Systematic Review

Impact of Social Determinants of Health on Access to and Quality of Pediatric Cancer Care in North America: A Literature Review

Dilnoor K. Randhawa[1]

1. Faculty of Health Sciences, McMaster University, Hamilton, ON

ABSTRACT

Cancer is the second leading cause of death among children ages 1 to 14 in North America, with approximately 17,000 new diagnoses each year in the United States and 1,000 in Canada. Overall survival now exceeds 80% in well-resourced settings; however, not all children have equal access to the care that makes survival possible. Social determinants of health, including income, insurance status, race and ethnicity, geographic location, and language, shape every stage of a child's cancer journey. These factors account for 30 to 55% of health outcomes, surpassing the impact of direct medical care itself. This systematic review followed PRISMA-ScR guidelines and synthesized 47 review articles published between 2009 and 2024, drawn from PubMed, OVID, CINAHL, and Web of Science. Lower socioeconomic status was the most consistently documented barrier, examined in 87.2% of included reviews; it was associated with delayed diagnosis, treatment interruption, and 10 to 30% higher mortality risk. Racial disparities were documented in 80.9% of reviews: Black children faced 30 to 40% higher mortality rates for acute lymphoblastic leukemia, while Hispanic children faced a 50% increased risk of advanced-stage CNS tumors. Children in rural areas experienced longer diagnostic delays and higher treatment abandonment; some communities faced median travel times of 95 minutes to the nearest pediatric oncologist. Five-year survival rates, while exceeding 80% overall, fell to 65 to 70% for children facing multiple social disadvantages. No child's survival should depend on their postal code, race, or family income. These findings call for universal screening for social needs, culturally responsive care, and urgent intervention research targeting the most underserved children in North America.

Accepted: September 1st, 2025 **Published:** March 20th, 2026

Keywords: Social Determinants, Pediatric Cancer Care, North America, Access to Healthcare

Introduction

Cancer is the second leading cause of death among children ages 1 to 14 in North America, with over 248,749 cases reported between 2003 and 2019 in the United States alone (American Cancer Society, 2023; American Childhood Cancer Organization, 2019). This condition manifests differently across populations, with approximately 17,000 children and adolescents (<21 years) diagnosed annually in the United States and roughly 1,000 new cases each year in Canada (Canada, P.H.A., 2022; American Childhood Cancer Organization, 2019). The most common conditions include leukemia, lymphomas, and germ cell cancers, each requiring distinct therapeutic approaches and support systems (Aristizabal et al., 2021a)

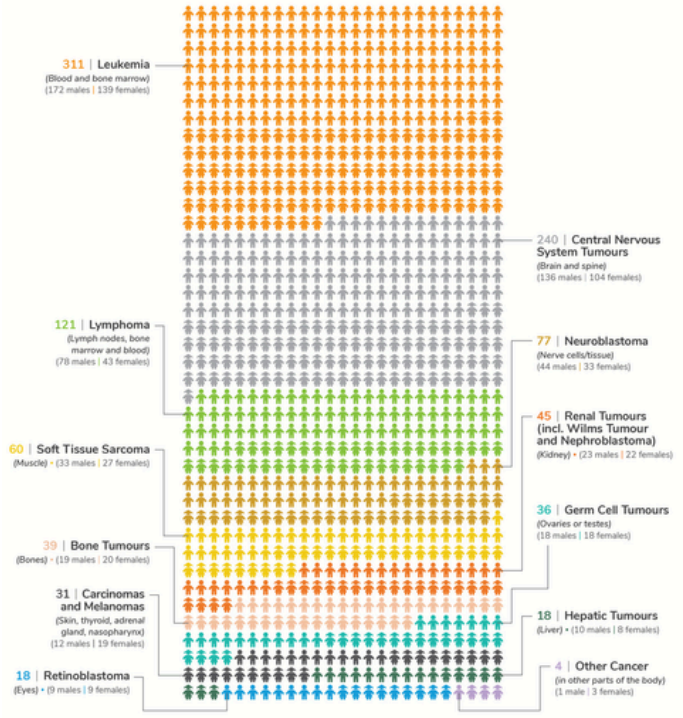

Figure 1. For every 1,000 children diagnosed with cancer, the expected numbers of each of the 12 main types of cancer are as follows above.

There has been remarkable progress in the evolution of treatment approaches over recent decades; since 1970, the cancer death rate has declined by more than half, primarily attributed to treatment innovations and strong participation in clinical trials (American Cancer Society, 2023; Aristizabal et al., 2021c). This progress has resulted in survival rates exceeding 80% in well-resourced settings (H. Tran et al., 2022a). A table was created based on data from specific survival rates for differential factors from the National Program of Cancer Registries. (Refer to Appendix A, Figure A1). It can be observed that five-year survival rates are typically above 80%. Yet, persistent challenges remain. While some populations benefit from cutting-edge treatments and comprehensive care protocols, others face substantial barriers to accessing these life-saving interventions. These disparities are not random but follow predictable patterns shaped by social determinants of health (SDoH) (Beltrami et al., 2022; Canadian Partnership Against Cancer, n.d.).

In the context of pediatric cancer care, social determinants of health refer to the non-medical conditions and circumstances that shape a family's ability to access timely diagnosis and navigate healthcare systems. These determinants include factors such as household income, parental educational levels, insurance coverage, geographic proximity to specialized pediatric care centres, and availability of transportation. Each of these factors influences whether a child receives appropriate care at every stage of their cancer journey. More broadly, social determinants of health encompass the conditions in which people are born, grow, work, live, and age, which influence health outcomes beyond individual medical care or lifestyle choices. (World Health Organization, 2021; Canadian Public Health Association, 2019). These determinants account for 30 to 55% of health outcomes, surpassing even the impact of direct medical care. (World Health Organization, 2021) The World Health Organization emphasizes that health inequities follow a social gradient: the lower the socioeconomic position, the worse the health outcomes (World Health Organization, 2021).

In pediatric oncology, these social gradients appear through various barriers. Economic instability may prevent parents from taking the necessary time off work to attend multiple appointments at distant treatment centers, leading to missed visits or delayed care (Chalfant et al., 2023). Limited health literacy can result in families struggling to understand complex treatment protocols, consent forms, or recognize warning signs of complications (Chalfant et al., 2023). Geographic isolation from specialized cancer centers creates logistical challenges around travel costs, accommodation, and coordination of care (Chalfant et al., 2023). Inadequate insurance coverage may restrict access to certain medications, supportive care services, or participation in clinical trials (Chalfant et al., 2023). Language barriers and cultural differences can impede effective communication with healthcare teams (Chalfant et al., 2023). The absence of strong social support networks leaves families emotionally isolated (Chalfant et al., 2023). These interconnections between social determinants and health outcomes result in systemic inequalities and biological consequences in pediatric cancer care, such as poorer survival rates, increased treatment complications, and diminished quality of life for children from disadvantaged backgrounds (Muhannad Sharara et al., 2024; Aristizabal et al., 2023; Graetz, 2023).

