A literature review on kidney cancer outcomes among Indigenous populations in Canada, the U.S., Australia, and New Zealand, 1990−2023

Megan Lowe[1,2], Sayna Leylachian[2], Sydney Glac[2,3], Lisa K. Ellison[2], Brenda Elias[4], Alethea Kewayosh[2], Amanda J. Sheppard[2,5]
[1]School of Medicine, Queen's University, Kingston, ON, Canada; [2]Indigenous Health Unit, Ontario Health, ON, Canada; [3]University of Guelph, Guelph, ON, Canada; [4]University of Manitoba, Winnipeg, MB, Canada; [5]Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada

Cite as: Lowe M, Leylachian S, Glac S, et al. A literature review on kidney cancer outcomes among Indigenous populations in Canada, the United States, Australia, and New Zealand, 1990−2023. *Can Urol Assoc J* 2026 September 25; Epub ahead of print. http://dx.doi.org/10.5489/cuaj.9546

Published online September 25, 2026

Corresponding author: Dr. Sayna Leylachian, Indigenous Health Unit, Ontario Health, ON, Canada; sayna.leylachian@ontariohealth.ca

***

ABSTRACT

Introduction: Rates of kidney cancer incidence and mortality have risen globally, with Indigenous populations in countries such as Canada, the U.S., New Zealand, and Australia disproportionally impacted. This literature review was aimed to summarize current evidence on kidney cancer outcomes among Indigenous populations in these countries.
Methods: A structured literature review on kidney cancer outcomes among Indigenous populations in Canada, the U.S., New Zealand, and Australia was conducted using Ovid MEDLINE and EMBASE databases. Articles that were in the English language and published between 1990 and 2023 were screened and appraised for inclusion in the review.
Results: The search strategy initially identified 1868 records, of which 136 were reviewed in detail; 74 records were included. Most studies were based in the U.S. Overall, findings demonstrated that Indigenous populations have higher incidence and mortality rates of kidney cancer compared to non-Indigenous populations. This disparity was also accompanied by a higher prevalence of or exposure to known risk factors for kidney cancer. Additionally, Indigenous populations faced barriers to accessing treatment for kidney cancer, and when treatment is received, it is often more invasive.
Conclusions: Indigenous populations in Canada and U.S. have a disproportionally higher burden of kidney cancer. These findings highlighted the need for targeted and improved cancer

surveillance and control efforts in Indigenous populations. Culturally appropriate preventive measures are needed to address risk factors, carcinogenic exposures, target Indigenous-specific determinants of health, and reduce the unique barriers to accessing healthcare services.

INTRODUCTION

Kidney cancer is ranked as the 13th most common type of cancer globally.[1] Renal cell carcinoma (RCC) is the most prevalent form of kidney cancer and accounts for more than 90% of cases.[2] In 2020, there were over 431,000 new cases of kidney cancer reported worldwide, resulting in approximately 180,000 deaths.[3] North America and Europe exhibit higher incidence kidney cancer rates, primarily due to improved diagnoses and greater exposures to established cancer risk factors.[4] Risk factors linked to kidney cancer include age, sex, race, common pain medication use, smoking, obesity, hypertension, family kidney disease history, genetic and hereditary risk factors, advanced kidney disease, and workplace exposures.[5-12]

Historically, Indigenous populations experienced low rates of cancers, but in more contemporary times, incidence (including kidney cancer) has been on the rise.[13] In an Ontario and Canadian context, rates of kidney cancer were ranked 5th most common for First Nations while 12th for the general population.[14] Indigenous populations have had disproportionally elevated rates of kidney cancer incidence and mortality compared to non-Indigenous populations worldwide.[14-16] Given this history and the current impact of kidney cancer, a systematic review of research on kidney cancer in Indigenous populations globally is needed to identify common themes and gaps and validate the need for Indigenous-informed policies, prevention strategies and treatment strategies to address a persistent health issue.

Indigenous peoples are broadly understood to be descendants of the original inhabitants of a region who maintain distinct cultural, social, political, and territorial identities despite colonization.[17] This includes many distinct Nations, communities, and groups globally, including those represented in this review across Canada, the United States, Australia, and New Zealand. Indigenous populations are often examined across these countries because they share broadly comparable settler-colonial histories, health system contexts, and documented disparities in Indigenous health outcomes.[17] They are also among the most frequently represented settings in Indigenous oncology and population health research, allowing for meaningful comparison across jurisdictions.[18] While Indigenous Peoples within and across these countries are culturally, politically, and historically distinct, they continue to experience common structural inequities that may shape cancer incidence, access to care, and survival. Including these four countries therefore provides an opportunity to synthesize the available evidence on kidney cancer trends in Indigenous populations and identify cross-context gaps relevant to policy, prevention, and care. This review was conducted by an Indigenous and non-Indigenous led team of researchers dedicated to addressing cancer amongst Indigenous populations.

METHODS

Project support and governance

This study builds on a larger Canadian Institutes of Health Research (CIHR) grant examining cancer staging and other outcomes among First Nations, Inuit, and Métis adults in Canada. It was supported by the grant team, consisting of Indigenous and non-Indigenous academics and healthcare providers and the Joint Ontario Indigenous Health Committee (JOIHC) (previously the Joint Ontario Indigenous Cancer Committee (JOICC)). This committee is comprised of representatives from Political Territorial Organizations and First Nations, Inuit, Métis and urban Indigenous provincial organizations. The overall research objectives were shaped by discussions in face-to-face meetings with JOIHC and the grant team. Project updates were provided for discussion at annual JOIHC meetings. Throughout the project, JOIHC members were invited to participate in all stages of the work, including reviewing the final manuscript. Ethics approval (RIS Human Protocol number 37899) was obtained from the University of Toronto.

Search strategy

A structed literature review was conducted to investigate kidney cancer among Indigenous populations from 1990 to 2023. The search was informed by systematic search principles but was not designed as a formal systematic review.

The literature search was conducted using Ovid MEDLINE and EMBASE databases, including studies published until February 24, 2023. The search included full-text articles and conference abstracts from major scientific meetings. To ensure inclusivity, the search terms captured Indigenous populations across Canada and the United States (US), Australia and New Zealand. The review was restricted to articles published in English. The full search strategies used for Ovid MEDLINE and EMBASE are provided in Appendix A.

Study selection and data extraction

Retrieved references were screened for duplicates using the Mendeley Reference Manager Software. Records were then imported into Screenatron, an online systematic review software for title and abstract screening to identify relevant studies for further review. Full-text review was subsequently performed to confirm eligibility based on populations and outcomes of interest. Screening and study selection were conducted by a single reviewer.

Studies were included if they reported on kidney cancer (including subtypes such as renal cell carcinoma, clear cell carcinoma, and Wilms tumour) in Indigenous populations from Canada, the United States, Australia, or New Zealand. Studies were excluded if they did not report findings specific to Indigenous populations, did not include kidney cancer-related outcomes, or did not provide sufficient Indigenous-specific kidney cancer data to allow interpretation of relevant outcomes (e.g., incidence, mortality, survival, treatment, or risk factors). No minimum sample size threshold for Indigenous participants was applied.

For each included article, study characteristics were extracted including author, year of publication, country, and study design. Findings were synthesised narratively and grouped into key thematic areas: risk factors and exposures, stage/age-at-diagnosis, incidence, mortality, survival, treatment, cancer disparities and underrepresentation in the data.

Given the nature of the literature review, a formal risk of bias assessment was not conducted, however, study findings were interpreted in the context of study design and reported limitations.

