



Psychosocial well-being and supportive care needs of cancer patients and survivors living in rural or regional areas: a systematic review from 2010 to 2021

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Abstract

Purpose To summarise what is currently known about the psychosocial morbidity, experiences, and needs of people with cancer and their informal caregivers, who live in rural or regional areas of developed countries.

Methods Eligible studies dating from August 2010 until May 2021 were identified through several online databases, including MEDLINE, EMBASE, PsychINFO, and RURAL (Rural and Remote Health Database). Results were reported according to the PRISMA guidelines and the protocol was registered on PROSPERO (CRD42020171764).

Results Sixty-five studies were included in this review, including 20 qualitative studies, 41 quantitative studies, and 4 mixed methods studies. Qualitative research demonstrated that many unique psychosocial needs of rural people remain unmet, particularly relating to finances, travel, and accessing care. However, most (9/19) quantitative studies that compared rural and urban groups reported no significant differences in psychosocial needs, morbidity, or quality of life (QOL). Five quantitative studies reported poorer psychosocial outcomes (social and emotional functioning) in *urban* cancer survivors, while three highlighted poorer outcomes (physical functioning, role functioning, and self-reported mental health outcomes) in the rural group.

Conclusion Recent research shows that rural people affected by cancer have unique unmet psychosocial needs relating to rurality. However, there was little evidence that rural cancer survivors report greater unmet needs than their urban counterparts. This contrasts to the findings from a 2011 systematic review that found rural survivors consistently reported worse psychosocial outcomes. More population-based research is needed to establish whether uniquely rural unmet needs are due to general or cancer-specific factors.

Keywords Cancer · Rural · Psychosocial · Healthcare needs · Informal caregivers · Oncology

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Introduction

Understanding the psychosocial well-being and supportive care needs of people with cancer has become an important public health concern [1]. As the number of people diagnosed with cancer and survival rates improve [2], more people living with cancer will require ongoing cancer treatment, surveillance, and supportive care to address their psychosocial needs [3, 4]. Supportive care can be defined as care that helps a person with cancer and their family cope with cancer and its treatment, from pre-diagnosis through the process of diagnosis and treatment to cure, continuing illness or death and into bereavement [5]. Unfortunately, given the increasing prevalence of cancer survivors and limited health workforce, current survivorship care leaves survivors with significant unmet needs [6–8]. Previous research indicates survivors living in rural or regional areas are likely to have more unmet needs than those residing in urban areas [9, 10]. Fortunately, targeted research is being undertaken to understand the specific, culturally complex indigenous cancer issues [11], as outcomes are even worse for these members of the rural population. However, it is also important to develop understanding about the supportive care needs of the significant number of non-indigenous rural people affected by cancer and caregivers, to improve service delivery models, and to inform new approaches.

Research suggests that rurality negatively impacts survival. A survival analysis in Australian cancer patients showed that cancer patients living in remote areas are 35% more likely to die within 5 years of a cancer diagnosis than those living in urban areas [12, 13]. Similar patterns have been found in various geographical regions around the world and using multiple definitions of rurality [14]. Contributing factors may include more labour-intensive work schedules, delayed diagnosis, geographic isolation, and lower levels of income, education, and socioeconomic status (SES) [12, 15, 16]. As there are fewer cancer services in rural or regional areas, rural people with cancer may also experience a lack of local support and services, and often have to travel significant distances or relocate to access cancer care [17–20]. This may affect their treatment decisions and follow-up care post-treatment, and profoundly impact their psychosocial well-being, resulting in poorer health status [20–22].

In 2011, a systematic review on psychosocial well-being and the supportive care needs of people living in urban and rural/regional areas, diagnosed with cancer, was published online [23]. Bringing together the literature on psychosocial morbidity in rural areas (excluding studies on medical outcomes, survival, interventions etc.), this influential 2011 review included 37 studies and found that the majority of controlled studies reported worse psychosocial outcomes for rural cancer patients, who had higher needs, particularly in the domains of daily living and physical functioning, compared to

urban cancer patients. Furthermore, many rural patients and families reported rural-specific challenges including travel, financial, emotional, and relationship challenges. The review concluded that more research was needed that included people with heterogeneous cancers from rural and urban settings to confirm these disparities. Since then, increasing research interest in this field has been driven, at least in part, by the finding that although cancer survival is improving overall, disparities between rural and urban populations are continuing to grow [24]. Addressing rural cancer disparities has become a key priority area for the National Cancer Institute in the United States (US), which has led to an increase in the amount of research funding being directed towards this field [25]. However, the impact of rurality on *psychosocial* morbidity remains less clear than the impact that it has on *physical* morbidity and survival. Therefore, the purpose of this study was to systematically review studies on levels of psychosocial morbidity and the experiences and needs of people with cancer and their informal caregivers, living in rural or regional areas, that have been published in the last 10 years, since the 2011 review. Where studies included data on both psychosocial and physical morbidity, we report only the former.

Methods

This systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [26]. The study protocol was registered in the online database of PROSPERO (CRD42020171764).

Eligibility criteria

Papers eligible for inclusion were published in English after July 2010 (i.e., the end date of the previous systematic review) and reported on studies comparing rural versus urban-dwelling cancer survivors in terms of their psychosocial morbidity or supportive care needs, or alternatively reported on these issues specifically for rural cancer survivors and/or their informal caregivers. Eligible studies included study participants who were adults (18 years or older) within a setting described as a regional or rural area(s) of Australia (i.e., the Accessibility/Remoteness Index of Australia (ARIA) as defined by the Australian Bureau of Statistics [27]), or as a rural area for countries of the developed world, as defined by the Human Development Index (HDI) of 0.8 or higher (i.e., high human development) [28]. The ARIA classifies locations into five categories: very remote, remote, moderately accessible, accessible, and highly accessible [27]. Both qualitative and quantitative (non-experimental) studies were included in the review. As per the previous review [23], studies were excluded if they did not report on the prevalence of psychosocial

morbidity or supportive care needs, i.e., they were intervention studies, focussed on medical outcomes or survival rates, reported differences in the uptake of cancer screening or focussed on health attitudes or treatment decision making, and discussed service delivery or discussed the effectiveness of support groups or support via videoconferencing. In addition, studies were excluded if they explored psychosocial outcomes in indigenous populations (as the issues facing these populations are unique).

Information sources

Searches were identified via searching four electronic bibliographic databases, including RURAL: Rural and Remote Health Database (which specifically covers a range of subjects related to rural and remote area health issues and care), PsychINFO, Embase, and Medline. Additionally, backward and forward citation searching of all included articles was performed to identify any additional studies.

Search strategy

The searches were conducted in the final week of April 2020 and updated in the third week of May 2021. Search strategies were amended to the requirements of each database. In general, the searches included the following combinations of terms and were combined as (#1 OR #6) AND (#2 OR #7) AND (#3 OR #8) AND (#4 OR #9) NOT (#5 OR #10; Table 1). The search was limited to August 2010 until May 2021.

Search selection

Initial search results from all databases were screened for duplicates and eliminated through a systematic review management software (Covidence). Screening of articles was completed in two stages: of information provided in the title and

abstract, and subsequently, full text. One reviewer (SK) screened all papers individually and the other reviewers screened a percentage in duplicate, 20% in the first stage (KG) and 100% in the second stage. Any disagreement was resolved by discussion and where consensus could not be easily reached, a third independent reviewer (KS) made the final decision.

Data collection and items

Data extraction was conducted by one reviewer (SK). A second reviewer (KS) checked the data extracted from 20% of the articles to assess the quality of data collection. Additional data was extracted for one paper. As per the previous review [23], the included articles were summarised according to reference, study design, response rate, sample size, setting, measures, type of cancer, results, and study quality. In addition, data on study population was collected to allow for clearer documentation of whether study participants were adult cancer survivors undergoing treatment (i.e., people who were receiving cancer treatment at time of study — not including hormonal therapy), adult cancer survivors post-treatment (i.e., people who had finished cancer treatment at time of study), cancer patients in palliative care, and/or family or friends caring for a person with cancer.

Risk of bias

The quality of individual studies was assessed independently by two reviewers (SK and KS). Studies were critically appraised using the appropriate appraisal tool for the study design (both quantitative and qualitative), available from the Joanna Briggs Institute [29]. Included articles were categorised as having poor, good, or very good methodological reporting by calculating the percentages of items on which studies were rated as including essential quality characteristics (i.e., less than 40% were classified as poor, 40–70% as good,

Table 1 Search strategy*

Medical Subject Heading (MeSH) terms	Text terms included in titles and/or abstract
1 Neoplasms	6 cancer OR neoplasm OR carcinoma OR oncology
2 Rural population	7 regional OR remote OR travel
3 'Quality of life'	8 well-being OR 'quality of life' OR QOL OR psycho* OR social OR emoti* OR morbidity OR adjust* OR depress* OR anx* OR distress OR 'unmet needs' OR need*
4 Adult	9 adult OR adults OR men OR women OR man OR woman OR elderly OR 'the aged' OR 'middle aged' OR senior* OR geriatric*
5 Oceanic ancestry group	10 aborigi* OR indigenous*

*Combined as (#1 OR #6) AND (#2 OR #7) AND (#3 OR #8) AND (#4 OR #9) NOT (#5 OR #10)

and higher than 70% as very good). Studies that combined qualitative and quantitative methods (i.e., mixed methods) were assessed by the Mixed Methods Appraisal Tool (MMAT) [30]. Any initial differences (17%) were resolved through discussion and consensus. Studies of all levels of quality were included in the data synthesis.

Summary measures

Levels of psychosocial morbidity and quality of life (QOL) were measured in proportions. The unmet needs and experiences of people with cancer were documented thematically.

Results

Study selection

The search of electronic databases identified 4589 unique papers published online since August 2010 (Figure 1). After removal of duplicates, 4332 studies remained and were evaluated on title and abstract. A total of 259 potentially relevant papers were assessed on full text, of which 61 papers were

included. Four additional papers were identified through backward and forward citation searching, resulting in 65 studies being included in this systematic review (August 2010–May 2021).

Study characteristics

Characteristics of studies identified through the systematic review are presented in Tables 2, 3, 4, 5, 6. Of the 20 qualitative studies included, data collection methods included one-on-one interviews ($n = 14$), focus groups ($n = 2$), and combined interviews and focus groups ($n = 4$). Of these 20 studies, ten were conducted in Australia, five in the US, four in Canada, and one in Europe. Most studies focussed on a variety of cancer types ($n = 10$), three each on breast and haematological cancers, two on gynaecological cancer, and one each on prostate and myeloma cancer.

