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Cancer-related care for rural and remote populations in Canada: A scoping review

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ABSTRACT

Background: Synthesizing unique barriers to cancer-related care among rural and remote populations would be useful to inform future research and health service priorities. To fill this gap, the overall goal of this review is to synthesize the cancer literature about those living in rural and remote locations in Canada.

Methods: Using JBI scoping review methods, we extracted the following: definition of rural or remote; phase of cancer care continuum (screening, diagnosis, treatment/care, post-treatment, outcomes); province(s) and/or territory(ies) of the sample; and cancer diagnosis(es).

Results: Within the 45 studies, definitions of rural and remote varied widely. The treatment/care phase was most often reflected ($n = 18$) followed by screening ($n = 12$). All provinces were represented and data from the Yukon Territory was lacking. Breast and colorectal cancer diagnoses were most common ($n = 20$ and $n = 18$, respectively) and most studies ($n = 31$) used quantitative designs.

Conclusion: Review results illuminate the state of cancer-related research of rural and remote populations across Canada and high-light implications for further examination.

INTRODUCTION

Canada is comprised of 8,788,702 square kilometers wherein nearly 37 million inhabitants live across 10 provinces and three territories (Statistics Canada, 2022). The

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dispersion of inhabitants across this expansive and diverse land mass means that approximately six million people, representing 16% of the country's population, live within Canada's rural regions (Statistics Canada, 2023). Considering these points, it is plausible that people living across Canada's rural regions may have widely varied experiences; however, understanding such nuances may depend on how rurality is defined. Although various definitions of rurality exist (Nelson et al., 2021), the Government of Canada defines rural as areas beyond census metropolitan areas with 1,000 inhabitants or more (Government of Canada, 2022). The term remote has also been variably defined (Hosseininasabnajar et al., 2023) for which Statistics Canada developed a remote index to classify degrees of proximity to urban areas (Rajendra Subedi et al., 2019). Although varying definitions exist for both rural and remote, for the purposes of this paper, both terms will be used herein to capture the spectrum of geographical living beyond urban areas.

Across Canada, people living in rural areas report greater satisfaction with life than those living in urban areas (St John et al., 2021); this significant difference persists even after controlling for sociodemographic and health-related factors (St John et al., 2021). Nevertheless, rural living in Canada is not without its challenges, including barriers to accessing timely and quality health care (Baylak et al., 2020; Rajendra Subedi et al., 2019). Such barriers were federally recognized, nearly 20 years ago, in the Government of Canada's *10-Year Plan to Strengthen Health Care* (Government of Canada, 2004). This document outlined the need to renew health care wherein timely access to quality care would be a reality for all Canadians (Government of Canada, 2004). Rural and remote populations were explicitly outlined as priority groups in the document; however, these groups continue to experience health and healthcare disparities (Baylak et al., 2020; Rajendra Subedi et al., 2019) nearly two decades later.

In addition to the disparities mentioned above, prevalence proportions of cancer are higher in rural versus urban areas (Canadian Cancer Statistics Advisory et al., 2022). This higher proportion may be due to socio-contextual or systemic barriers to cancer-related care for rural inhabitants. Documented barriers to cancer-related care include travel distance (Loughery & Woodgate, 2019; Nadalin et al., 2016; Vallance et al., 2013), time (Vallance et al., 2013) and cost (Vallance et al., 2013), as well as a lack – or high turnover – of providers (Howard et al., 2014). These factors may contribute to the poorer cancer outcomes of rural and remote inhabitants when compared to urban inhabitants, i.e., longer diagnosis-to-treatment time for radiation (Andkhoie & Szafron, 2020) or higher cancer incidence and mortality (Blake et al., 2017). Acknowledging these disparities, the Canadian Cancer Research Alliance identified access to cancer care for rural and remote populations as a

health services and policy research priority (Canadian Cancer Research Alliance, 2021).

Although suggestions to address the cancer care needs of rural and remote populations have been proposed (Booker, 2023), a synthesis of the cancer literature involving rural and/or remote inhabitants across Canada has not been completed. This synthesis would be useful to illuminate how the terms 'rural' and 'remote' have been used in the Canadian cancer literature, in order to identify any trends among these definitions as related to cancer-related care. Furthermore, the synthesis would be useful to understand what is and is not known about the cancer-related care of Canada's rural and remote inhabitants and used to inform the planning of health services and research. Given that survivorship and psychosocial care were specifically identified as health services and policy research priorities (Canadian Cancer Research Alliance, 2021) suggests that a synthesis of literature by phases of the cancer care continuum (Cancer Care Ontario, n.d.) would be useful. Considering the above, the objectives of this review were:

1. To determine how the terms rural and remote have been used in Canadian cancer literature, and
2. To synthesize the cancer literature involving those living in rural and remote locations in Canada

METHODS

Protocol and registration

The JBI scoping review method (Aromataris et al., 2021) was used. Scoping methods are particularly useful to determine the degree of literature about a topic and to synthesize such literature to inform subsequent research (Tricco et al., 2016); these purposes are aligned with the objectives of this review. To enhance the transparency of this work, the study protocol was published on the Open Science Framework (<https://osf.io/sw2gu/>) and PRISMA-ScR guidelines (Tricco et al., 2018) for reporting were followed.

Search strategy

A comprehensive search approach was employed to locate published studies. A preliminary search was conducted in Ovid MedLine on the broader topic of cancer care to underserved populations (Cancer Care Ontario, n.d.). After confirmation from all authors, this search was translated in other databases: Embase and PsycInfo (both Ovid) and CINAHL (Ebsco). This was followed by an analysis of relevant studies, to identify applicable text words and database-specific subject headings, including on the specific topic of rural and remote communities. All databases were searched without language nor date restrictions. Full searches were conducted on July 7, 2021, and updated on May 11, 2022.

Following these broad searches, a more targeted search was developed specifically for the rural and remote populations. With consultation from all authors, strategies were developed for Medline, Embase and PsycInfo (all Ovid) as well as CINAHL (Ebsco). These searches were run on April 18, 2023. Full search strategies for both the broader and narrower searches are available in a **Supplementary Table**.

Study selection

After the searches were complete, references were imported into the Covidence platform (Veritas Health Innovation, n.d.).

Two members of the research team independently screened titles, abstracts and full texts in accordance with our eligibility criteria. Conflicts were resolved by a third-reviewer (another member of the research team) via the Covidence platform (Veritas Health Innovation, n.d.).

Included articles were those that described cancer-related care of adults (≥ 18 years of age) who lived in rural or remote areas of Canada. We used Cancer Care Ontario's cancer care continuum (Cancer Care Ontario, n.d.) to define cancer-related care; however, literature about cancer prevention initiatives were excluded since they did not align with our intended focus on cancer-specific encounters. As such, literature about cancer screening, diagnosis, treatment and care, post-treatment, or outcomes were included. Included articles were published in either French or English and used primary data collection methods (e.g., qualitative, quantitative, mixed methods). Population level studies were included only if the primary objective of the study was to explore rural or remote populations or variables. To account for potential changes in healthcare since the publication of the Government of Canada's *10-Year Plan to Strengthen Health Care* (Government of Canada, 2004), only articles published or that used data collected in 2005 or later were included.

Data extraction

Reviewers were paired according to the cancer continuum: HK and KB extracted data related to screening and diagnosis; LP and JH extracted data related to treatment and care; and AA and CS extracted data related to post-treatment and outcomes. In each pair, reviewers independently extracted data as related to the objectives. Data were extracted into an Excel file after the reviewers had pilot tested it. The form included (1) author, (2) year, (3) province/territory, (4) objective/aims, (5) study design and method, (6) phase of cancer care continuum, (7) sample details (age, gender, SES, type of cancer etc.), and (8) key findings as related to this review's objectives. Conflicts were resolved through discussion and/or consultation with a third reviewer (JG).

Data analysis

Initially, the reviewer pairs descriptively summarized their extracted data in accordance with the study objectives. Thereafter, the primary author (JG) collated the descriptive summaries for each objective. First, the summaries of rural and remote definitions were collated. This was completed to address Objective 1. Thereafter, the summaries for each phase of the cancer continuum were organized into a cohesive narrative summary in alignment with Objective 2.