RESULTS

Search results and study characteristics

The search strategy identified a total of 1868 records (Figure 1). After removing duplicates, 1682 articles underwent abstract and title screening, from which 136 were identified for full-text review. Ultimately, 74 articles met inclusion criteria and were included in the literature review. The majority of included studies were conducted in the US. Overall, articles were included in the study if they mentioned both kidney cancer, (including all other subtypes i.e., RCC, Clear Cell, and Wilms' tumor etc.,) and Indigenous peoples. Studies were excluded if the Indigenous population was not from at least one of the four countries of focus (Canada, US, Australia, and New Zealand), or if there were insufficient data on kidney cancer outcomes among Indigenous populations, and/or if kidney cancer (including any subtype) was not mentioned. Of the 74 articles included in the review, 54 were conducted in the US and 13 in Canada, 4 in Australia, and 3 in New Zealand. Table 1 provides a summary of the papers, including the author, country, study design and thematic findings relevant to the review. The study's selection process is presented in Figure 1.

Risk factors and exposure

Across included studies, the most consistently discussed risk factors for kidney cancer in Indigenous populations were smoking, obesity, diabetes mellitus, hypertension, and environmental contaminant exposures. [5-9] These risk factors overlap with those established in the general population, but evidence suggests they may be more prevalent or differently distributed in some Indigenous communities, potentially contributing to disproportionately higher kidney cancer incidence, mortality, and poorer outcomes.[6-8] Watson et al. (2008) reported that American Indian males had a higher risk of kidney cancer than American Indian females and also identified cigarette smoking and tobacco use as prevalent exposures of concern.[5, 6, 19] Physical inactivity, excessive intake of fatty foods, and high-protein diets were also commonly associated with an increased risk of kidney cancer.[19, 20] Similarly, obesity and elevated body mass index (BMI) have been proposed as important contributors to kidney cancer burden in American Indian and Alaska Native (AI/AN) populations.[6, 21, 22] These factors were exacerbated by the discriminatory practices and systemic challenges faced by Indigenous populations. Additionally, hypertension and diabetes have been linked to kidney cancer with some studies noting a higher prevalence of

these comorbidities in Indigenous populations than what were defined as European Americans (EAs) or "White" populations (non-Indigenous, non-Hispanic, and non-Black).[6, 22] For example, Decker et al. (2020) found a significant interaction between diabetes and First Nations status for risk of kidney cancer in those aged 60 to 74 years.[8] They also concluded that several modifiable risk factors for kidney cancer including smoking, obesity, and hypertension, were more prevalent among First Nations peoples in Canada.

Environmental exposures to carcinogens such as arsenic, cadmium, and uranium were also identified as potential contributor to kidney cancer risk in Indigenous populations in several studies. [10-12] Because some Indigenous communities are disproportionately located near contaminated land or water sources, chronic exposure to harmful contaminants has been proposed as a possible contributor to kidney cancer burden. For instance, AIs are described as disproportionally exposed to these contaminants through drinking water, soil, and air relative to the general US population.[12, 23, 24] While García-Esquinas et al. (2014) found no significant association between arsenic and cadmium with kidney cancer in AIs, they emphasized the need for further research to understand the potential relationship between these exposures and kidney cancer risk.[10, 11] Redvers et al. (2021) similarly highlighted uranium contamination in drinking water sources on AI reservations in the US and cited emerging evidence that suggest chronic exposure to uranium may increase kidney cancer incidence.[12]

Stage and age at diagnosis

Research comparing the age and stage of kidney cancer diagnosis suggests that Indigenous populations are often diagnosed at later cancer stages and younger ages compared to non-Indigenous individuals.[7, 22,-29] Across several studies, Indigenous patients were consistently found to be younger at diagnosis, with differences reported of approximately 5 to 10 years compared to non-Indigenous groups.[7,25,30] For example, Batai et al. reported that AIs diagnosed with RCC were younger compared to what were defined as "Non-Hispanic White's" ("NHWs") (58.9 vs. 64.3 years), and similar findings were observed in Māori population.[7,30]

Multiple studies also suggest a higher likelihood of advanced stage of kidney cancer diagnosis among Indigenous populations. [27,28,31] While Canadian data reported similar stage at diagnosis despite younger age at presentation, U.S.-based studies found that AI/AN patients had a higher proportion of advanced-stage RCC and were less likely to be diagnosed at an early stage compared with non-Hispanic White patients.[26–28,31] However, some associations were attenuated after adjustment for neighbourhood characteristics.[28]

Incidence

Kidney cancer incidence has been consistently higher among several Indigenous populations globally, particularly in the US and Canada, compared with non-Indigenous populations. In the U.S., Melkonian et al. (2019) reported that kidney cancer incidence rates were significantly higher in AI/AN populations compared to White populations (Relative Risk (RR) = 1.66, $p < 0.05$).[32] Similarly, Simard et al. (2012) reported that kidney cancer incidence was numerically

highest among AI/AN populations in both men and women. Incidence rates among AI/ANs were 29.4 per 100,000 in men and 17.0 per 100,000 in women, exceeding those reported in White, Black, Asian/Pacific Islander, and Hispanic populations. The average annual percent change was 1.9 among AI/AN men and 3.4 among AI/AN women, with only the latter reported as statistically significant ($p < .05$). However, comparative confidence intervals or p-values between groups were not provided, limiting formal inference regarding between-group differences.[33] Using 2009 to 2013 North American cancer registries, Bergersen et al. (2017) demonstrated that age-adjusted kidney cancer incidence rates among NAs were significantly higher in Arizona and New Mexico.[34] Gonzalez et al. (2022) also found that the age-adjusted incidence rate in Oklahoma was 32.3 per 100,000 among AI/ANs compared with 15.8 per 100,000 among White populations (IRR = 2.04).[35] In 2019, Batai et al. similarly reported that AIs had a significantly higher incidence of kidney cancer than "NHWs" of 1.9 times higher and was the second most diagnosed cancer among AIs.[23] Similarly, Kratzer et al. (2022) revealed that compared to non-Indigenous people, incidence rates were about two times higher for kidney cancer in AI/ANs (RR = 1.79).[36] Kelly et al. (2014) found that incidence rates among AN people significantly exceeded rates among US "White's" for kidney cancer (RRmen=1.39; RRwomen= 1.90).[37] They reported that kidney cancer incidence rates were higher among AN men aged 70 to 79 than men of similar age and were higher among AN women aged 50 to 59 than "White" women of similar age.[37] Valencia et al. (2021), Palumbo et al. (2020, 2021), and Schafer et al. (2022) similarly identified a disproportionately high RCC and kidney cancer burden among AI/AN populations relative to non-Indigenous comparison groups.[28,38–40] In contrast, Lichtensztajm et al. (2022) found that Asian American/Pacific Islanders were more likely to develop clear-cell RCC than any other renal cancer.[41] Earlier studies also identified kidney cancer as among the most common cancers in AI/AN males and females, with elevated incidence and risk reported across both sexes and younger age groups.[19,20,42,43]

This elevated burden also varies geographically. Studies conducted in the Contract Health Service Delivery Areas (CHSDA) and Indian Health Services regions consistently found higher kidney cancer incidence among AI/AN populations, particularly the Northern Plains, Alaska, Southern Plains, Southwest, Pacific Coast, and East. [16,31,44-47] For instance, Wilson et al. (2008) found a significantly higher kidney cancer incidence among AI/AN in CHSDA counties compared to "NHW" (RR = 1.51; 95%, Confidence Interval (CI):1.42-1.61), suggesting that regional variation may reflect differences in risk factor burden, environmental exposures, healthcare access, or structural inequities.[31]