These social determinants do not operate in isolation. Instead, they interact to create cumulative disadvantages throughout the cancer care journey. The impact of social determinants on pediatric cancer care becomes evident through delayed diagnoses when families lack access to primary care or cannot recognize concerning symptoms, limited participation in clinical trials that could offer cutting-edge treatments, higher rates of treatment abandonment when financial or logistical burdens become insurmountable, and compromised access to psychosocial support services that buffer the emotional toll of cancer treatment (Aristizabal et al., 2023; Graetz, 2023). A figure was created based on data on death rates sorted by differential factors. It can be observed how certain factors, such as age, correspond with disproportionately higher numbers. (Refer to Appendix A, Figure A2).

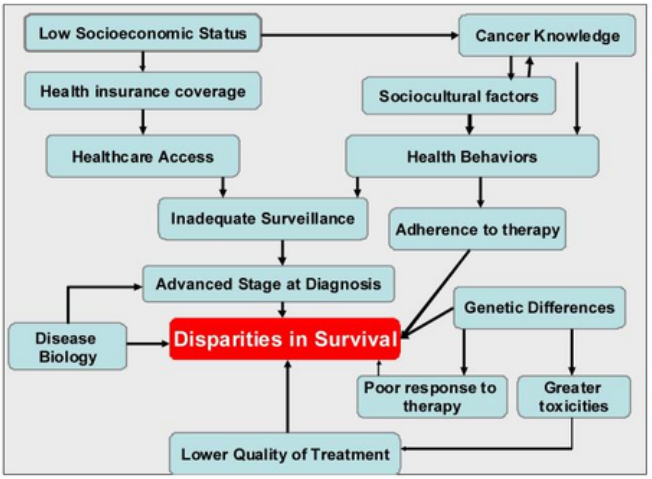

Figure 2. Potential Causes of Disparities in Disease-Free Survival in Patients with Newly Diagnosed Cancer

Insurance status serves as a particularly critical determinant, with public insurance often correlating with worse outcomes due to access limitations, care disruptions, and restrictions on specialist referrals (Tucker-Seeley et al., 2024). Children with Medicaid or other public insurance may experience longer wait times for specialty appointments, reduced access to certain treatment facilities, and gaps in coverage for supportive services such as mental health counseling, nutritional support, or transportation assistance. These disparities reflect systemic inequities in healthcare delivery and resource allocation, affecting both immediate treatment outcomes and long-term quality of life for survivors who may face ongoing health challenges related to their cancer treatment (Beltrami et al., 2022).

Current research in pediatric oncology

focuses on improving treatment efficacy while minimizing long-term side effects through innovative approaches such as CAR T-cell treatments and immunotherapies (H. Tran et al., 2022b; Aristizabal et al., 2021b). Studies emphasize the growing importance of personalized medicine through molecular profiling, allowing for more targeted therapeutic strategies (Amjad et al., 2023). While these advances hold tremendous promise for improving survival and reducing treatment-related toxicities, they simultaneously raise critical questions about equitable access. The most sophisticated treatments are often available only at major academic medical centers, require complex insurance authorization, and may involve significant out-of-pocket costs, creating additional barriers for families already disadvantaged by social determinants of health (Hunleth et al., 2024). Without efforts to address systemic barriers, innovations in pediatric cancer care risk widening rather than narrowing existing disparities.

This systematic review aims to analyze how various social determinants of health influence access to and quality of care for pediatric cancer patients across North America and how they have a compounding impact on patients. Understanding these relationships is essential for developing targeted interventions and policy solutions that can ensure all children with cancer have equitable opportunities to benefit from advances in pediatric oncology

Methods

Information Sources and Search Strategy

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines. The protocol was designed to systematically map the existing literature examining the relationship between social determinants of health and pediatric cancer outcomes in North America.

A strategy involving keyword searching, medical subject heading (MeSH) terms, filters, and manual reference reviews was used to identify studies investigating relationships between SDoH and survival outcomes in pediatric patients with cancer.

We conducted a comprehensive literature search across multiple electronic databases: PubMed (National Library of Medicine), OVID (including MEDLINE and Embase), CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Web of Science Core Collection. The search strategy was developed in consultation with a health sciences librarian and was designed to capture three key conceptual domains: (1) pediatric cancer populations, (2) social determinants of health, and (3) healthcare access and quality indicators. Search terms were carefully selected to encompass the diverse terminology used across disciplines while maintaining specificity to the research question.

Search Term Categories

Pediatric Cancer Terms: "pediatric cancer," "childhood cancer," "pediatric oncology," "childhood neoplasm*," and "pediatric malignancy."

Social Determinants of Health Terms: "social determinant*" OR "health disparit*" OR "social factor*" OR "socioeconomic" OR "sociocultural" OR "health inequit*" OR "social inequit*" OR "social class" OR "poverty" OR "income" OR "education* level" OR "health literacy" OR "language barrier*" OR "cultural barrier*" OR "ethnic*" OR "race" OR "racial" OR "insurance status" OR "health insurance" OR "geographic*" OR "rural" OR "urban" OR "transportation" OR "food security" OR "housing" OR "neighborhood" OR "community resource*"

Healthcare Access and Quality Terms: "healthcare access" OR "health care access" OR "access to care" OR "quality of care" OR "treatment outcome*" OR "survival rate*" OR "mortality" OR "treatment adherence" OR "follow-up care" OR "continuity of care" OR "care coordination" OR "healthcare disparit*" OR "health service* accessibility" OR "treatment barrier*"

Publication Type Limiters: "review" OR "systematic review" OR "scoping review" OR "literature review" OR "meta-analysis" OR "meta synthesis" OR "evidence synthesis." These four concept groups were combined using Boolean operators (AND, OR) to create search strings tailored to each database's specific requirements and controlled vocabulary. For instance, in PubMed, we incorporated relevant MeSH terms to complement our keyword searches. The general structure of our search strategy followed this format: (pediatric cancer terms) AND (social determinants terms) AND (healthcare access/quality terms) AND (review article terms) Within each concept group, terms were combined using the OR operator to maximize sensitivity. Truncation symbols (asterisks) were employed to capture word variations (e.g., "ethnic*" captures ethnicity, ethnic, ethnical). All searches were limited to English-language publications focusing on North American populations. We restricted our search to publications from the past 15 years (2009-2024) to ensure the currency of findings while maintaining comprehensive coverage of the literature.

Eligibility Criteria

Articles were included if they met all of the following criteria:

1. Systematic reviews, scoping reviews, meta-analyses, literature reviews, or evidence synthesis articles. Review articles were specifically targeted to provide a comprehensive overview of existing primary research and to identify patterns across multiple studies.

2. Focused on pediatric cancer patients, defined as individuals diagnosed with malignant neoplasms before age 21 years. Studies could include any pediatric cancer type (leukemias, lymphomas, solid tumors, central nervous system tumors, etc.).

3. Examined populations in North America, specifically the United States and/or Canada. Studies were required to either focus exclusively on North American populations or, if they analyzed multiple countries and economic levels, include North American data that could be separately identified and extracted.

4. Explicitly examined one or more social determinants of health, including but not limited to: socioeconomic status (income, poverty level), education (parental education level, health literacy), insurance status and type, race and ethnicity, geographic location (rural/urban residence, distance to treatment centers), language barriers, housing stability, food security, transportation access, or community resources.

5. Addressed at least one healthcare access or quality metric relevant to pediatric cancer care. Acceptable outcomes included: treatment access (time to diagnosis, treatment initiation, clinical trial enrollment), treatment effectiveness (response rates, treatment completion, abandonment rates), survival outcomes (overall survival, disease-free survival, mortality rates), quality of care indicators (adherence to treatment protocols, receipt of guideline-concordant care), or care coordination measures.

