

CANCER AND SOCIAL DETERMINANTS OF HEALTH: EXAMINING THE IMPACT OF ECONOMIC, GEOGRAPHIC, AND RACIAL DISPARITIES IN TREATMENT OUTCOMES: A REVIEW

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ABSTRACT

Cancer is a leading global health concern, responsible for significant morbidity and mortality. However, treatment outcomes are not solely determined by biological factors but are heavily influenced by social determinants of health (SDOH), including economic status, geographic location, and racial and ethnic background. This review explores how these disparities shape cancer care access, treatment efficacy, and survival outcomes.

Economic disparities play a critical role in determining whether patients can afford cancer screenings, timely diagnoses, and high-quality treatment options. Individuals from lower socioeconomic backgrounds face financial toxicity, limited insurance coverage, and barriers to accessing novel therapies, which contribute to poorer outcomes. Additionally, geographic disparities, particularly in rural and medically underserved areas, limit access to specialized cancer care, leading to delayed diagnoses and reduced survival rates. Patients in these areas often travel long distances for treatment, experience provider shortages, and face higher healthcare costs.

Racial and ethnic disparities further exacerbate inequities in cancer treatment outcomes. Structural racism, implicit bias in medical practice, and historical mistrust in healthcare systems contribute to lower rates of screening, delayed treatment initiation, and exclusion from clinical trials among racial and ethnic minority groups. Black, Hispanic, and Indigenous populations consistently experience higher cancer-related mortality rates, partly due to systemic barriers in healthcare access and quality.

To address these challenges, policy and interventional strategies are crucial in mitigating disparities in cancer treatment. Policy-driven approaches such as Medicaid expansion, patient navigation programs, and telemedicine initiatives have shown promise in improving access to care. Additionally, community-based interventions, culturally tailored health education programs, and increased representation of minority populations in clinical research can help bridge existing gaps.

Future research should focus on refining targeted interventions, integrating SDOH into oncologic care frameworks, and leveraging emerging technologies to enhance healthcare access. By addressing these disparities, healthcare systems can work toward more equitable cancer treatment and improved patient outcomes.

Keywords: Cancer disparities, social determinants of health, economic barriers, geographic disparities, racial inequities, cancer treatment outcomes, healthcare access, policy interventions.

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1.0 INTRODUCTION

1.1 Background and Significance

Cancer continues to be one of the leading causes of mortality worldwide, accounting for an estimated 10 million deaths in 2020 alone. It is projected to remain a dominant cause of death as aging populations and lifestyle-related risk factors contribute to rising incidences across all regions (World Health Organization [WHO], 2021). While advancements in medical research have led to significant improvements in early detection, novel treatment modalities, and overall survival rates, many disparities in cancer care persist. These disparities are deeply embedded in the fabric of healthcare systems, and they are intricately linked to social determinants of health (SDOH), including factors like socioeconomic status, geographic location, and racial or ethnic background. The impact of these determinants on health outcomes is profound and cannot be overstated, as they

significantly influence individuals' access to care, adherence to treatment, and overall survival outcomes (Marmot et al., 2020). Addressing these disparities is crucial, as it is essential to ensure equitable access to cancer care and improve treatment outcomes for underserved and vulnerable populations worldwide.

The concept of social determinants of health is broad, encompassing a range of non-medical factors that significantly influence health outcomes. These include an individual's income level, educational attainment, employment status, housing conditions, and access to healthcare services (Centers for Disease Control and Prevention [CDC], 2022). Social determinants are not just important in determining whether an individual can access healthcare, but they also shape the quality of care they receive. Disparities in cancer outcomes often serve as a stark reflection of broader systemic inequities in healthcare systems, public health policies, and social infrastructure, which disproportionately affect vulnerable populations, including those in low-income neighborhoods, rural areas, and communities of color (Williams et al., 2019). Understanding how these determinants influence cancer treatment is a key step toward addressing healthcare disparities and achieving health equity.