In Canada, available evidence similarly suggests higher kidney cancer incidence among First Nations and some Inuit populations, with several studies reporting significantly higher rates among both men and women.[13,15,48-53] For example, Mazereeuw et al. (2019) found that kidney cancer incidence was significantly higher in First Nations males and females compared to their non-Indigenous counterparts (RRmen = 1.66, 95%CI = 1.43–1.94; RRwomen = 2.22, 95%CI = 1.88–2.68).[15] In contrast, findings from Australia and New Zealand were less consistent, with

one study reporting lower incidence among Australians in the Northern Territory (NT) and another finding similar RCC incidence between Māori and non-Māori peoples of New Zealand despite younger age at diagnosis in Māori's population.[30,54]

Mortality

The literature demonstrates higher kidney cancer mortality among Indigenous populations in the US, Canada, New Zealand, with more variable findings in Australia. In the US, several studies reported disproportionally high mortality among AI/AN populations. Islami et al. (2021) found that AI/AN males and females had 75% and 64% higher kidney cancer death rates, respectively.[19] Similarly, three studies identified kidney cancer was a leading cause of cancer death for AI/AN men, with mortality rates twice as high than those of White populations.[19, 55,56] Additionally, Li et al. (2014), Foote et al. (2016), and Cobb and Paisano (1998) reported elevated mortality, including in CHSDA counties, where rates were approximately 1.9 to 2.2 times higher than in White populations.[16,46,57] Valencia et al. (2021) and Kratzer et al. (2022) similarly found higher mortality among AI/AN populations, with Kratzer et al. identifying one of the largest disparities for kidney cancer (RR = 1.77).[28,36]

Specific regional analysis also suggests high mortality in certain U.S areas. Espey et al. (2005) found that AI/AN men had a significantly higher mortality rates for kidney cancer, with the highest regions of cases in Alaska and the Northern Plains.[59] Batai et al. (2018) found that kidney cancer mortality rates declined for US "White's" from 1990 to 2009, but remained unchanged for NAs, who had a significantly higher mortality rate than EAs of non-Hispanic origin.[45] The mortality rate was almost twice as high in NAs as EAs, with the highest rates observed in the Southern Plains (13.7 per 100,000) and a mortality rate ratio of 3.1 among younger adults in the Southwest.[45] More recent studies also reported significantly higher mortality among AI/AN populations in Arizona (HR = 1.55, 95% CI: 1.18–2.04) and Oklahoma (mortality rate ratio = 1.98) compared with White populations.[24,35]

In Canada, elevated kidney cancer mortality among Indigenous populations were also reported. Jamal et al. (2021) found significantly higher mortality rates for kidney cancer among First Nations people in Ontario, while Louchini et al (2008) demonstrated higher cancer mortality rates, including kidney cancer, among Indigenous in Québec.[13,50] Wong et al. (2017) reported elevated kidney cancer mortality across seven studies, with higher age-adjusted mortality rate ratios for Indigenous populations, ranging from 1.24–1.70.[48]

Mixed findings were reported in Australia and New Zealand. Baker et al. (2011) found significantly higher mortality rates of cancer, particularly among Indigenous females in New South Wales.[60] In contrast, Condon et al. (2004) found that NT Indigenous peoples had a lower mortality rate than the total Australian mortality rate.[61] In New Zealand, Hulme and Murray (2019), found that the Māori Indigenous population have a higher mortality rate compared to their non-Māori counterparts.[62]

Survival

Research on kidney cancer survival among Indigenous populations is relatively limited, with existing studies demonstrating mixed results. Nash et al. (2018) reported that the 5-year survival rate for kidney cancer among AI/ANs was 72.2%.[63] They further analyzed the survival rates by age and sex and found that individuals over the age of 65 had a higher risk of death (HR = 3.53, 95%CI: 2.04, 6.12), while no significant differences were observed based on sex.[63] The study revealed that kidney cancer survival rates did not change significantly between the time periods of 1992-2002 and 2003-2013.[63] In contrast, Dasgupta et al. (2022) found that Aboriginal and Torres Strait Islander peoples had a diagnosed with kidney cancer had a higher risk of death within 5 years of diagnosis compared to other Australian, with nearly 20% of the observed deaths considered potentially preventable in the absence of survival disparities.[64]

However, some studies did not demonstrate worse survival outcomes. After adjusting for clinical and sociodemographic factors, Jivanji et al. (2021) found that there was no significant association between AI/AN race and 5-year cause-specific survival (HR = 1.01, 95%CI: 0.75, 1.36).[65] However, the authors noted the need for larger sample sizes and the inclusion of data on factors such as income, comorbidities, and access to care to obtain more robust results.[65] Similarly, Withrow et al. (2017) reported no difference in survival rates for kidney cancer in First Nations people compared to their non-Indigenous counterparts in Canada,[66] while Akhavan et al. (2015) reported improved survival among NAs with RCC, thought these findsings were limited in small sample size.[67] Johnson et al. (2011) found that childhood Wilms tumors survival rates were significantly lower for both AI/AN and Asian/Pacific Islander children compared to "White" children.[58] A New Zealand study by Jeffereys et al. (2009) determined that the Māori population had a poorer survival rate from all cancers (including kidney cancer) compared to non-Māori peoples; however, that in relation to socioeconomic inequalities, ethnicity was not a confounding factor and further research was required.[68]

Interventions and treatment

Depending on cancer stage at diagnosis, interventions and treatments for kidney cancer vary in their effectiveness and invasiveness.[69] Indigenous populations experience surgical and treatment disparities which contribute to higher risk of mortality from kidney cancer.[69, 70] Recent studies have reported that AI/ANs were less likely to receive surgical treatments for RCC compared to "NHWs" and, among those who underwent nephrectomy, had increased odds of receiving radical rather than partial nephrectomy.[25, 69, 70] Given that partial nephrectomy is preferred for localized disease and radical nephrectomy when not feasible, this pattern may suggest differences in stage at presentation, tumour characteristics, or access to care.[25, 69, 70] While surgical disparities were more frequently reported, comparatively little literature addressed access to systemic therapies for advanced or metastatic kidney cancer. This represents an important gap, as inequities in access to targeted therapy, immunotherapy, or oncology care pathways may also contribute to poorer outcomes in Indigenous populations.[71]

Barriers such as inadequate access to healthcare and insurance coverage are two of many reasons for the disparities seen in kidney cancer treatment and outcomes in Indigenous

populations. According to Markin et al. (2013), AI cancer patients were more likely to undergo cancer surgery at rural hospitals than "NHW" patients.[72] However, residing and receiving care in rural locations often limits access to other forms of medical care.[72] Further, Guadagnolo et al. (2014) showed that AI cancer patients, including kidney cancer patients, were less likely to enroll in hospice care compared to "NHW" patients in their last 6 months of life.[73] According to the authors, lower hospice enrollment rates can be attributed to the absence of Indian Health Service and tribally operated hospice programs located in or near AI reservations.[73]

Hammond et al. (2017) identified social, historical, and institutional barriers to cancer care among First Nations women in Canada, including challenges accessing treatment and supportive care within or close to their community and felt disconnected from healthcare and supportive professionals who were not locally based.[74] First Nations participants shared that their community clinics lacked sufficient funds to provide adequate care and support for cancer survivors.[74] Historical and present-day medical mistrust and dissatisfaction with healthcare services are common obstacles to kidney cancer treatment and improved kidney cancer outcomes. Quinonez-Zanabria et al. (2021) state that access to specialized cancer care, cancer information, and culturally competent care is limited for AI/AN patients.[75] They illustrated that even when healthcare is available, there are delays in receiving surgery and other treatments.[75]