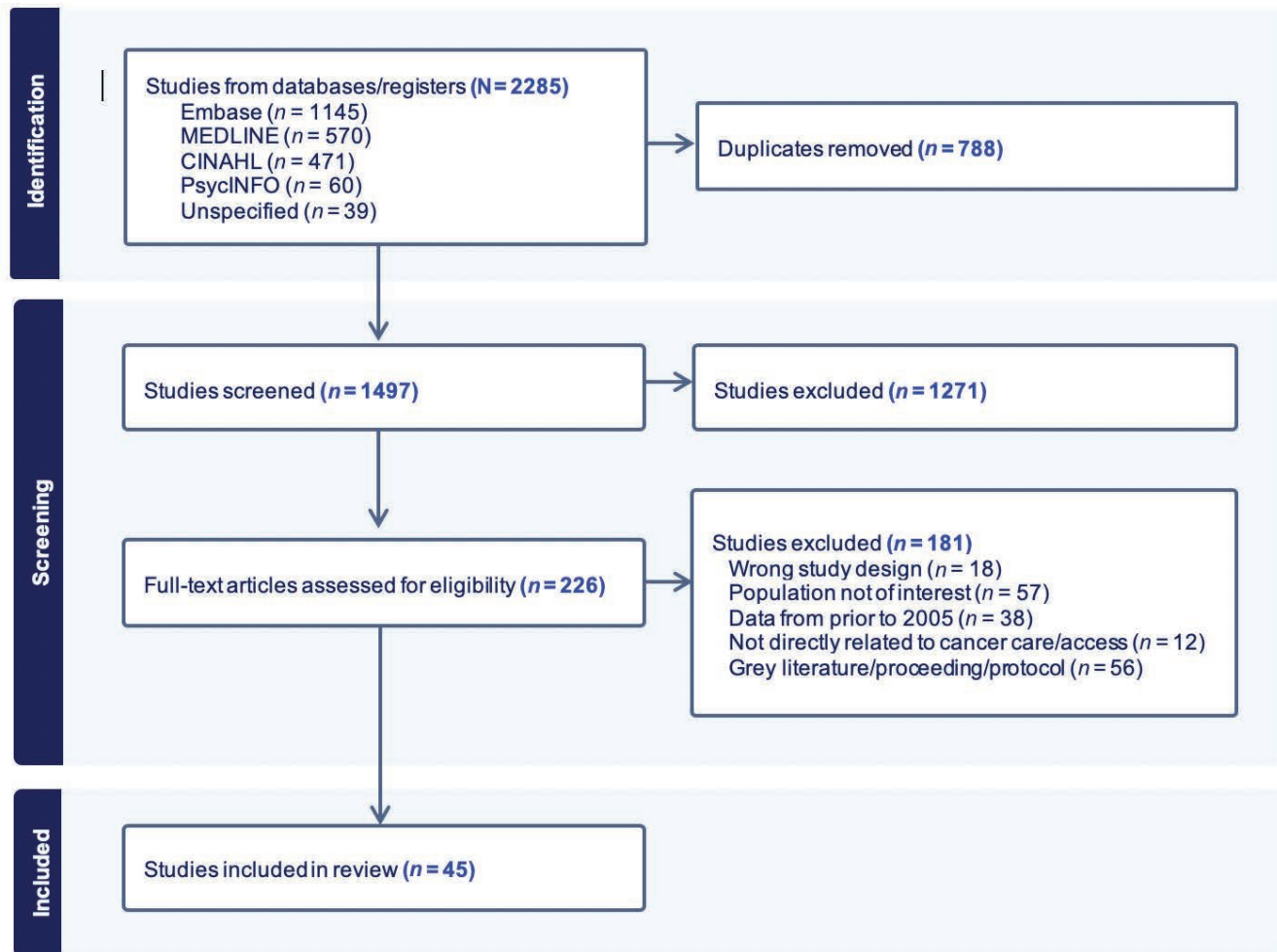
RESULTS

A total of 2,285 articles were identified from the search strategy. After removing duplicates ($n = 788$), 1,497 were assessed for eligibility in the screening processes. Forty-five articles were included in this review (see Tables 1 and 2). The total number of records identified for each database and reasons for exclusion are provided in Figure 1.

The most commonly addressed phase of the cancer trajectory was treatment/care ($n = 18$), followed by screening ($n = 12$) and post-treatment ($n = 10$). Although the samples in the included studies were both homogeneous and heterogeneous in the diagnoses reflected, breast cancer was the most common ($n = 20$),

Figure 1

PRISMA Diagram



followed by colon and/or rectal cancers ($n = 18$). Data from Ontario samples was most common ($n = 17$), followed by British Columbia ($n = 9$) and Québec ($n = 4$). Six studies used data spanning multiple provinces and/or territories; the provinces and/or territories varied widely by study (see Table 2). Overall, quantitative designs were the most commonly used ($n = 31$), of which cohort or population-based designs were most prevalent ($n = 18$; see Table 3). There was a trend for more recent dates of publication among the included studies; over half ($n = 24$ [53%]) were published since 2019.

Definitions of rural and remote

There was substantial variation in researchers' definitions of rural or remote. Some researchers stated that the study took place in a rural or remote setting without further description (Chow et al., 2020; Gagnon & Hébert, 2023; Loughery & Woodgate, 2019; McBride & Gesink, 2018; Mema et al., 2017; Nostedt et al., 2014; Racey & Gesink, 2016; Racey et al., 2016; Vallance et al., 2013; Watanabe et al., 2013). Others defined rural or remote as a specified community (Hartford et al.,

2019), region (Nadalin et al., 2016; Olson et al., 2014; Smith-Turchyn et al., 2021), or province or territory (Jull et al., 2021; Miedema et al., 2013; Smith et al., 2020). Still others used population size (El-Haouly, Dragomir et al., 2021; El-Haouly, Lacasse et al., 2021; Fitch et al., 2021; Gesink et al., 2014; Mathews et al., 2017; McLay et al., 2017; Pesut et al., 2010; Vander Meer et al., 2017) or travel distance to receive cancer-related care (Canale et al., 2018; Ding et al., 2022; Smith et al., 2011; Vander Meer et al., 2017). Two authors used a combination of these (home address and postal code) via spatial methods (Parker et al., 2015; Springer et al., 2020).

Eleven studies referenced a Statistics Canada definition of rural or remote (Blair & Datta, 2020; Evans et al., 2017; Febbraro et al., 2020; Gold et al., 2023; Howard et al., 2014; Lofters et al., 2019; Price & Brunet, 2021; Santi et al., 2022; Simkin et al., 2019; St-Jacques et al., 2013; Yu et al., 2021); however, the definition was applied differently among studies. For example, Evans (2017) utilized definitions of urban, rural, rural-remote, and rural very remote, St-Jacques et al. (2013) developed a five-tier

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Table 1

Summary of Included Studies

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Screening	Chow et al. (2020)	To provide access to cancer screening education, screening opportunities, and to increase uptake of cancer screening for First Nations people ^a in Northwestern ON	Quantitative – pilot intervention	Not provided.	Of the 841 First Nations adults who attended appointments, most were female (81%, <i>n</i> = 685); specifically, females over the age of 50 (49%, <i>n</i> = 410).	Over the 3 years that data were collected, there were increased numbers of screening appointments booked and attended. Satisfaction with experience also increased over the years.
	Gesink et al. (2014)	To explore who are the never- or under-screened populations of ON for breast, cervical and colon cancer	Qualitative – grounded theory	One community with population slightly over 4,000 identified from a map as archetypal.	Healthcare providers and community members in 4 communities – urban, suburban, small, and rural. Rural participants: 26 white females under 40 years (older than 21 years per minimal age for cervical screening), 8 white males over 40 years.	Cultural differences (e.g., older Mennonite) to accessing healthcare. Rural men believed retired men accessed more care than working men and that men generally prefer to rely on themselves or traditional healing rather than from a physician.
Screening	Gold et al. (2023)	Identify characteristics associated with participation in ON Breast Screening Program and if screening is associated with lower stage at diagnosis	Quantitative – retrospective cohort	Individuals who lived outside of CMA (e.g., urban areas from less than 100,000 people to over 1,500,00 people [Statistics Canada, n.d.]).	Women (<i>n</i> = 48,927) diagnosed with breast cancer, aged 51–74 years, diagnosed with breast cancer between 2010 and 2017. 12.1% of the sample lived in rural area.	Women living in rural areas had lower odds of not being screened (OR 0.73, 95% CI 0.68, 0.78), compared to women living in the largest urban areas.
	Lofters et al. (2019)	To describe the ON population who are screen-eligible for each of breast, cervical, and colorectal cancers, but overdue for screening by at least 5 years, to highlight subpopulations and regions in ON with the most urgent needs for screening interventions	Quantitative – retrospective cohort	Urban, suburban or rural status was determined from postal codes from Statistics Canada's 2016 Census data.	Among the breast (<i>n</i> = 1,534,000), cervical (<i>n</i> = 3,630,981), and colorectal (<i>n</i> = 3,102,453) cohorts, 139,297(9.1%), 241,842(6.7%), and 289,816(9.3%), respectively, lived in rural settings. Among those who had completed screening for breast, cervical, and colorectal cancer in the last 5 years, 29,965 (21.5%), 57,039 (23.6%), and 73,326 (25.3%), respectively, were among people living in rural settings.	In comparison to rural dwellers, those in urban settings were more likely to have screening for breast (OR = 1.04 [95% CI 1.03–1.06]) and colorectal (OR = 1.04 [95% 1.03–1.06]) cancer; however, the opposite was found for cervical cancer screening (OR = 0.98 [95% CI 0.97–0.99]). In comparison to rural dwellers, those in suburban settings were more likely to have screening for breast (OR = 1.06 [95% CI 1.04–1.08]) and cervical (OR = 1.02 [95% CI 1.01–1.03]) cancers; however, the inverse was found for colorectal (OR = 0.99 [95% 0.98–1.00]) cancer screening.