1.2 The Impact of Disparities on Cancer Treatment Outcomes

Economic disparities are a critical barrier in cancer care. For many individuals, particularly those from lower socioeconomic backgrounds, the costs associated with cancer care—such as screening, diagnostic tests, and treatments—are significant barriers to timely and adequate care. These economic factors are often compounded by lack of access to insurance coverage, which can result in delayed diagnoses, poorer treatment outcomes, and higher mortality rates (National Cancer Institute [NCI], 2023). Lower-income patients often have limited access to state-of-the-art therapies, which can be expensive and may not be covered under insurance plans or government healthcare programs. Additionally, there are logistical barriers such as the ability to afford transportation to healthcare facilities, especially for individuals living in rural or underserved urban areas, further delaying access to critical cancer treatments.

Geographic disparities also play a major role in shaping cancer care outcomes, particularly in rural areas where healthcare providers are in short supply, and the availability of specialized cancer services is limited (Onega et al., 2023). In these settings, patients may be forced to travel long distances to access care, which can delay diagnosis, increase treatment costs, and, in some cases, result in incomplete treatment due to logistical barriers. Moreover, healthcare infrastructure in rural areas may be insufficient to meet the needs of cancer patients, with limited availability of oncologists, radiologists, and other specialists, leading to treatment delays and suboptimal outcomes. Geographic isolation often compounds economic disadvantages, as individuals in these areas may also have fewer financial resources and limited access to supportive care services.

Racial and ethnic disparities in cancer care are among the most persistent and well-documented forms of health inequity. Structural racism, historical injustices, implicit bias in healthcare delivery, and a lack of cultural competence among healthcare providers contribute to inequitable care for racial and ethnic minorities. African Americans, Hispanics, Native Americans, and other racial and ethnic minorities are often diagnosed at later stages of cancer, receive less aggressive treatment, and experience worse survival outcomes compared to their white counterparts (Shulman et al., 2024). In addition to systemic discrimination and inadequate access to healthcare, factors such as cultural mistrust of the medical system, lack of representation in clinical trials, and the underutilization of healthcare services further exacerbate these disparities. Furthermore, genetic differences that are not sufficiently addressed in medical research or treatment development may also play a role in the unequal burden of cancer in minority populations (Pacheco et al., 2021).

1.3 Objectives of the Review

This review aims to examine the multifaceted ways in which economic, geographic, and racial disparities influence cancer treatment outcomes. The review will focus on the following key objectives:

1. **Economic Barriers:** Analyze the impact of economic disparities, including insurance status, income level, and healthcare affordability, on the accessibility of cancer treatment, patient adherence to prescribed therapies, and overall survival outcomes. It will explore the financial burden of cancer care on lower-income individuals and the consequences of unequal access to early detection and cutting-edge treatments.
2. **Geographic Disparities:** Evaluate the effect of geographic location on cancer care, particularly the differences in healthcare access between rural and urban populations. This section will explore the challenges posed by transportation barriers, limited healthcare provider availability, and the lack of

specialized oncology services in rural areas, as well as the role of telemedicine in mitigating these disparities.

3. **Racial and Ethnic Disparities:** Investigate the role of racial and ethnic disparities in cancer treatment, with a focus on systemic discrimination, cultural factors, genetic considerations, and healthcare access. This section will examine the historical context of these disparities, the impact of implicit bias in healthcare delivery, and the consequences of underrepresentation in clinical research.
4. **Policy Interventions and Healthcare Strategies:** Discuss policy interventions and healthcare strategies aimed at reducing disparities and improving equity in cancer treatment. This section will focus on the role of governmental and non-governmental organizations in promoting healthcare access, improving health insurance coverage, and addressing the specific needs of vulnerable populations in cancer care.

By addressing these critical areas, this review seeks to contribute to the growing body of literature on health equity in cancer care. The findings will offer evidence-based recommendations for improving cancer care accessibility, treatment outcomes, and survival rates for vulnerable and underserved populations. Ultimately, the goal is to ensure that advancements in cancer treatment are accessible to all individuals, regardless of their socioeconomic status, geographic location, or racial/ethnic background. Achieving these goals is essential not only for improving public health outcomes but also for advancing the broader objectives of health equity and social justice.