6. Published in English.

7. Published between January 1, 2009, and December 31, 2024.

Articles were excluded if they met any of the following criteria:

1. Primary research studies (observational studies, clinical trials, case series, case reports), editorials, commentaries, conference abstracts, letters to the editor, or protocol papers without results. While these study types provide valuable information, they were excluded to focus on synthesized evidence from review articles.

2. Focused exclusively on adult cancer populations (age 21 years and older) or studies of cancer survivors that did not examine outcomes related to their pediatric diagnosis

3. Examined populations exclusively outside North America, including studies from Europe, Asia, Africa, South America, or Australia, without North American data.

4. Reviews that did not explicitly address social determinants of health or their impact on healthcare outcomes.

5. Studies exclusively examining long-term survivorship care and late effects in adult survivors of childhood cancer were excluded unless they specifically addressed how social determinants affected access to or quality of survivorship care during the pediatric treatment period.

6. Articles published in languages other than English or articles for which full text could not be obtained through institutional access or interlibrary loan.

Study Selection Process

The study selection process followed a systematic, multi-stage approach designed to ensure thoroughness and minimize selection bias. All identified records were imported into Covidence systematic review management software. The software's automated deduplication algorithm identified and removed duplicate citations based on matching titles, authors, publication years, and DOIs. Two reviewers independently screened the titles and abstracts of all unique records against the predefined inclusion and exclusion criteria. Reviewers were provided with a standardized screening guide that provided eligibility criteria. During this initial phase, articles were advanced to full-text review if either reviewer believed they might meet inclusion criteria or if eligibility could not be determined from the title and abstract alone.

Articles that passed title and abstract screening underwent a comprehensive full-text review by the same two independent reviewers. During this phase, reviewers assessed each article using a standardized full-text screening form developed specifically for this review. The form included specific questions addressing each inclusion criterion. Reviewers were required to provide specific justification for exclusion decisions, selecting from predefined categories (wrong study design, wrong population, wrong geographic focus, does not address SDoH, does not address healthcare outcomes, language, date).

All phases of the study selection process were documented in detail to ensure transparency and reproducibility. The number of records identified from each database, the number of duplicates removed, the number of records screened at each stage, and the reasons for exclusion were recorded. These data were used to construct a PRISMA flow diagram showing the flow of articles through the review process, from initial identification through final inclusion.

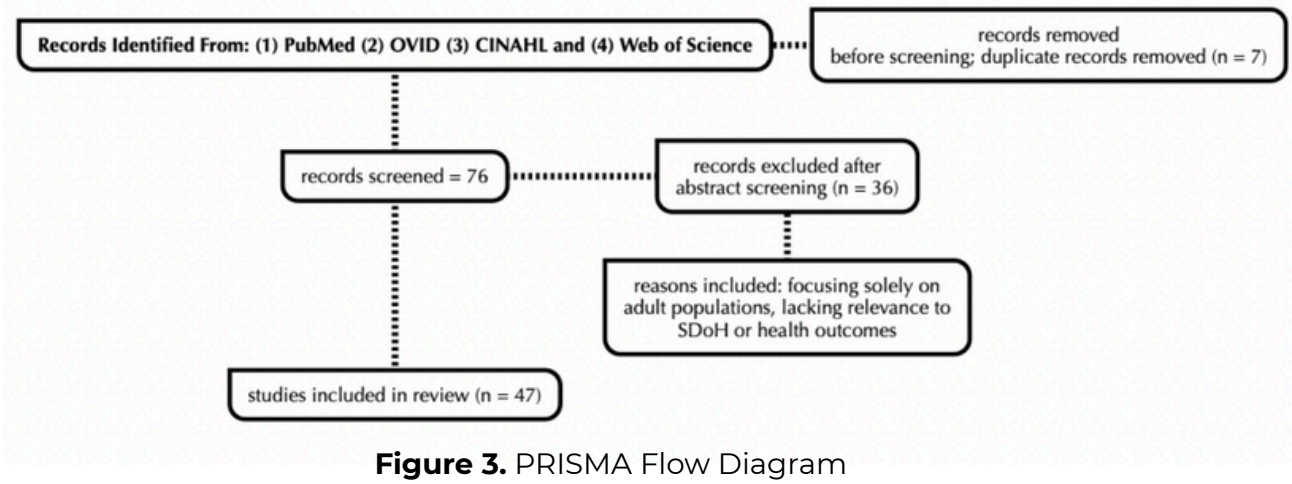

Figure 3. PRISMA Flow Diagram

Data Extraction and Analysis

A data extraction template was developed to ensure it captured all relevant information and to refine variable definitions. Two reviewers independently extracted data from all included articles using a standardized electronic form created in Microsoft Excel. The data extraction form was organized into several categories:

Study Characteristics:

- First author and publication year
- Review type (systematic review, scoping review, meta-analysis, narrative review, evidence synthesis)
- Number of primary studies included in the review
- Study period covered by the review (date range of included primary studies)
- Geographic coverage (United States only, Canada only, both U.S. and Canada, North America with other regions)
- Quality of care metrics such as mortality rate, survival rates, quality of care, etc.)

Population Characteristics:

- Age range of pediatric populations studied
- Cancer types examined (specific cancers vs. all pediatric cancers)
- Sample sizes (when reported in aggregate)

Social Determinants of Health:

- Specific SDoH factors examined (checked all that apply from predetermined list):
  - Socioeconomic status (income level, poverty status)
  - Parental education level
  - Health literacy
  - Insurance status (uninsured, public insurance, private insurance)
  - Race and ethnicity
  - Geographic location (rural vs. urban, census region)
  - Distance/travel time to treatment center
  - Language barriers and concordance
  - Housing stability
  - Food security
  - Transportation access
  - Community resources and social support
  - Employment status
- How SDoH variables were measured (individual-level vs. area-level, specific instruments or data sources used)

Healthcare Access and Quality Metrics:

- Primary outcomes examined:
  - Diagnostic timeliness (time from symptom onset to diagnosis, stage at diagnosis)
  - Treatment access (enrollment in clinical trials, receipt of standard-of-care therapy)
  - Treatment completion (abandonment rates, adherence)
  - Survival outcomes (overall survival rates, disease-free survival, mortality rates)
  - Treatment-related mortality
  - Quality of care indicators
  - Follow-up care and surveillance
- Measurement approaches and definitions used

Extracted data was entered directly into the electronic form, with guidelines for recording when information was not reported or not applicable. Discrepancies between reviewers in extracted data were identified through comparison of completed forms and resolved through discussion and re-examination of the source article.

We employed a narrative synthesis approach rather than quantitative meta-analysis. The synthesis was organized thematically around key social determinants of health to analyze data to identify patterns and correlations between SDoH and healthcare outcomes in pediatric cancer populations. Included reviews were initially categorized by primary SDoH focus and primary outcome domain (diagnostic timeliness, treatment access, survival, etc.). We generated descriptive statistics summarizing the characteristics of included reviews, including frequency distributions of publication years, review types, geographic coverage, cancer types studied, and SDoH/outcome combinations examined. These data were presented in summary tables and figures. (Refer to Figure A3). For each major SDoH domain, we synthesized findings narratively, identifying consistency of findings across reviews, direction of reported associations (beneficial, harmful, or no association), and proposed mechanisms linking SDoH to outcomes. We systematically identified gaps in the existing evidence, including understudied populations, SDoH factors that have received limited attention, and outcomes that have been infrequently examined.