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Screening	McBride & Gesink (2018)	To develop, deliver, and evaluate a cancer screening intervention focused on rural Anabaptist communities in ON, to increase routine breast, cervical, blood, and colon cancer screenings among women	Participatory action	Unclear.	Of the 75 Old Order Amish or Mennonite women aged 21 years or older, only 64 provided demographic details. 53% (n = 33) were under 50 years of age, 39% (n = 25) were 50–70 years. 85% were under or never screened for breast, cervical, blood, and/or colon cancer.	Almost all women had previously participated in cervical cancer screening, even if not up to date. 26% participated in breast cancer screening for the first time and 29% participated in colon cancer screening for the first time. Most (78%) of women said the intervention day made it much easier to get screened for cancer. Involvement of community members (e.g., leaders and advisory group) identified barriers to cancer screening to permit delivery of culturally appropriate interventions.
	Mema et al. (2017)	To compare cervical and colorectal cancer screening uptake among women in rural and remote northern AB who attend a mobile mammography program with and without Enhanced Access to Cervical and Colorectal Cancer Screening (EACS) intervention	Quantitative – non-randomized screening intervention	Unclear.	Among 9,702 women attending mobile mammography clinics, 6,174 of those aged for cervical or colorectal cancer screening received standard of care, while 958 received EACS. Demographic details not provided.	Uptake of cervical cancer screening in EACS group increased by 14.5% [95% CI 12.3–6.7] at 3 months compared to increase of 4.9% [95% CI 4.3–5.4%] in standard of care group. Uptake of colorectal cancer screening increased by 16.5% [95% CI 14.3–18.8%] at 3 mos in EACS group compared to 7.4% [95% CI 6.8–8%] in standard of care group.
Screening	Nadalin et al. (2016)	To learn from under/never-screened women about their breast cancer and breast screening knowledge, experiences with and barriers to screening, noting any regional observations between Timmins, downtown Toronto, and Peel region	Qualitative – focus groups	Living in the Timmins health agency region.	Among the 74 participants: 19 were in Timmins, 30 in Toronto, and 25 in Peel. The average age of Timmins participants was 60.8 years, all were Canadian born, and over 70% had had a mammogram previously.	Barriers reported by only rural participants included fears and anxieties related to the safety and accuracy of screening testing, and; accessibility challenges in regard to transportation distance and safety.
Screening	Racey & Gesink (2016)	To explore the initial reaction and perception to HPV self-collected testing, in the context of current barriers and facilitators to cervical cancer screening, among women in an under-screened community in rural ON	Qualitative – focus groups	Described characteristics of the Mount Forest, ON, community as rural.	25 women, aged 18–70 years, “under screened” no record of cervical cancer screen in past 3 years.	Themes: Logistical barriers (time to go to doctor, inconvenient clinic hours/appt bookings), procedural barriers (embarrassment, lack of social distance/privacy), barriers to intent to screen (fear of cancer, lack of awareness, lack of preventative healthcare behaviour). Facilitators: positive and meaningful relationship with care provider, e-call system, decreasing stigma through awareness/education.

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Screening	Racey et al. (2016)	To determine if cervical cancer screening uptake would increase among under-screened women living in rural ON if at-home self-collected sampling for HPV testing was offered as a primary cervical cancer screening modality, compared to invitation for Pap testing or standard of care	Quantitative – randomized controlled trial	Described characteristics of the Mount Forest, ON, community as rural.	818 women, aged 30–70 years participated: 335 received an HPV self-collection kit, 331 received a reminder letter for a Pap, and 152 received the standard of care.	In total, 32% (n = 107) from the HPV self-collection arm, 15% (n = 51) from the Pap reminder letter arm, and 8.5% (n = 13) in the standard of care arm were screened. Those who received the self-collected HPV kit were 3.7 (95% CI 2.2–6.4) times more likely to undergo screening compared to the standard of care arm. In the HPV self-collection arm, 80% said they would be very likely to choose self-collected sampling in the future.
	Simkin et al. (2019)	To quantify the effect of income on up-to-date colorectal cancer screening and highlight important differences across levels of urbanization	Quantitative – cross-sectional cohort	Statistics Canada MIZ classifications (Statistics Canada, 2015a). Rural was defined as Strong and Moderate MIZ (5% to < 50% MIZ) and remote was defined as Weak and No MIZ (0% to <5%).	Among the 22,523 participants aged 50–74 years, 48.7% were male, 5,190 (23%) lived as rural and 4,004 (17.7%) lived as remote.	Although not significant, up-to-date screening was the highest among remote respondents (54.9%) followed by urban (51.9%) and then rural (50.9%). Across all levels of urbanization, higher income was associated with increased odds of up-to-date screening. Rural and low-income populations are less likely to report up-to-date colorectal cancer screening than urban and high-income.
Screening	Smith et al. (2020)	To evaluate the participation and impact of CRC screening guidelines in a remote northern population	Quantitative-retrospective cohort study	Unclear.	Between 2014–2019, 6,817 NWT residents aged 50–74 years completed a fecal immunohistochemical test (FIT). Socio-demographic characteristics of the overall sample are not provided.	The annual average screening rate was 25%. No significant differences in stage, pathology, or location between screen-detected cancers and clinically-detected cancers were found. FIT-based CRC screening did not facilitate earlier CRC detection.
Screening	St. Jacques et al. (2013)	To evaluate the impact of distance on the participation of women in the QC Breast Cancer Screening Programme, and assess whether the rural–urban classification modifies the relation of distance to participation	Quantitative-retrospective cohort	A five-level rural–urban classification was created based on a classification developed from Statistics Canada (Statistics Canada, 2001): Montreal Island, Montreal suburbs, midsize cities (more than 50,000 inhabitants), small cities (10,000–50,000 inhabitants), and villages and rural areas (municipalities <10,000 inhabitants).	Among 833,856 women aged 52–69 years and living in QC on 15 October 2008: the sample mean age was 59 years and mean driving distance was 11.3 km to their designated screening centre (DSC; median 5.3 km). Most (74%) lived < 12.5 km from DSC and 3% were > 50 km.	Compared to women who lived < 2.5 km from the nearest DSC, an absolute decrease of 6.3% in participation rates were observed for distances of 50–75 km (rate ratios [RR] = 0.88, 95% CI 0.86 to 0.89) and a decrease of 9.8% ≥ 75.0 km (RR = 0.81, 95% CI 0.79 to 0.83). The association of distance to participation varied according to the rural–urban classification used in this study (interaction $p < 0.0001$).

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Diagnosis	Blair & Datta (2020)	To assess the associations between social and material deprivation, physician density, rural residence, and absence of provincial mail-out-based screening programs and CRC stage at diagnosis	Quantitative – retrospective cohort	Statistics Canada's rural/urban classification for Dissemination Areas (Statistics Canada, 2015b).	In the Canadian Cancer Registry, 54,745 CRC diagnoses were examined between 2011–2015. Over half were male (58%) and older than 60 years of age (66%). Most (77%) lived in an urban area.	No statistically significant differences in late-stage prevalence were observed by urban or rural residence. Across all stage-group contrasts, no significant differences were observed according to rural residence.
Diagnosis	Khalil et al. (2019)	To better classify and understand differences in access to health care by location of residence (rural vs urban or by province) that may lead to variability in stage at presentation of laryngeal cancer	Quantitative – retrospective cohort	Unclear.	1,550 patients in Canadian Cancer Registry with cancer staging data between 2005–2013 (male $n = 1,280$ and female $n = 265$). Data not provided for rurality in sample.	Rural dwellers having the highest and lower income quartiles are being diagnosed with more advanced cancer compared to urban residents having the highest income quartile (OR 1.73, 95% CI 1.07–2.78, $p = 0.02$).
Diagnosis	Shah et al. (2021)	To measure the relationship between geographic residence in SK and stage of lung cancer at the time of diagnosis	Quantitative – retrospective cohort	Saskatoon and Regina health regions were categorized as urban and all others were rural; rural was subdivided into north and south.	2,972 patients (35 years and older) with primary diagnosis of NSCLC or SCLC between 2007–2012. Mean age was 68.7 years (SD 10.0 years), equal numbers of male and female, 80% had NSCLC and 20% SCLC. Distribution across income quintiles was lowest 22.4%, med low 20.9%, middle 18.5%, medium high 20.3%, highest 16.8%.	There was a higher incidence proportion of advanced stage NSCLC in rural compared to urban areas (RR in rural SK = 1.11 [95% CI 1.01–1.22] and AR = 3 per 10,000 [95% CI 0–6] compared to urban SK). The risk was significantly higher in rural north SK [RR = 1.17, 95% CI 1.01–1.31, AR = 5, 95% CI 1–9]. Rural north SK patients were more likely to be male, younger, and have lower SES. Trends for SCLC were similar but not statistically significant. Data did not include smoking or radon exposure.
Treatment/Care/Outcomes	Canale et al. (2018)	To determine the effect of rurality on management and outcomes of patients with advanced pancreatic cancer	Quantitative – retrospective cohort	Rural and urban status were defined as living ≥ 100 and < 100 km from the closest treatment site, respectively.	The sample ($n = 659$) had a mean age of 66.9 years (SD ± 9.94). 358 (54%) were male.	No significant associations were found between rurality and study outcomes (e.g., treatment variations, chemotherapy used, risk of death).
Treatment/Care	El-Haouly, Lacasse et al. (2021)	To describe out-of-pocket direct medical and non-medical costs, describe patients' perceived financial burden and identify clinical and sociodemographic factors associated with such burden among prostate cancer patients	Quantitative – cross sectional survey	The Abitibi-Témiscamingue region in QC, where 58% of people live in urban areas ($\geq 10,000$ inhabitants) and 42% in rural areas ($\leq 10,000$ inhabitants).	The mean age of the 171 participants was 68.73 (± 7.3) years. 73 (43%) lived in rural areas.	No differences were found in the perceived financial burden between rural vs urban participants (Crude OR = 1.11 [95% CI 0.54–2.30]).