2.0 METHODOLOGY

This review paper employs a systematic literature review (SLR) approach to analyze the impact of economic, geographic, and racial disparities on cancer treatment outcomes. The methodology follows a structured process to ensure a comprehensive, unbiased, and replicable synthesis of existing research. The review process includes data sources and search strategy, inclusion and exclusion criteria, data extraction and synthesis, and quality assessment.

2.1. Data Sources and Search Strategy

A systematic search was conducted across multiple electronic databases, including:

- **PubMed** (biomedical and clinical studies)
- **Google Scholar** (broad academic literature)
- **Web of Science** (multidisciplinary health and social science research)
- **Scopus** (peer-reviewed journal articles)
- **CINAHL (Cumulative Index to Nursing and Allied Health Literature)** (nursing and allied health research)

The search strategy used a combination of Medical Subject Headings (**MeSH**) terms and keywords related to cancer disparities. The primary search terms included:

- “cancer disparities”
- “social determinants of health and cancer”
- “economic barriers to cancer care”
- “racial disparities in cancer treatment”
- “geographic disparities in cancer outcomes”
- “rural-urban differences in cancer survival”
- “cancer health equity”

- **“healthcare access and cancer”**

Boolean operators (**AND, OR, NOT**) were used to refine the search. Searches were limited to **peer-reviewed studies published between 2010 and 2024** to ensure the inclusion of recent and relevant research.

2.2. Inclusion and Exclusion Criteria

Inclusion Criteria:

- Studies published in **peer-reviewed journals**
- Research conducted in **human populations**
- Studies that discuss the impact of **economic, geographic, or racial disparities** on **cancer diagnosis, treatment, survival, or patient outcomes**
- Articles published in **English**
- Studies using **quantitative, qualitative, or mixed-methods** approaches

Exclusion Criteria:

- Articles focused **solely on animal models or laboratory research**
- Studies **not directly related** to cancer disparities
- Non-peer-reviewed literature (e.g., opinion pieces, policy briefs, or editorials)
- **Duplicate studies** found in multiple databases

After initial screening, duplicate articles were removed using **Zotero** reference management software, and the remaining articles were assessed for relevance based on their abstracts and full texts.

2.3. Data Extraction and Synthesis

The selected articles were systematically reviewed, and data were extracted based on the following key variables:

- **Study characteristics** (author, year, country, sample size, study design)
- **Type of disparity examined** (economic, geographic, racial/ethnic)
- **Cancer type(s) studied** (breast, lung, colorectal, prostate, etc.)
- **Primary outcomes measured** (access to care, treatment delays, mortality rates, survival rates)
- **Key findings** (summary of how disparities influence cancer outcomes)
- **Proposed interventions** (policy recommendations, healthcare strategies, community-based initiatives)

A **narrative synthesis** approach was employed to summarize findings across different studies, identifying key themes and patterns in the data. Quantitative studies were reviewed for statistical significance, while qualitative studies were examined for common themes related to patient experiences and barriers to care.

2.4. Quality Assessment and Risk of Bias

To ensure the reliability and validity of the included studies, a **critical appraisal** was performed using:

- The **Newcastle-Ottawa Scale (NOS)** for observational studies
- The **Critical Appraisal Skills Programme (CASP) tool** for qualitative studies
- The **Cochrane Risk of Bias Tool** for randomized controlled trials

Each study was evaluated based on factors such as **study design, sample size, potential confounders, statistical methods, and generalizability of findings**. Studies with high risk of bias were excluded from the final synthesis.

2.5. Ethical Considerations

This study does not involve human subjects or require direct data collection. All data used were obtained from publicly available sources, ensuring compliance with ethical guidelines for secondary data research. Proper citations and references were maintained to acknowledge original authorship.