Among quantitative studies, 35 utilised a cross-sectional study design while six studies employed a longitudinal study methodology. Of these 41 studies, 18 were conducted in Australia, 16 in the US, six in Europe, and one in Canada. Most studies ($n = 18$) included participants with heterogenous cancers, eight with breast cancer, five with haematological

Figure 1 PRISMA study selection flowchart

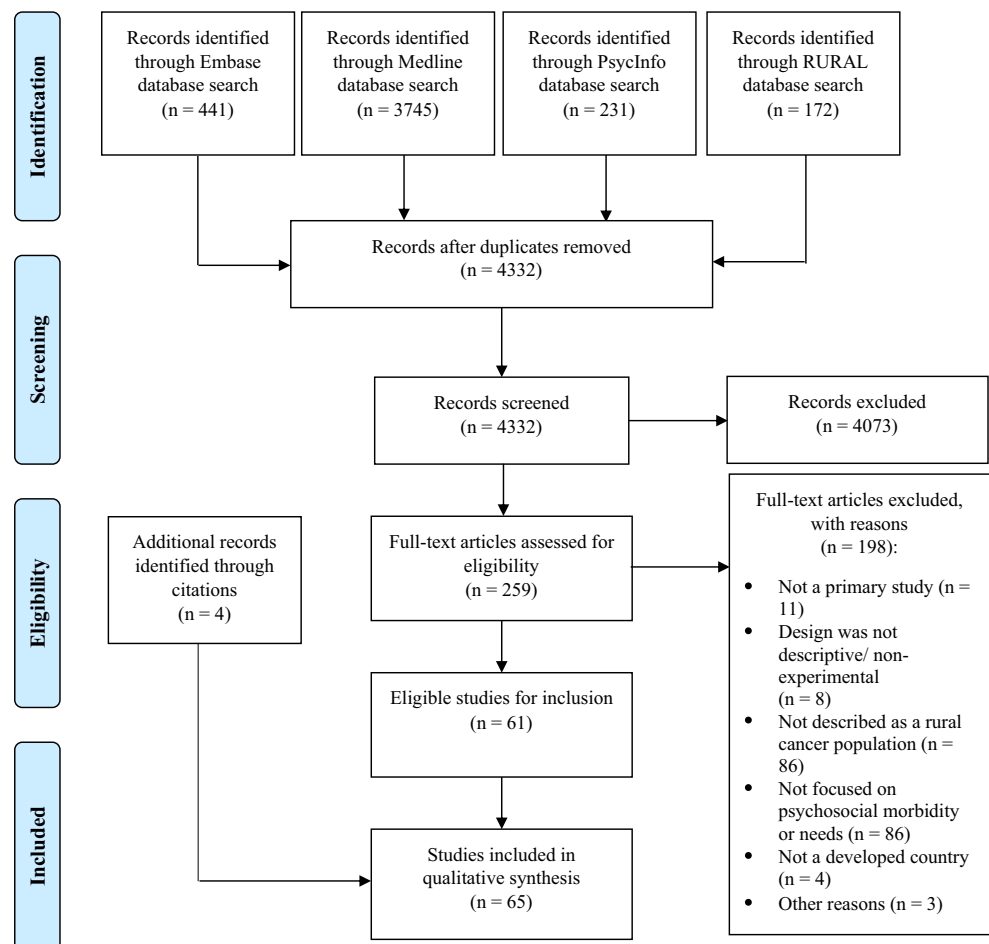


Table 2 Qualitative studies including both rural and urban survivors

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Studies on unmet needs of cancer survivors									
Jones, 2011 (United States) [31]	Cancer survivors	Qualitative descriptive study (hermeneutic phenomenological approach using focus groups; semi-structured interview)	N/A	12 urban and 11 rural	African American prostate cancer survivors were recruited from community-based centres (churches, barbershops, diners, and primary care clinics) in central Virginia and Maryland	N/A	Prostate cancer	Two common themes emerged: (1) family and physician support are important; and (2) insurance is a necessity for appropriate healthcare; one major difference between rural and urban African American prostate cancer survivors emerged: rural participants talked more about using spirituality throughout their diagnosis and treatment than those who lived in urban areas	Very good
Miedema, 2013 (Canada) [32]	Cancer survivors	Qualitative study (open-ended interviews using the Constructivist Grounded Theory approach)	N/A	15 from New Brunswick and 15 from the Greater Toronto Area	Two distinct areas of Canada: New Brunswick, a rural Eastern Canadian province, and Toronto, Canada's largest metropolitan centre	N/A	Various (1 to 5 years post-diagnosis)	Three themes emerged from the analysis of the data: (1) delayed diagnosis (dismissed complaints, wrong diagnosis, unusual age for diagnosis); (2) cost related to cancer treatment (medication costs, part-time work, lack of sick leave and limited health insurance coverage, and reliance upon parental assistance); and (3) community support (benefit events, meals and support from friends, cancer organisation support); additional theme was satisfaction with care (lack of information and support, regional issues, top class cancer facility, and intense follow-up screening)	Very good
Wenzel, 2012 (United States) [33]	Cancer survivors	Qualitative study (semi-structured focus groups)	N/A	28 urban and 20 rural (snowball sampling)	African Americans residing in a rural area in Virginia or an urban area in Maryland recruited from community-based centres	N/A	Various	Four main issues emerged from the analysis of the data: (1) the need for more health-related and cancer-specific education; (2) the importance of faith and spirituality; (3) the availability of support; and (4) participants' difficulty identifying and articulating financial needs	Good
Studies on needs and psychological morbidity									
Galica, 2020 (Canada) [34]	Cancer survivors	Qualitative descriptive study (semi-structured)	N/A	6 small urban and 9 rural	Participants completed treatment at the Cancer Centre of South-eastern Ontario in Kingston, Ontario, Canada	N/A	Ovarian cancer (average time since	Five themes for coping were expressed by all women: (1) healthcare provider support; (2) knowing, trusting, and prioritising self; (3)	Very good

Table 2 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
		focus groups or telephone interviews)		(convenience sample)			diagnosis was 2.7 years)	finding what works; (4) uniqueness and belonging; and (5) redirecting thoughts and actions. One additional theme was expressed by most women: (6) preparing for the future	
Studies on financial issues and travel issues									
McGrath, 2015 (Australia) [35]	Cancer patients	Qualitative descriptive study (open-ended, in-depth interviews)	N/A	5 metro, 16 regional, 14 rural, 9 remote, 1 interstate (purposive sample)	The study was funded by the Leukaemia Foundation of Queensland (LFQ) Australia and participants were chosen from the LFQ patient contact database for 2012; geographical location defined by distance to primary specialist centres	N/A	Haematological cancer	Two important strategies: (1) visits by metropolitan haematologist to regional areas (benefits included not having to experience the stress of separation from family, reduction in the need for lengthy travel, regional hospital is familiar, reduction in the financial cost of treatment, local treatment with regard to taking time off); and (2) opportunities for haematology patients to undergo part or all of their treatment at regional hospitals (allows patients to stay within the comfort of their own home, physically less demanding, very convenient and time saving for those who live locally, more convenient, bonds of trust and friendship with regional health professionals, regional hospital can be accessed by car); lessens the emotional impact of diagnosis and treatment, and patients are better off financially being treated regionally	Good
McGrath, 2015 (Australia) [36]	Cancer patients	Qualitative descriptive study (open-ended, in-depth interviews)	N/A	5 metro, 16 regional, 14 rural, 9 remote, 1 interstate (purposive sample)	The study was funded by the Leukaemia Foundation of Queensland (LFQ) Australia and participants were chosen from the LFQ patient contact database for 2012; geographical location defined by distance to primary specialist centres	N/A	Haematological cancer	At the point of diagnosis and along the continuum of treatment, the experience of relocation was associated with psychosocial stress; major issues were the sense of disorientation and being overwhelmed by the speed and complexity of the city; needs resulting from family separation are not always addressed and was described as the 'biggest' issue creating distress; the distress was not only associated with lack of support	Good

Table 2 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
McGrath, 2015 (Australia) [37]	Cancer survivors	Qualitative descriptive study (open-ended, in-depth interviews)	N/A	5 metro, 16 regional, 14 rural, 9 remote, 1 interstate (purposive sample)	The study was funded by the Leukaemia Foundation of Queensland (LFQ) Australia and participants were chosen from the LFQ patient contact database for 2012; geographical location defined based on the government scheme for assisting patients with travel and accommodation (The Patient Transit Subsidy Scheme = PTSS)	N/A	Haematological cancer	and loneliness for patients but was also related to concerns about the impact of separation on family members remaining at home; strong theme for those who had to relocate for specialist treatment was the sense of being stuck in the city; stoicism is associated with rural living, which could translate into individuals not talking about their longing to go home; many would prefer the option of accessing treatment locally Eight themes emerged from the analysis of the data: (1) the challenge of accessing treatment from a distance; (2) strategies for overcoming the distance barrier, including what works now and ideas for the future; (3) the importance of work issues for both the patient and their family; (4) the additional costs of relocation and treatment; (5) the factors contributing to financial distress and hardship; (6) the financial buffers; (7) the possibility of a spiral to poverty; and (8) the contribution of Leukaemia Foundation of Queensland's supportive care service delivery to ameliorating the impact of relocation	Good

