REVIEW OPEN ACCESS

Barriers to Access among Indigenous Women Seeking Prenatal Care: A Literature Review

Zarish Jawad, BMSc Student [1], Nikita Chugh, BMSc Student [1], Karina Dadar, BHsc Student [2]

- [1] Schulich School of Medicine and Dentistry, Western University, London, Ontario, N6A 3K7
- [2] Faculty of Health Sciences, Western University, London, Ontario, N6A 3K7

*Corresponding Author: <u>zjawad@uwo.ca</u>

URNCST Journal

"Research in Earnest"

Abstract

Introduction: Indigenous women in Canada suffer disproportionately adverse prenatal outcomes due to access barriers in Canada's healthcare system. This paper aims to identify barriers Indigenous women face in accessing prenatal care in Canada. **Methods:** A literature search was conducted by all three authors using the following databases: PubMed, SCOPUS and CINAHL, and the keywords "Indigenous," "prenatal care," "access barriers," "maternal health," and "Canada." The search results yielded a total of 100 studies.

Results: The studies included were written in English only, included Indigenous females between the age of 19–35, and excluded review articles. Twelve studies met the inclusion criteria and were included in the review. Participants in the studies examined did not have any severe underlying medical conditions for the duration of the study, and study designs included in the review are prospective cohort, cross-sectional, case report, and case-control studies. Five studies discussed the geographical distribution of facilities as the first major barrier to accessing prenatal care. Four studies identified distrust between patients and healthcare providers as the second major barrier, and six studies identified lack of culturally sensitive prenatal care as the third major access barrier.

Discussion: The study found three main barriers Indigenous women face in accessing prenatal care in Canada; the geographical distribution of healthcare facilities, distrust between patients and healthcare professionals, and cultural sensitivity. Some changes in Canada's healthcare system to reduce access barriers to prenatal care include building more birthing and prenatal care facilities in rural areas for Indigenous women, educating healthcare professionals on culturally sensitive healthcare, and involving Indigenous people in decision-making to reduce distrust and power imbalances.

Conclusion: The involvement of Indigenous women and community leaders is essential in making decisions regarding implementing effective healthcare and prenatal programs for Indigenous women. However, further research is required to understand the effectiveness of the solutions and the barriers that make prenatal care less accessible for Indigenous women in Canada.

Keywords: Indigenous; maternal health; prenatal care; access barriers; Canada.

Introduction

Indigenous peoples in Canada face several health care disparities due to the historical trauma of colonization, continued systematic exclusion, and injustices they experience today [1, 20]. The intergenerational effects of trauma because of historical events, colonial policies, residential schools, forced displacement, assimilation, and racial discrimination have led to anxiety, mental illnesses, difficulties expressing emotions, depression, and low self-esteem in Indigenous women. The effects have been major contributors to health inequities experienced by the Indigenous population in Canada [2-4].

One primary deficit in the Canadian healthcare system is access to prenatal care for Indigenous women. Prenatal care is essential to ensure a safe and healthy pregnancy, and research shows that women with adequate prenatal care exhibit better health outcomes than those with little or no access [3,4]. Inadequate prenatal care is defined as having four or fewer visits during pregnancy. Indigenous women in Canada face higher rates of stillbirth, neonatal and postnatal death than the general population [5-7].

In addition, infant mortality rates among Indigenous peoples are twice as high as those of non-Indigenous peoples [20]. Indigenous mothers are more likely to be single or of a younger age compared to non-Indigenous women [21]. It is, therefore, crucial to understand their cultural and individual values, beliefs, and experiences to provide appropriate prenatal care to Indigenous women [10-13]. Prenatal care in the Indigenous population is a holistic and balanced approach involving physical, emotional, mental, and spiritual states [14].