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Treatment/Care	El-Haouly Dragomir et al. (2021)	To describe and identify the determinants of treatment decision-making in men with localized prostate cancer living in remote areas	Quantitative – cross sectional survey	The Abitibi-Témiscamingue region in QC, where 58% of people live in urban areas ($\geq 10,000$ inhabitants) and 42% in rural areas ($\leq 10,000$ inhabitants).	The mean age of the 127 participants was 68.3 (± 7.2) years. 53 (42%) lived in rural areas.	When controlling for age and income, no differences between rural vs urban participants were found in regard to their choice to receive out of region radiotherapy (OR = 1.18 [95% CI 0.55–2.52]).
Treatment/Care	Evans et al. (2017)	To assess the rates for lung cancer surgical resection and concordance with postoperative adjuvant chemotherapy (AC) guideline by health region during two time periods (2010–2011 and 2012–2013) according to five equity measures (including location of residence)	Quantitative – population-based	Statistic's Canada's definitions of urban, rural, rural-remote, rural very remote.	5,968 patients diagnosed with Stages I, II, or IIIA NSCLC.	Patients in rural areas were as likely to receive AC as urban dwellers, although some regional variations were determined during the timeframes examined.
Treatment/Care	Febbraro et al. (2020)	To document the percentage of cancer patients without documentation of a medical or radiation oncology consultation, and to determine factors that affect access to specialist consultation in northwestern ON	Quantitative – retrospective cohort	Statistics Canada's census definition of rural: population outside settlements ≥ 1000 with a population density ≥ 400 inhabitants km^2 .	Of the 2,583 cases, most ($n = 774$, 30%) were ≥ 80 years of age, and 1,404 (54%) were male. Among the categorizations of cancer diagnoses, most participants were "other" ($n = 1,368$, 53%), which was unspecified.	Those residing in a rural location were less likely to receive medical or radiation oncology consultation ($p < 0.0001$; OR = 0.48; 95% CI 0.48 to 0.72).
Treatment/Care	Gagnon et al. (2023)	To explore the needs of rural cancer patients requiring in-home palliative and end of life care (PELC) and to describe the nursing care and services available to them	Qualitative – descriptive interviews	Unclear.	The 5 participants were, on average 63 years (range 52–74 years).	Each participant reported multiple needs of which were categorized into physical, informational, emotional, psychological, social, spiritual, and practical.
Treatment/Care	Hartford (2019)	To examine the impact of a HPB surgery program on the management of pancreatic cancers before and after its inception	Quantitative – pre/post inception of the surgical program	Unclear.	Pre-HPB surgery ($n = 98$), participants were, on average, 71 (± 12) years of age and 52 (54%) were male. Post-HPB ($n = 109$), participants were, on average, 71 (± 10) years of age and 57 (52%) were male.	The post-HPB surgery group had a shorter median time to surgical consultation (11 vs 43 d, $p < 0.001$) and a greater number of them received surgical consultation (34% vs 74%, $p < 0.001$) with decreased median travel distance to receive the consultation (411 vs 79 km, $p < 0.001$).

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Treatment/Care	Jull et al. (2021)	To understand the experience of Inuit peoples in who travel from NU to receive cancer care in Ottawa, ON; and gain understanding of how these experiences impact opportunities to participate in decisions during the journey to receive cancer care	Qualitative – narrative methods	Unstated.	Inuit patients (n = 8) and medical escorts (n = 6) were, on average 20–80 years of age. 9 identified as male and 5 female.	Participants described themselves as directed, with little or no support, and seeking opportunities to collaborate with others on the journey to receive cancer care. They found it hard to take part in decisions about getting health care and that no one explained the decisions that they needed to make. The lack of knowledge impacted opportunities to engage in decision making. They also described a duty to make decisions that support family and community.
Treatment/Care/Outcomes	Kagedan et al. (2016)	To elucidate the influence of sociodemographic marginalization on receipt of pancreatectomy OS, and receipt of adjuvant treatment	Quantitative – observational cohort	Census metropolitan area (>100,000) and census agglomeration (10,000).	Of the 6,296 cases, 885 (14%) were categorized as rural.	Patients living in rural areas (OR = 0.68; 95% CI, 0.51–0.91) had a lower likelihood of undergoing surgical resection compared with patients in the urban areas with the highest income. No differences in OS nor receipt of adjuvant treatment were found between rurality and the highest income urban setting.
Treatment/Care	Loughery et al. (2019)	To increase understanding about the supportive care experiences of adult women requiring treatment for invasive breast cancer who reside in rural MB.	Qualitative – interpretive description	Unclear.	20 participants whose ages ranged from 34–85 years; most were between 46–65 years. 11 lived in or close to a city ≥7,500 people; the remainder lived in or close to a town <7,500. 16 had a rural community cancer program in their community and 4 needed to travel to receive chemotherapy. The travel distances for these women ranged from 15–1,100 km. Land was the primary mode of travel, but 4 utilized air travel and had access to financial compensation.	Participants described positive and negative aspects of living rurally across 7 domains: physical (i.e., managing side effects, challenges accessing care), informational (i.e., access to and relevance), social (i.e., lack of privacy, strong sense of community), practical (i.e., caring for family, travel to treatment), emotional (i.e., travel costs, insensitive providers), psychological (i.e., lack of control, trying to stay well), and spiritual (i.e., discovery of self and mortality).
Treatment/Care	Mathews et al. (2017)	To examine the experiences of cancer patients from the onset of symptoms to the start of treatment in NL, and to describe wait times and efforts to improve timeliness of care from patients' perspectives	Qualitative – interviews thematically analyzed	Populations <10,000.	60 participants of whom 33 (55%) were male and 29 (48%) were considered rural.	Rural patients who had an option to see cancer specialists in the urban centre or at a “travelling clinic” in smaller, regional centres resulted in more timely appointments by contacting the staff and indicating a willingness to travel or attend a particular clinic.

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Treatment/Care	Mahar et al. (2019)	To investigate patient, disease, and health system factors associated with receipt of symptom screening in the year after a cancer diagnosis	Quantitative – retrospective cohort	Postal Code Conversion File databases (Wilkins, 2009) and RIO (Kralj, 2009).	Of the 425,905 participants, 18,919 (4%) lived in an area with an RIO score >51.	Compared with patients living in mid-level urban areas, those in the most rural (and urban) areas were significantly less likely to have at least 1 symptom screening record.
Treatment/Care	Nostedt (2014)	To quantify where patients from rural MB underwent surgery for rectal cancer (local vs urban) and explore factors that influenced their decision on where to undergo surgery	Quantitative – population-based Qualitative – grounded theory	Unclear.	Between 2004–2006, 2,086 patients received diagnoses of CRC of whom 508 (24%) were rectal. The 20 interview participants were, on average, 62 (±11.2) years and 14 (70%) were male.	Of the 427 rectal cancer patients who had surgery, 172 were from rural areas. Of these, 80 (46%) had procedures in Winnipeg and 92 (54%) at a rural hospital. Interview participants described varying input into referral decisions. When they were involved, they cited treatment (e.g., surgeon factors and hospital factors related to skill, volume and reputation) and personal (e.g., travel, support, accommodation, finances and employment) factors were important.
Treatment/Care	Pesut et al. (2010)	To gain an understanding of the experiences of rural cancer patients who commute to an urban cancer centre for palliative care	Mixed methods – interviews and surveys	Defined as residing within communities with a population of <10,000.	Of the 15 participants, 8 (53%) were women, and the mean age was 62 years (range 48–79). The mean length of travel (one way) was 177 km: 6 traveled between 101–200 km and 3 travelled > 200 km.	Questionnaire data suggested that participants were experiencing a number of problems, most commonly pain and difficulties with heavy housework. Strategies for commuting included preparing for the trip with particular attention to pain management, making the most of time, and maintaining significant relationships. Establishing a routine helped to offset anxiety from commuting. Commuting was costly but the quality of life and supportive relationships obtained through treatment were significant benefits.
Treatment/Care	Santi et al. (2022)	To analyze the number of referrals billed from urology, radiation and medical oncology specialists for prostate cancer patients in Northern ON and ON as a whole for whom surgery or radiation therapy are indicated for treatment	Quantitative – retrospective population-based	Unclear definition from Statistics Canada was used.	The study population (n = 22,169) included men with a first prostate cancer diagnosis in ON between 2010–2019 who had a prostatectomy within 1 year of diagnosis and no other cancer diagnoses between the time of initial prostate cancer diagnosis and date of prostatectomy. 3,019 (14%) of sample lived in rural areas.	Rural residence was associated with lower odds of receiving a radiation oncologist consultation before having a radical prostatectomy (aOR = 0.72, 95% CI, 0.65–0.79). When geographic location was analyzed, residing in North East ON had the lowest odds of receiving a radiation consultation compared with the rest of ON (aOR = 0.50, 95% CI, 0.42–0.59).