Table 3 Qualitative studies including only rural survivors

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Studies on the use of formal and informal mental health resources									
Gunn, 2013 (Australia) [38]	Cancer survivors	Qualitative study (semi-structured, face-to-face, hour-long interviews)	N/A	17	Participants were recruited through Cancer Council South Australia's supported accommodation facilities, the rural media and personal contacts; rurality was defined by the Accessibility/Remoteness Index of Australia (ARIA)	N/A	Various	The themes identified could be split into two broad categories: (A) Issues in the provision of psychosocial care: (1) psychosocial support is highly valued by those who have accessed it; (2) having access to both lay and professional psychosocial support is vitally important; (3) accessing psychosocial services is made difficult by several barriers such as lack of information about services, initial beliefs they are unnecessary, feeling overwhelmed, and concerns about stigma and dual relationships; (4) medical staff located in metropolitan treatment centres are not sufficiently aware of the unique needs of rural patients; (5) patients require better access to psychosocial services post-treatment; (B) How the provision of psychosocial care could be improved: (1) providing more rural-specific information on psychosocial care; (2) improving communication between healthcare providers and referral to psychosocial services; (3) making psychosocial services a standard part of care	Very good
Pascal, 2014 (Australia) [39]	Cancer survivors	Qualitative descriptive study (in-depth interviews)	N/A	19 (purposive sampling)	The sample was drawn from the geographic setting within the Loddon-Mallee region of Central Victoria, Australia; rurality was defined by the Australian Institute of Health and Welfare definition	N/A	Various (2 years post-treatment)	Psychosocial care provision unmet needs included feeling let down by formal service provision, sense of isolation, lack of access to psychosocial care, lack of information and referrals, lack of follow-up care, inaccessibility of services due to distance cost or wait times, and lack of appropriate	Good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Studies on unmet needs of cancer survivors and patients in palliative care									
Adams, 2017 (United States) [40]	Cancer survivors	Qualitative study (focus groups and in-depth interviews, using semi-structured)	N/A	15	Participants who lived in one of three rural Black Belt counties in Alabama recruited through the Community Health Advisors as Research Partner (CHARP) network; rurality not defined	N/A	Women with breast cancer (average 5 years in survivorship)	Four overarching themes emerged during the analysis of the data: (1) cancer is a secret; (2) perish with lack of knowledge; (3) start with a good prayer life; and (4) limited survivorship support and education; these four themes can further be divided into thirteen subthemes, as follows: (1) fatalism at diagnosis, delay in treatment, fear of disclosure; (2) what is lymphedema, what are the side effects of hormonal therapy, sexuality and body image, fatigue, fear of weight loss, depression; (3) religion and spirituality; and (4) family/friend support, education and support, cancer surveillance, awareness of breast cancer advocacy	Good
Allen, 2014 (United States) [41]	Cancer survivors	Qualitative study (face-to-face or telephone interviews, semi-structured open-ended interviews grounded in a social constructionist theoretical framework)	N/A	20	Rural Appalachia recruited from cancer centres: Southwest and West Virginia	N/A	Gynaecological cancer	The study provides three new perspectives: (A) participants followed four different routes in learning they had cancer: (1) receiving a diagnosis immediately upon suspecting symptoms; (2) enduring a series of tests and waiting up to a year for confirmation; (3) living with the suspicion that something was wrong but delayed medical confirmation until after meeting family responsibilities; (4) having	Very good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Coyne, 2019 (Australia) [42]	Cancer survivors	Qualitative study (in-depth telephone interviews)	200 invited; 16 completed consent; 14 completed interviews	8 survivors and 6 family members	The participants for this study resided in rural Queensland and had stayed in Cancer Council Queensland [CCQ] accommodation during treatment; rural is defined as living up to and over 180 km away from a major city	N/A	Various	<p>their cancer discovered during routine gynaecological exam; (B) There was great variation among the women in their beliefs about cancer and four different patterns of cancer survivorship were revealed: (1) positive attitude; (2) cautious; (3) distanced; (4) resigned; and (C) Although not every woman resonated with being a cancer survivor, every woman did perceive herself to be strong and felt supported by strong family ties and strong connections to higher power</p> <p>Three themes emerged from the analysis of the data: (1) confronting diagnosis, i.e., the initial shock, sense of disbelief, working through the shock, and the importance of support at this time, was imperative; (2) challenges, i.e., getting through the treatment, travelling to and from treatment; and (3) negotiating support, i.e., person with cancer felt concerned about being a burden to their family and information was a challenge as it was not always at their level of understanding (included community, spiritual, and instrumental support)</p>	Very good
Devik, 2013 (Norway) [43]	Cancer patients in palliative care	Qualitative study (interviews; combined phenomenological philosophy with hermeneutic interpretation)	N/A	5	Contact was mediated through an oncologic policlinic in a local hospital in Norway; the participants resided in communities (both mountain and coastal) with low population density; ranged from 920 to 7775	N/A	Various (incurable cancer, receiving life--prolonging chemotherapy)	<p>Four themes emerged from the analysis of the data: (1) enduring by keeping hope alive (subthemes: having confidence in the expertise at the policlinic, coping with conflicting feelings, dreaming and making plans); (2) becoming aware that you are your own (subtheme: navigating alone); (3) living up to expectations of being</p>	Very good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Duggleby, 2011 (Canada) [44]	Cancer patients in palliative care	Qualitative study (open-ended interviews and focus groups defined in grounded theory)	N/A	6 patients, 10 family caregivers, and 12 rural healthcare professionals (purposive sampling)	The palliative care coordinators from the 3 rural health regions in western Canada contacted participants, self-reported to live in a rural area	N/A	Various	a good patient (subtheme: having limited control, becoming a burden); and (4) being at risk of losing identity and value (subtheme: being in decline, losing dignity, losing continuity) Four themes emerged from the analysis of the data: (1) community connectedness/isolation (participants described feeling connected to their community as part of the social context but also isolated, rural healthcare providers connected through living and working with people they knew both personally and professionally); (2) lack of accessibility to care (lack of access to palliative care services and lack of continuity of care); (3) communication and information issues (poor communication with healthcare providers resulted in palliative patients and their family members perceiving that they were lacking important information regarding their care); and (4) independence/dependence (shared sense that palliative patients, together with their informal and formal caregivers, felt the need for retaining the patient's sense of independence as they became more dependent on others)	Very good
Garrard, 2017 (Australia) [45]	Cancer patients and their family	Qualitative study (semi-structured interviews based upon the Resilience Model of Family Adjustment and Adaption)	N/A	10 families, 34 patients total	Participants were recruited via a media release and by rurally based doctors; postcode as 'outer regional' according to the Accessibility/Remoteness Index of Australia (ARIA)	N/A	Not reported	Three key challenges were identified: (1) frequent travel; (2) increased work/financial demands; and (3) family separation; protective internal factors were an adaptive communication approach,	Very good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Grimison, 2013 (Australia) [46]	Cancer patients	Qualitative (focus groups and structured interviews via telephone or face-to-face)	N/A	36 patients, 14 carers, and 32 health professionals	New South Wales, Australia at four rural and regional hospitals and three metropolitan locations; rural area defined by Accessibility/remoteness index of Australia (ARIA)	N/A	Various (diagnosed in the last 2 years)	strength of family relationships and its value, and family's ability to problem-solve to promote normality; protective external factors were availability and engagement of community support, and the ability to access professional support services Six themes emerged from the analysis of the data: (1) access to healthcare professionals; (2) access to services for investigation and treatment; (3) travel and accommodation; (4) quality of treatment; (5) information and support needs; and (6) experience of healthcare professionals	Good
Loughery, 2019 (Canada) [47]	Cancer survivors	Qualitative interpretive study (open-ended, semi-structured interviews, face-to-face)	N/A	20 (purposive sampling)	Rural or north areas of Manitoba, Canada	N/A	Women with breast cancer	Findings according to the domains of the supportive care framework: (1) physical: travelling and access to experienced and qualified health professionals resulted in additional burdens on family and friends; however, the positive roles of the rural cancer program helped many transition through the physical demands that were encountered; (2) information: number of factors impacted the ability to process the information such as escalating fears, long travel days, and lack of a support person available to attend the appointment; (3) social: living alone was positive and negative, nurses are important in rural setting, strong sense of community but lack of anonymity and invasion of privacy; (4) practical: burden of extensive travel, relocation, employment challenges, and financial losses; (5) emotional: shock, disbelief,	Good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Sawin, 2010 (United States) [48]	Cancer survivors	Qualitative study (semi-structured interview using a hermeneutic phenomenological strategy)	N/A	9 (convenience sample)	Rural women from community settings in western Virginia and West Virginia; Rurality was determined by participants' responses to the Rural Survey and confirmed by matching participants' zip codes with statistics on rurality from the Virginia Department of Health, the US Census Bureau, and the United States Department of Agriculture (USDA)	N/A	Women with breast cancer (average 9.8 years post-diagnosis)	Several themes emerged related to the experience of breast cancer with a non-supportive intimate partner in a rural setting: (1) driving (driving was exhausting and stressful); (2) gossip (women did not mention loss of privacy in terms of the breast cancer, but rather in the context of their difficult intimate partner relationships, which had both positive and negative manifestations); (3) rural location as therapeutic (although the participants did not have the support of their intimate partner, they described the rural location and physical space as an important part of their cancer recovery); and (4) community support (community support was an important aspect of support for these rural women)	Good
Wagland, 2015 (Australia) [49]	Cancer survivors	Qualitative (semi-structured interviews through interpretative phenomenological analysis)	N/A	5	Participants were recruited through the Leukaemia Foundation National Myeloma Coordinator and the 'Myeloma' newsletter (rural Australia)	N/A	Myeloma (average 5.2 years post-diagnosis)	Three themes emerged from the analysis of the data: (1) isolation due to living with a rare cancer; (2) isolation within the myeloma population; and (3) isolation due to the disease effects and treatment; isolation depicted the sense of being alone or separated, both physically and	Good

Table 3 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Studies on needs and quality of life									
Gunn, 2021 (Australia) [50]	Cancer survivors and their carers	Qualitative (semi-structured, face-to-face interviews through thematic analysis)	N/A	22	Participants expressed interest in participating in response to media articles, posters, and notices; rural area defined by Accessibility/remoteness index of Australia (ARIA)	N/A	Various (1–5 years post-treatment)	Study consisted of two parts; part A investigated the impact of post-treatment challenges on quality of life and found four overarching themes: (1) quality of life is not restored after treatment completion, e.g., fear of recurrence and feeling depressed or fatigued; (2) lack of confidence in rural health services' ability to help address post-treatment quality of life; (3) challenges with returning to metropolitan centres, such as time away and financial costs; and (4) most support provided by family, friend, nurses, and support groups. Part B investigated how quality of life-related needs could be better addressed and found six overarching themes: (1) engage with telephone or face-to-face services; (2) serviced need to reach out; (3) barriers to accessing support via internet-based programs still exist; (4) continuity of care highly valued; (5) nurses are appropriate to deliver post-treatment, quality of life-focussed support; and (6) telehealth is popular alternative to face-to-face appointments	Very good

Table 4 Quantitative studies with rural and urban comparison groups

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
<p>Studies on the use of formal and informal mental health resources</p> <p>Andykowski, 2010 (United States) [51]</p>	<p>Cancer survivors</p>	<p>Cross-sectional</p>	<p>34%</p>	<p>51 rural and 62 nonrural</p>	<p>Cancer survivors were recruited from the state-wide, population-based Kentucky SEER Cancer Registry (KCR); the rural-nonrural distinction was defined by objective, geographic, and population-based criteria: 2003 United States Department of Agriculture (USDA) Rural-Urban Continuum (RUC) Codes</p>	<p>The Mental Health Resource Questionnaire (MHRQ)</p>	<p>Female breast cancer, colorectal or haematological cancer; 1 to 5 years post-diagnosis</p>	<p>Rural survivors were less likely to report a psychologist ($\chi^2 = 8.40, p < 0.01$) or support group ($\chi^2 = 9.20, p < 0.01$) within 30 miles of home; rural survivors were less likely to report they could access a support group if they wanted to ($\chi^2 = 4.56, p < 0.05$); rural cancer survivors reported less favourable personal attitudes regarding talking to friends/family about emotional difficulties ($t(111) = 2.31; p < 0.05$); rural survivors reported less favourable social norms regarding addressing emotional difficulties by talking to friends/family ($t(111) = 2.04; p < 0.05$) or participating in a support group ($t(111) = 2.17; p < 0.05$); rural survivors reported less favourable attitudes ($t(111) = 2.05; p < 0.05$) and social norms ($t(111) = 2.20; p < 0.05$) regarding MH resource usage</p> <p>Urban patients talked less with their doctor about their emotional state (65%, $p < 0.01$) and showed poorer knowledge of cancer-specific mental health resources (60%, $p < 0.002$); a good doctor-patient relationship was associated with a better mental health outcome; a significant predictor for acceptance was distress; 94% of patients without a nearby support facility lived in rural areas ($p < 0.001$); there were no group differences concerning distress, mental health outcomes, or acceptance of</p>	<p>Very good</p>
<p>Beraldi, 2015 (Germany) [52]</p>	<p>Cancer patients</p>	<p>Cross-sectional</p>	<p>89%</p>	<p>251 rural and 283 urban</p>	<p>Data was obtained from the Munich Cancer Registry; rurality was categorised in a similar way as the Rural-Urban Continuum (RUC) Code, considering the regional conditions of Southern Germany</p>	<p>Distress was evaluated using the Distress Thermometer (DT) and the Stress in Cancer Patients (QSC-R10); depression and anxiety were evaluated by the Patient Health Questionnaire (PHQ-4)</p>	<p>Colorectal cancer; 3 months after surgery</p>	<p>Urban patients talked less with their doctor about their emotional state (65%, $p < 0.01$) and showed poorer knowledge of cancer-specific mental health resources (60%, $p < 0.002$); a good doctor-patient relationship was associated with a better mental health outcome; a significant predictor for acceptance was distress; 94% of patients without a nearby support facility lived in rural areas ($p < 0.001$); there were no group differences concerning distress, mental health outcomes, or acceptance of</p>	<p>Very good</p>