Jawad et al. | URNCST Journal (2022): Volume 6, Issue 9

Some barriers to accessing prenatal care amongst Indigenous women include geographical distance, transportation costs, scarcity of childcare, lack of integration and coordination of community programs, and a lack of culturally sensitive, safe, and appropriate care [15]. As for the quality of prenatal care for Indigenous women, limitations include the shortage of healthcare professionals, community midwifery, and antenatal care [4]. Many Indigenous women also fear judgment and racist perceptions in healthcare settings, resulting in an unwillingness to share information or seek help [17].

Indigenous women are a vulnerable population in Canada; thus, removing barriers to accessing prenatal care should be a priority for Canada's healthcare system as it remains a challenge. This literature review examines the barriers to accessing prenatal care among Indigenous women in Canada.

Methods

An initial search was performed on PubMed using the keywords "Indigenous" OR "first nations" OR "Aboriginal" and "Canada," limiting the time frame between 2015 and 2022. The search result yielded around 35 articles. Another search was conducted on SCOPUS using the initial keywords in addition to the keywords "Prenatal care" and "Barriers to prenatal care," which yielded 45 results. The last search was conducted on CINAHL using all keywords, which generated around 20 results. All authors were assigned one database for research, including PubMed, Scopus and CINAHL. A reference manager, Zotero, was used to remove 80 duplicates, producing 20 articles. Once all the studies were found, the authors divided the studies amongst themselves to review the abstracts based on relevance to the review's objective. The results were synthesized, and the articles were kept based on the overlap between barriers. All authors recorded the barriers discussed in all the articles and placed the barriers into categories, and marked the barriers based on the number of times they appeared in the articles to identify the three major barriers.

Results

The inclusion criteria used to conduct the literature search included articles published in English, focusing on Canada and barriers to accessing prenatal care for Indigenous women between the ages of 19-35 within the past seven years (2015-present) and excluded articles that did not include access barriers to prenatal care. The full texts of 20 articles were assessed based on the inclusion criteria and narrowed to twelve articles within the literature review (Figure 1).

Geographical Distribution of Facilities

The first major barrier to prenatal care for Indigenous women is geographic inequalities, the distribution of accessible medical and birthing facilities, and a lack of proximal access for Indigenous communities. 41% (n=5) of

the included studies describe factors such as low population numbers, residence in rural areas, and extreme weather conditions that play a role in the accessibility Indigenous communities have [1-4]. Notably, the root cause of this inequality stems from colonial policies across various industries, favouring non-indigenous communities over indigenous ones. One such industry is healthcare, where geographic access to high-quality care is disproportionately granted to non-Indigenous communities [5-7].

The evacuation policy of One Health Canada instructs all First Nations women late in their pregnancy (36 to 38 weeks of gestational age) residing in remote reserves to relocate to urban centers to gain access to essential birthing services [6]. Their significantly worse perinatal health causes many women to adhere to this policy. As a result, many women in rural Northern communities access specialized maternity health care services in Southern urban centers [11]. Rural and remote communities in Canada have begun to increase their number of primary care services and make them more accessible. However, most of these facilities, including the specialists and medical equipment needed for handling higher-risk pregnancies, remain primarily available in the Southern cities [14].

Consequently, when the women endure pregnancy at a high risk medically, it does not leave them with much choice other than being medically evacuated and transferred to the South to give birth so they can receive the necessary medical attention [20,21]. For years, the women residing in Northern Canada have been routinely exposed to the process of evacuating to a hospital in the South for childbirth. A census-linked 2004–2006 study comparing birth outcomes for indigenous versus non-indigenous women also found that the preterm birth rate was greater for Inuit women, possibly due to factors like exposure to diseases such as bacterial vaginosis, young maternal age, and the stress of evacuation [8, 20].

In several communities, healthcare professionals such as midwives and nurses are not present proximally, so regardless of a high-risk pregnancy being a current concern for the woman, Indigenous women are forced to be sent away for childbirth [5-7]. Indigenous women continue to resist the idea of childbirth evacuation. However, there are many associated challenges with giving birth outside of the communities, including substantial emotional, social, cultural, and financial costs to the women [9]. In addition, lack of proximal prenatal care affects the access to high-quality prenatal care during their pregnancy. These services include antenatal visits to check the health of the mother and fetus and early ultrasonography [10].