In a randomized controlled trial by Hodge et al. (2022), a culturally tailored intervention was implemented to manage individual cancer symptoms, including those from kidney cancer.[76] The intervention included educational curriculum, cancer information, and instruction on self-managing cancer symptoms.[76] The intervention group showed positive outcomes compared to the control group, including improved pain, depression, fatigue, and loss of function management in AI adults.[76]

Disparities and underrepresentation in data

Indigenous populations worldwide are significantly underrepresented in kidney cancer data used for public health and medical research.[77-79] In 2021, Wolff et al. evaluated the National Cancer Database (NCDB), which captures new cancer diagnoses in the US, to determine its coverage rate by race.[77] Their study revealed that AI/AN subjects exhibited the lowest capture rates for all major cancers, including kidney cancer, when compared to "White", Black, and Asian/Pacific Islander subjects.[77] Similarly, Javier-DesLoges et al. confirmed these findings in their recent investigation of NCDB in 2022, which examined the underrepresentation of AI/ANs through a retrospective cohort of patients specifically diagnosed with kidney cancer.[78] Their study concluded that compared to "NHWs", AI/ANs had the lowest capture rate in NCDB, capturing less than 55% of kidney cancer cases.[78] Furthermore, Taparra et al.'s (2022) cohort study cautioned against aggregating data on Indigenous groups with other populations, as improper aggregation could conceal disparities among Indigenous populations in data that could impact health policies.[79]

DISCUSSION

This literature review provides an overview of the current state of kidney cancer among Indigenous populations in the US, Canada, Australia and New Zealand. The majority of the articles included were from the US. Across all study regions, findings consistently demonstrated higher rates of kidney cancer incidence among Indigenous compared to non-Indigenous populations. These findings emphasize the urgent need for improved surveillance and timely, specialized control strategies to address the high incidence and mortality rates of kidney cancer among Indigenous populations worldwide. Moreover, this review highlights the need for targeted, evidence-informed approaches that address underlying social determinants of health. This encompasses delivering healthcare that is equitable, targeted, and culturally safe, with the goal of reducing barriers and improving access to timely diagnosis and treatment. Additionally, it is imperative to acknowledge that these disproportionate rates of kidney cancer, along with other adverse health outcomes, stem from systemic racism entrenched within the healthcare system, compounded by intergenerational trauma that continues to afflict Indigenous individuals to this day. Systemic racism within healthcare systems can manifest through unequal access to diagnostic and treatment services, experiences of discrimination or dismissal within clinical encounters, and a lack of culturally appropriate care, all of which can contribute to delayed diagnosis, reduced engagement with healthcare services, and poorer health outcomes for Indigenous patients.[80,81] Experiences of racism in healthcare have also been shown to reduce healthcare access, delay care seeking, and contribute to mistrust of healthcare systems, further exacerbating health inequities.[82] Intergenerational trauma, rooted in the historical and ongoing impacts of colonial policies such as residential schools, can further influence health by shaping trust in healthcare institutions, contributing to avoidance of care, and increasing exposure to social and structural determinants of health that elevate cancer risk and limit access to timely treatment.[83,84]

There are gaps in the literature, particularly around survival data for kidney cancer where the few articles identified had mixed results. Furthermore, the studies highlighted the ongoing disparities and underrepresentation of Indigenous data, which is crucial for informing health policies and improving health outcomes.[85]

Several articles examined risk factors and carcinogenic exposures that could increase the likelihood of developing kidney cancer. Due to the direct impacts of colonialism, Indigenous populations often live in rural areas where they face disproportionate risk factors and exposures. The geographical placement of Indigenous communities in rural areas, particularly in proximity to industrial zones, can elevate their exposure to carcinogenic chemicals, thus increasing risks to health. Residing in these rural settings presents a significant barrier due to limited resources and high costs associated with the need to travel considerable distances for healthcare access, compounded by transportation challenges. Studies consistently reveal that the treatment for kidney cancer among Indigenous populations, particularly in rural areas, tends to be more invasive.

To address these barriers, the literature points to several priority policy and practice approaches. First, improving access to specialized and reliable medical travel services is critical for Indigenous patients living in rural and remote communities, where distance, cost, and time away from family and community remain major barriers to accessing cancer care. Research with Inuit patients travelling for cancer care has shown that travel itself can shape whether and how care is accessed, and broader Canadian evidence has highlighted the need to improve medical travel experiences for people from remote regions.[86,87]

Second, increasing Indigenous patient navigator programs have been identified as an important strategy to support Indigenous patients across the cancer journey by facilitating access to services, coordinating care, addressing cultural and spiritual needs, arranging translation and transportation supports, and helping make care more culturally safe.[88,89] Evidence from broader literature also suggests that patient navigation can improve care coordination and patient experience for Indigenous populations.[90]

Third, ensuring the delivery of culturally safe care is essential to addressing systemic barriers and improving trust in the healthcare system. Evidence from Canadian research indicates that culturally safe care requires collaboration with Indigenous communities, provider self-reflection, attention to power dynamics, and the creation of safe and respectful care environments.[91] In cancer-specific contexts, culturally safe care has also been described as involving family and community, incorporating culture as healing, and explicitly addressing systemic racism within healthcare systems.[92,93]

In Ontario, relevant system-level examples include the First Nations, Inuit, Métis and Urban Indigenous Cancer Strategy; Indigenous patient navigator roles embedded in regional cancer programs; culturally relevant education resources for Indigenous communities; Indigenous Relationship and Cultural Awareness training for providers; and Indigenous-specific screening research and knowledge translation initiatives developed with Métis and First Nations partners.[94,95] The Joint Ontario Indigenous Health Committee (JOIHC), formerly the Joint Ontario Indigenous Cancer Committee (JOICC), continues to serve as an Indigenous advisory table guiding these priorities.[96]

Therefore, the literature underscores the importance of adopting targeted, culturally appropriate and evidence-informed interventions to address both elevated risk factors and persistent barriers to kidney cancer care among Indigenous populations.

As future research progresses, it is crucial that Indigenous data is collected properly, respectfully, and in collaboration with Indigenous organizations and communities. This process should be distinction-based, culturally sensitive, and incorporate appropriate training. Strengthening Indigenous data governance and ensuring community ownership and control of data are also critical to producing meaningful and actionable evidence. Only through meaningful, respectful, and ongoing collaboration with Indigenous partners and communities can improvements truly be made within Indigenous health on a global scale.