2.6. Limitations of the Methodology

While this systematic review provides a comprehensive analysis of disparities in cancer treatment, several limitations must be acknowledged:

- **Publication Bias:** Studies with significant findings are more likely to be published, potentially excluding relevant but unpublished research.
- **Language Restriction:** Only English-language articles were included, which may exclude important studies published in other languages.
- **Variability in Study Designs:** Differences in study methodologies across sources may impact the consistency of findings.
- **Time Frame of Studies:** Research published before 2010 was excluded, which may omit historical perspectives on disparities.

Despite these limitations, this methodology ensures a **rigorous and systematic approach** to understanding cancer disparities, providing valuable insights for healthcare professionals, policymakers, and researchers.

3.0 RESULTS

The findings of this review reveal significant disparities in cancer treatment outcomes associated with economic, geographic, and racial factors. The evidence highlights that patients from lower socioeconomic backgrounds, rural areas, and racial and ethnic minority groups experience disproportionately higher cancer mortality rates, later-stage diagnoses, and reduced access to high-quality care. Furthermore, policies and intervention strategies have shown mixed effectiveness in mitigating these disparities.

3.1 Economic Disparities and Cancer Outcomes

Financial barriers play a critical role in determining cancer diagnosis, treatment, and survival rates. Studies consistently show that uninsured and underinsured patients are more likely to receive a late-stage cancer diagnosis, leading to poorer prognoses and limited treatment options (Han et al., 2021). Cancer treatment is expensive, and financial toxicity—a term used to describe the economic burden of cancer—has been identified as a significant determinant of patient adherence to therapy (Yabroff, Zhao, Han, & Zheng, 2019).

One study found that cancer patients with lower incomes were 35% more likely to experience treatment interruptions due to cost-related issues compared to their wealthier counterparts (Smith, Ganz, & Shih, 2020). Additionally, economic disparities extend to the quality of care, as wealthier patients have greater access to comprehensive cancer centers and cutting-edge therapies, while lower-income patients often rely on community hospitals with limited resources (Altice, Banegas, Tucker-Seeley, & Yabroff, 2019).

The impact of insurance coverage on cancer outcomes is profound. After the implementation of the Affordable Care Act (ACA), uninsured cancer rates dropped significantly, but disparities persisted, particularly for marginalized populations (Ward, Sherman, & Henley, 2021). Patients without insurance are more likely to experience delays in diagnosis and less likely to receive targeted therapies or participate in clinical trials, further exacerbating survival gaps (Han et al., 2021).

3.2 Geographic Disparities in Cancer Care

Rural cancer patients face significant barriers to care, including fewer oncologists per capita, long travel distances to treatment centers, and reduced access to advanced medical technologies (Jones & Patel, 2021). One

study found that rural patients diagnosed with breast and colorectal cancer were 20% more likely to die within five years compared to urban patients, even after controlling for stage at diagnosis (Onega et al., 2020).

Delayed cancer diagnosis is another major issue among rural populations. The shortage of medical specialists, compounded by limited screening programs, leads to delayed detection and treatment initiation (Bashshur, Doarn, Frenk, Kvedar, & Woolliscroft, 2020). This is particularly concerning for cancers such as lung and pancreatic cancer, where early diagnosis is crucial for survival.

Telemedicine has emerged as a potential solution to bridge geographic disparities, particularly during the COVID-19 pandemic. However, its effectiveness is limited by disparities in digital literacy, internet access, and reimbursement policies (Dorsey & Topol, 2020). Additionally, rural hospitals often lack the necessary infrastructure to support telehealth oncology services, leaving many patients without viable alternatives for timely care (Onega et al., 2020).

3.3 Racial and Ethnic Disparities in Cancer Treatment and Outcomes

Racial and ethnic minorities experience disproportionately worse cancer outcomes compared to non-Hispanic White populations. Black and Hispanic patients are more likely to be diagnosed at later stages, have lower survival rates, and face significant treatment delays (Chen, Hayman, & Wilson, 2021). Systemic barriers, including implicit bias in healthcare, socioeconomic disadvantages, and mistrust in the medical system, further compound these disparities (Williams, Lawrence, & Davis, 2019).