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Treatment/Care	Springer et al. (2020)	To determine whether proximity to colorectal fellowship training sites (CFTS) influences laparoscopy utilization for rectal cancer patients	Quantitative – retrospective cohort	Home address postal codes were used as codes in a geographic cluster analysis.	Data from 11,261 were used. The cohort's mean age was 65.5 (± 11.6) years and 62% were male. 2,226 (20%) lived in a rural neighbourhood and 5,403 (48%) lived > 100 km from a CFTS.	Significantly more patients lived in a rural neighbourhood in the open resection group than laparoscopic group (21.5% vs. 15%, $p < 0.001$). Farther distance from a CFTS had lower odds of laparoscopic resection ($p < 0.001$). However, after adjusting for disease and patient factors, surgeon, hospital, province, and proximity to CFTS, patients in rural areas were not more likely to undergo an open resection (OR = 0.95, 95% CI 0.84–1.08, $p < 0.001$).
	Watanabe et al. (2013)	To assess the feasibility of using video-conferencing to provide specialist multidisciplinary PC and palliative RT consultation to cancer patients in rural areas and to explore symptom, cost, and satisfaction outcomes	Quantitative – pilot	Unclear.	Among the 44 participants, the median age was 60 years (range 20–88), 26 (59%) were male, and 15 (34%) were diagnosed with GI cancer.	Average per visit savings for patients seen by video conferencing versus attending the cancer centre were 471.13 km, 7.96 hours, and \$192.71 CAD. Patients and referring physicians indicated a high degree of satisfaction with the video conferencing clinic.
	Yu et al. (2021)	To evaluate the impact of geography on access to different specialists and liver directed treatment options, as well as explore associations with survival outcomes	Quantitative – retrospective cohort	Patients' home address postal codes were correlated with the corresponding population centre, then categorized to Statistics Canada's population centre size groups (Statistics Canada, 2018): small (populations 1,000–29,999), medium (30,000–99,999), and large ($\geq 100,000$ population).	286 patients with HCC had a median age of 62 years. 82% were male, and 25 (9%) lived in small population centres.	Patients in large population areas were more likely to be referred to a hepatologist (62% vs 48% vs 40%; $p = 0.031$) and undergo transarterial chemoembolization (43% vs 24% vs 24%; $p = 0.018$) than those living in medium and small population areas, respectively. Survival outcomes were similar when analyzed by population size, reflecting that geography did not influence OS.
Post-treatment	Fitch et al. (2020)	To explore (and compare) the context of residency location (rural vs urban) on the experiences of cancer survivors in three domains: physical concerns, emotional concerns and practical challenges	Quantitative – cross-sectional survey	A rural categorization was used, defined as individuals living in villages or towns with $\leq 10,000$ residents or on an acreage, ranch, or farm.	12,899 participants, of whom 4,646 (36%) were rural. Most ($n = 4,052$, 87%) rural participants were 55 years or older, and 2,327 (50%) were male.	The levels of concerns reported by rural and urban respondents were similar. Although the proportions of rural and urban participants who sought help for their concerns were similar, fewer rural participants sought help for return to work (28% vs 35% for urban). Differences for seeking help were observed in relation to getting health/life insurance (31% rural vs 20% urban) and rural participants had more difficulty finding help related to relationship changes with friends/co-workers (45% vs 39% for urban) and family (40% vs 34% for urban). Although the types of unmet needs were similar, a larger proportion of rural respondents experienced unmet needs related to return to work (75% vs 67% for urban).

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Post-treatment	Howard et al. (2014)	To describe the experiences of cancer survivors living in rural communities to access medical and supportive care post-cancer treatment	Qualitative – interviews and focus groups	Statistics Canada (no reference provided), or self identify as remote because of distance from a tertiary hospital.	52 participants from 8 communities located 61–432 miles (1–9.5 hours) away from a regional centre. Characteristics of First Nations ^a rural cancer survivors and general population rural cancer survivors were: on average, 50 and 59 years; 64% and 83% female; and 27% and 68% had a breast cancer diagnosis.	Although the types of needs differed, all rural cancer survivors described challenges to accessing medical care, psychological support and services, and information after cancer treatment. They also described financial and employment challenges after treatment.
	Miedema et al. (2013)	To compare the cancer care experiences of young adult cancer patients in NB, a rural Eastern Canadian province, and Toronto ON, Canada's largest metropolitan centre	Qualitative – grounded theory	A sparsely populated geographical area (NB).	There were 15 participants from each rural or urban setting, who were, on average, 29.5 and 34.6 years of age, wherein 20% and 27% were diagnosed with breast cancer.	More rural than urban participants described a delayed diagnosis and lower levels of community support. However, rural participants were more satisfied with their cancer care. Urban participants discussed out-of-pocket expenses more than those living in rural areas.
	Olson et al. (2014)	To identify categories of unmet needs for cancer survivors living in rural communities in northern BC in order to develop survivorship programs and care plans	Mixed-methods – surveys, interviews and focus groups	Rural Northern BC is 600,000 km ² with approximately 300,000 residents.	79 participants of whom 23 (29%) identified as First Nations peoples ^a and 56 (71%) non-FN. Respectively, their mean ages were 55 years (range 21–81) and 59 years (range 33–83). Most (n = 48, 61%) of the sample were diagnosed with breast cancer. First Nations participants lived farther away from all available cancer centres than non-First Nations participants.	Participants expressed unmet needs in all assessed domains; however, First Nations participants' needs were higher than non-First Nations peoples: Information (2.29 vs 0.8, $p < 0.001$), Work and Financial (1.66 vs 0.5, $p < 0.001$), Access and Continuity of Health Care (1.83 vs 0.44, $p < 0.001$), Coping and Sharing (2.22 vs 0.62, $p < 0.001$), and Emotional (2.12 vs 0.63, $p < 0.001$).
Post-treatment	Parker et al. (2015)	To determine participation rates to a survey about patient interest an online post-treatment disease outcomes and quality of life monitoring program for patients who have received radiation treatment for prostate cancer	Quantitative – survey	Postal codes and spatial statistical analysis calculated the distance from the nearest of the 5 provincial radiation treatment facilities. These distances were grouped into 3 categories: < 200 km, 200–400 km, and > 400 km.	358 people diagnosed with prostate cancer and treated with radiation therapy between 2007 and 2011. The average age of the sample was 73 years (± 8 years) and 96 (27%) lived in a rural setting. 295 (82%) of the sample lived <200km from a cancer centre, while 41 (11%) and 22 (6%) lived 200–400 km and > 400 km, respectively.	Participation rates were higher in urban vs rural areas (262/700, 37.5%, vs 96/330, 29.1%). After adjusting for age, lack of access to wireless broadband connectivity, living in a rural area, and receiving EBRT were significant predictors of lower participation. Increasing distance from a centre was not significant in the age-adjusted model.

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Post-treatment	Price & Brunet (2021)	To test the feasibility and acceptability of a 12-week telehealth behaviour change intervention to promote physical activity (PA) and fruit and vegetable (FVs) consumption	Quantitative – mixed methods feasibility trial	Rural community was defined as areas with < 35,000 inhabitants (Statistics Canada, 2011).	Nine young adult cancer survivors, were, on average 33.9 years of age (SD = 3.1, range = 28–37) and had completed treatment 4.6 years previously (SD = 6.7). Most were female (n = 6) and had completed university (n = 5).	Retention over the 1-year period was 74% and adherence was 95%, indicating feasibility. In regard to acceptability, the delivery method facilitated access to supportive care for those in rural areas (as compared to urban areas). Rural participants reported no access to many, if any, resources focused on their PA and FV consumption. As such, they felt this type of intervention was much needed, and offering it via distance was favourable.
Post-treatment	Smith et al. (2011)	To explore preferences for content and format of survivorship care among survivors of breast cancer from different age groups and from rural and urban locations	Qualitative – focus groups	Rural defined as > 2-hour drive to cancer centre.	26 breast cancer survivors with a mean age of 59 years (range 45–80 years). Five lived in a rural setting.	No differences for preferred content were observed between urban vs rural inhabitants. Although all participants wanted ongoing contact with an oncology resource person, rural participants preferred electronic formats (e.g., email) as the medium for this communication.
Post-treatment	Smith-Turchyn et al. (2021)	To describe the exercise behaviours, barriers, facilitators, and motivators to exercise participation of cancer survivors	Quantitative – cross-sectional survey	North Simcoe Muskoka region, which has a stable regional population of approximately 60,000.	The mean age of the 72-participant sample was 65 years of age (SD±10 years). 35 (49%) were diagnosed with breast cancer. Twenty-six (36%) lived 10 min from downtown, 28 (39%) lived 20–30 min, and 18 (25%) lived ≥ 40 min.	38% of respondents were meeting the guidelines for aerobic exercise. They reported that while on treatment and afterward, physical side effects were reported as the most common barrier to exercise (65% and 35%), followed by time (13% and 13%), lack of awareness of (13% and 22%), distance to (13% and 13%), and cost of exercise programs (10% and 6%). The top facilitators of exercise were to receive information from a qualified exercise professional (46%) and access to a gym (33%) and equipment (26%).
Post-treatment	Vallance et al. (2013)	To determine preferences for Physical Activity (PA) counselling and programming and barriers to program participation	Quantitative – cross-sectional survey	The Alberta Cancer Registry was used to identify eligible survivors residing in the rural and smalltown sectors of the province.	The sample of rural and small town breast cancer survivors (n = 524) were, on average, 62 years of age (SD±11) and had a mean travel time of 77 min (SD±54 min) to a cancer centre.	Most (85%) felt they would possibly participate in a PA program. Barriers to participation included: travel (73.1%), lack of time (50.2%), and cost (29.5%). Demographic and clinical characteristics were associated with interest in receiving PA counselling.