REFERENCES

1. Pandey J, Syed W. Renal cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022. Available at: https://www.ncbi.nlm.nih.gov/books/NBK558975/.
2. Hsieh JJ, Purdue MP, Signoretti S, et al. Renal cell carcinoma. *Nat Rev Dis Primers* 2017;3:17009. doi:10.1038/nrdp.2017.9
3. Makino T, Kadomoto S, Izumi K, et al. Epidemiology and prevention of renal cell carcinoma. *Cancers (Basel)* 2022;14:4059. doi:10.3390/cancers14164059
4. Medina-Rico M, López-Ramos H, Lobo M, et al. Epidemiology of renal cancer in developing countries: Review of the literature. *Can Urol Assoc J* 2018;12:E154-62. doi:10.5489/cuaj.4464
5. Sauer AG, Siegel RL, Jemal A, et al. Current prevalence of major cancer risk factors and screening test use in the United States: Disparities by education and race/ethnicity. *Cancer Epidemiol Biomarkers Prev* 2019;28:629-42. doi:10.1158/1055-9965.EPI-18-1169
6. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2017. *CA Cancer J Clin* 2017;67:7-30. doi:10.3322/caac.21387
7. Batai K, Harb-De la Rosa A, Zeng J, et al. Racial/ethnic disparities in renal cell carcinoma: Increased risk of early onset and variation in histologic subtypes. *Cancer Med* 2019;8:6780-8. doi:10.1002/cam4.2552
8. Decker KM, Lambert P, Demers A, et al. Examining the impact of First Nations status on the relationship between diabetes and cancer. *Health Equity* 2020;4:211-7. doi:10.1089/heq.2019.0121
9. Wong E, Kapoor A, Mallick R, et al. Renal cell carcinoma in the Canadian Indigenous population. *Can Urol Assoc J* 2018;12:S2. doi:10.5489/cuaj.4464
10. García-Esquinas E, Pollan M, Tellez-Plaza M, et al. Cadmium exposure and cancer mortality in a prospective cohort: The Strong Heart Study. *Environ Health Perspect* 2014;122:363-70. doi:10.1289/ehp.1306587
11. García-Esquinas E, Pollán M, Umans JG, et al. Arsenic exposure and cancer mortality in a US-based prospective cohort: The Strong Heart Study. *Cancer Epidemiol Biomarkers Prev* 2013;22:1944-53. doi:10.1158/1055-9965.EPI-13-0234-T
12. Redvers N, Chischilly AM, Warne D, et al. Uranium exposure in American Indian communities: Health, policy, and the way forward. *Environ Health Perspect* 2021;129:035002. doi:10.1289/EHP7537
13. Jamal S, Jones C, Walker J, et al. Cancer in First Nations people in Ontario, Canada: Incidence and mortality, 1991 to 2010. *Health Rep* 2021;32:14-28. doi:10.25318/82-003-x202100600002-eng
14. Chiefs of Ontario, Cancer Care Ontario, Institute for Clinical Evaluative Sciences. Cancer in First Nations people in Ontario: Incidence, mortality, survival, and prevalence. Toronto (ON): Chiefs of Ontario; 2017. Available at: https://www.cancercareontario.ca/en/content/cancer-first-nations-people-ontario.
15. Mazereeuw MV, Withrow DR, Nishri ED, et al. Cancer incidence among First Nations adults in Canada: Follow-up of the 1991 Census Mortality Cohort (1992-2009). *Can J Public Health* 2018;109:700-9. doi:10.17269/s41997-018-0091-0

16. Li J, Weir HK, Jim MA, et al. Kidney cancer incidence and mortality among American Indians and Alaska Natives in the United States, 1990-2009. *Am J Public Health* 2014;104:S396-403. doi:10.2105/AJPH.2013.301616
17. Cooke M, Mitrou F, Lawrence D, et al. Indigenous well-being in four countries: An application of the UNDP's human development index to indigenous peoples in Australia, Canada, New Zealand, and the United States. *BMC Int Health Hum Rights* 2007;7:9. doi:10.1186/1472-698X-7-9
18. Moore SP, Antoni S, Colquhoun A, et al. Cancer incidence in indigenous people in Australia, New Zealand, Canada, and the USA: A comparative population-based study. *Lancet Oncol* 2015;16:1483-92. doi:10.1016/S1470-2045(15)00232-6
19. Watson RA. Kidney cancer in American Indian and Native Alaskan men and women-time to notice, time to care. *Urology* 2008;72:726-30. doi:10.1016/j.urology.2008.06.002
20. Weir HK, Jim MA, Marrett LD, et al. Cancer in American Indian and Alaska Native young adults (ages 20-44 years): US, 1999-2004. *Cancer* 2008;113:1153-67. doi:10.1002/cncr.23731
21. Islami F, Guerra CE, Minihan A, et al. American Cancer Society's report on the status of cancer disparities in the United States, 2021. *CA Cancer J Clin* 2022;72:112-43. doi:10.3322/caac.21703
22. Batai K, Harb-De la Rosa A, Lwin A, et al. Racial and ethnic disparities in renal cell carcinoma: An analysis of clinical characteristics. *Clin Genitourin Cancer* 2019;17:e195-202. doi:10.1016/j.clgc.2018.10.012
23. Batai K, Gachupin FC, Estrada AL, et al. Patterns of cancer-related health disparities in Arizona. *Cancer Health Disparities* 2019;3:e1-20.
24. Batai K, Asmar S, Gachupin FC, et al. Abstract 1179: Renal cell carcinoma health disparities in American Indians Alaska Natives and Hispanic Americans: Comparison of National Cancer Database and Arizona Cancer Registry data. *Cancer Res* 2020;80(16 Suppl):1179. doi:10.1158/1538-7445.AM2020-1179
25. Gachupin FC, Lee BR, Chipollini J, et al. Renal cell carcinoma surgical treatment disparities in American Indian/Alaska Natives and Hispanic Americans in Arizona. *Int J Environ Res Public Health* 2022;19:1185. doi:10.3390/ijerph19031185
26. Wong ECL, Breau RH, Mallick R, et al. Renal cell carcinoma in the Canadian Indigenous population. *Curr Oncol* 2019;26:e367-71. doi:10.3747/co.26.4707
27. Dobyns AC, Coutelle NA, Suthumphong CY, et al. Race/ethnicity and advanced stage of renal cell carcinoma in adults: Results from surveillance, epidemiology, and end results program 2007-2015. *Eur J Cancer Prev* 2021. doi:10.1097/CEJ.0000000000000689
28. Valencia CI, Asmar S, Hsu CH, et al. Renal cell carcinoma health disparities in stage and mortality among American Indians/Alaska Natives and Hispanic Americans: Comparison of National Cancer Database and Arizona Cancer Registry data. *Cancers (Basel)* 2021;13:50990. doi:10.3390/cancers13050990
29. Batai K, Harb De La Rosa A, Gachupin F, et al. Abstract C059: Clinical and molecular profile of renal cell carcinoma in Hispanic Americans, Native Americans, and European Americans. *Cancer Epidemiol Biomarkers Prev* 2020;29(6 Suppl 1):C059. doi:10.1158/1538-7755.DISP18-C059
30. Delahunt B, Bethwaite P, Nacey JN. Renal cell carcinoma in New Zealand: A national survival study. *Urology* 1994;43:300-9. doi:10.1016/0090-4295(94)90070-1