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Corboy, 2014 (Australia) [53]	Cancer survivors	Cross-sectional	31%	286 major cities, 104 inner regional, 46 outer regional, 8 remote, 3 very remote	Registered with Australia Medicare; geographic remoteness was measured as a continuous variable, using the Accessibility/Remoteness Index of Australia (ARIA+)	The Liverpool Stoicism Scale (LSS); the Need for Control and Self-reliance subscale of the Barriers to Help Seeking Scale	Australian men who had undergone a radical prostatectomy as treatment for prostate cancer; 9.11 months post-diagnosis	cancer-specific mental health resources An increase in geographic remoteness was associated with a decrease in intentions to use a telephone-based support service; geographic remoteness did not predict perceived behavioural control; relationship between geographic remoteness and intention to use a telephone-based support service was partially mediated by stoicism and subjective norms ($r = -0.04, p < 0.001$); a significant direct path indicated that stoicism significantly increased with distance from metropolitan areas	Very good
Studies on unmet needs of cancer survivors and support persons Ahern, 2015 (Australia) [54]	Cancer survivors	Cross-sectional (10-year replication study)	81%	224 major cities, 62 inner regional, 39 outer regional, remote, or very remote	Participants were sources from two Australian databases: Register4 and Survey Group; rurality was defined by the Australian Bureau of Statistics (ABS) Remoteness Area (RA) code	Study used a previously validated survey; six questions were added	Australian women with breast cancer who had been diagnosed between 6 and 30 months before the start of the study	There were no statistically significant differences found in information issues received and satisfaction with sources of support based on geographic location; percentages of women using the newspaper as an information source was statistically significant lower ($\chi^2 = 8.033, p = 0.018$) in outer regional, remote, and very remote areas ($n = 8, 21%$) compared to major cities ($n = 91, 41%$) and inner regional areas ($n = 30, 48%$); a statistically significant difference was found with the breast cancer nurse as a source of support ($\chi^2 = 6.253, p = 0.044$) at a higher percentage in the outer regional, remote, and very remote areas (16/39, 41%) compared to major cities	Good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Ahern, 2016 (Australia) [55]	Cancer survivors	Cross-sectional (survey)	Not reported	604 major cities, 207 inner regional, 91 outer regional, remote, or very remote	Participants were sourced from two Australian databases: Register4 and the BCNA Review and Survey Group; an Australian Bureau of Statistics (ABS) Remoteness Area (RA) code was manually allocated to the physical residential address of each participant to identify their geographical location	Study used a previously validated survey; the Supportive Care Needs Survey (SCN-SF34); the Communication and Attitudinal Self-Efficacy Scale for cancer (CASE-cancer)	Australian women with breast cancer who had completed active treatment at least 6 months before start of the study	(50/224, 22%) and inner regional areas (17/62, 27%) The analysis of unmet needs by geographical residence revealed two statistically significant findings: (1) outer regional, remote, and very remote areas were significantly more likely to report unmet needs in the choice about which healthcare service or hospital they attended ($\chi^2 = 8.780, p = 0.012$); and (2) major cities were significantly more likely to report unmet needs in being treated in a hospital or clinic that was as physically pleasant as possible ($\chi^2 = 6.151, p = 0.046$); no significant differences were reported in self-efficacy scores across geographic areas	Good
Lymagh, 2018 (Australia) [56]	Informative care-givers	Cross-sectional (population-based)	35%	792 urban and 193 rural	Recruited from 5 Australian state population-based cancer registries; residential postcodes were used to classify support persons as 'rural' or 'urban' based on the Accessibility and Remoteness Index of Australia (ARIA+)	The Support Person Unmet Needs Survey (SPUNS); the Depression Anxiety and Stress Scale (DASS-21)	Haematological cancer	Significantly higher proportion of rural support persons (76%) had at least one moderate/high/very high unmet need compared with urban support persons (64%, $\chi^2 = 8.72, p = 0.003$); significantly higher proportion of participants living in rural areas were forced to relocate temporarily in comparison with those living in urban areas (35 vs 8%, $p < 0.0001$); 40% of rural participants had to travel between 2 and 5 h compared with only 5% of urban support persons, while travel time for the majority of those in urban areas (81%) was less than 1 h compared with 35% in rural areas ($p < 0.0001$); significantly, more participants from rural areas reported that they had to take time off work	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Tzelepis, 2018 (Australia) [57]	Cancer survivors	Survey	35%	1145 urban and 272 rural	Recruited from 5 Australian state population-based cancer registries; residential postcodes were used to classify support persons as 'rural' or 'urban'	The Survivor Unmet Needs Survey (SUNS); the Depression, Anxiety and Stress Scale (DASS-21)	Haematological cancer	(52 vs 43%, $p = 0.023$), had less income (37 vs 27%, $p = 0.009$), had difficulty paying bills (22 vs 13%, $p = 0.002$), had trouble meeting day-to-day expenses (15 vs 8%, $p = 0.011$), and were forced to use up their savings (28 vs 16%, $p = 0.0003$) Feeling tired was the most common high/very high unmet need for rural (15.2%) and urban (15.5%) survivors; the emotional health domain had the highest mean score for rural (M = 0.66, SD = 0.84) and urban (M = 0.73, SD = 0.92); in contrast, the access and continuity of care domain had the lowest mean unmet need score for rural survivors (M = 0.39, SD = 0.60) and urban survivors (M = 0.37, SD = 0.64); being a rural resident was associated with a decreased unmet emotional health domain score (ES = -0.06; 95% CI: -0.11 to -0.01)	Very good
White, 2011 (Australia) [58]	Cancer patients	Cross-sectional (survey)	47%	383 metro, 234 rural, and 169 remote	Participants were identified through the Western Australian Cancer Registry (WACR); to determine geographical areas, the Australian Bureau of Statistics (ABS) remoteness classes were adapted using the ABS classifications and collapsed into metropolitan (ABS = 0); rural/regional (ABS = 1 and 2); and remote (ABS = 3 and 4)	The Long Form Supportive Care Needs Survey (SCNS-LF59)	Various (6 months to 2 years post-diagnosis)	Participant needs did not vary by geographical location, with no significant differences found for any of the 15 items; the item for which the greatest, albeit non-significant ($p = 0.12$) difference was seen, was concern about financial situation; Differences among all other items were not significant (p -values from 0.28 to 0.96); proportion of participants reporting 'moderate to high need' on these items did not differ significantly across	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Studies on needs and quality of life									
Cahir, 2017 (Ireland) [59]	Cancer survivors	Cross-sectional	66%	698 rural and 870 urban	Women with breast cancer were identified in August 2015 from the National Cancer Registry Ireland (NCRI) database; a composite measure of urban–rural classification was created using three indicators; settlement size, population density, and proximity to treatment hospital	The Functional Assessment of Cancer Therapy (FACT-G); an endocrine subscale (ES)	Women with breast cancer 1–5 years post-diagnosis	geographical populations (p -values from 0.13 to 0.91) The association between urban–rural residence/status and QOL and endocrine symptoms was assessed using linear regression with adjustment for sociodemographic and clinical covariates; in multivariable analysis, rural survivors had a statistically significant higher overall QOL ($\beta = 3.81$, standard error (SE) 1.30, $p < 0.01$), emotional QOL ($\beta = 0.70$, SE 0.21, $p < 0.01$), and experienced a lower symptom burden ($\beta = 1.76$, SE 0.65, $p < 0.01$) than urban survivors	Very good
Pateman, 2018 (Australia) [60]	Cancer patients	Prospective study with baseline (prior to treatment), 1 month, and 6 months post-treatment	86% baseline and 56.8% lost to follow-up	48 major city, 25 inner regional, 18 outer regional, 3 remote, 1 very remote	Tertiary hospital in Brisbane, Australia; rurality was classified according to the Australian Standard Geographic Classification-Remoteness Area (ASCG-RA) system	The University of Washington Quality of Life Survey (UW-QOL)	Newly diagnosed patients who were referred for the diagnosis, and/or treatment of head and neck cancer	At baseline, the regional/remote group scored significantly worse in the pain domain compared with the metropolitan group ($p = 0.031$); Post hoc χ^2 tests did not reveal a significant difference between urban and regional/remote groups for tumour-related variables, such as staging; there was a trend towards lower scores in the global QOL among the regional/remote group at all three time points; however, this association did not reach statistical significance	Very good
Pedro, 2014 (United States) [61]	Cancer survivors	Cross-sectional (survey)	35% for RUCC 7, 31% for RUCC 8, and 41% for RUCC 9	49 RUCC 7, 28 RUCC 8, 14 RUCC 9	Participants were recruited from the Colorado Central Cancer Registry (CCCR); rurality was based on the 2003 Rural-Urban Continuum Codes (RUCCs): RUCC 7 (urban population of 2,500–19,999, not adjacent to a metro area), RUCC 8 (complete rurality or less than	The Rosenberg Self-Esteem Scale (RSES); the Personal Resource Questionnaire (PRQ) 2000, a measure of social support; and the European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 (EORTC QLQ-C30)	Various	A significant difference was noted between RUCC 7 and RUCC 9 in social functioning ($\beta = -0.25$, $p < 0.05$), symptom-related QOL ($\beta = 0.26$; $p < 0.05$), and financial difficulties ($\beta = 0.31$, $p < 0.05$); those residing in RUCC 7 reported poorer social	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Thomas, 2014 (Ireland) [62]	Cancer survivors	Cross-sectional (population survey)	59%	361 urban and 214 rural	The National Cancer Registry Ireland was used; 3 composite measures for defining rurality were used: self-reported area, distance from the participant's current residence to the hospital from the registry, and population density	The Functional Assessment of Cancer Therapy (FACT-G) — specific to head and neck cancer survivors (FACT-HN)	Head and neck cancer (at least 8 months post-diagnosis)	functioning scores, worse symptom score, and greater financial difficulties than those residing in RUCC 9; differences between RUCC 8 and RUCC 9 followed a similar pattern, but RUCC 8 reporting more symptoms ($\beta = 0.31, p < 0.05$); self-esteem and social support strongly correlated with HRQOL Controlling for demographic and clinical variables, rural survivors reported higher physical (coefficient 1.27, bias-corrected and accelerated 95% CI 0.54–2.43), emotional (coef. 0.99, 95% CI 0.21–2.02), and HNC-specific (coef. 1.55, 95% CI 0.32–3.54) QOL than their urban counterparts; social and functional QOL did not differ significantly	Very good
Thomas, 2015 (Ireland) [63]	Cancer survivors	Cross-sectional (survey)	39%	166 remote and 330 not remote	The National Cancer Registry Ireland was used; distance from residence to hospital was used to define rurality 'urban' based on the Accessibility and Remoteness Index of Australia (ARIA+)	The European Organisation for the Research and Treatment of Cancer Quality of Life Core 30 (EORTC QLQ-C30)	Colorectal cancer (at least 6 months post-diagnosis)	Living remote from the treating hospital was associated with lower physical functioning (coefficient -4.38 [95% CI -8.13, -0.91]) and role functioning (coef. -7.78 [-12.64, -2.66]) among all colorectal cancer survivors; in separate gender models, remoteness was significantly associated with lower physical and role functioning (coef. -11.50 [-19.66, -2.65]) for women, but not for men; remoteness had a significant negative relationship to global health status (coef. -4.31 [-8.46, -0.27]) for men lowest mean unmet need score for rural (M = 0.39, SD = 0.60)	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Andykowski, 2014 (United States) [64]	Cancer survivors	Cross-sectional	26% cancer group; 23% health control group	193 cancer group; 152 health control match	Cancer survivors were recruited from the population-based SEER Kentucky Cancer Registry (KCR); ruralness of residence was categorised based on county of residence using 2003 United States Department of Agriculture Rural–Urban Continuum (RUC) Codes	The Medical outcomes study 36-item short-form health Survey (SF-36); the Hospital Anxiety and Depression Scale (HADS); the Distress Thermometer (DT); Perceived Stress Scale (PSS)	Non-small cell lung cancer 10–15 months post-diagnosis	and urban (M = 0.37, SD = 0.64) 43% of rural reported clinically important distress (HADS-Total ≥ 15) compared with 24% of urban survivors ($\chi^2 = 8.44, p < 0.01$); 60% of rural survivors met criteria for moderate/severe distress on the DT (DT rating ≥ 4) compared with 43% for urban ($\chi^2 = 4.82; p < 0.05$); rural cancer survivors reported poorer mental health relative to urban cancer survivors with a mean effect size of 0.43 SD in unadjusted analyses and 0.29 SD adjusted for education and physical comorbidity on three mental health indices; the rural cancer group reported poorer mental health than the rural control group on all mental health indices with a mean ES of 0.51 SD; the mental health of urban cancer and health control groups did not differ (mean ES = 0.00 SD)	Very good
Andykowski, 2017 (United States) [65]	Cancer survivors	Cross-sectional	26%	117 rural and 76 urban	Cancer survivors were recruited from the state-wide, population-based, Surveillance Epidemiology and End Results (SEER) Kentucky Cancer Registry (KCR); ruralness of residence was categorised based on county of residence using the 2003 United States Department of Agriculture	The Posttraumatic Growth Inventory (PTGI); the Benefit-Finding Questionnaire (BFQ); the Hospital Anxiety and Depression Scale (HADS); the Medical outcomes study 36-item short-form (SF-36)	Non-small cell lung cancer 10–15 months post-diagnosis	No significant difference was found between rural and urban for BFQ total scores; rural and urban differ with regard to PTGI total scores ($p = 0.042$; ES = 0.30 SD); rural cancer survivors reported greater growth on all five PTGI subscales (binomial test, $p = 0.062$, two-tailed); significant difference between rural and urban was evident for the Spiritual Change subscale ($p = 0.03$, ES = 0.32 SD); difference between the rural and urban cancer survivor groups with regard to PTGI	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Carey, 2017 (Australia) [66]	Informative caregivers	Cross-sectional	35% returned complete survey; 66% of survivors had a support person	187 rural and 783 urban	Recruited from 5 population-based cancer registries in Australia; the Accessibility and Remoteness Index of Australia (ARIA+) classification was used to define rurality	The Depression, Anxiety, and Stress Scale (DASS-21); the Support Person Unmet Needs Survey (SPUNS)	Haematological cancer	No significant differences in proportion of urban versus rural support persons in elevated levels of depression (21% vs 23%), anxiety (16% vs 17%), or stress (16% vs 20%); odds of having at least 1 DASS outcome increased between 12 and 18% for each additional high/very high unmet need ($p < 0.0001$); odds of reporting at least 1 indicator of psychological morbidity increased by 10 to 17% and by 2% for those who had relocated to receive treatment and was decreased by 5 to 54% for those support persons who reported that they had no chronic health conditions; support persons who had to relocate had 2.06 higher odds of having DASS ≥ 1 (95% CI: 1.15 to 3.70, $p = 0.015$)	Very good
Corboy, 2019 (Australia) [67]	Cancer survivors	Cross-sectional	Not reported	286 urban and 161 rural	Registered with Australia Medicare; geographic remoteness was defined by the Accessibility/Remoteness Index of Australia (ARIA+)	The Brief Symptom Inventory (BSI); the Functional Assessment of Cancer Therapy—Prostate Cancer Subscale (FACT-PC); the Need for Control and Self-Reliance Barriers to Help Seeking Scale; the Liverpool Stoicism Scale (LSS)	Australian men who had undergone a radical prostatectomy as treatment for prostate cancer	Average psychological distress score measured by BSI was 49.25 (SD = 12.54); similar percentage of men in the urban cohort ($n = 61$; 21.3%) and men in the regional/remote cohort ($n = 33$; 20.4%) met the criteria for caseness; place of residence did not predict psychological distress; Stoicism \times Place of Residence	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Grov, 2011 (Norway) [68]	Cancer survivors	Cross-sectional	53%	223 urban and 256 rural; 1437 control	The Nord-Trøndelag County of Norway consists of four cities, which were defined urban; other municipalities were defined a rural	The Hospital Anxiety and Depression Scale (HADS); Rosenberg Self-Esteem instrument	Elderly cancer survivors (ECSs) with various cancer; short-term ECSs 1–5 years post-diagnosis, long-term beyond 5 years	<p>was a significant predictor of psychological distress (urban: $b = 0.18$, $t(443) = 2.20$, $p = 0.02$); regional/remote cohort, the association between stoicism and psychological distress was not significant</p> <p>Rural versus urban areas of living explained 6.3% variance in being a rural inhabitant; self-reported health was significant on the model and explained 3% of the variance between rural and urban (OR = 2.03, 95% CI 1.28–3.21, $p = 0.003$)</p>	Good
Gunn, 2020 (Australia) [69]	Cancer survivors	Cross-sectional (survey)	11.8%	3379 urban, 776 rural, 140 remote	Data collected between January 2010 and June 2015 were obtained from the South Australian Monitoring and Surveillance System (SAMSS)	Self-reported health, psychological distress (Kessler Psychological Distress Scale – K10), suicidal ideation (four questions from the General Health Questionnaire)	Various	<p>No difference in the proportion of cancer survivors who reported high/very high levels of distress (urban 9.6% vs rural 7.0%, $p = 0.04$); rural cancer survivors' lower odds of reporting high/very high distress was evident in the partially adjusted (OR = 0.59, 95% CI 0.41–0.84, $p = 0.004$) and fully adjusted model (OR = 0.47, 95% CI 0.32–0.69, $p < 0.001$); higher proportion of rural cancer survivors who indicated they believed people in their neighbourhood trusted one another (89% vs 80%, $p < 0.001$)</p>	Very good
Hall, 2016 (Australia) [70]	Cancer patients and survivors	Cross-sectional (survey)	35%	1144 urban and 270 rural	Survivors were recruited from 5 Australian state population-based cancer registries (registries A, B, C, D, and E); residential postcode at diagnosis classified by the Australian Bureau of Statistics Accessibility and Remoteness Index of Australia (ARIA+) defined rurality	The Depression Anxiety and Stress Scale 21-item version (DASS-21)	Haematological cancer	<p>Of urban survivors, 25% ($n = 274$), 24% ($n = 268$), and 17% ($n = 194$) reported above normal levels of anxiety, depression, and stress, respectively; 27% ($n = 70$), 28% ($n = 74$), and 15% ($n = 38$) of rural survivors reported above normal levels of anxiety, depression, and stress; anxiety, depression, and stress were not significant for location;</p>	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Schootman, 2013 (United States) [71]	Cancer survivors	Cross-sectional	57.4% in 2009 and 59.5% in 2010	471 rural and 3088 control; 701 urban and 5270 control	The 2009-2010 Missouri Behavioural Risk Factor Surveillance System was used; the county of residence was coded according to its location in a metropolitan statistical area (MSA) as defined by the US Office of Management and Budget	Self-reported by interview; the Patient Health Questionnaire (PHQ-8)	Various	however, OR for rural versus urban was anxiety OR = 1.14, depression OR = 1.38, stress OR = 0.87 Prevalence of fair/poor health was 38.5% among rural compared with 27.4% among urban survivors and less than 20% among both control groups; after controlling for sociodemographic factors, prevalence of fair/poor health was similar for rural and urban survivors but higher among controls; rural survivors (48.8%) had a higher prevalence of fatigue than rural controls (27.9%) and urban survivors (36.1%) reported more fatigue than urban controls (26.5%); no differences among the 4 groups when controlling for sociodemographic characteristics, access to medical care, or chronic conditions; percentage who reported getting social and emotional support did not vary significantly across the 4 groups; rural survivors (61.7%) were less likely to receive follow-up care instructions than urban (78.2%) survivors ($p = 0.2$) No significant differences in distress levels across the remoteness categories ($\chi^2 = 3.91, p = 0.27$); Kruskal-Wallis test revealed a significant difference in number of problems across the four remoteness categories ($\chi^2 = 10.58, p = 0.01$); patients in the remote category reported a lower median number of	Very good
Watts, 2016 (Australia) [72]	Cancer patients	Cross-sectional	Not reported	67 major city, 162 inner regional, 189 outer regional, 21 remote, and 2 very remote	Distress screening data were routinely collected following implementation of screening across seven Western Australian health regions; the Australian Standard Geographical Classification (ASGC) Remoteness Areas was used	Distress Thermometer and Problem List (DT-PL)	Various		Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
								problems (Md = 7.0) than patients in the other three categories combined (Md = 10.0; U = 3482, $z = -2.23$, $p = 0.03$, $r = 0.11$); significant association between remoteness and insurance/financial problems ($\chi^2 = 8.19$, $p = 0.04$, Cramer's $V = 0.14$), and remoteness and transportation difficulties ($\chi^2 = 13.07$, $p = 0.004$, Cramer's $V = 0.17$); in the emotional domain, remoteness was significantly associated with fears ($\chi^2 = 16.03$, $p = 0.001$, Cramer's $V = 0.19$), sadness ($\chi^2 = 14.33$, $p = 0.002$, Cramer's $V = 0.18$), and worry ($\chi^2 = 18.56$, $p < 0.001$, Cramer's $V = 0.21$)	
Paul, 2013 (Australia) [73]	Cancer patients	Registry-based study	37%	149 urban and 119 rural	A state-based (Western Australia) cancer registry in Australia; rurality defined by the Accessibility and Remoteness Index of Australia (ARIA+)	The Depression Anxiety and Stress Scale (DASS-21)	Haematological cancer who had been diagnosed in the previous 3 years	55% in outer regional/remoteness locations had to relocate for treatment compared to 20% from inner regional and 3.4% from metropolitan locations ($\chi^2 = 74.32$, $p < 0.001$); 55% living in a nonmetropolitan area travelled ≥ 1 h compared to 13% from major city ($\chi^2 = 49.1$, $p < 0.001$); logistic regression analysis indicated that participants living in nonmetropolitan areas had 17× the odds of reporting a locational/financial barrier on access to care compared to those in metropolitan areas; survivors living in major city reported significantly more financial impact ($\chi^2 = 6.06$, $p = 0.014$)	Very good
Vanderpool, 2020	Cancer survivors	Survey	ASK was 22% and HINTS	179 ASK and 504 HINTS	Appalachian Kentucky; Geographic strata were based on the 2013 U.S. Department	The Health Status of Kentucky (ASK) survey; Health	Various	77% of the Appalachian survivors resided in counties designated as strata 3–4; geographic strata	Very good

