizations in First Nations Communities of the Sioux Lookout Zone. Can J Public Health 2001; 92: 42–45.

33. Toffolon-Weiss M, Hagan K, Leston J, Peterson L, Provost E, Hennessy T. Alaska Native parental attitudes on cervical cancer, HPV and the HPV vaccine. Int J Circumpolar Health 2008; 67: 363–373.

34. Kim K, Kim B, Choi E, Song Y, Han H-R. Knowledge, Perceptions, and Decision Making About Human Papillomavirus Vaccination Among Korean American Women: A Focus Group Study. Womens Health Issues 2015; 25: 112–119.

35. Glenn BA, Tsui J, Singhal R, Sanchez L, Nonzee NJ, Chang LC et al. Factors associated with HPV awareness among mothers of low-income ethnic minority adolescent girls in Los Angeles. Vaccine 2015; 33: 289–293.

36. Perkins RB, Tipton H, Shu E, Marquez C, Belizaire M, Porter C et al. Attitudes Toward HPV Vaccination Among Low-Income and Minority Parents of Sons. Clin Pediatr 2013; 52: 231–240.

37. Henderson L, Millett C, Thorogood N. Perceptions of childhood immunization in a minority community: qualitative study. J R Soc Med 2008; 101: 244–251.

38. Lee CHJ, Sibley CG. Ethnic disparities in vaccine safety attitudes and perceptions of family doctors/general practitioners. Vaccine 2020; 38: 7024–7032.

39. Rahman MS. The Advantages and Disadvantages of Using Qualitative and

Quantitative Approaches and Methods in Language "Testing and Assessment" Research: A Literature Review. J Educ Learn 2016; 6: 102.

40. Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln YS, editors. Handbook of Qualitative Research. Thousand Oaks: Sage Publications, Inc.; 1994. p. 105-117.