The time and expenses are not feasible for the distance some indigenous women travel; therefore, many skip these early prenatal appointments. First Nations mothers are less likely to have the recommended four antenatal visits and less likely to have undergone an early ultrasound than non-First Nations women [9].

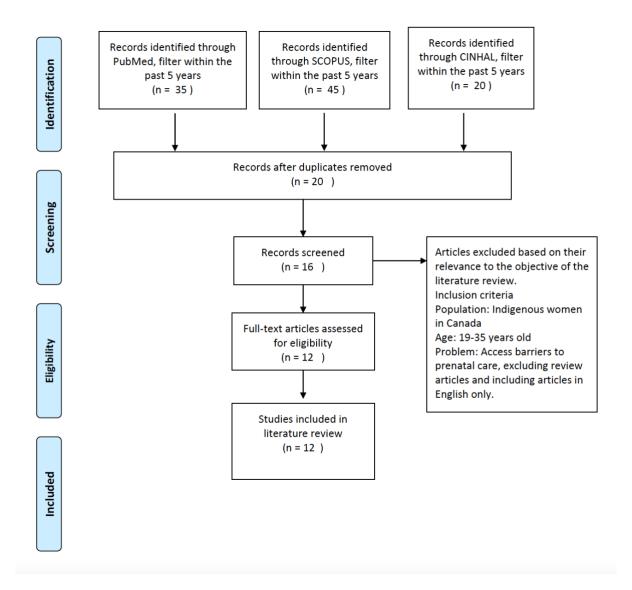


Figure 1. Illustration of the PRISMA diagram showing the identification, screening, and eligibility and included studies for the literature search on barriers to accessing prenatal care for Indigenous women in Canada (adapted from Moher et al. [22]).

Geographic inequalities contribute to reducing the quality and extent of prenatal care. When patients receive fewer antenatal visits than recommended, it increases the chances that pregnancy complications, especially those in correspondence with prenatal mortality, go undetected. There is an increased occurrence of stillbirths in First Nation populations compared to other high-income communities, suspected to be because of obesity, hypertension, and diabetes [10]. In addition, women are more susceptible to complications such as preeclampsia or intrauterine growth restrictions when these antenatal visits are not complete [9].

An important aspect of prenatal care is doing an ultrasound early into the first or second trimester. Performing this assessment is a relatively accurate method

to estimate the delivery date and helps eliminate complications of post-term pregnancy. This process is also essential to reduce perinatal mortality as it can detect congenital anomalies in the fetus [9].

Distrust Between Patients and Healthcare Professionals

33% (n=4) of the included studies identify distrust between patients and healthcare providers as the second major barrier for Indigenous women in accessing prenatal care [12]. An ethnographic community-based research study conducted with the Cree community of Maskwacis in Alberta found relationships and trust to be the foundation for effective prenatal care in Indigenous women [4]. Building genuine relationships requires trust and

commitment. However, it was also a major barrier for Indigenous women accessing prenatal care [7].

Building relationships and trust are essential as it reduces the patient's fear of judgement and discrimination and helps them move past their previous negative experiences. This also makes it likely for Indigenous women to follow the doctor's advice and share information [4].

Often, Indigenous women fear judgement and discrimination due to their past experiences and do not feel comfortable with healthcare providers or sharing information [11]. This causes women to withdraw and be unable to express their needs or concerns with healthcare providers, conforming to the long-standing power dynamics and paternalism with non-indigenous healthcare professionals [5].

Women are also required to be responsible for navigating the entire healthcare system alone without sufficient support leading to further distrust and dislike between healthcare providers and indigenous women. Participants in a qualitative research study also described the importance of healthcare professionals exchanging communication with the indigenous women, listening, learning, making them feel heard, and fostering a trusting relationship [12]. The lack of choice for women subject to the evacuation policy has also led to a sense of resignation with the location, individuals, or lack of care provided [6].