Results and Discussion

Search and Selection Results

The systematic search and screening process followed a rigorous three-stage approach to identify relevant review articles examining social determinants of health in pediatric cancer care across North America.

The search across four electronic databases conducted in November 2024 yielded a total of 83 records. Following importation into Covidence systematic review management software, automated and manual deduplication processes identified 7 duplicate citations, resulting in 76 unique articles advancing to the screening phase. This was a relatively low duplication rate (8.4%). 76 articles underwent title and abstract screening, with 47 meeting the inclusion criteria for full-text review. Of these, 36 articles were excluded for reasons such as focusing solely on adult populations, lacking relevance to SDoH, or healthcare outcomes. A total of 47 articles were included in the final analysis. All 47 articles that advanced from title and abstract screening underwent a detailed full-text assessment by two independent reviewers. Following full-text evaluation using standardized assessment forms, all 47 articles were confirmed to meet the inclusion criteria and were retained for data extraction and synthesis.

The complete selection process can be summarized as follows:

- Initial database yield: 83 records
- After deduplication: 76 unique records
- After title/abstract screening: 47 records advanced to full-text review
- After full-text review: 47 articles included in final synthesis
- Overall inclusion rate: 61.8% of unique records screened

A PRISMA flow diagram documenting this selection process with detailed reasons for exclusions at each stage is presented in Figure 3.

Characteristics of Included Reviews

Publication years for included reviews ranged from 2009 to 2024, spanning the entire 15-year search window. The temporal distribution revealed increasing research attention to health disparities in pediatric oncology over time. Notably, more than half of all included reviews (57.4%, n=27) were published in the most recent six-year period (2019-2024), compared to 25.5% (n=12) in the middle period (2014-2018) and 17.0% (n=8) in the earliest period (2009-2013). This accelerating publication trend reflects growing recognition of social determinants as critical factors shaping pediatric cancer outcomes. The majority were systematic reviews (n=30, 63.8%), reflecting the availability of sufficient primary research. Scoping reviews comprised nearly one-quarter of included articles (n=10, 21.3%), typically used to map emerging evidence or examine broad questions spanning multiple social determinants and outcomes. Meta-analyses represented 14.9% of included reviews (n=7). Geographic focus varied among included reviews, with most concentrating specifically on North American populations. 23 reviews (48.9%) examined U.S. pediatric cancer populations exclusively. 15 reviews (31.9%) included populations from both North American countries, often comparing outcomes or examining shared challenges. 9 reviews (19.1%) included a broader international scope while maintaining separately identifiable North American data. Among reviews with broader international coverage, most compared North American outcomes to other high-income countries or contrasted high-income and low- and middle-income country contexts to situate North American disparities within a global perspective. A detailed table summarizing key characteristics of each included review (author, year, review type, geographic focus, cancer types, social determinants examined, outcomes assessed, and quality rating) is outlined in Figure A3.

SDoH Impact Analysis

Lower socioeconomic status emerged as the most consistently documented determinant of adverse pediatric cancer outcomes, examined in 87.2% of included reviews (n=41).

Children from lower-SES families experienced multiple disadvantages across the cancer care continuum:

- Lower SES was consistently associated with longer intervals from symptom onset to diagnosis and more advanced disease stage at presentation (Tarnasky et al., 2021; Bhatia, 2011; Cotache-Condor et al., 2022). Proposed mechanisms included limited access to primary care, competing demands from economic insecurity delaying care-seeking, and lower health literacy affecting symptom recognition.
- Families from low-income households faced substantial financial burdens even when insurance coverage existed, including costs for transportation, temporary housing near treatment centers, lost wages from work absences, and out-of-pocket medical expenses (Iragorri et al., 2021; Ehrlich et al., 2023). These financial pressures were correlated with treatment interruptions and, in severe cases, treatment abandonment. The financial burden of treatment frequently intensifies over time; one study found that the proportion of families unable to meet basic needs increased during treatment, with households losing over 40% of their income during chemotherapy courses (Tran et al., 2022).
- Lower SES was associated with poorer survival outcomes across multiple pediatric cancer types, with effects persisting even after adjusting for disease characteristics, treatment received, and other demographic factors (Bhatia, 2011; Siegel et al., 2020; Tran et al., 2022). Reviews reported 10-30% higher mortality risk for children from the lowest compared to the highest SES groups. This is a range across reviews.
- Lower SES was associated with higher amputation rates versus limb salvage, more frequent enucleation versus ocular preservation, and reduced access to organ-sparing procedures. (Roberts et al., 2023)

Lower SES consistently correlated with delayed diagnoses and reduced access to specialized care, creating a cascade of disadvantages that shaped the entire treatment period.

Particularly concerning is the phenomenon of treatment interruption or abandonment among low-income families, highlighting how financial struggles can force impossible choices between medical care and basic necessities (Iragorri et al., 2021).

Racial and ethnic disparities in pediatric cancer outcomes were documented in 80.9% of included reviews (n=38), with patterns varying by specific racial/ethnic group and cancer type:

- Black children: Multiple reviews documented that Black children experienced significantly worse survival outcomes compared to White children, particularly for acute lymphoblastic leukemia (30-40% higher mortality rates) (Reeves et al., 2021; Bhatia, 2011; Eche & Aronowitz, 2020). There were also correlations with poorer survival in extremity sarcomas, breast cancer, hepatocellular carcinoma, neuroblastoma, colorectal carcinoma, and retinoblastoma (Roberts et al., 2023). Black children also presented more frequently with advanced-stage solid tumors and had lower rates of clinical trial enrollment. While some of these disparities were reduced when adjusting for socioeconomic factors and insurance status, significant racial gaps persisted, suggesting multiple pathways through which systemic racial barriers affect outcomes.
- Hispanic/Latino children: Hispanic children similarly experienced worse outcomes than non-Hispanic White children across multiple cancer types, with significant disparities at diagnosis and survival stages for solid tumors (Beltrami et al., 2022; Roberts et al., 2023). Language barriers emerged as a critical factor affecting Hispanic families' experiences, influencing communication with healthcare teams, understanding of treatment plans, and navigation of complex healthcare systems (Robles et al., 2024). There were specific statistics brought up, such as a 37% higher likelihood of distant disease in Wilms tumors, 50% increased risk of advanced-stage CNS tumors, 3.8 times higher odds of advanced-stage melanoma, and more frequent extraocular disease in retinoblastoma cases (Roberts et al., 2023).
- Other racial/ethnic minorities: Evidence for Asian, Pacific Islander, American Indian, and Alaska Native children was more limited but suggested concerning disparities, particularly related to geographic barriers to accessing specialized care and cultural factors affecting treatment acceptance (Valery et al., 2014; Patel et al., 2017; Liu et al., 2023).