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
(United States) [74]			HINTS was 34%		of Agriculture's Rural-Urban Continuum Codes (RUCC): strata I included counties with RUCC codes 1–3, which are considered metro counties, while strata II (RUCC 4–5), strata 3 (RUCC 6–7), and strata 4 (RUCC 8–9) included counties with population sizes of 20,000 or more, 2,500–19,999, and less than 2,500, respectively	Information National Trends Survey (HINTS)		was significantly correlated with cancer-related financial distress among Appalachian Kentucky survivors with higher percentages of distress reported among residents of strata 3 and 4 ($p = 0.0013$); majority of HINTS respondents (85%) resided in strata 1 counties; among HINTS respondents, geographic strata was not significantly associated with cancer-related financial distress; ASK cancer survivors were significantly more likely to report financial distress (64%) compared to HINTS cancer survivors (37%, $p < 0.0001$); geographic strata did not retain significance in the final model ($p = 0.355$) for ASK; in the HINTS multivariate analysis, geographic strata was not associated with financial distress ($p = 0.983$)	
Zahnd, 2019 (United States) [75]	Cancer survivors	Cross-sectional (population--based survey)	Between 32 and 40.0%	1136 urban and 223 rural	National survey by the National Cancer Institute; rural-urban status was determined using the 2003 US Department of Agriculture Rural-Urban Continuum Codes (RUCC)	The National Cancer Institute's (NCI) Health Information National Trends Survey (HINTS); 2012, 2014, and 2017	Various	Overall prevalence of financial burden was 20% higher among survivors; 50.4% of total rural cancer survivors indicated financial problems following their diagnosis and treatment compared to 38.8% of urban survivors (difference = 11.6%, $p = 0.02$); however, after adjustment for covariates, 49.3% of rural cancer survivors reported financial problems following diagnosis and treatment compared to 38.7% of urban survivors, but not statistically significant ($p = 0.06$)	Very good
Cancer patients	Population-based longitudinal		44%	890 major cities, 373 rural	Participants were selected from NSW and Victorian Cancer	Data were obtained by self-report survey and from the Cancer		During the first 12 months after diagnosis, outer	

Table 4 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Zucca, 2011 (Australia) [76]		cohort (at 6 and 12 months)		inner regional, 136 outer regional, and 11 remote	Registries; cut-point for travel burden as ≥ 2 h one way	Registries; single item from The European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30 v3); single item from the Supportive Care Needs Survey Access to Services Module	Various (during the first 12 months after diagnosis)	regional/remote residents had the greatest travel burden; 61% travelled at least 2 h one way to receive treatment and 49% lived away from home to receive treatment; strongest associates of travel burden were living in regional/remote areas (OR = 18.9–135.7), having received surgery (OR = 6.7) or radiotherapy (OR = 3.6); between 6 and 12 months after diagnosis, 2% of patients declined cancer treatment because of the time it would take to get to treatment; patients who travelled more than 2 h or lived away for treatment reported significantly greater financial difficulties (38%; 40%) than those who did not (1.2%; 1.4%), even after adjusting for covariates	Very good
Studies on satisfaction with life Cipora, 2018 (Poland) [77]	Cancer patients	Cross-sectional	Not reported	48 rural and 73 urban	Women who had undergone surgical treatment in the Sub-Carpathian Oncology Centre in Brzozów, Poland	The Satisfaction with Life Scale (SLS)	Women with ill breast cancer	Level of satisfaction with life varied according to place of residence: urban was 22.04 (6.15 sten score) vs 18.56 (4.85 sten score) for rural women ($p < 0.001$); in each category of the scale, rural women (low satisfaction) had significantly lower scores than urban women (mediocre satisfaction), the p -value for individual statements remained $p = 0.001$ and $p = 0.000$	Good