Cultural Beliefs and Sensitivity

50% (n=6) studies identify a lack of culturally sensitive and appropriate prenatal care as the third major barrier for Indigenous women accessing prenatal care. Moving beyond the mainstream healthcare model and respecting Indigenous beliefs and values when making decisions. Research indicates that contemporary inequalities, including political, social, and economic marginalization and histories such as residential schools and colonialism, influence power imbalances in the relationships between non-Indigenous healthcare professionals and Indigenous patients [5-7]. For instance, Indigenous people view the childbirth evacuation policy as a colonialist policy because it does not respect the Indigenous health care system, cultures, practices, and beliefs [8-10].

Cultural beliefs and the importance of traditions provide significant health benefits when integrating prenatal care. Miscommunications in this regard may have dangerous implications on women's healthcare outcomes. Cultural competence is required, which refers to when healthcare professionals display congruent behaviour to enable systems and individuals to work respectfully in a cross-cultural fashion [5]. Cultural repression may also hinder women from accessing health care services and communicating and expressing their needs [11-13].

For example, Canada's evacuation policy for pregnant First Nations women introduces a cultural gap, where women are deprived of their preferred birthplace, ceremonies, familial support, choice, midwives, and resource requirements [7]. The non-responsiveness of Indigenous women to healthcare professionals is often attributed to cultural factors. However, non-cultural factors such as systematic discrimination and negative past experiences with non-Indigenous health care professionals make Indigenous women unwilling to share information and seek healthcare [20,21].

Discussion

The main barriers to accessing prenatal care for Indigenous women in Canada include the geographical distribution of facilities, distrust between patients and healthcare professionals and cultural beliefs and sensitivity. Changes in Canada's healthcare system can help mitigate the barriers to accessing prenatal care for Indigenous women. Some changes include addressing geographic inequities in prenatal care facilities, implementing prenatal care programs and assessments and training healthcare professionals to provide safe and culturally appropriate prenatal care to Indigenous women.

A Solution to Geographic Distribution

A major solution would be to build medical and birthing facilities, such as midwifery service centers in more rural parts of Canadian provinces, for Indigenous women to seek prenatal care [13]. Although that may not always seem like the rational approach for the government, both practically and financially, these women could be offered access to prenatal and maternal care closer to where they live, for example, in their respective community health centers.

Proximal prenatal care facilities would grant relief to individuals who do not own or cannot afford a vehicle for transportation [5]. Indigenous women have recommended locating more prenatal services closer to each community and helping with transportation and family-friendly services, including bus tickets, taxi vouchers, or vans for mothers with more than one child [9]. Women also wish for more awareness surrounding the importance of receiving prenatal care services in remote communities [10-12].

Another solution is to conduct research that captures inequities amongst Indigenous and non-Indigenous communities regarding geographic access to birth facilities/services in remote areas using geocoding [14]. Solutions should involve Indigenous leaders and people participating in healthcare planning and delivery and education of Indigenous midwives and healthcare providers [13-17].

A Solution to Trust and Power Imbalance

Another initiative to aid prenatal care for indigenous women living in remote locations would be implementing maternity education programs and assessments. Such resources would benefit individuals living in areas with low access to medical and healthcare services. Timely and

Jawad et al. | URNCST Journal (2022): Volume 6, Issue 9

Page 4 of 7

dependable information from trusted healthcare professionals is also essential, along with receiving positive support. Especially for women with gestational diabetes, administering insulin doses requires consistent support from a trusted professional. Therefore, imbalances of authority should be minimized to force conformity [11-13]. Healthcare professionals should be educated on how various communication with Indigenous patients sometimes unintentionally displays discrimination against Indigenous women [12]. Finally, the Society of Obstetricians and Gynecologists of Canada recommends that healthcare professionals navigate patient interactions with Indigenous women by being culturally sensitive and aware of geographical and historical trauma and healthcare disparities [12-15].