31. Wilson RT, Richardson LC, Kelly JJ, et al. Cancers of the urinary tract among American Indians and Alaska Natives in the United States, 1999-2004. *Cancer* 2008;113:1213-24. doi:10.1002/cncr.23733
32. Melkonian SC, Jim MA, Haverkamp D, et al. Disparities in cancer incidence and trends among American Indians and Alaska Natives in the United States, 2010-2015. *Cancer Epidemiol Biomarkers Prev* 2019;28:1604-11. doi:10.1158/1055-9965.EPI-19-0288
33. Simard EP, Ward EM, Siegel R, et al. Cancers with increasing incidence trends in the United States: 1999 through 2008. *CA Cancer J Clin* 2012;62:118-28. doi:10.3322/caac.20141
34. Bergersen A, Batai K, Michalak J, et al. Urologic cancer disparities among Hispanic Americans and Native Americans in four U.S.-Mexico border states. *J Endourol* 2017;31:A146.
35. Gonzalez V, Suflita M, Janitz A, et al. Kidney cancer incidence and mortality disparities involving American Indians/Alaska Natives: An analysis of the Oklahoma Central Cancer Registry (OCCR). *J Cancer Epidemiol* 2022;2022:2689386. doi:10.1155/2022/2689386
36. Kratzer TB, Jemal A, Miller KD, et al. Cancer statistics for American Indian and Alaska Native individuals, 2022: Including increasing disparities in early onset colorectal cancer. *CA Cancer J Clin* 2023;73:120-46. doi:10.3322/caac.21757
37. Kelly JJ, Lanier AP, Schade T, et al. Cancer disparities among Alaska Native people, 1970-2011. *Prev Chronic Dis* 2014;11:E221. doi:10.5888/pcd11.130369
38. Palumbo C, Pecoraro A, Rosiello G, et al. Renal cell carcinoma incidence rates and trends in young adults aged 20-39 years. *Cancer Epidemiol* 2020;67:101762. doi:10.1016/j.canep.2020.101762
39. Palumbo C, Pecoraro A, Knipper S, et al. Contemporary age-adjusted incidence and mortality rates of renal cell carcinoma: Analysis according to gender, race, stage, grade, and histology. *Eur Urol Focus* 2021;7:644-52. doi:10.1016/j.euf.2020.05.003
40. Schafer EJ, Jemal A, Wiese D, et al. Disparities and trends in genitourinary cancer incidence and mortality in the USA. *Eur Urol* 2023;83:400-8. doi:10.1016/S0302-2838(22)02841-X
41. Lichtensztajm DY, Hofer BM, Leppert JT, et al. Associations of renal cell carcinoma subtype with patient demographics, comorbidities, and neighborhood socioeconomic status in the California population. *Cancer Epidemiol Biomarkers Prev* 2022;31:2244-52. doi:10.1158/1055-9965.EPI-22-0784
42. Wiggins CL, Espey DK, Wingo PA, et al. Cancer among American Indians and Alaska Natives in the United States, 1999-2004. *Cancer* 2008;113:1142-52. doi:10.1002/cncr.23734
43. Paltoo DN, Chu KC. Patterns in cancer incidence among American Indians/Alaska Natives, United States, 1992-1999. *Public Health Rep* 2004;119:340-8. doi:10.1016/j.phr.2004.05.009
44. Melkonian SC, Jim MA, Pete D, et al. Cancer disparities among non-Hispanic urban American Indian and Alaska Native populations in the United States, 1999-2017. *Cancer* 2022;128:1626-36. doi:10.1002/cncr.34122

45. Batai K, Bergersen A, Price E, et al. Clinical and molecular characteristics and burden of kidney cancer among Hispanics and Native Americans: Steps toward precision medicine. *Clin Genitourin Cancer* 2018;16:e535-41. doi:10.1016/j.clgc.2018.01.006
46. Foote M, Strickland R, Lucas-Pipkorn S, et al. The high burden of cancer among American Indians/Alaska Natives in Wisconsin. *WMJ* 2016;115:11-6.
47. Nutting PA, Freeman WL, Risser DR, et al. Cancer incidence among American Indians and Alaska Natives, 1980 through 1987. *Am J Public Health* 1993;83:1589-98. doi:10.2105/AJPH.83.11.1589
48. Wong ECL, Kapoor A. Epidemiology of prostate and kidney cancer in the Aboriginal population of Canada: A systematic review. *Can Urol Assoc J* 2017;11:E222-32. doi:10.5489/cuaj.4185
49. Mahoney MC, Michalek AM. A meta-analysis of cancer incidence in United States and Canadian Native populations. *Int J Epidemiol* 1991;20:323-7. doi:10.1093/ije/20.2.323
50. Nielsen NH, Storm HH, Gaudette LA, et al. Cancer in Circumpolar Inuit 1969-1988: A summary. *Acta Oncol* 1996;35:621-8. doi:10.3109/02841869609096996
51. Gaudette LA, Gao RN, Freitag S, et al. Cancer incidence by ethnic group in the Northwest Territories (NWT) 1969-1988. *Health Rep* 1993;5:23-32.
52. Louchini R, Beaupré M. Cancer incidence and mortality among Aboriginal people living on reserves and northern villages in Quebec, 1988-2004. *Int J Circumpolar Health* 2008;67:445-51. doi:10.3402/ijch.v67i5.18355
53. Lanier AP, Alberts SR. Kidney and bladder cancer in Inuit 1969-1988. *Acta Oncol* 1996;35:617-20. doi:10.3109/02841869609096992
54. Condon JR, Armstrong BK, Barnes T, et al. Cancer incidence and survival for Indigenous Australians in the Northern Territory. *Aust N Z J Public Health* 2005;29:123-8. doi:10.1111/j.1467-842X.2005.tb00061.x
55. Rhoades DA, Farley J, Schwartz SM, et al. Cancer mortality in a population-based cohort of American Indians - The Strong Heart Study. *Cancer Epidemiol* 2021;74:101978. doi:10.1016/j.canep.2021.101978
56. Jemal A, Clegg LX, Ward E, et al. Annual report to the nation on the status of cancer, 1975-2001, with a special feature regarding survival. *Cancer* 2004;101:3-27. doi:10.1002/cncr.20288
57. Cobb N, Paisano RE. Patterns of cancer mortality among Native Americans. *Cancer* 1998;83:2377-83. doi:10.1002/(SICI)1097-0142(19981201)83:11<2377::AID-CNCR18>3.0.CO;2-Z
58. Johnson KA, Aplenc R, Bagatell R. Survival by race among children with extracranial solid tumors in the United States between 1985 and 2005. *Pediatr Blood Cancer* 2011;56:425-31. doi:10.1002/pbc.22825
59. Espey D, Paisano R, Cobb N. Regional patterns and trends in cancer mortality among American Indians and Alaska Natives, 1990-2001. *Cancer* 2005;103:1045-53. doi:10.1002/cncr.20876
60. Baker D, Morrell S, You H. Estimates of cancer incidence, mortality, and survival in Aboriginal people in NSW. *Asia Pac J Clin Oncol* 2011;7:112. doi:10.1186/1471-2407-12-168

61. Condon JR, Barnes T, Cunningham J, et al. Long-term trends in cancer mortality for Indigenous Australians in the Northern Territory. *Med J Aust* 2004;180:504-7. doi:10.5694/j.1326-5377.2004.tb06052.x
62. Hulme KR, Murray AP. Renal cell carcinoma histological subtypes and ethnicity in New Zealand: A regional study. *Pathology* 2019;51(Suppl 1). doi:10.1016/j.pathol.2018.12.217
63. Nash SH, Meisner ALW, Zimpelman GL, et al. Cancer survival among Alaska Native people: Alaska Native cancer survival. *Cancer* 2018;124:2570-7. doi:10.1002/cncr.31350
64. Dasgupta P, Andersson TML, Garvey G, et al. Quantifying differences in remaining life expectancy after cancer diagnosis, Aboriginal and Torres Strait Islanders, and other Australians, 2005-2016. *Cancer Epidemiol Biomarkers Prev* 2022;31:1168-75. doi:10.1158/1055-9965.EPI-21-1390
65. Jivanji D, Jamieson S, Mallory C, et al. The association between race and 5-year survival in patients with clear cell renal cell carcinoma: A cohort study. *Urology* 2021;148:185-91. doi:10.1016/j.urology.2020.10.055
66. Withrow DR, Pole JD, Nishri ED, et al. Choice of relative or cause-specific approach to cancer survival analysis impacts estimates differentially by cancer type, population, and application: Evidence from a Canadian population-based cohort study. *Popul Health Metr* 2017;15:24. doi:10.1186/s12963-017-0142-4
67. Akhavan A, Richards M, Shnorhavorian M, et al. Renal cell carcinoma in children, adolescents and young adults: A National Cancer Database study. *J Urol* 2015;193:1336-41. doi:10.1016/j.juro.2014.10.108
68. Jeffreys M, Sarfati D, Stevanovic V, et al. Socioeconomic inequalities in cancer survival in New Zealand: The role of extent of disease at diagnosis. *Cancer Epidemiol Biomarkers Prev* 2009;18:915-21. doi:10.1158/1055-9965.EPI-08-0685
69. Garfield K, LaGrange CA. Renal cell cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023. Available at: https://www.ncbi.nlm.nih.gov/books/NBK470336/.
70. Batai K, Pollock G, Gachupin F, et al. Assessment of renal cell carcinoma surgical disparities in American Indians and Hispanic Americans. *J Urol* 2020;203:e752-3. doi:10.1097/JU.0000000000000912.04
71. Cruz A, Dickerson F, Pulling KR, et al. Impacts of neighborhood characteristics and surgical treatment disparities on overall mortality in stage I renal cell carcinoma patients. *Int J Environ Res Public Health* 2022;19:2050. doi:10.3390/ijerph19042050
72. Markin A, Habermann EB, Zhu Y, et al. Cancer surgery among American Indians. *JAMA Surg* 2013;148:277. doi:10.1001/jamasurg.2013.1423
73. Guadagnolo BA, Huo J, Buchholz TA, et al. Disparities in hospice utilization among American Indian Medicare beneficiaries dying of cancer. *Ethn Dis* 2014;24:393-8.
74. Hammond C, Thomas R, Gifford W, et al. Cycles of silence: First Nations women overcoming social and historical barriers in supportive cancer care. *Psychooncology* 2017;26:191-8. doi:10.1002/pon.4335
75. Quinonez-Zanabria E, Valencia CI, Asif W, et al. Racial and ethnic disparities in preoperative surgical wait time and renal cell carcinoma tumor characteristics. *Healthcare (Basel)* 2021;9:1183. doi:10.3390/healthcare9091183