Phase of cancer trajectory	Author (Year)	Objective/Aim	Study Design	Definition of Rural/Remote	Sample Details	Key Findings
Post-treatment	Vander Meer et al. (2017)	To determine lifestyle information sources, needs, and preferences among breast cancer survivors in Northern BC	Quantitative – cross-sectional survey	Degree of rurality was stratified into: (i) those who live in a community and (ii) those who live out of town (>10 min driving to services) or out in the country (>30 min drive to services).	132 breast cancer survivors, of whom 117 (89%) were 50 years of age or older, 90 (68%) were unpartnered, and 89 (70%) lived in a community.	Between those who travelled the farthest versus the least for health services, no differences were found in regard to informational needs (about weight, diet, nor physical activity) Although most participants preferred face-to-face programming over internet) no between group differences were found.
Outcomes	Ding et al. (2022)	To examine the effect of the length of time to the first chemotherapy treatment initiation and the other factors affecting overall survival	Quantitative - retrospective cohort	Rural was defined as > 50 km from nearest cancer centre.	Of 4,520 patients, 53% were male and 14% were from rural areas. The sample's income was nearly equal (~20%) across five income brackets. Time to the first treatment had a median of 63 days (IQR: 40–98 days) while the distance from the nearest centre had a median of 12 km (IQR: 5–48 km).	Type of the chemotherapy, length of time to the first treatment, and distance from the nearest centre had statistically significant impact on survival. Every additional 10 km from the nearest cancer centre was associated with a 0.5% increased risk of death (HR = 1.005; 95% CI 1.000–1.010).
Outcomes	McLay et al. (2017)	To evaluate the effect of treatment centre on the OS and head and neck cancer-specific survival (HNCSS)	Quantitative - retrospective cohort	A Local Health Area was defined as rural if greater than 50% of residents lived in a community of fewer than 10,000.	Among the 2,330 participants, the median age at diagnosis was 68 years (range 23–101 years). 1,742 were male. 306 (13%) lived in a rural area.	Using multivariable analyses to assess the impact of patient, tumour and treatment characteristics on HNCSS and OS, using the population size of Local Health Area as a covariate, no significant difference in HNCSS of subjects from rural areas (HR = 0.89; 0.68–1.16; $p = 0.38$) were found when compared to those living in largest urban areas. Likewise, OS was not significantly different for subjects from rural areas (HR = 0.97; 0.85–1.11; $p = 0.67$) compared to those living in largest urban areas.

Note. AB = Alberta; aOR = adjusted odds ratio; AR = absolute risk; BC = British Columbia; CAD = Canadian dollars; CI = confidence interval; CMA = Census Metropolitan Area; CRC = colorectal cancer; EBRT = external beam radiotherapy; GI = gastrointestinal; HCC = hepatocellular cancer; HPB = hepatopancreatobiliary; HPV = Human Papilloma Virus; HR = hazard ratio; IQR = interquartile range; km = kilometres; MB = Manitoba; min = minutes; MIZ - Metropolitan Influenced Zone; NB = New Brunswick; NL = Newfoundland and Labrador; NSCLC = non-small cell lung cancer; NWT = Northwest Territories; ON = Ontario; OR = Odds Ratio; OS = overall survival; Pap = Papanicolaou test; PC = palliative care; QC = Québec; RIO = Rurality Index of Ontario; RT = radiotherapy; SCLC = small cell lung cancer; SES = socioeconomic status; SK = Saskatchewan.

^a The authors of this review acknowledge and respect that “Indigenous peoples” is a collective name for the original peoples of North America and their descendants. In this scoping review, we have reported the language used by the authors of the included studies.

Table 2

Included Studies by Cancer Diagnosis, Continuum, and Province

Phase of Cancer Continuum	Location	Author (Year)	Cancer Diagnoses ^a															
			Breast (n = 20)	Cervix (n = 7)	Colon and/or Rectal (n = 18)	Hematological (n = 8)	Hepatocellular (n = 1)	Genitourinary (n = 3)	Gynecological (n = 9)	Laryngeal/Head & Neck (n = 1)	Lung (n = 4)	Melanoma (n = 2)	Pancreas (n = 4)	Prostate (n = 7)	Testicular (n = 1)	Thyroid (n = 2)	Other (n = 11)	
Screening (n = 12)	AB	Mema et al. (2017)		X	X													
	NWT	Smith et al. (2020)			X													
	ON (n = 8)	Chow et al. (2020)	X	X	X													
		Gesink et al. (2014)	X	X	X													
		Gold et al. (2023)	X															
		Lofters et al. (2019)	X	X	X													
		McBride & Gesink (2018)	X	X	X													
		Nadalín et al. (2016)	X															
		Racey & Gesink (2016)		X														
	Racey et al. (2016)		X															
QC	St. Jacques et al. (2013)	X																
Multiple				X														
Diagnosis (n = 3)	SK	Shah et al. (2021)									X							
	Multiple (n = 2)	Blair & Datta (2020) ^c			X													
		Khalil et al. (2019) ^d									X							
Treatment/Care (n = 18)	AB	Watanabe et al. (2013)	X		X	X		X			X						X ^f	
	BC (n = 3)	Canale et al. (2018)										X						
		Pesut et al. (2010)															X ^f	
		Yu et al. (2021)						X										
	MB (n = 2)	Loughery et al. (2019)	X															
		Nostedt et al. (2014)			X													
	NL	Mathews et al. (2017)	X		X						X			X				
NU	Jull et al. (2021)															X ^f		

Post-Treatment (n = 10)	ON (n = 6)	Evans et al. (2017)								X			
		Febbraro et al. (2020)	X	X						X	X	X ^f	
		Hartford et al. (2019)									X		
		Kagedan et al. (2016)									X		
		Mahar et al. (2019)	X		X	X	X	X	X	X		X ^g	
		Santi et al. (2022)				X							
		QC (n = 3)	El-Haouly, Lacasse, et al. (2021)									X	
			El-Haouly, Dragomir, et al. (2021)									X	
			Gagnon & Hébert (2023)		X		X		X				X ^h
		Multiple	Springer et al. (2020) ^c		X								
		AB	Vallance et al. (2013)	X									
		BC (n = 5)	Howard et al. (2014)	X	X	X			X				X
			Olson et al. (2014)	X	X	X			X				X ^f
		Parker et al. (2015)								X			
		Smith et al. (2011)	X										
		Vander Meer et al. (2017)	X										
	ON (n = 2)	Price & Brunet (2021)			X						X	X	
		Smith-Turchyn et al. (2021)	X	X	X			X	X	X	X	X ^f	
	Multiple (n = 2)	Fitch et al. (2021)	X	X	X				X	X		X ^f	
		Miedema et al. (2013) ^e	X		X							X X	
Outcomes (n = 2)	BC	McLay et al. (2017)								X			
	ON	Ding et al. (2022)								X			

Note. AB = Alberta; BC = British Columbia; MB = Manitoba; NB = New Brunswick; NL = Newfoundland and Labrador; NU = Nunavut; NWT = Northwest Territories; ON = Ontario; QC = Québec; SK = Saskatchewan.

^a Some studies included more than one cancer diagnosis

^b Data were retrieved from AB, MB, NB, NL, PEI, and QC

^c Data were retrieved from all provinces and territories except QC.