A Solution to Cultural Sensitivity

Another critical aspect of providing access to prenatal care would be culturally appropriate healthcare with respect and regard to the indigenous women's beliefs and values. Healthcare professionals should also overcome language barriers by appointing professionals with transcultural knowledge [5, 20]. More education is required in the Canadian healthcare system not to perpetuate power imbalances and about different cultural beliefs and comfort levels. The Indigenous Physicians Association of Canada has also provided resources for medical students to educate them on providing culturally appropriate health care for First Nations, Métis, and Inuit patients [12, 20].

Some resources should include reflection on power inequalities, learning about women's challenges and barriers, and trust and open communication [12-15]. To cultivate a positive and welcoming environment without judgment, education about the implications of the history between Aboriginal and non-Aboriginal peoples is also necessary. Nurses should display sensitivity when communicating with Indigenous women on matters such as drugs, intoxication, and domestic abuse [13]. Health care providers can also acquire cultural understanding through real-life experiences, learning from patients and, most importantly, culturally sensitive training before interacting with Indigenous patients [4-7].

Limitations

The literature review findings provide some insight into the research regarding prenatal care for Indigenous women and moving towards reducing barriers to prenatal care access for Indigenous women in Canada. However, it has certain limitations. Unlike a systematic or scoping review, the study results are subject to bias because they did not follow a formal protocol. In addition, the titles and abstracts of all identified sources to remove irrelevant studies and duplicates were not independently screened by two reviewers. Future reviews must consider the perspectives of Indigenous patients; utilizing their

perspectives in Indigenous communities could be an effective way to address barriers to accessing prenatal care.

Conclusions

Access to prenatal care for Indigenous women in Canada is a concern for the country's healthcare system. This literature review examined the main barriers Indigenous women in Canada face in accessing prenatal care. The main barriers to access for Indigenous women in Canada include geographic inequities/distribution of prenatal care facilities, distrust between patients and healthcare providers and lack of culturally sensitive and safe prenatal care. Based on previous studies and findings, it is crucial to involve indigenous women and community leaders in decision-making for new policies and to reform healthcare planning and delivery. Further research is required to understand the gaps in implementing the solutions and the effectiveness of solutions in reducing barriers to prenatal care for Indigenous women in Canada.

Conflicts of Interest

The author(s) declare that they have no conflict of interests.

Ethics Approval and/or Participant Consent

This did not require ethics approval and/or participant consent because this was a literature review, and no primary data collection involving human participants was required.

Authors' Contributions

ZJ: made major contributions to drafting and revising the manuscript, performed the literature review, analyzed and interpreted the data, and gave final approval of the version to be published.

KD: made substantial contributions to drafting and revising the manuscript, performing the literature review, analyzing, and interpreting the data, and giving final approval of the version to be published.

NC: made substantial contributions to drafting and revising the manuscript, performed the literature review, analyzing and interpreting the data, and giving final approval of the version to be published.

Acknowledgements

We would like to acknowledge and thank our mentor Assala Alqahwaji for her guidance throughout the paper, as well as for help with editing and design.

Funding

This study was not funded.

References

[1] Jameson A. Access Barriers Among Indigenous Women Seeking Prenatal Care in Canada: A Literature Review [Internet] University of Manitoba. [cited 2022 Jun 17]. http://hdl.handle.net/1993/35980