Table 5 Quantitative studies including only rural survivors

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
<p>Studies on the use of formal and informal mental health resources</p> <p>Corboy, 2011 (Australia-a) [78]</p>	<p>Cancer patients and survivors</p>	<p>Cross-sectional</p>	<p>Not reported</p>	<p>40 inner regional, 31 outer, and 5 remote</p>	<p>The men were living in rural and regional areas within the Grampians region in the state of Victoria, Australia; rural and regional areas were defined using the ARIA+ index (Moderately Accessible, Accessible, and Remote)</p>	<p>List of Physical Complaints; Brief Symptom Inventory (BSI); Social Support Subscale of the Coping Resources Inventory</p>	<p>Men with various cancers</p>	<p>27 participants met the definition of caseness (i.e., BSI-T-score of 63), indicating probable clinically significant psychological distress; regression analysis demonstrated that level of physical distress was significant for psychological distress; 82% were aware of at least one formal service offering emotional support and 49% had used such a service; telephone- and Internet-based services were most used type of support; lower age was a predictor of participation in a formal service (average 8 years younger; $M = 65.00$ ($SD = 7.68$) ($SD = 11.2$) versus $M = 73.05$ ($SD = 7.68$))</p>	<p>Poor</p>
<p>McDowell, 2011 (Australia-a) [79]</p>	<p>Cancer survivors</p>	<p>Longitudinal study (baseline and 6 months)</p>	<p>61%</p>	<p>396</p>	<p>Regional cancer treatment centre in Queensland, Australia; rurality not defined</p>	<p>The ENRICHD Social Support Instrument; the Impact of Events Scale (IES)</p>	<p>Various</p>	<p>14% of cancer patients reported using psychosocial support; females ($OR = 2.73$; 95% CI 1.26–5.94) and patients with more positive attitudes ($OR = 1.69$; 95% CI 1.03–2.79) towards help seeking were more likely to have utilised a support service; the relationship between positive attitudes to seeking help and psychosocial support service use was mediated by behavioural intentions ($OR = 1.91$, 95% CI 1.26–2.90); patients reported high levels of social support ($M = 20.81$, $SD = 4.78$), and low social constraints ($M = 1.68$, $SD = 0.69$)</p>	<p>Very good</p>
<p>Studies on unmet needs of cancer patients and survivors</p> <p>Bazzell, 2015 (United States) [80]</p>	<p>Cancer patients</p>	<p>Cross-sectional (survey)</p>	<p>Not reported</p>	<p>52</p>	<p>Participant were recruited at the American Cancer Society sponsored events; the Health Resources and Services Administration of the US Department of Health and Human Services definition of rural was used</p>	<p>The Survivors' Unmet Needs Survey (SUNS)</p>	<p>Failed to collect data on this; mean years since diagnosis was 9.65</p>	<p>2.5% of the rural survivors reported high/very high emotional health or access and continuity of care unmet needs; ANOVA results provide evidence that there is a difference between survivor years since diagnosis and access and continuity of care unmet needs ($F = 4.891$, $p = .002$); ANOVA results found differences between</p>	<p>Very good</p>

Table 5 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Glasser, 2013 (United States) [81]	Cancer survivors and their significant other	Cross-sectional (survey)	Not reported	29 survivors and 15 partners	Survivors of cancer were recruited from two rural community cancer programs in Illinois; rurality not defined	The Distress Thermometer (DT); the Durham Geriatric Research, Education and Clinical Centre (GRECC) Depression Scale; the PROMIS SF-Global Health inventory; the Cancer Survivors' Unmet Needs (CaSUN)	Not reported	<p>survivor age and emotional unmet needs; access to interventions and survivorship resources were found to be limited in rural areas</p> <p>38% of survivors reported fatigue and 28% depression; more than 50% of survivors and partner groups were at risk for depression, and 34% of the survivors were at risk for some type of psychosocial problem that currently required assistance; survivors expressing unmet needs tended to score worse than those expressing no needs for depression, distress, chronic conditions, quality of life, and general health</p>	Good
Riley-Clark, 2014 (United States) [82]	Cancer patients	Cross-sectional (survey)	Not reported	47	Adirondack region of northern New York; rurality not defined	Self-designed questionnaire	Various	<p>Support groups were found helpful, while others indicated not attending cause of lack of knowledge about current groups and times, and lack of evening meetings and transportation issues; high degree of interest in a counsellor, yoga or relaxation classes, however not present in rural areas</p>	Poor
Studies on needs and quality of life Coker, 2018 (United States) [83]	Cancer survivors	Cross-sectional	40% in Kentucky and 41% in North Carolina	3320	The Kentucky Cancer Registry (KCR) and the North Carolina Central Cancer Registry (NCCR) were used; Beale code was used to define rurality	The Functional Assessment of Cancer Therapy-General (FACT-G); Functional Assessment of Chronic Illness Therapy-Spiritual Well-being (FACIT-SP); the Perceived Stress Scale; the Brief Symptom Inventory (BSI)	Women with various cancers (diagnosed in the prior 12 months)	<p>Unadjusted FACT-G scores were poorer among Appalachian versus non-Appalachian residents for total scores (61.24 vs 63.39) and physical (13.03 vs 13.91), and emotional (13.67 vs 14.09), and work/life functionality (16.66 vs 17.31) domains; higher stress scores (3.49 vs 3.22) were reported by participants living in Appalachian; additional adjustment for depression and stress at diagnosis, FACT-G total, physical, work/life functionality domains, and comorbid conditions remained associated with Appalachian residence; differences by Appalachian residence remained only for FACT-G</p>	Very good

Table 5 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Costrini, 2011 (United States) [84]	Cancer survivors	Cross-sectional	Not reported	39	Patients were drawn from the 2001–2010 records of Georgia Gastroenterology Group and from public solicitations in rural press outlets; rural zip codes (as defined by the 2000 Census) in the rural zones west of Savannah and east of Macon were used to define rurality	The Medical Outcomes Study 36-item short-form health survey (SF-36); the Functional Assessment of Cancer Therapy-General (FACT-G) with the FACT-Colorectal	Colorectal cancer	physical and number of comorbid physical conditions, after adjusting for socioeconomic factors Of the 71% of patients who had to travel more than 100 miles round, 8% judged distance as an impediment to care; financial impact was significant and limited in 18% of patients; rural Georgia self-report worse general health, psychical functioning, physical role limitations, bodily pain, and vitality scores compared to general population ($p < 0.05$); using FACT-C tool, rural patients reported better social/family well-being compared to general population with effect size of 0.42 ($p = 0.002$); longer time since diagnosis was associated with better functional well-being and colorectal cancer-related scores	Poor
Steenland, 2011 (United States) [85]	Cancer patients	Follow-up study (baseline, 6 and 12 months)	58%	260	Southwest Georgia; rurality not defined	The Medical Outcomes Study Short-Form 12-item Health Survey (SF-12); the University of California, Los Angeles, Prostate Cancer Index	Prostate cancer (newly diagnosed)	Self-reported physical ($p < 0.0001$) and emotional ($p < 0.0001$) QOL declined significantly after treatment for all treatment groups (declined after 6 months and remained about the same at 12 months); the decline in physical/emotional QOL did not differ by age, race, education, or Gleason score; patients treated with hormones showed the worst deterioration in physical and emotional QOL	Very good
Studies on needs and psychological morbidity Befort, 2011 (United States) [86]	Cancer survivors	Cross-sectional (survey)	77%	770	Three cancer centres located in rural Kansas; rural designation was defined by the ZIP code approximation of the Rural-Urban Commuting Area (RUCA) codes	Study developed survey modelled after the Breast Cancer Prevention Trial Symptom Checklist (BCPT)	Women with breast cancer (3 months to 6 years post-treatment)	Premenopausal women were more likely to experience depression (39% vs 23%) at the time of treatment; across the total sample, the most common concerns were fear of recurrence (52%), diminished physical strength (39%), change in body image (31%), and financial stress (19%); women premenopausal at diagnosis were significantly more	Very good

Table 5 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Duggleby, 2014 (Canada) [87]	Informative caregivers	Cross-sectional (prospective correlational design)	16%	122	Western Canadian provincial cancer registries (Alberta and Saskatchewan); home address had to be rural postcode; postal codes in Alberta include anyone who does not live in the two tertiary or five regional centres	The Herth Hope Index (HHI); the General Self-Efficacy Scale (GSES); the Non-Death Version Revised Grief Experience Inventory (NDRGEI); the Short Form Health Survey (SF-12v2)	Various	likely than postmenopausal women to report psychosocial factors, including fear of recurrence (68% vs 47%), fear of death (16% vs 5%), change in body image (43% vs 27%), change in relationships (21% vs 5%), and financial stress (32% vs 15%; all $p \leq 0.001$); women premenopausal at diagnosis reported significantly lower satisfaction levels (3.4–1.5) compared to women postmenopausal at diagnosis (3.8–1.5) ($p = 0.001$), also after adjusting Mental health/well-being was found to be a predictor of hope for rural women caregivers ($p = 0.002$); the mental and physical health of the participants of this study, when compared to US population norms, were at or below the 25th percentile, this finding suggests that the health of the rural women participants was poor; general self-efficacy was a significant factor predicting hope in the participants ($p \leq 0.05$); guilt ($p = 0.002$) was a significant predictor of hope (one component of grief) Mental health/well-being was found to be a predictor of hope for rural women caregivers ($p = 0.002$); the mental and physical health of the participants of this study, when compared to US population norms, were at or below the 25th percentile, this finding suggests that the health of the rural women participants was poor; general self-efficacy was a significant factor predicting hope in the participants ($p \leq 0.05$); guilt ($p = 0.002$) was a significant predictor of hope (one component of grief)	Very good
Lashbrook, 2018 (Australia) [88]	Cancer survivors	Cross-sectional	88%	85 regional and 49 rural	Study was conducted at the Riverina Cancer Care Centre (RCCC) and its two outreach clinics located in outlying rural areas of the Riverina region of southern NSW, Australia; Accessibility/Remoteness Index of Australia (ARIA) was used for the classification of remoteness	DT; Patient-Reported Outcome Measurement Information System (PROMIS)	Survivors with breast, prostate, colorectal, or lung who had completed treatment	Cancer survivors without a partner (OR = 2.60, 95% CI 1.06–6.39) and with advanced cancer at diagnosis (OR = 2.70, 95% CI 1.20–6.08) had higher odds for anxiety; those with colorectal cancer (OR = 5.80, 95% CI 1.33–24.91), who lived without a partner (OR = 3.90, 95% CI 1.46–10.35) and had a higher educational level (OR = 4.14, 95% CI 1.60–10.91) had increased odds of depression; participants living in rural areas (OR = 5.0, 95% CI 1.75–14.29) had high odds of having sleep disturbance compared to regional; those who	Very good

Table 5 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Schlegel, 2012 (United States) [89]	Cancer patients	Longitudinal study (4 surveys over 13 months)	92% second survey, 91% third, and 90% fourth	224	9 radiation clinics in Missouri; rurality was quantified with a continuous variable and defined by 2 indices of rurality (county code and city population)	The Centre for Epidemiologic Studies-Depression Scale	Women with breast cancer	Women who were not married ($p = 0.00$) or had children living at home ($p = 0.01$) reported higher levels of depressive symptoms; women with lower incomes reported increased depressive symptoms after the completion of treatment ($p = 0.02$); younger women reported elevated depressive symptoms during initial treatment ($p = 0.01$) but dissipated after the completion of treatment ($p = 0.12$)	Very good
Studies on financial issues Mandaliya, 2016 (Australia) [90]	Cancer patients	Cross-sectional	78%	45	Rural oncology clinic in the New England region, NSW, Australia; rurality not defined	The Quality of Life in Adult Cancer (QLACS) Survivors Scale; the Personal and Household Finances Questionnaire (HILDA)	Various (3–5 years post-treatment)	There was no evidence of associations between any demographic variable and either financial stress or cancer-specific quality of life domains; financial stress was however significantly associated with the cancer-specific quality of life domains of appearance-related concerns (estimate 0.37, $p = 0.0152$), family-related distress (estimate 0.30, $p = 0.0132$), and distress related to recurrence (estimate 0.52, $p = 0.0012$)	Very good
Pisu, 2017 (United States)	Cancer survivors	Longitudinal study (data from a trial at	16% attrition	432	Data were used from the Rural Breast Cancer Survivor Intervention trial; rural eligibility was established	The Work and Finances Inventory (WFI); the Breast Cancer Survivor Socio-demographic and Treatment	Women with breast cancer	Mean out-of-pocket (OOP) burden was 9% at baseline and between 7 and 8% at the next assessments;	Very good

Table 5 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
States) [91]		baseline, 6, 9, and 12 months)			based on residence in one of 33 Florida rural counties or in a rural pocket of one of 34 Florida urban counties	Survey; the Centers for Epidemiologic Studies Depression Scale (CES-D)		the predicted mean OOP burden was higher at baseline than in the other assessments ($p = 0.007$); factors suggestive of contributing to higher OOP costs and OOP burden were younger age, lower income, time in survivorship from diagnosis, and use of supportive services; the lowest predicted OOP burden was for women on disability (5.1%), and the highest was for participants with incomes below \$20,000 (13.0%)	

cancer, three each with colorectal and prostate cancer, and two each with lung and head and neck cancer. Of these 41 quantitative studies, 27 included both urban and rural cancer survivors.