^d Data were retrieved from AB, MN, NL, NS, PEI, and SK

^e Data were retrieved from ON and NB

^f Not specified

^g Bones, joints, or soft tissue; nervous system and orbit; gastrointestinal; endocrine system, other/unclear

^h Esophageal and neuroendocrine

Table 3*Study Designs by Phase of Cancer Care Continuum*

Phase of Cancer Continuum	Study Designs Used
Screening (<i>n</i> = 12)	Quantitative (<i>n</i> = 8): intervention (<i>n</i> = 2); cohort/population-based (<i>n</i> = 5) Qualitative (<i>n</i> = 4): grounded theory (<i>n</i> = 1); participatory action (<i>n</i> = 1); descriptive (<i>n</i> = 2)
Diagnosis (<i>n</i> = 3)	Quantitative (<i>n</i> = 3): cohort/population-based (<i>n</i> = 3) Qualitative (<i>n</i> = 0)
Treatment/Care (<i>n</i> = 18)	Quantitative (<i>n</i> = 12): cohort/population-based (<i>n</i> = 8); cross-sectional survey (<i>n</i> = 2); intervention/pre-post (<i>n</i> = 2) Qualitative (<i>n</i> = 4): interpretive description (<i>n</i> = 1); descriptive (<i>n</i> = 2); narrative (<i>n</i> = 1) Mixed or multiple methods (<i>n</i> = 2): survey + intervention (<i>n</i> = 1); cohort + grounded theory (<i>n</i> = 1)
Post-Treatment (<i>n</i> = 10)	Quantitative (<i>n</i> = 6): cross-sectional survey (<i>n</i> = 5); trial (<i>n</i> = 1) Qualitative (<i>n</i> = 3): descriptive (<i>n</i> = 2); grounded theory (<i>n</i> = 1) Mixed or multiple methods (<i>n</i> = 1): survey + interview (<i>n</i> = 1)
Outcomes (<i>n</i> = 2)	Quantitative (<i>n</i> = 2): cohort/population-based (<i>n</i> = 2) Qualitative (<i>n</i> = 0)

rurality scale (Statistics Canada, 2001), and Febraro et al. (2020) used the census definition of rural: those living outside of settlements of 1,000 people with a population density of greater than 400 or more inhabitants per square kilometre. Other definitions posed by Statistics Canada were also used, for instance, Gold et al. (2023) and Khalil et al. (2019) used Census Metropolitan areas (Statistics Canada, n.d.), Simkin et al. (2019) used Metropolitan Influenced Zone classifications (Statistics Canada, 2015a), and Blair & Datta (2020) used the rural/urban classification for Dissemination Areas (Statistics Canada, 2015b).

Experiences across the cancer care continuum

Cancer Screening

Twelve studies focused on cancer screening. In Ontario, urban (Gold et al., 2023; Lofters et al., 2019) and suburban (Lofters et al., 2019) dwellers were significantly more likely to be screened for cancer in comparison to those living in rural settings. However, no significant differences were found in the up-to-date colorectal cancer screening rates among urban, rural and remote populations (Simkin et al., 2019). In Québec, distance away from a breast screening centre impacted screening rates: a 6.3% absolute decrease in screening was observed for distances 50–75 km from a screening centre and 10% decrease for distances >75 km (St-Jacques et al., 2013). These results indicate that rural and remote populations experience barriers in regard to cancer screening, which has been specifically explored in three of the included studies (Gesink et al., 2014; Nadalin et al., 2016; Racey & Gesink, 2016). Barriers to screening were described by rural inhabitants as logistical, procedural, and intentional (Racey & Gesink, 2016), including anxiety about safety and accuracy of testing (Nadalin et al., 2016), transportation distance and safety (Nadalin et al., 2016), as well as cultural beliefs about accessing the healthcare system (Gesink et al., 2014).

Specific initiatives have been explored to overcome barriers to screening for rural and/or remote populations. These have

included promoting cervical and colorectal cancer screening at a rural outreach mammography service (Mema et al., 2017) or community health day (McBride & Gesink, 2018), opportunistic breast, cervical, and colorectal screening at a temporary residence (Chow et al., 2020), and at-home self-screening kits (Racey et al., 2016; Smith et al., 2020). Some initiatives, such as mobile (Mema et al., 2017) and self-collection (Racey et al., 2016) programs were found to increase cancer screening rates, while specific facilitators of cancer screening included positive and meaningful relationships with providers, an e-call system, and decreased stigma through awareness and education (Racey & Gesink, 2016). On the other hand, earlier cancer detection was not facilitated when broad-reaching screening initiatives (e.g., fecal immunohistochemical testing for colorectal cancer; Smith et al., 2020) were used. Opportunistic and targeted screening programs were highly satisfactory when co-designed with the community (Chow et al., 2020; McBride & Gesink, 2018).

The Cancer Diagnosis

The association of rurality with stage of cancer diagnosis was explored within three population-level studies (Blair & Datta, 2020; Khalil et al., 2019; Shah et al., 2021). Among people within the highest income quartiles, living in a rural location was associated with later stages of laryngeal cancer in comparison to those living in urban locations (Khalil et al., 2019). However, when age, sex, and income quintile were controlled, no differences were observed between rural versus urban residence and stage of laryngeal cancer at diagnosis (Khalil et al., 2019). Likewise, residents of rural Saskatchewan were found to have a higher incidence proportion of advanced stage non-small cell lung cancer in comparison to those living in urban areas (Shah et al., 2021). More specifically, residents of the rural north had nearly 20% greater risk of being diagnosed with advanced NSCLC compared to those living in urban areas (Shah et al., 2021). While similar trends were seen for small cell lung cancer

diagnoses, these results were not statistically significant (Shah et al., 2021). In regard to colorectal cancer, no significant differences were found in stage at diagnosis according to urban or rural residence (Blair & Datta, 2020).

Cancer Treatment and Care

Eighteen studies focused on cancer treatment and care. These studies illustrated the experiences and care needs of persons living in rural settings with respect to receiving cancer-related treatment. Identified care needs spanned multiple domains, including physical, informational, emotional, psychological, social, spiritual, and practical support (Gagnon & Hébert, 2023; Loughery & Woodgate, 2019). For instance, those who needed to travel for cancer care experienced worse physical symptoms, employment challenges, financial losses, and the need to relocate as a result of this travel (Loughery & Woodgate, 2019). To combat the costly and complex commuting challenges to receive cancer care, rural inhabitants implemented strategies to prepare for this travel, such as increased attention to pain management and established routines to decrease anxiety (Pesut et al., 2010). Patients living in the most remote regions of Ontario were less likely to undergo symptom screening than those in mid-level urban communities (Mahar et al., 2019). Nevertheless, when the perceptions of financial burden were compared between rural and urban inhabitants, no significant differences were found (El-Haouly, Lacasse, et al., 2021).

The cancer treatment decision-making processes of rural inhabitants were examined in three studies. Among those with a choice about where to receive cancer surgery, both knowledge of surgeon (i.e., skill, case volume, reputation) and hospital factors (e.g., case volume, reputation, previous experiences with that hospital) influenced peoples' decision-making (Nostedt et al., 2014). Among the rural patients included in this study, 46% elected to undergo surgery in an urban centre while 54% underwent surgery in a rural hospital (Nostedt et al., 2014). Personal factors (i.e., travel, support, accommodation, finances, and work) were less often cited as influencing decision making (Nostedt et al., 2014). Jull and colleagues (2021) found that unclear expectations about the patient role in cancer care decision-making and a lack of knowledge made it hard for rural Inuit patients diagnosed with cancer to participate in care decisions. Nevertheless, the decision to travel to radiotherapy that was unavailable locally did not differ between rural and urban inhabitants (El-Haouly, Dragomir, et al., 2021).

Comparisons of cancer treatment between rural and urban populations were explored in seven studies. In comparison to those living within urban settings, rural dwellers were less likely to receive a referral to a hepatologist and transcatheter arterial chemoembolization for hepatocellular carcinoma (Yu et al., 2021), surgical resection for pancreatic cancer (Kagedan et al., 2016), and consultation with medical and radiation oncologists (Febbraro et al., 2020) prior to surgery (Santi et al., 2022). When considering the distance that patients traveled to receive surgical cancer treatment, those who lived farther (e.g., > 100 km) from a colorectal fellowship training centre were more likely to undergo an open resection (versus laparoscopic approach) for rectal cancer (Springer et al., 2020). However, in

other studies, treatment patterns of those diagnosed with pancreatic cancer did not significantly differ by geographical status (Canale et al., 2018) and the receipt of adjuvant chemotherapy for lung cancer was comparable between rural and urban residents (Evans et al., 2017).

Rural inhabitants acknowledged the commuting challenges to receiving cancer-related care as a trade-off for rural living, as they considered their rural lifestyle an important part of their overall well-being (Pesut et al., 2010). Specifically, a love for rural life, strong sense of community atmosphere, and peaceful living (Loughery & Woodgate, 2019) were highlighted as positive aspects of rural living. Both Watanabe et al. (2013) and Mathews et al. (2017) looked at strategies to provide cancer care closer to home. Videoconferencing was found to improve access to palliative care and radiation oncology consultations (Watanabe et al., 2013) and providing rural inhabitants with options (e.g., "travelling clinics") where they could receive cancer care resulted in more timely appointments (Mathews et al., 2017).

The Post-Treatment Period

Ten studies addressed the period after cancer treatment. Many of the reported post-treatment needs and experiences of rural inhabitants were similar to their urban counterparts (Fitch et al., 2021). However, a greater proportion of those in rural (vs urban) settings had difficulty getting to and from appointments as well as accessing support for challenges in their relationships with co-workers, friends and family (Fitch et al., 2021). Furthermore, a larger proportion of rural inhabitants had unmet needs related to their return to work in comparison to those living in urban communities although a smaller proportion of rural inhabitants sought assistance for their return to work (Fitch et al., 2021). Although supportive care resources may have been available for rural cancer survivors, they were often unaware of these supports (Howard et al., 2014; Olson et al., 2014; Smith-Turchyn et al., 2021). When cancer-related information (e.g., long-term effects of cancer treatment and what to expect post-treatment) was found, it often did not consider seasonality or available community facilities (Howard et al., 2014). Further, costs associated with travel and distance were primary barriers to accessing post-treatment services (Howard et al., 2014; Olson et al., 2014; Smith-Turchyn et al., 2021). Although travel subsidies were available, not everyone qualified to receive them (Howard et al., 2014).