Jawad et al. | URNCST Journal (2022): Volume 6, Issue 9

Page 5 of 7

- [2] Luo ZC, Senécal S, Simonet F, Guimond É, Penney C, Wilkins R. Birth outcomes in the Inuit-inhabited areas of Canada. CMAJ. 2010 Feb 23;182(3):235-42. https://doi.org/10.1503/cmaj.08204
- [3] Oliveira AP, Kalra S, Wahi G, McDonald S, Desai D, Wilson J, Jacobs L, Smoke S, Hill P, Hill K, Kandasamy S. Maternal and newborn health profile in a first nations community in Canada. Journal of obstetrics and gynaecology Canada. 2013 Oct 1;35(10):905-13. https://doi.org/10.1016/S1701-2163(15)30812-4
- [4] Trevors T. Neonatal morbidity among macrosomic infants in the James Bay Cree population of northern Quebec [Internet]. McGill University Library. [cited 2022 Jun 17]. Available from: https://escholarship.mcgill.ca/concern/theses/qr46r283f
- [5] Forbes J. Starting strong: Exploring experiences of prenatal care among First Nations mothers [Internet]. University of Manitoba. [cited 2022 Jun 17]. http://hdl.handle.net/1993/34330
- [6] Kornelsen J, McCartney K. System Enablers of Distributed Maternity Care for Aboriginal Communities in British Columbia: Findings from a Realist Review [Internet]. The University of British Columbia. Cited 2022 Jun 17]. Available from: https://med-fom-crhr.sites.olt.ubc.ca/files/2018/08/APRU_FNHA_System-Enablers-of-Distributed-Maternity-Care-for-Aboriginal-Communities-in-BC_Report_Final.pdf
- [7] Oster RT, Bruno G, Montour M, Roasting M, Lightning R, Rain P, Graham B, Mayan MJ, Toth EL, Bell RC. Kikiskawâwasow-prenatal healthcare provider perceptions of effective care for First Nations women: an ethnographic community-based participatory research study. BMC Pregnancy and Childbirth. 2016 Dec;16(1):1-9. https://doi.org/10.1186/s12884-016-1013-x
- [8] Burns L, Whitty-Rogers J, MacDonald C. Understanding Mi'kmaq women's experiences accessing prenatal care in rural Nova Scotia. Advances in Nursing Science. 2019 Apr 1;42(2):139-55. https://doi.org/10.1097/ANS.0000000000000248
- [9] Lawford KM, Giles AR, Bourgeault IL. Canada's evacuation policy for pregnant First Nations women: resignation, resilience, and resistance. Women and Birth. 2018 Dec 1;31(6):479-88. https://doi.org/10.1016/j.wombi.2018.01.009
- [10] Vang ZM, Gagnon R, Lee T, Jimenez V, Navickas A, Pelletier J, Shenker H. Interactions between indigenous women awaiting childbirth away from home and their southern, non-indigenous health care providers. Qualitative health research. 2018 Oct;28(12):1858-70. https://doi.org/10.1177/1049732318792500