There were four mixed methods studies, of which three were conducted in the US and one in Scotland. Two of these studies were conducted in people with breast cancer and two in a heterogenous cancer population. None of these four studies integrated the quantitative and qualitative data.

Risk of bias within the studies

Of the 20 qualitative studies, none were considered of poor methodological quality. Ten studies were considered to be of very good methodological quality and 10 considered good (Tables 2 and 3). Of the 41 quantitative studies, 33 studies were considered to be of very good methodological quality, five of good quality, and three poor (Tables 4 and 5). Most mixed methods studies were of good methodological quality, except for one study that was very good (Table 6).

Results of studies

Results of qualitative studies including both rural and urban survivors are presented below, followed by qualitative studies including only rural survivors, quantitative studies with rural and urban comparison groups, quantitative studies including only rural survivors, and mixed methods studies.

Qualitative studies including both rural and urban survivors

Seven qualitative studies with both rural and urban cancer groups [31–37], exploring respectively general needs and psychological morbidity, and financial issues and travel issues, were identified (Table 2). Compared with urban cancer survivors, more rural cancer survivors discussed having experienced a delay in their cancer diagnosis [32]. However, rural participants were more satisfied with their cancer care, even though they were aware that not all cancer care services were available where they lived. Rural African American cancer participants also talked more about using spirituality throughout their diagnosis and treatment than those who lived in urban areas [31, 33].

An Australian study on travel issues that included both rural and urban survivors [36] found that the experience of relocation was associated with psychosocial stress, due to a lack of support and loneliness but also because of concerns about the impact of separation on family members remaining at home. Another Australian study [37] found that lengthy travel, distance, lack of opportunity to take leave from work, and the additional costs of relocation and treatment all added to the stress of relocation. A third Australian study [35] found that visits by metropolitan haematologists to regional areas

Table 6 Mixed methods studies

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Mixed methods studies comparing urban and rural participants									
McNulty, 2015 (United States) [92]	Cancer survivors	Mixed methods	Not reported	42 urban Alaska and 34 urban Oregon; 26 rural Alaska and 30 rural Oregon; 19 interviews (convenience sample)	Cancer survivors living in Alaska and Oregon; Alaska rural was defined by > 1-h travel time to a major regional hospital; Oregon rural was defined as a geographic area that is at least 30 miles by road from an urban community	The Impact of Cancer version 2 (IOC-v2); the Memorial Symptom Assessment Scale-Short Form (MSAS-SF)	Various (average 6.7 years post-treatment)	Overall comparisons between location (rural/urban) and region (Alaska/Oregon) showed no statistically significant or meaningful differences between groups; follow-up tests comparisons between 4 places showed significant results for: worry, negative impact, and employment concerns; rural-urban differences from interview data included access to healthcare access, care coordination, connecting and community, thinking about death and dying, public/private journey, and advocating for self and healthcare services	Very good
Mixed methods studies on rural participants									
Hubbard, 2015 (Scotland) [93]	Cancer patients and survivors	Mixed methods (survey and semi-structured telephone interviews)	25%	44; 10 interviews (purpose sample)	Sample was obtained from Breast Cancer Care's electronic database in rural Scotland; rurality was defined by residential postcode	The short-form Supportive Care Needs Survey (SCNS-SF34)	Women with breast cancer (55% were receiving treatment)	57% of participants reported at least one moderate to high unmet need and 11% reported low needs; the most prevalent moderate to high need was being informed about cancer in remission, fears about the cancer spreading, being adequately informed about the benefits and side effects of treatment and concerns about the worries of those close to you; women ≤ 5 years reported greater unmet need than those > 5 years from diagnosis, and statistically significantly	Good

Table 6 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
Martinez-Donate, 2013 (United States) [94]	Cancer patients	Mixed methods based on the Chronic Care Model (semi-structured, interviews, and health literacy assessments; focus groups and surveys with clinical staff)	Not reported	53 interviews; 30 completed STOFHLA; 51 completed follow-up; 41 clinical staff (purposive sample)	Five clinics in rural Wisconsin	The Short Test of Functional Health Literacy in Adults (STOFHLA); follow-up based on the Consumer Assessment of Healthcare Providers and Systems and the Assessment of Cancer Care and Satisfaction surveys	Various (receiving cancer care)	<p>higher needs were observed for the health systems and information domain (67% vs 22%; Pearson's $\chi^2 = 9.03, p = 0.003$); interviews highlighted the following unmet needs: information about treatment and side effects, overview of care, fear of recurrence, impact on family, and distance from support</p> <p>Results aligned with 4/5 dimensions of the Chronic Care Model: (1) limited availability of formal support services and cultural values of stoicism, pragmatism, independence, privacy, and self-reliance were often in conflict with patients' needs resulting in patients suffering in silence; (2) all who completed STOFHLA reported adequate health literacy, but staff reported that patients struggle with understanding medical information; (3) need for greater levels of care coordination, burden of assessing non-medical needs, and shorter clinical forms; and (4) shared decision making, patient empowerment, and verbal communication strategies</p>	Good
Torres, 2015 (United States) [95]	Cancer survivors	Mixed methods (survey and in-depth, open-ended)	Not reported	31 (snowball sampling)	Three rural counties in eastern North Carolina; rurality not defined	Survey	Women with breast cancer	<p>The main themes were: (1) breast cancer diagnosis (most common ways were self-discovery, via</p>	Good

Table 6 (continued)

Author, year (country)	Population	Study design	Response rate	Sample size	Setting	Measure	Type of cancer	Results	Study quality
		questions focus group interviews)						age-recommended screening, and/or their gynaecologists); (2) psychosocial well-being (fear, coping mechanisms, and QOL concerns); and (3) quality of care factors (doctor-patient relationship, side effects of treatment, adherence to follow-up care, and financial resources)	

reduce stress associated with separation from family, the need for lengthy travel, and the financial cost of treatment. Furthermore, this study found that the opportunity to undergo part or all of treatment at regional hospitals is physically less demanding, more convenient and time saving, establishes bonds of trust and friendship with regional health professionals, lessens the emotional impact of diagnosis and treatment, and has financial benefits for patients.

Qualitative studies including only rural survivors

Thirteen qualitative studies including only rural cancer survivors were identified (Table 3) [38–50]. Two Australian studies [38, 39] found several issues in the provision of psychosocial care including access to appropriate psychosocial services (e.g., lack of information about services and concerns about stigma and dual relationships with service providers as friend/physician) and lack of knowledge of the unique needs of rural cancer survivors by medical staff located in metropolitan treatment centres. However, those rural survivors who had accessed psychosocial support highly valued that support as it helped reduce uncertainty, fear and loneliness, and normalised patients' experiences [38]. Unmet needs included feeling let down by formal service provision, a sense of isolation, lack of referrals and follow-up care, inaccessibility of services due to distance, cost or wait times, and lack of appropriate care based on age, stage, or type of cancer [39]. Rural cancer patients suggested this could be improved by providing rural-specific information on psychosocial care, improving communication between healthcare providers, and making psychosocial services a standard part of care [38]. Another Australian study [50] investigated rural cancer survivors' experience post-treatment in relation to QOL. This study found that a range of issues impacted the post-treatment QOL of rural cancer survivors, including fatigue and fear of cancer recurrence, and that these rural survivors lack information on how to access support to manage these issues. Participants highlighted several acceptable strategies to improve their QOL post-treatment, including nurse-led, telephone-based, or face-to-face interventions that include support with managing emotional challenges [50].

One Canadian study [44] looked at rural people with cancer in the palliative care setting. Four themes emerged: (1) community connectedness/isolation; (2) lack of accessibility to care; (3) communication and information issues; and (4) independence/dependence. Some of these findings resonated with a Norwegian study [43] that examined the lived experience of older rural persons receiving palliative treatment. This study found their participants struggled with having limited control, avoided becoming a burden, tried to live up to the expectations of being a 'good patient', and kept hope alive by dreaming and making plans. Several studies [40–42, 45–49] highlighted rural difficulties with support and isolation, and

psychological issues such as a loss of control over the illness, anxiety, and a lack of knowledge. Some rural cancer patients stated that the information given was complex and in combination with condensed appointment schedules (to minimise travel) made the processing of information difficult. However, the support of family and home care services helped many transition through the physical and psychological demands that were encountered.

Quantitative studies with rural and urban comparison groups

Quantitative studies with an urban control group ($n = 27$) are presented in Table 4 [51–77]. Three addressed the use of formal and informal mental health resources, five examined financial and travel issues, one measured satisfaction with life, and the remainder explored the general needs, psychological morbidity, and QOL of cancer survivors and informal caregivers. Only two studies were longitudinal [60, 76].

Of the 19 studies exploring needs, psychological morbidity, and QOL, three (one US and two European) reported poorer outcomes for rural cancer survivors [63, 64, 68] and one (Australian) reported poorer outcomes for rural informal caregivers [56]. Five (one Australian, two US, and two European) reported poorer outcomes for urban cancer survivors [57, 59, 61, 62, 65], one (Australian) found needs differed between groups [55], while nine (eight Australian and one US) concluded there were no meaningful differences between groups [54, 58, 60, 66, 67, 69–72]. Physical functioning, role functioning, and reported mental health outcomes were more likely to be worse in rural samples, whereas urban cancer survivors reported poorer social functioning and emotional QOL.

One US study of 113 heterogeneous cancer survivors [51] found that rural cancer survivors reported significantly less favourable attitudes ($t(111) = 2.05, p < 0.05$) and social norms ($t(111) = 2.20, p < 0.05$) towards mental health resources than urban cancer survivors. Conversely, a German study of 534 colorectal cancer patients [52] showed that urban cancer patients were significantly less likely to talk with their doctor about their emotional state (65%, $p < 0.01$) and showed poorer knowledge (60%, $p < 0.002$) of cancer-specific mental health resources than rural cancer patients. There were no differences concerning distress, mental health outcomes, or acceptance of cancer-specific mental health resources between rural and urban cancer survivors (undergoing treatment and post-treatment) in the German sample [52].

A study conducted in Appalachian Kentucky (US) found that geographic location was significantly correlated with cancer-related financial distress among rural cancer survivors ($p = 0.0013$) [74]. Survivors who lived in regional or remote locations were 17 times more likely to report locational or financial barriers to accessing care compared to survivors living in metropolitan locations [73]. Another US study [75]

found that the overall prevalence of financial burden was 20% higher among rural cancer survivors than urban cancer survivors. However, after adjusting for covariates, this finding became not statistically significant ($p = 0.06$). Another study [76] (Australian) found that regional or remote cancer patients (first year after diagnosis) were more likely to report travel burden compared to cancer patients living in major cities (OR = 18.9, $p < 0.001$; OR = 135.7, $p < 0.001$, respectively). Similar findings were found for financial difficulties ($p < 0.05$) [61], for which patients who travelled more than 2 h (OR = 2.65, $p = 0.0178$) or lived away for treatment (OR = 2.79, $p = 0.0152$) reported significantly greater financial difficulties than those who did not 6 months post-diagnosis [76].

One US study of 193 lung cancer survivors [65] examined differences between rural and urban cancer survivors in reports of positive outcomes, namely posttraumatic growth and benefit-finding of one's cancer experience. Although no significant differences were found for benefit-finding between the two groups, rural cancer survivors reported significant greater posttraumatic growth (effect size (ES) = 0.30 SD; $p = 0.042$). Another study examined the satisfaction with life among women with breast cancer and found that rural women with breast cancer reported lower satisfaction with life than their urban counterparts ($p < 0.001$) [77].

Quantitative studies including only rural survivors

There were 14 quantitative studies including only rural cancer survivors [78–91], two on the use of formal and informal mental health resources, four on psychological needs and psychological morbidity, two on financial issues, and six on general needs and QOL. In total, four studies [79, 85, 89, 91] were longitudinal and only one study [87] was on informal caregivers (Table 5).

The single study on rural informal caregivers [87], with a sample of 122 participants, found that participants with higher hope had higher mental health scores ($\beta = 0.266; p = 0.002$), lower perceptions of loss and grief ($\beta = -0.356; p = 0.001$), and were more confident in their ability to deal with difficult situations ($\beta = 0.511; p = 0.000$). Other studies on psychological morbidity [86, 88, 89] found that rural cancer survivors who lived without a partner (OR = 3.90, 95% CI 1.46–10.35) or had a higher educational level (OR = 4.14, 95% CI 1.60–10.91) had increased odds of mild to severe levels of depression (i.e., score of ≥ 55) [88]. One US study in rural women with breast cancer found that premenopausal women were more likely to experience depression at the time of treatment compared to postmenopausal women (39% versus 23%, respectively; $p < 0.001$) [86]. This study also found that the most common concerns among all rural women with breast cancer (i.e., percentage of women who reported experiencing psychosocial factors) were fear of recurrence (52%), diminished

physical strength (39%), change in body image (31%), and financial stress (19%) [86].