Among rural inhabitants, those who identified as First Nations peoples (see Table 1, Footnote a) had more unmet post-treatment needs than non-First Nations peoples (Olson et al., 2014). First Nations peoples described several challenges of accessing post-treatment services, including difficulties working through multiple levels of bureaucracy to access financial support (Olson et al., 2014). First Nations peoples indicated that supportive care services were generally unavailable or difficult to access due to language barriers and cultural inappropriateness (Howard et al., 2014). Adding to these challenges was unreliable Internet connection and/or the associated costs of Internet connectivity and owning a computer (Howard et al., 2014).

Six articles explored the need for types of interventions used by cancer survivors living in rural areas. Two studies examined

the barriers of engaging in exercise for rural cancer survivors, most of which were in alignment with barriers experienced by urban cancer survivors (i.e., physical side effects, cost of programs, lack of awareness of programs, and time to exercise); however, distance, lack of time, and cost (Smith-Turchyn et al., 2021; Vallance et al., 2013) of exercise programs were unique barriers reported by rural cancer survivors. To overcome geographical barriers, a telehealth intervention to promote physical activity and fruit and vegetable consumption was conducted (Price & Brunet, 2021), which was reported to be feasible and acceptable by participants. These rural inhabitants appreciated synchronous communication and distance-based delivery (Price & Brunet, 2021), which was similarly expressed in regard to ongoing email communication with an oncology resource person (Smith et al., 2011). Nevertheless, in other studies, rural inhabitants, regardless of their degree of rurality (Vander Meer et al., 2017), preferred face-to-face interventions over Internet delivery (Olson et al., 2014). The preferred content for survivorship care planning was similar for those residing in urban and rural areas (Smith et al., 2011).

Outcomes

The five¹ studies that explored survival or mortality outcomes used population-level data. No differences in mortality were found between rural and urban samples diagnosed with pancreatic (Canale et al., 2018; Kagedan et al., 2016), head and neck (McLay et al., 2017), nor hepatocellular (Yu et al., 2021) cancer. However, distance from the nearest cancer centre² had a statistically significant impact on non-small cell lung cancer survival (Ding et al., 2022); every additional 10 kilometres from the nearest cancer centre was associated with a 0.5% increased risk of death (HR = 1.005, 95% CI 1.000–1.010; Ding et al., 2022).

DISCUSSION

The overall objective of this review was to synthesize the cancer literature involving rural and remote populations in Canada. Using a scoping review method that included a systematic search and a priori eligibility criteria, 45 studies were included. Within these studies, there was considerable variation in the conceptual and operational definitions of rural and remote utilized. Quantitative designs were most commonly used, data from Ontario was most commonly represented, and the treatment and care phase of the cancer care continuum was most often the focus. People having a breast cancer diagnosis were reflected in nearly half of the studies. In what follows, an exploration of review results is undertaken leading to suggested implications for health services planning and future research.

Implications for rural and remote definitions

Review results revealed varying definitions of rural and remote. Indeed, the challenge of defining rural and remote in research has long been an issue (du Plessis et al., 2001).

- 1 Three of these studies also explored treatment and care and are also described as part of that phase of the cancer care continuum (see Treatment and Care Section).
- 2 In addition to type of chemotherapy and length of time to the first treatment.

However, rural and remote contexts across Canada's vast geography are diverse and heterogeneous (Lavergne & Kephart, 2012), which likely contributes to the ways in which the concepts are defined or assigned predefined attributes (i.e., distance from an urban centre; Du Plessis et al., 2001; Lavergne & Kephart, 2012). For these reasons, there is a need to be wary of generalizing people in rural and remote communities in Canada. Although the inconsistency of these definitions limits the generalizability, it also highlights the importance for researchers and health services administrators to understand the unique contexts that exist within Canada (e.g., focusing on the social determinants of health that exist within and across rural and remote areas in Canada; Lavergne & Kephart, 2012). Review results also indicate the need for researchers and health services administrators to clearly provide their definition of rural and/or remote in their reports. Such reporting should indicate whether a previously developed definition was used (e.g., from Statistics Canada or otherwise) and articulate the possible impact(s) that the utilized definition may have for project results and implications. These actions will enhance the transparency of rural and remote research and implications for health services delivery.

Implications for rural and remote populations

Notwithstanding the uniqueness of rural and remote populations and considering that “people living far from services” (Cancer Care Ontario, n.d.) are identified as needing particular attention, it is interesting to note the under-researched rural and remote populations revealed in this review. For example, only four of the 45 included studies involved samples from the Territories and two of these four studies involved data from persons residing in the Territories *and* data from persons residing in other provinces. In this way, review results clearly indicate the lack of cancer-related research among rural and remote populations living in Canada's Territories. The Atlantic provinces have similarly received minimal focus: Five of the 45 included studies involved samples from Atlantic Canada, only one of which focused on rural and remote populations in an Atlantic province (Newfoundland and Labrador; Mathews et al., 2017). These examples, which reflect less populated Canadian provinces and territories, illuminate a “geographical inequity” to understanding the unique cancer-related contexts of rural and/or remote populations across Canada. This finding reinforces the need for research in these areas so that their unique cancer-related contexts can be fulsomely understood. This understanding can be used to inform the development of cancer-related health services uniquely suited to address the respective populations.

Implications across the cancer care continuum

Within the included studies, the treatment (and care) phase of the cancer care continuum (Cancer Care Ontario, n.d.) was most commonly explored. Indeed, research into this phase is important given the increasing prevalence of cancer in Canada (Canadian Cancer Statistics Advisory et al., 2022). In looking at the types of cancer diagnoses reflected across the continuum, it is noteworthy that none of the included studies explored the diagnosis and outcomes of people diagnosed with breast or prostate cancers, which reflect two of

the most common cancer diagnoses in Canada (Canadian Cancer Statistics Advisory Committee et al., 2023). Although the numbers of rural and/or remote people diagnosed with these cancers is not clear, this reflects areas where further research is needed.

The utility of quantitative methods, such as the cohort and population-based designs commonly used in Canadian cancer research revealed in this review, are useful to understand data relevant to large groups of people. Indeed, quantitative designs were the most commonly used in all phases of the cancer care continuum; however, such designs lack breadth and depth to understand the determinants of health and socio-structural factors that intersect to create social inequalities. In some cases, this is perceived as perpetuating inequities because comparisons made across groups without considering diversity of experiences through an intersectionality lens is lacking (Truant et al., 2019). In these instances, qualitative designs would be most useful. Notably, qualitative methods have not been used to explore the diagnosis and cancer outcomes among rural and remote populations, illuminating a gap in the existing research landscape, having important implications for the delivery of appropriate health services.

In looking at the methods used across studies, a notable gap is the lack of patient- and/or community-member engagement. This engagement is crucial to truly understand the community and develop or tailor strategies and solutions relevant to their context (Canadian Partnership Against Cancer, 2021; Springer & Skolarus, 2019). Furthermore, organizations (i.e., Canadian Cancer Society, 2024; Canadian Institutes of Health Research, 2014) are increasingly endorsing patient-partnerships in research. Nevertheless, only one of the studies included in this review described methods that engaged with knowledge users using a community based participatory approach (McBride & Gesink, 2018). The result was an increased access to and uptake of cancer screening. Nevertheless, the lack of patient- and/or community-engaged cancer research with rural and remote populations in Canada is a gap that should be addressed in future health services and policy work. A number of resources exist (Canadian Institute for Health Information (CIHI); Canadian Institutes of Health Research, 2014; Canadian Partnership Against Cancer, n.d.) to support research and/or health services delivery teams to complete this work.

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STRENGTHS AND LIMITATIONS

Strengths of this review include the broad systematic search used to capture the pan-Canadian literature base. Furthermore, synthesizing the reviewed literature by phases of the cancer care continuum (Cancer Care Ontario, n.d.) is a strength in that it permits a nuanced understanding of literature that can be used to inform tailored health services and policy research (Canadian Cancer Research Alliance, 2021). However, a limitation of this review is that the prevention phase of the cancer care continuum was not included despite being outside of our team's intent for this review. Another limitation is that the rural and remote literature were synthesized, which may be challenging for readers who intend to focus on either rural or remote cancer populations. Nevertheless, the goal of this review was to synthesize this literature and propose implications for further study. Understandably, as the literature about rural and remote populations continues to expand, and nuances in terms are more fully appreciated, such literature will be too heterogeneous to synthesize. Finally, the quality of the literature included in this review was not appraised. Nevertheless, such an appraisal was beyond the intent of this review, which was to search the available literature broadly, to gain an understanding of what is and is not known about Canada's rural and remote inhabitants who access and/or need cancer-related care.

CONCLUSION

The increasing cancer prevalence points to the need for astute research and policy to address the cancer-related care needs of rural and remote communities across Canada. In some cases, strategies to address rural health care access have begun (i.e., The Rural Road Map for Action published by the College of Family Physicians of Canada in 2017) and align with the Canadian Strategy for Cancer Control's priority of eliminating barriers to people getting the care they need (Canadian Partnership Against Cancer, 2019). However, gaining an understanding of the experiences of affected populations and engagement of community members to understand what is needed is required first. This scoping review provides an initial step toward this goal by synthesizing the Canadian cancer literature involving rural and remote populations in Canada.

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