- [11] Sheppard AJ, Shapiro GD, Bushnik T, Wilkins R, Perry S, Kaufman JS, Kramer MS, Yang S. Birth outcomes among first nations, Inuit and metis populations. Health Rep. 2017 Nov 15;28(11):11-6. https://www.researchgate.net/profile/Russell-Wilkins/publication/321105926 Birth outcomes among First Nations Inuit and Metis populations/links/5a0d9a50a6fdcc39e9c13362/Birth-outcomes-among-First-Nations-Inuit-and-Metis-populations.pdf
- [12] Riddell CA, Hutcheon JA, Dahlgren LS. Differences in obstetric care among nulliparous First Nations and non-First Nations women in British Columbia, Canada. Cmaj. 2016 Feb 2;188(2):E36-43. https://doi.org/10.1503/cmaj.150223
- [13] Oster RT, Toth EL. A retrospective analysis of stillbirth epidemiology and risk factors among First Nations and non-First Nations pregnancies in Alberta from 2000 to 2009. Journal of Obstetrics and Gynaecology Canada. 2015 Feb 1;37(2):117-21. https://doi.org/10.1016/S1701-2163(15)30332-7
- [14] Heaman MI, Sword W, Elliott L, Moffatt M, Helewa ME, Morris H, Tjaden L, Gregory P, Cook C. Perceptions of barriers, facilitators and motivators related to use of prenatal care: A qualitative descriptive study of inner-city women in Winnipeg, Canada. SAGE open medicine. 2015 Dec 15;3:2050312115621314. https://doi.org/10.1177/2050312115621314
- [15] Tait Neufeld H. Patient and caregiver perspectives of health provision practices for First Nations and Métis women with gestational diabetes mellitus accessing care in Winnipeg, Manitoba. BMC Health Services Research. 2014 Dec;14(1):1-4. https://doi.org/10.1186/1472-6963-14-440
- [16] Van Wagner V, Osepchook C, Harney E, Crosbie C, Tulugak M. Remote midwifery in Nunavik, Quebec, Canada: outcomes of perinatal care for the Inuulitsivik health centre, 2000–2007. Birth. 2012 Sep;39(3):230-7. https://doi.org/10.1111/j.1523-536X.2012.00552.x
- [17] Smylie J, O'Brien K, Beaudoin E, Daoud N, Bourgeois C, George EH, Bebee K, Ryan C. Long-distance travel for birthing among Indigenous and non-Indigenous pregnant people in Canada. CMAJ. 2021 Jun 21;193(25):E948-55. https://doi.org/10.1503/cmaj.201903
- [18] Di Lallo S. Prenatal care through the eyes of Canadian Aboriginal women. Nursing for women's health. 2014 Feb 1;18(1):38-46. https://doi.org/10.1111/1751-486X .12092
- [19] Reading CL, Wien F. Health inequalities and social determinants of Aboriginal peoples' health [Internet]. National Collaborating Centre for Aboriginal Health. British Columbia [cited 2022 Jun 17]. https://doi.org/10.1089/heq.2019.0041

Jawad et al. | URNCST Journal (2022): Volume 6, Issue 9

Page 6 of 7

- [20] Kirmayer LJ, Brass GM, Tait CL. The mental health of Aboriginal peoples: Transformations of identity and community. The Canadian Journal of Psychiatry. 2000 Sep;45(7):607-16. https://doi.org/10.1177/07067437000 4500702
- [21] Cidro J, Bach R, Frohlick S. Canada's forced birth travel: towards feminist indigenous reproductive mobilities. Mobilities. 2020 Mar 3;15(2):173-87. https://doi.org/10.1080/17450101.2020.1730611
- [22] Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Annals of internal medicine. 2009 Aug 18;151(4):264-9. https://doi.org/10.1371/journal.pmed.1000097

Article Information

Managing Editor: Jeremy Y. Ng

Peer Reviewers: Kavin Selvan, Katelyn Sushko

Article Dates: Received Jun 17 22; Accepted Aug 14 22; Published Sep 22 22

Citation

Please cite this article as follows:

Jawad Z, Chugh N, Dadar K. Barriers to access among Indigenous women seeking prenatal care: A literature review.

URNCST Journal. 2022 Sep 22: 6(9). https://urncst.com/index.php/urncst/article/view/389

DOI Link: https://doi.org/10.26685/urncst.389

Copyright

© Zarish Jawad, Nikita Chugh, Karina Dadar. (2022). Published first in the Undergraduate Research in Natural and Clinical Science and Technology (URNCST) Journal. This is an open access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in the Undergraduate Research in Natural and Clinical Science and Technology (URNCST) Journal, is properly cited. The complete bibliographic information, a link to the original publication on http://www.urncst.com, as well as this copyright and license information must be included.



Funded by the Government of Canada



Page 7 of 7

Do you research in earnest? Submit your next undergraduate research article to the URNCST Journal!

| Open Access | Peer-Reviewed | Rapid Turnaround Time | International | | Broad and Multidisciplinary | Indexed | Innovative | Social Media Promoted | Pre-submission inquiries? Send us an email at info@urncst.com | Facebook, Twitter and LinkedIn: @URNCST Submit YOUR manuscript today at https://www.urncst.com!

Jawad et al. | URNCST Journal (2022): Volume 6, Issue 9