76. Hodge FS, Line-Itty T, Arbing RHA. Cancer-related symptom management intervention for Southwest American Indians. *Cancers (Basel)* 2022;14:4771. doi:10.3390/cancers14194771
77. Wolff DT, Monaghan TF, Gordon DJ, et al. Racial differences in incident genitourinary cancer cases captured in the National Cancer Database. *Medicina (Kaunas)* 2021;57:671. doi:10.3390/medicina57070671
78. Javier-DesLoges J, Walia A, Meagher M, et al. Underrepresentation of Hispanics and American Indian/Alaska Natives in the National Cancer Database. *J Urol* 2022;207(Suppl 5). doi:10.1097/JU.0000000000002618.19
79. Taparra K, Qu V, Pollom E. Disparities in survival and comorbidity burden between Asian and Native Hawaiian and other Pacific Islander patients with cancer. *JAMA Netw Open* 2022;5:e2226327. doi:10.1001/jamanetworkopen.2022.26327
80. Phillips-Beck W, Eni R, Lavoie JG, et al. Confronting racism within the Canadian healthcare system: Systemic exclusion of First Nations from quality and consistent care. *Int J Environ Res Public Health* 2020;17:8343. doi:10.3390/ijerph17228343
81. Wylie L, McConkey S. Insiders' insight: Discrimination against Indigenous peoples through the eyes of health care professionals. *J Racial Ethn Health Disparities* 2019;6:37-45. doi:10.1007/s40615-018-0495-9
82. Goodman A, Fleming K, Markwick N, et al. "They treated me like crap and I know it was because I was Native": The healthcare experiences of Aboriginal peoples living in Vancouver's inner city. *Soc Sci Med* 2017;178:87-94. doi:10.1016/j.socscimed.2017.01.053
83. Nguyen NH, Subhan FB, Williams K, et al. Barriers and mitigating strategies to healthcare access in Indigenous communities of Canada: A narrative review. *Healthcare (Basel)* 2020;8:112. doi:10.3390/healthcare8020112
84. Bombay A, Matheson K, Anisman H. Intergenerational trauma: Convergence of multiple processes among First Nations peoples in Canada. *J Aborig Health* 2009;5:6-47.
85. Smylie J, Firestone M. Back to the basics: Identifying and addressing underlying challenges in achieving high quality and relevant health statistics for Indigenous populations in Canada. *Stat J IAOS* 2015;31:67-87. doi:10.3233/SJI-150864
86. Jull J, Sheppard A, Hizaka A, et al. Experiences of Inuit in Canada who travel from remote settings for cancer care and impacts on decision making. *BMC Health Serv Res* 2021;21:328. doi:10.1186/s12913-021-06303-9
87. Canadian Partnership Against Cancer. Were you able to receive care close to home? First Nations, Inuit and Métis indicator on travel access to care.
88. Sheppard AJ. "In a good way": Going beyond patient navigation to ensure culturally relevant care in the cancer system for First Nations, Inuit, and Métis patients in Ontario. *Int J Indig Health* 2019;14:293-306. doi:10.32799/ijah.v14i2.31995
89. Hiscock EC, Stutz S, Mashford-Pringleet A, et al. An environmental scan of Indigenous Patient Navigator programs in Ontario. *Pimatisiwin* 2022. doi:10.1177/08404704211067659
90. Whop LJ, Valery P, Beesley V, et al. Navigating the cancer journey: A review of patient navigator programs for Indigenous cancer patients. *Asia Pac J Clin Oncol* 2012;8:e89-96. doi:10.1111/j.1743-7563.2012.01532.x

91. Brooks-Cleator L, Phillipps B, Giles A. Culturally safe health initiatives for Indigenous peoples in Canada: A scoping review. *Can J Nurs Res* 2018;50:202-13. doi:10.1177/0844562118770334
92. Gifford W, Dick P, Larocque C, et al. What culturally safe cancer care means to Algonquins of Pikwakanagan First Nation. *J Prim Care Community Health* 2023;19. doi:10.1177/11771801231168681
93. Gifford W, Larocque C, Dick P. Culturally safe cancer care for Indigenous people: Nursing practice beyond the rhetoric. *Clin J Oncol Nurs* 2022;26:443-8. doi:10.1188/22.CJON.443-448
94. Cancer Care Ontario / Ontario Health. First Nations, Inuit, Métis and Urban Indigenous Cancer Strategy 2019-2023.
95. Ontario Health. Annual Report 2022/23.
96. Ontario Health. Equity, Inclusion, Diversity, Anti-Racism 2023-2024 Highlights.

Acknowledgments: *The authors wish to thank Sadaf Ullah for her invaluable contribution in compiling the search criteria for the literature searches for this study. The research presented in this paper was made possible through the support of a Canadian Institute for Health Research grant (application number 410545), with special thanks to the grant members, including Carmina Ng, Michael Tjepkema, Angeline Letendre, and Loraine Marrett. Additionally, we extend our appreciation to the Joint Ontario Indigenous Health Committee, which consists of representatives from Political Territorial Organizations and provincial First Nations, Inuit, Métis, and urban Indigenous organizations, for their support in advancing this research.*

FIGURES AND TABLES

Figure 1. Study selection flow diagram for the study selection.