Four longitudinal studies [79, 85, 89, 91] reported findings on several topics. One Australian study [79] found that rural cancer patients with a more positive attitude towards help seeking were more likely to have utilised a support service 6 months following study commencement (OR = 1.69, $p < 0.05$). One US study [91] found that the out-of-pocket (OOP) burden (i.e., OOP costs as a percentage of income) significantly declined over time for rural cancer survivors ($p = 0.007$); the predicted mean OOP burden was 9.8% at baseline, and between 7 and 8% at follow-up. Factors suggestive of contributing to higher OOP burden for rural cancer survivors included younger age, lower income, time in survivorship from diagnosis, and use of supportive services [91]. Another rural US study [89] found a decrease in depressive symptoms in the first 3 months after the start of treatment but an increase 5 months thereafter. This trend was observed due to the decrease in psychological distress immediately after completion of active treatment but increase thereafter due to the fear of recurrence. Lastly, one longitudinal study [85], on the needs and QOL of men with prostate cancer in rural Georgia, found that self-reported physical QOL (coefficient = -5.8 , $p < 0.0001$) and emotional QOL (coefficient = -5.7 , $p < 0.0001$) declined significantly after treatment.

A rural-focussed Australian study on financial issues found that financial stress was significantly associated with the cancer-specific QOL domains of appearance-related concerns (ES = 0.37, $p = 0.015$), family-related distress (ES = 0.30, $p = 0.013$), and distress-related to recurrence (ES = 0.52, $p = 0.001$) [90]. One Australian study on service use [78] found that despite most (82%) of the rural men being aware of a formal service offering psychosocial support, only 49% of the rural men used such a service. This is contrary to another rural-focussed Australian study [79] that found only 14% of participants reported having used a psychosocial support service.

The remainder of studies [80–85] were on the general needs and QOL of rural people affected by cancer, for which some also reported data on psychological morbidity and compared rural cancer patients with the general population, however excluded urban cancer groups. These studies found that 25% of the rural cancer survivors reported high/very high emotional health needs, 38% reported fatigue, and 28% reported depression. QOL scores seemed to be lower in rural cancer survivors compared to the general population. However, rural cancer patients reported better social/family well-being compared to the general population. Finally, rural cancer patients reported that support groups were very helpful, though some participants reported that they did not attend because of a lack of knowledge about current support groups and times.

Mixed methods studies

There were four studies that used a mixed methods approach (Table 6) [92–95]. One study, comparing rural and urban cancer survivors, found no statistically meaningful differences between groups in the quantitative analysis [92]. However, the qualitative analysis revealed that rural cancer survivors had more challenges than urban cancer survivors including access to healthcare, care coordination, and the very public journey of their survivorship due to the close-knit nature of their communities. The other three studies among rural cancer survivors showed that health systems and information, psychological needs, and quality of care were the most frequently reported domains of unmet needs [93–95]. The interviews from one study [93] also highlighted the following unmet rural needs: information about treatment and side effects, overview of care, fear of recurrence, impact on family, and distance from support.

Discussion

Summary of evidence

Main findings

This systematic review examined the research conducted over the last 10 years on the psychosocial well-being and supportive care needs of cancer patients and survivors living in urban and rural/regional areas. The 65 studies included in this review, of which most studies were conducted in Australia (28/65; 43%) followed by the US (24/65; 37%), demonstrated that among the studies that found a difference, rural cancer survivors were more likely to report worse outcomes in physical functioning, role functioning, and reported mental health, whereas urban cancer survivors were more likely to report poorer outcomes in social functioning and emotional QOL. However, most studies that compared rural and urban cancer survivors found no differences between the two populations with regard to psychosocial well-being and QOL. This review also found that rural cancer survivors were more likely to report unmet needs relating to financial and travel issues and experience more difficulties with accessing care compared to urban cancer survivors. This highlights that rural and urban cancer survivors have different psychological needs and concerns, and rural cancer survivors have some additional unmet needs related to rurality that require careful assessment and management.

Context within the 2011 systematic review

Over the last 10 years, research on the psychosocial well-being and supportive care needs of rural and urban cancer

survivors has increased. The previous systematic review on the same topic identified 37 studies that were published before August 2010. Our review included 65 studies published between August 2010 and May 2021. Compared to the 2011 review, more studies included in this review were conducted in people with heterogenous cancers (30 versus 11), and included a control group of urban cancer survivors (27 versus 11) or used a general population control group (3 versus 1). Moreover, the quality of studies seems to have improved over the last 10 years as the studies included in this review had better reporting of design (68% versus 54%), and more often defined rurality or used a validated measurement tool, compared to the 2011 systematic review.

This review identified three studies [64, 68, 71] that included rural and urban general population control groups, and directly compared rural and urban cancer populations. These studies found that significant differences existed in health outcomes between rural and urban cancer survivors and healthy controls (one study was matched on age [68], and one study was matched on age, gender, and country of residence [64]). More specifically, cancer survivors in general reported poorer self-rated health compared to healthy controls, for which rural cancer survivors reported slightly poorer outcomes than urban cancer survivors. However, after adjusting for sociodemographic factors, rural and urban cancer survivors reported similar outcomes, nonetheless poorer than healthy controls. Conversely, the 2011 review that included only one population-based control study found that the age-adjusted QOL was similar among all groups. However, while our review identified three population-based control studies that included a heterogenous or lung cancer population, the 2011 review identified a single population-based control study that included only breast cancer survivors, who in general report better QOL outcomes compared to lung cancer survivors for example, and have better overall survival rates [96].

While 9 quantitative studies with an urban control group in this review showed no evidence of meaningful differences between rural and urban cancer survivors [54, 58, 60, 66, 67, 69–72], five studies concluded that urban cancer survivors reported poorer psychosocial outcomes than rural cancer survivors [57, 59, 61, 62, 65] and three studies found that rural cancer survivors reported poorer psychosocial outcomes than their urban counterparts [63, 64, 68]. These findings differ from the 2011 review on this topic, which found that rural cancer survivors generally reported worse outcomes than urban cancer survivors. Recent research suggests that rural cancer survivors may have greater protective factors against poorer emotional health, including active coping styles, positive reinterpretation [16], and the belief that a person's health is decided by powerful others [97], that urban cancer survivors may be lacking. Studies have also shown that people living in rural areas not only tend to be more stoic about their health, which could result in under-reporting of distress, but also

differ in their expectations of health services than people living in urban areas [98, 99]. In addition, rural cancer survivors report higher levels of community trust, which may buffer the impact of a lack of professional psychosocial support services in rural areas [69]. This may explain rural cancer survivors reporting fewer unmet emotional needs than urban cancer survivors. Further, it is also possible that the introduction of numerous regional cancer centres in the last 10 years in Australia, where many of these studies were conducted, has helped reduce the psychosocial toll of a cancer diagnosis for rural Australians. Moreover, the increase use in technology (e.g., telehealth) and digital healthcare may also have helped to overcome the tyranny of distance and led to improvements.

The majority of studies focussed on a heterogenous group of cancer survivors (30/65; 46%), followed by breast cancer survivors (13/65; 20%) and haematological cancer patients (8/65; 12%).

In the qualitative studies with urban comparison groups, findings were similar to the 2011 review regarding unmet needs and travel issues. In both reviews, rural cancer survivors reported more frequent episodes of delayed diagnosis compared to urban cancer survivors [32]. Other challenges that were similar to the 2011 review included difficulties with access to healthcare and care coordination/navigation, for which rural cancer survivors reported more challenges than urban cancer survivors [92]. Furthermore, in both systematic reviews, the qualitative studies confirmed the findings on travel issues in quantitative studies [35–37]. Both reviews found that travelling caused additional stress, can put pressure on family relationships, and in general posed difficulties to patients. This was also found in qualitative studies without an urban control group in both reviews, highlighting that rural cancer survivors and families report difficulties with support and isolation, psychological issues such as a loss of control over the illness, anxiety, and a lack of knowledge, and access to mental health services. The current review also highlighted an additional finding that a lack of opportunity to take leave from work may mean that some rural cancer survivors cannot undergo treatment [37]. This may be related to the greater proportion of people who are self-employed in rural versus urban areas [100]. However, although these challenges are still apparent in rural cancer survivors, more research is needed that investigates whether these challenges have improved with the increased use and quality of telehealth and digital healthcare over time.

In total, six longitudinal studies (four without a control group) were identified in this study. The longitudinal studies with a control group [60, 76] found that rural cancer survivors reported lower QOL (6 months post-treatment) and greater travel burden (12 months post-diagnosis) compared with urban cancer survivors over time. The studies without a control group [79, 85, 89, 91] found that the out-of-pocket burden and QOL declined over time (1–3 years post-diagnosis). However,

levels of depression increased 12 months post-diagnosis after an initial decline 3 months after the start of treatment. The 2011 review also found that the health system and information needs of rural cancer patients decreased over time. These findings suggest that needs may change along the cancer survivorship continuum. For instance, post-diagnosis needs might revolve around providing information and support, whereas post-treatment needs focus more around the practical issues of being able to perform activities of daily living.

Limitations

While this systematic review provides updated information on what is known about levels of psychosocial morbidity and the needs of rural people with cancer and their informal caregivers, the results should be interpreted with the following limitations in mind. First, this review has brought together studies that were conducted in multiple developed countries that used different definitions for rurality, such as the ARIA (Australia) and the Rural-Urban Continuum (RUC; US). Additionally, studies included in this review used different methodological approaches and different data sources. Conducting a separate qualitative and quantitative review may have had merit, but we wanted to follow the successful approach employed in the previous review. As these studies were very heterogeneous, no meta-analysis was conducted, and the findings of this review are conceptual rather than statistical. As most studies included in this review used a cross-sectional design, it was impossible to explore causality. Further, all data reported on in the studies contained in this review were collected prior to the COVID-19 epidemic, which may have led to improvements in remote access to support services, with particular benefits for rural populations. Second, the search strategy was restricted to English-language publications, which made it impossible to comment on the experiences of rural cancer survivors living in non-English-speaking countries. Lastly, as the scope of this review was psychosocial in nature, physical morbidity and medical outcomes or survival rates were excluded. As these outcomes are closely related to a cancer survivor's psychosocial well-being and needs, there may have been merit in broadening the scope of the review to include them. However, this would have limited our ability to make comparisons with the findings from the previous review.

Conclusions

Over the last 10 years, the number of studies on the topic of psychosocial morbidity and unmet needs in rural cancer survivors has almost doubled. While 37 studies were identified in the 2011 review, this study identified 65 new studies published after July 2010. Many (9/19) quantitative studies with

an urban control group did not report any meaningful differences between rural and urban cancer survivors with regard to psychosocial morbidity or general unmet needs. There were slightly more quantitative studies with control groups that reported worse outcomes in urban cancer survivors (5/19) than rural cancer survivors (3/19), for which urban cancer survivors reported worse social and emotional functioning and rural cancer survivors reported worse physical functioning, role functioning, and reported mental health outcomes compared to their counterparts. Nonetheless, many needs were still unmet in both populations, and people with cancer living in rural areas were found to face different, additional financial and travel issues, and experience difficulties accessing care. These uniquely rural psychosocial challenges need careful assessment and management by health professionals, if equality in treatment outcomes between rural and urban populations is to be achieved. Further longitudinal research is also warranted that includes both rural and urban cancer groups and includes population-based control groups, to establish whether differences in psychosocial outcomes between rural and urban survivors are due to general geographic or cancer-specific factors. This will help inform the development of future intervention trials that seek to test new strategies to address key issues, in the populations who need them most.

Availability of data and material We have control of all data and agree to allow the journal to review our data if required.

Author contribution Shannen R. van der Kruk: **conceptualisation, data curation, formal analysis, methodology**, project administration, writing — original draft

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Declarations

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