Geographic factors, examined in 59.6% of reviews (n=28), created substantial access challenges, particularly for rural families:

- Children living in rural areas or at greater distances from pediatric cancer centers experienced longer diagnostic delays, lower clinical trial enrollment, and higher treatment abandonment rates (Tarnasky et al., 2021; Liu et al., 2023). Distance created both logistical challenges (time and cost of travel, need for temporary housing, separation from support networks) and potentially delayed emergency presentation for treatment complications. Analysis of over 90 million children and adolescents revealed that while 83.3% could reach the nearest pediatric oncologist within one hour, significant disparities existed. American Indian and Alaska Native populations faced the longest median travel times (46 minutes), followed by residents of rural areas (95 minutes) and regions with high deprivation levels (36 minutes) (Liu et al., 2023).

- Reviews documented persistent regional variations in pediatric cancer outcomes, with Southern and Mountain states showing worse outcomes than Northeastern and Coastal regions even after accounting for patient characteristics (Siegel et al., 2020; Liu et al., 2023). Geographic disparities in the pediatric oncology workforce were associated with these patterns, with the lowest per capita availability of pediatric oncologists in underserved regions. Wyoming had the lowest pediatric oncologist supply (zero oncologists per 100,000 pediatric population), while Washington, D.C., had the highest (53.3 oncologists per 100,000) (Liu et al., 2023).

Insurance emerged as a critical determinant, examined in 68.1% of reviews (n=32):

- Though relatively rare among children with cancer, lack of insurance was associated with catastrophic disparities, including delayed diagnosis, lower treatment completion rates, and substantially worse survival outcomes (Beltrami et al., 2022; Tran et al., 2022).
- Children with public insurance (primarily Medicaid) consistently demonstrated worse outcomes than those with private insurance, even after adjusting for socioeconomic status and other factors (Tran et al., 2022; Bhatia, 2011; Roberts et al., 2023). Public insurance was associated with longer time to diagnosis, reduced access to certain treatment facilities, lower clinical trial enrollment, and lower survival rates. These disparities are a result of both coverage limitations and public insurance serving as a marker for other social disadvantages.

Multiple reviews documented systematic differences in access to high-quality pediatric cancer care based on social circumstances:

- Children from minority racial/ethnic backgrounds, lower-SES families, rural areas, and those with public insurance had consistently lower rates of enrollment in clinical trials (Beltrami et al., 2022; Tarnasky et al., 2021). This represented a disparity in unequal access to potentially superior therapies and unequal contribution to research that will benefit future patients.
- Minority and low-income children were less likely to receive care at specialized pediatric cancer centers, more often receiving treatment at community hospitals with limited pediatric oncology expertise (Beltrami et al., 2022; Rodriguez-Galindo et al., 2015).
- Several reviews found that children from disadvantaged backgrounds were less likely to receive treatments consistent with clinical practice guidelines, including appropriate chemotherapy regimens, indicated radiation therapy, and timely surgical interventions (Roberts et al., 2023; Beltrami et al., 2022).
- Counties where ≥10% of residents had less than a ninth-grade education showed higher rates of radiation therapy refusal (OR 1.71, p=0.008) compared to more educated counties (Patel et al., 2017).
- Cultural factors also impact treatment acceptance. American Indian, Alaska Native, Asian, and Pacific Islander populations demonstrated higher radiation refusal rates (OR 2.12, p=0.002) compared to Black or White populations, potentially reflecting cultural preferences for alternative medicine or unfamiliarity with radiation therapy (Patel et al., 2017).

Survival rates showed persistent disparities across multiple social determinants:

- Ethnic and socioeconomic disparities were linked to 5-15 percentage point differences in five-year survival rates for common pediatric cancers (Bhatia, 2011; Reeves et al., 2021). While overall pediatric cancer survival exceeded 80% in recent cohorts, disadvantaged groups experienced lower survival, approaching 65-70% for some cancer types.
- Children from lower-SES backgrounds and racial/ethnic minority groups experienced higher rates of treatment-related mortality, reflecting reduced access to supportive care, delayed recognition of complications, and greater frequency of comorbid conditions. (Ehrlich et al., 2023; Van Weelderen et al., 2021).

Several reviews identified care coordination challenges that affected families facing social disadvantages:

- Low-SES families were more likely to experience fragmented care with poor communication between providers, incomplete care plans, and challenges navigating complex healthcare systems (Iragorri et al., 2021). These families often lacked resources (time, transportation, childcare for siblings, workplace flexibility) necessary to coordinate care across multiple providers and settings.
- Social determinants substantially affected adherence to complex treatment regimens, particularly for oral medications requiring careful home administration (Rodriguez-Galindo et al., 2013). Factors including unstable housing, limited health literacy, and lack of social support were correlated with non-adherence.

Research Gaps

Understudied populations included Indigenous children; despite documented disparities impacting Indigenous children specifically, only 4.3% of reviews focused on Indigenous populations. Few reviews examined outcomes for children from immigrant or refugee families despite the unique challenges these populations face. Most reviews compounded diverse populations into single categories, potentially excluding important within-group variations. Only 8.5% of reviews examined food insecurity despite evidence that financial struggles created food access challenges for many families. Housing was examined in only 12.8% of reviews. Few reviews directly measured experiences of discrimination within healthcare settings. Very few included reviews evaluated interventions designed to address social determinants or reduce disparities. Future research should prioritize the evaluation of interventions addressing financial barriers, transportation challenges, language barriers, care coordination, and other social factors affecting pediatric cancer outcomes.

Limitations

First, by focusing on review articles rather than primary studies, we synthesized already-synthesized evidence, potentially missing recent primary studies not yet incorporated into published reviews. Second, the reviews contained uneven coverage of different social determinants, with limited research on food security, housing stability, discrimination experiences, and community resources. Third, while this review is intended to focus on North American populations specifically, there were 9 LMIC-focused reviews included in the synthesis. This is because they had data that could be extracted independently and focused specifically on North American populations. Future reviews might benefit from a separate synthesis of regionally focused versus internationally focused studies.

Conclusion

This systematic review of 47 high-quality papers spanning 15 years found persistent connections between the social determinants of health and pediatric cancer outcomes across North America. Through synthesis of evidence, including approximately 800-1000 primary research studies, clear patterns show how socioeconomic status, race and ethnicity, geographic location, insurance coverage, and other factors shape every stage of the pediatric cancer journey. These are children facing life-threatening illnesses through no fault of their own, with dramatic differences in survival based on postal code, race, or insurance coverage. The fact that 5-year survival exceeds 80% overall but falls to 65-70% for disadvantaged groups highlights the costs of allowing social circumstances to determine mortality rates. These findings

demonstrate how healthcare systems can amplify existing social inequalities, creating systemic disadvantages for already vulnerable populations. Children experiencing multiple social disadvantages face compounding barriers that accumulate throughout their treatment period. Hospitals should implement universal screening for social needs, integrating social determinants assessment into routine clinical care, while policymakers should mandate this type of screening as a standard for pediatric oncology units. Identification of families experiencing food insecurity, housing instability, transportation barriers, or financial distress allows connection with appropriate resources before these challenges lead to treatment interruption or abandonment. Culturally responsive care must become standard practice, including use of professional interpretation services, the availability of written materials in families' preferred languages, and provider training in cultural awareness. Treatment plans should account for families' social circumstances, considering factors like work schedules, transportation capacity, and housing situations. Future research should prioritize several key areas. First, intervention research testing approaches to addressing social determinants and reducing disparities is urgently needed. Second, research should examine understudied populations, including Indigenous children, specific Asian and Pacific Islander subgroups, immigrant and refugee children, and populations in underresearched geographic regions. Third, understudied social determinants, including food security, housing stability, social support, discrimination experiences, and neighborhood environment, warrant attention. The evidence synthesized in this review provides a clear display of problems demanding attention.