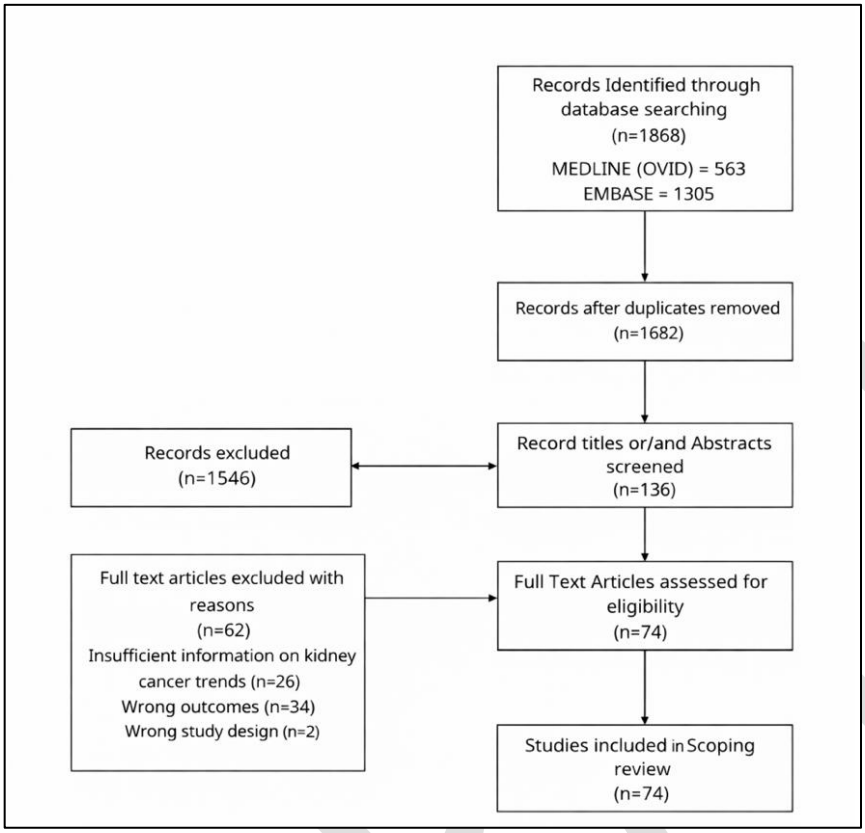

Figure 2. Identification of studies via databases.

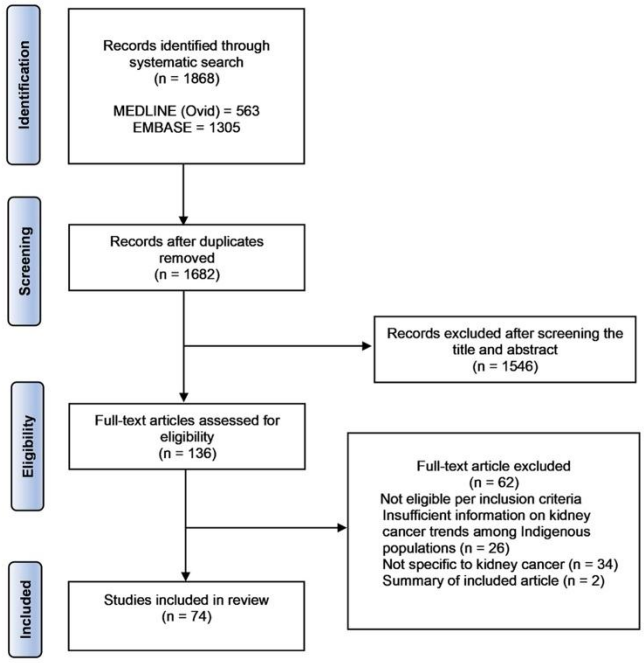

Table 1. Study characteristics of included articles (from earliest publication to latest)			
Year	Thematic relevancy	Country	Study design
1991	Incidence	U.S./Canada	Meta-analysis
1993	Incidence	Canada	Retrospective cohort
1993	Incidence	U.S.	Retrospective cohort
1994	Age-at-diagnosis, survival, incidence	New Zealand	Retrospective cohort
1996	Incidence	U.S./Canada	Retrospective cohort
1996	Risk factors, incidence	U.S./Canada	Retrospective cohort
1998	Mortality	U.S.	Retrospective cohort
2004	Mortality	Australia	Retrospective cohort
2004	Incidence, mortality, survival	U.S.	Retrospective cohort
2004	Incidence	U.S.	Retrospective cohort
2005	Incidence, survival	Australia	Retrospective cohort
2005	Mortality	U.S.	Retrospective cross-sectional
2008	Incidence, mortality	Canada	Retrospective cohort
2008	Risk factors, incidence, mortality	U.S.	Literature review/commentary
2008	Risk factors, incidence	U.S.	Retrospective cohort

2008	Incidence	U.S.	Retrospective cohort
2008	Stage-at-diagnosis, incidence	U.S.	Retrospective cohort
2009	Survival	New Zealand	Retrospective cohort
2010	Survival	U.S.	Retrospective cohort
2011	Survival	U.S.	Retrospective cohort
2012	Mortality, survival, treatment	Australia	Retrospective cohort
2012	Incidence	U.S.	Retrospective cross-sectional
2013	Exposure	U.S.	Retrospective cohort
2013	Age-at-diagnosis, treatment	U.S.	Retrospective cohort
2014	Exposure	U.S.	Retrospective cohort
2014	Treatment	U.S.	Retrospective cohort
2014	Incidence	U.S.	Retrospective cohort
2014	Incidence, mortality	U.S.	Retrospective cohort
2015	Survival	U.S.	Retrospective cohort
2019	Incidence	U.S.	Retrospective case-cohort
2016	Risk factors, incidence, mortality	U.S.	Retrospective cohort
2017	Incidence	U.S.	Retrospective cohort
2017	Treatment	Canada	Qualitative (Phenomenology)
2017	Risk factors, incidence	U.S.	Retrospective cohort
2017	Survival	Canada	Retrospective cohort
2017	Risk factors, incidence, mortality, survival	Canada	Systematic review
2018	Stage-at-diagnosis, survival, treatment	Canada	Retrospective cohort
2018	Risk factors, incidence, mortality, survival, treatment	U.S.	Literature review
2018	Incidence	Canada	Retrospective cohort
2018	Survival	U.S.	Retrospective cohort
2019	Incidence	New Zealand	Retrospective cohort
2019	Incidence	U.S.	Retrospective cohort
2019	Age-at-diagnosis	U.S.	Retrospective cross-sectional
2019	Risk factors, age-at-diagnosis	U.S.	Retrospective cohort
2019	Risk factors	U.S.	Literature review
2019	Stage-at-diagnosis, age-at-diagnosis, treatment	Canada	Retrospective cohort
2020	Survival	U.S.	Retrospective cohort
2020	Mortality	U.S.	Retrospective cohort
2020	Treatment	U.S.	Retrospective cohort

2020	Risk factors, age-at-diagnosis	U.S.	Retrospective cohort
2020	Risk factors	Canada	Retrospective case-cohort
2020	Incidence	U.S.	Retrospective case-cohort
2020	Stage-at-diagnosis	U.S.	Retrospective cohort
2021	Mortality, cancer disparities	U.S.	Retrospective cohort
2021	Risk factors, mortality, survival	U.S.	Retrospective cohort
2021	Incidence, mortality	Canada	Retrospective cohort
2021	Survival	U.S.	Retrospective cohort
2021	Incidence, survival	U.S.	Retrospective cohort
2021	Treatment	U.S.	Retrospective case series
2021	Exposure	U.S.	Commentary
2021	Risk factors, mortality	U.S.	Retrospective cohort
2021	Underrepresentation in data	U.S.	Retrospective cohort
2022	Prevalence/subtype	U.S.	Retrospective cohort
2022	Treatment	U.S.	Retrospective cohort
2022	Survival	Australia	Retrospective cohort
2022	Stage-at-diagnosis	U.S.	Retrospective cohort
2022	Age-at-diagnosis, mortality, treatment	U.S.	Retrospective cohort
2022	Incidence, mortality	U.S.	Retrospective cohort
2022	Treatment	U.S.	Randomized controlled trial
2022	Underrepresentation in data	U.S.	Retrospective cohort
2022	Risk factors, incidence, mortality	U.S.	Retrospective cohort
2022	Incidence	U.S.	Retrospective cohort
2022	Incidence	U.S.	Retrospective cohort
2022	Survival, cancer disparities	U.S.	Retrospective cohort