REFERENCES

Abboud, M. R., Ghanem, K., & Muwakkit, S. (2014). Acute lymphoblastic leukemia in low and middle-income countries. Current Opinion in Oncology, 26(6), 650–655. https://doi.org/10.1097/cco.0000000000000125

Afriyie, D. O., Kwesiga, B., Achungura, G., Tediosi, F., & Fink, G. (2023). Effects of Health Insurance on Quality of Care in Low-Income Countries: A Systematic Review. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 01053361100001

Al Lamki, Z. (2017). Improving Cancer Care for Children in the Developing World: Challenges and Strategies. Current Pediatric Reviews, 13(1), 13–23. https://doi.org/10.2174/1573396312666161230145417

American Cancer Society. (2023, January 12). Key Statistics for Childhood Cancers. Www.cancer.org. https://www.cancer.org/cancer/types/cancer-in-children/key-statistics.html

American Childhood Cancer Organization. (2019, April 5). American Childhood Cancer Organization (ACCO). ACCO. https://www.acco.org/us-childhood-cancer-statistics/

Amjad, S., Tromburg, C., Adesunkanmi, M., Jannatul Mawa, Nazif Mahbub, Campbell, S., Chari, R., Rowe, B. H., & Ospina, M. B. (2023). Social Determinants of Health and Pediatric Emergency Department Outcomes: A Systematic Review and Meta-Analysis of Observational Studies. Annals of Emergency Medicine. https://doi.org/10.1016/j.annemergmed.2023.10.010

Apple, A., & Lovvorn, H. N. (2020). Wilms Tumor in Sub-Saharan Africa: Molecular and Social Determinants of a Global Pediatric Health Disparity. Frontiers in Oncology, 10. https://doi.org/10.3389/fonc.2020.606380

Aristizabal, P., Shilpa Nataraj, K. Arissa, Kumar, N. V., Perdomo, B. P., Marí a Elena Martí nez, Nodora, J., Liu, L., Lee, E., & Thornburg, C. D. (2023). Social Determinants of Health and Informed Consent Comprehension for Pediatric Cancer Clinical Trials. JAMA Network Open, 6(12), e2346858–e2346858. https://doi.org/10.1001/jamanetworkopen.2023.46858

Aristizabal, P., Winestone, L. E., Umaretiya, P., & Bona, K. (2021a). Disparities in Pediatric Oncology: The 21st Century Opportunity to Improve Outcomes for Children and Adolescents With Cancer. American Society of Clinical Oncology Educational Book, 41(41), e315–e326. https://doi.org/10.1200/edbk_320499

Aristizabal, P., Winestone, L. E., Umaretiya, P., & Bona, K. (2021b). Disparities in Pediatric Oncology: The 21st Century Opportunity to Improve Outcomes for Children and Adolescents With Cancer. American Society of Clinical Oncology Educational Book, 41(41), e315–e326. https://doi.org/10.1200/edbk_320499

Aristizabal, P., Winestone, L. E., Umaretiya, P., & Bona, K. (2021c). Disparities in Pediatric Oncology: The 21st Century Opportunity to Improve Outcomes for Children and Adolescents With Cancer. American Society of Clinical Oncology Educational Book, 41(41), e315–e326. https://doi.org/10.1200/edbk_320499

Arora, R., Eden, T., & Kapoor, G. (2009). Epidemiology of childhood cancer in India. Indian Journal of Cancer, 46(4), 264. https://doi.org/10.4103/0019-509x.55546

Beltrami, A., Hilliard, A., & Green, A. L. (2022a). Demographic and socioeconomic disparities in pediatric cancer in the United States: Current knowledge, deepening understanding, and expanding intervention. Cancer Epidemiology, 76, 102082. https://doi.org/10.1016/j.canep.2021.102082

Beltrami, A., Hilliard, A., & Green, A. L. (2022b). Demographic and socioeconomic disparities in pediatric cancer in the United States: Current knowledge, deepening understanding, and expanding intervention. Cancer Epidemiology, 76, 102082. https://doi.org/10.1016/j.canep.2021.102082

Bhakta, N., Force, L. M., Allemani, C., Atun, R., Bray, F., Coleman, M. P., Steliarova-Foucher, E., Frazier, A. L., Robison, L. L., Rodriguez-Galindo, C., & Fitzmaurice, C. (2019). Childhood cancer burden: a review of global estimates. The Lancet Oncology, 20(1), e42–e53. https://doi.org/10.1016/s1470-2045(18)30761-7

Bhatia, S. (2011). Disparities in cancer outcomes: Lessons learned from children with cancer. Pediatric Blood & Cancer, 56(6), 994–1002. https://doi.org/10.1002/pbc.23078

Cai, J., Yin Ting Cheung, & Hudson, M. M. (2024). Care Models and Barriers to Long-Term Follow-Up Care Among Childhood Cancer Survivors and Health Care Providers in Asia: A Literature Review. JCO Global Oncology, 10. https://doi.org/10.1200/go.23.00331

Canada, P. H. A. of. (2022, February 14). Childhood Cancer Counts in Canada. Www.canada.ca. https://www.canada.ca/en/public-health/services/publications/diseases-conditions/childho od-cancer-counts-canada.html

Canadian Partnership Against Cancer. (n.d.). Social determinants of health. Canadian Partnership against Cancer. https://www.partnershipagainstcancer.ca/topics/lung-cancer-equity/social-determinants-health/

Canadian Public Health Association. (2019). What are the social determinants of health? Cpha.ca. https://www.cpha.ca/what-are-social-determinants-health

REFERENCES

Cesia Cotache-Condor, Vinootna Kantety, Grimm, A., Williamson, J., Landrum, K., Schroeder, K., Staton, C. A., Majaliwa, E., Tang, S., Rice, H. E., & Smith, E. R. (2022). Determinants of delayed childhood cancer care in low- and middle-income countries: A systematic review. Pediatric Blood Cancer, 70(3). https://doi.org/10.1002/pbc.30175

Chalfant, V., Riveros, C., Bradfield, S., & Stec, A. A. (2023). Impact of social disparities on 10 year survival rates in paediatric cancers: a cohort study. The Lancet Regional Health - Americas, 20, 100454–100454. https://doi.org/10.1016/j.lana.2023.100454

Criss Koba Mjumbe, Desiré Mashinda Kulimba, Oscar Luboya Numbi, Murielle Nkumuyaya, Diane Muatama Balimo, Chadrack Kabeya Diyoka, & Benjamin Kabyla Ilunga. (2023). Financial costs of pediatric cancer management in Africa: systematic review. Frontiers in Public Health, 11. https://doi.org/10.3389/fpubh.2023.1175560

Eche, I. J., & Aronowitz, T. (2020). A Literature Review of Racial Disparities in Overall Survival of Black Children With Acute Lymphoblastic Leukemia Compared With White Children With Acute Lymphoblastic Leukemia. Journal of Pediatric Oncology Nursing, 104345422090754. https://doi.org/10.1177/1043454220907547

Ehrlich, B. S., McNeil, M. J., Pham, L. T. D., Chen, Y., Rivera, J., Acuna, C., Sniderman, L., Sakaan, F. M., Aceituno, A. M., Villegas, C. A., Force, L. M., Bolous, N. S., Wiphatphumiprates, P. P., Slone, J. S., Carrillo, A. K., Gillipelli, S. R., Duffy, C., Arias, A. V., Devidas, M., & Rodriguez-Galindo, C. (2023). Treatment-related mortality in children with cancer in low-income and middle-income countries: a systematic review and meta-analysis. The Lancet. Oncology, 24(9), 967–977. https://doi.org/10.1016/S1470-2045(23)00318-2

Foster Osei Baah, Sharda, S., Davidow, K., Jackson, S., Kernizan, D., Jacobs, J. A., Baumer, Y., Schultz, C. L., Baker-Smith, C. M., & Powell-Wiley, T. M. (2024). Social Determinants of Health in Cardio-Oncology. JACC. CardioOncology. https://doi.org/10.1016/j.jaccao.2024.02.009

Gabela, A., Wösten-van Asperen, R. M., Arias, A. V., Acuña, C., Zebin, Z. A., Lopez-Baron, E., Bhattacharyya, P., Duncanson, L., Ferreira, D., Gunasekera, S., Hayes, S., McArthur, J., Nagarajan, V. D., Puerto Torres, M., Rivera, J., Sniderman, E., Wrigley, J., Zafar, H., & Agulnik, A. (2024a). The burden of pediatric critical illness among pediatric oncology patients in low- and middle-income countries: A systematic review and meta-analysis. Critical Reviews in Oncology/Hematology, 203, 104467. https://doi.org/10.1016/j.critrevonc.2024.104467

Gabela, A., Wösten-van Asperen, R. M., Arias, A. V., Acuña, C., Zebin, Z. A., Lopez-Baron, E., Bhattacharyya, P., Duncanson, L., Ferreira, D., Gunasekera, S., Hayes, S., McArthur, J., Nagarajan, V. D., Puerto Torres, M., Rivera, J., Sniderman, E., Wrigley, J., Zafar, H., & Agulnik, A. (2024b). The burden of pediatric critical illness among pediatric oncology patients in low- and middle-income countries: A systematic review and meta-analysis. Critical Reviews in Oncology/Hematology, 203, 104467. https://doi.org/10.1016/j.critrevonc.2024.104467

Geel, J. A., Challinor, J., Ranasinghe, N., Myezo, K. H., Eyal, K. C., Aderounmu, W., Davidson, A., Pritchard-Jones, K., Howard, S. C., Bouffet, E., & Hessissen, L. (2021). Pediatric cancer care in Africa: SIOP Global Mapping Program report on economic and population indicators. Pediatric Blood & Cancer, 68(11). https://doi.org/10.1002/pbc.29345

Gheorghe, A., Chalkidou, K., Shamieh, O., Sultan, I., & Sullivan, R. (2020). Economics of Pediatric Cancer in Four Eastern Mediterranean Countries: A Comparative Assessment. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00564861600028

Government of Canada. (2024, July 18). Social determinants of health and health inequalities. Government of Canada. https://www.canada.ca/en/public-health/services/health-promotion/population-health/wha t-determines-health.html

Graetz, D. E. (2023). The most vulnerable pediatric cancer patients. The Lancet Regional Health – Americas, 21. https://doi.org/10.1016/j.lana.2023.100480

Graetz, D., Garza, M., Rodriguez-Galindo, C., & Mack, J. (2020). Pediatric cancer communication in low- and middle-income countries: A scoping review. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00573377000001

Guzman C, P. C., Cordoba, M. A., Godoy, N., Castaño, A., Ribeiro, K. B., Moreno, F., & de Vries, E. (2021). Childhood cancer in Latin America: from detection to palliative care and survivorship. Cancer Epidemiology, 71, 101837. https://doi.org/10.1016/j.canep.2020.101837

H. Tran, Y., Coven, S. L., Park, S., & Mendonca, E. A. (2022a). Social determinants of health and pediatric cancer survival: A systematic review. Pediatric Blood & Cancer, 69(5). https://doi.org/10.1002/pbc.29546

H. Tran, Y., Coven, S. L., Park, S., & Mendonca, E. A. (2022b). Social determinants of health and pediatric cancer survival: A systematic review. Pediatric Blood & Cancer, 69(5). https://doi.org/10.1002/pbc.29546

H. Tran, Y., Coven, S. L., Park, S., & Mendonca, E. A. (2022c). Social determinants of health and pediatric cancer survival: A systematic review. Pediatric Blood & Cancer, 69(5). https://doi.org/10.1002/pbc.29546

H. Tran, Y., Coven, S. L., Park, S., & Mendonca, E. A. (2022d). Social determinants of health and pediatric cancer survival: A systematic review. Pediatric Blood & Cancer, 69(5). https://doi.org/10.1002/pbc.29546

Hasle, H., & Kaspers, G. J. L. (2016). Strategies for reducing the treatment-related physical burden of childhood acute myeloid leukaemia - a review. British Journal of Haematology, 176(2), 168–178. https://doi.org/10.1111/bjh.14419

Hunleth, J., Burack, S., Kaufman, L., Mohrmann, C., Thembekile Shato, Wiedenman, E., & Njelesani, J. (2024). Inequities in childhood cancer research: A scoping review. EJC Paediatric Oncology, 4, 100171–100171. https://doi.org/10.1016/j.ejcped.2024.100171

Iragorri, N., de Oliveira, C., Fitzgerald, N., & Essue, B. (2021). The Out-of-Pocket Cost Burden of Cancer Care—A Systematic Literature Review. Current Oncology, 28(2), 1216–1248. https://doi.org/10.3390/curroncol28020117

Kaatsch, P. (2010). Epidemiology of childhood cancer. Cancer Treatment Reviews, 36(4), 277–285. https://doi.org/10.1016/j.ctrv.2010.02.003

REFERENCES

Kocarnik, J. M., Compton, K., Dean, F. E., Fu, W., Gaw, B. L., Harvey, J. D., Henrikson, H. J., Lu, D., Pennini, A., Xu, R., Ababneh, E., Abbasi-Kangevari, M., Abbastabar, H., Abd-Elsalam, S. M., Abdoli, A., Abedi, A., Abidi, H., Abolhassani, H., Adedeji, I. A., & Adnani, Q. E. S. (2021). Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life Years for 29 Cancer Groups From 2010 to 2019. JAMA Oncology, 8(3). https://doi.org/10.1001/jamaoncol.2021.6987

Liu, X., Fluchel, M., Kirchoff, A., Zhu, H., & Onega, T. (2023). Geographic Access to Pediatric Cancer Care in the US. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 01059410400010

Molyneux, E. M., Rochford, R., Griffin, B., Newton, R., Jackson, G., Menon, G., Harrison, C. J., Israels, T., & Bailey, S. (2012). Burkitt's lymphoma. The Lancet, 379(9822), 1234–1244. https://doi.org/10.1016/s0140-6736(11)61177-x

Morgan, A., Watt, M., Zullig, L., Sued, H., & Schroeder, K. (2022). Pediatric cancer outcomes after the implementation of a residential hostel in Tanzania. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00798831200001

Muhannad Sharara, Kellen Cristine Tjioe, Miranda-Galvis, M., Juarez, B. S., Agrawal, G., Balas, E. A., Johnson, T. S., & Cortes, J. E. (2024). Social determinants of health impact on cancer affecting children, adolescents, and young adults: systematic review and meta-analysis. Frontiers in Adolescent Medicine, 2. https://doi.org/10.3389/fradm.2024.1441776

Patel, C., Stavas, M., Perkins, S., & Shinohara, E. (2017). Central Nervous System Disease, Education, and Race Impact Radiation Refusal in Pediatric Cancer Patients. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00404121900028

Piya Rujkijyanont, & Inaba, H. (2024). Diagnostic and treatment strategies for pediatric acute lymphoblastic leukemia in low- and middle-income countries. Leukemia. https://doi.org/10.1038/s41375-024-02277-9

Reeves, T. J., Mathis, T. J., Bauer, H. E., Hudson, M. M., Robison, L. L., Wang, Z., Baker, J. N., & Huang, I-Chan. (2021). Racial and Ethnic Disparities in Health Outcomes Among Long-Term Survivors of Childhood Cancer: A Scoping Review. Frontiers in Public Health, 9. https://doi.org/10.3389/fpubh.2021.741334

Rivera-Luna, R., Zapata-Tarres, M., Shalkow-Klincovstein, J., Velasco-Hidalgo, L., Olaya-Vargas, A., Finkelstein-Mizrahi, N., Cárdenas-Cardós, R., & Aguilar-Ortiz, M. R. (2016). The burden of childhood cancer in Mexico: Implications for low- and middle-income countries. Pediatric Blood & Cancer, 64(6), e26366. https://doi.org/10.1002/pbc.26366

Roberts, B., Cooke-Barber, J., Ingram, M., Danko, M., Trudeau, M., Glick, R. D., Short, S. S., Robertson, D. J., Raval, M. V., Dasgupta, R., & Rich, B. S. (2023a). Disparities in care of pediatric, adolescent, and young adult patients with solid tumors: A systematic review. Pediatric Blood & Cancer, 70(7). https://doi.org/10.1002/pbc.30355

Roberts, B., Cooke-Barber, J., Ingram, M., Danko, M., Trudeau, M., Glick, R. D., Short, S. S., Robertson, D. J., Raval, M. V., Dasgupta, R., & Rich, B. S. (2023b). Disparities in care of pediatric, adolescent, and young adult patients with solid tumors: A systematic review. Pediatric Blood & Cancer, 70(7). https://doi.org/10.1002/pbc.30355

Robles, J. M., Ruiz, J., Correa, R., Dinescu-Munoz, N., Patel, C., Noyd, D., Alvarez, M., Frost, E., Ledbetter, L., & LeBlanc, T. W. (2024). The impact of language discordance on pediatric cancer care outcomes: A systematic review. Pediatric Blood & Cancer, 71(12), e31338. https://doi.org/10.1002/pbc.31338

Rodriguez-Galindo, C., Friedrich, P., Alcasabas, P., Antillon, F., Banavali, S., Castillo, L., Israels, T., Jeha, S., Harif, M., Sullivan, M. J., Quah, T. C., Patte, C., Pui, C.-H., Barr, R., & Gross, T. (2015). Toward the Cure of All Children With Cancer Through Collaborative Efforts: Pediatric Oncology As a Global Challenge. Journal of Clinical Oncology, 33(27), 3065–3073. https://doi.org/10.1200/jco.2014.60.6376

Rodriguez-Galindo, C., Friedrich, P., Morrissey, L., & Frazier, L. (2013a). Global challenges in pediatric oncology. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00313414400002

Rodriguez-Galindo, C., Friedrich, P., Morrissey, L., & Frazier, L. (2013b). Global challenges in pediatric oncology. Current Opinion in Pediatrics, 25(1), 3–15. https://doi.org/10.1097/mop.0b013e32835c1cbe

Siegel, D., Richardson, L., Henley, J., Wilson, R., Dowling, N., Weir, H., Tai, E., & Lunsford, N. (2020). Pediatric cancer mortality and survival in the United States, 2001-2016. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00554790800001

Tarnasky, A. M., Olivere, L. A., Ledbetter, L., & Tracy, E. T. (2021). Examining the Effect of Travel Distance to Pediatric Cancer Centers and Rurality on Survival and Treatment Experiences: A Systematic Review. Journal of Pediatric Hematology/Oncology, 43(5), 159–171. https://doi.org/10.1097/mph.0000000000002095

The American Cancer Society. (2019). Cancer in Children. The Cancer Atlas. https://canceratlas.cancer.org/the-burden/cancer-in-children/

Tran, Y., Coven, S., Park, S., & Mendonca, E. (2022). Social determinants of health and pediatric cancer survival: A systematic review. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00749695700001

Trijn Israëls, Kambugu, J., Kouya, F., Nader Kim El-Mallawany, Hesseling, P., Gertjan J. L. Kaspers, Eden, T., Renner, L., & Molyneux, E. (2013). Clinical trials to improve childhood cancer care and survival in sub-Saharan Africa. Nature Reviews Clinical Oncology, 10(10), 599–604. https://doi.org/10.1038/nrclinonc.2013.137

Tucker-Seeley, R., Maysa Abu-Khalaf, Bona, K., Shastri, S., Johnson, W., Phillips, J., Masood, A., Moushey, A., & Hinyard, L. (2024). Social Determinants of Health and Cancer Care: An ASCO Policy Statement. JCO Oncology Practice, 20(5). https://doi.org/10.1200/op.23.00810

Valery, P. C., Moore, S. P., Meiklejohn, J., & Bray, F. (2014). International variations in childhood cancer in indigenous populations: a systematic review. The Lancet Oncology, 15(2), e90–e103. https://doi.org/10.1016/S1470-2045(13)70553-9

van Breeschoten, J., De Abreu Lourenco, R., Signorelli, C., Haas, M., Cohn, R. J., Wakefield, C. E., & Fardell, J. E. (2017). Patterns and drivers of health care use in long-term childhood cancer survivors: A systematic review. Critical Reviews in Oncology/Hematology, 120, 60–76. https://doi.org/10.1016/j.critrevonc.2017.10.004

REFERENCES

Van Weelderen, R. E., Klein, K., Natawidjaja, M. D., De Vries, R., & Kaspers, G. J. (2021). Outcome of pediatric acute myeloid leukemia (AML) in low- and middle-income countries: a systematic review of the literature. Expert Review of Anticancer Therapy, 21(7), 765–780. https://doi.org/10.1080/14737140.2021.1895756

World Health Organization. (2021). Social determinants of health. World Health Organization. https://www.who.int/health-topics/social-determinants-of-health

Yanful, B., Kirubarajan, A., Bhatia, D., Mishra, S., Allin, S., & Di Ruggiero, E. (2023). Quality of care in the context of universal health coverage: a scoping review. Web of Science. https://www-webofscience-com.libaccess.lib.mcmaster.ca/wos/woscc/full-record/WOS:0 00983471400001

Zapata-Tarrés, M., Balandrán, J. C., Rivera-Luna, R., & Pelayo, R. (2021). Childhood Acute Leukemias in Developing Nations: Successes and Challenges. Current Oncology Reports, 23(5). https://doi.org/10.1007/s11912-021-01043-9