For instance, Black women with breast cancer are 40% more likely to die from the disease compared to White women, despite having similar incidence rates (Siegel, Miller, Fuchs, & Jemal, 2021). This disparity has been linked to reduced access to mammography, differences in tumor biology, and delays in receiving guideline-concordant treatment. Similarly, Hispanic patients with colorectal cancer experience lower rates of screening and are less likely to receive surgical interventions, contributing to poorer outcomes (Martinez Tyson, Medina-Ramirez, Flores, & Siegel, 2020).

Racial disparities also extend to participation in clinical trials. Minority populations remain underrepresented in oncology research, limiting the generalizability of novel therapies (Ford et al., 2020). A review found that Black and Hispanic patients are significantly less likely to be enrolled in precision medicine studies, leading to gaps in the development of effective, targeted treatments for these populations (Peek, Lopez, & Williams, 2019).

3.4 Effectiveness of Policy and Interventional Strategies

While numerous policy interventions have been implemented to reduce disparities in cancer care, their effectiveness remains inconsistent. The ACA played a crucial role in expanding insurance coverage, leading to earlier cancer diagnoses and improved survival rates among historically underserved populations (Han et al., 2021). However, states that did not expand Medicaid continue to see significant disparities in cancer outcomes, highlighting the need for broader policy adoption (Ward et al., 2021).

Community-based interventions, including patient navigation programs and culturally tailored cancer education initiatives, have demonstrated some success in reducing disparities (Peek et al., 2019). These programs help improve adherence to screening guidelines and facilitate timely treatment, particularly among racial and ethnic minority groups. However, funding limitations and inconsistent implementation hinder their widespread effectiveness.

Telehealth has shown promise in mitigating geographic disparities by improving access to specialist consultations and treatment follow-ups (Bashshur et al., 2020). Yet, barriers such as limited broadband access in rural areas and lower digital literacy among elderly patients limit its full potential (Dorsey & Topol, 2020).

Addressing disparities in cancer care requires a multi-pronged approach, integrating policy reforms, healthcare system improvements, and targeted community outreach efforts. While progress has been made, substantial inequities persist, underscoring the need for continued research and advocacy.

4.0 FUTURE DIRECTIONS AND RESEARCH PRIORITIES

While significant progress has been made in understanding how social determinants impact cancer treatment outcomes, substantial knowledge gaps remain. Addressing these gaps through targeted research is essential for

developing evidence-based interventions that promote health equity and improve survival rates for all cancer patients.

4.1 Addressing Economic Disparities through Longitudinal Studies

Although numerous studies have established a link between socioeconomic status and cancer outcomes, there is a need for more **longitudinal research** examining how financial instability over time influences disease progression, treatment adherence, and survivorship. Many studies focus on a single point in a patient's cancer journey, but financial toxicity can evolve, affecting long-term health outcomes. Future research should explore how **employment loss, medical debt, and economic downturns** impact treatment decisions and mortality rates (Yabroff et al., 2019).

Additionally, more research is needed to evaluate the effectiveness of **financial assistance programs**, including government subsidies, private grants, and hospital-based charity care, in reducing disparities. Studies should assess which financial interventions are most effective in ensuring timely treatment initiation and improving patient adherence to prescribed therapies (Altice et al., 2019).

4.2 Bridging Geographic Disparities with Innovative Care Models

Geographic disparities remain a major challenge, particularly in rural areas where oncology specialists and advanced treatment facilities are scarce. While **telemedicine** has emerged as a promising solution, research on its long-term impact on **cancer survival rates, patient satisfaction, and cost-effectiveness** is still limited (Dorsey & Topol, 2020). Future studies should investigate:

- The **effectiveness of telehealth in reducing delays in cancer diagnosis** and treatment initiation.
- Strategies to improve **digital literacy and internet access** in rural communities.
- The role of **mobile cancer screening units** in increasing early detection rates for underserved populations.

Furthermore, research should explore **alternative healthcare delivery models**, such as **hub-and-spoke cancer care systems**, where major cancer centers provide virtual consultations and treatment guidance to smaller rural hospitals (Jones & Patel, 2021). The implementation and scalability of these models require further evaluation.

4.3 Understanding the Biological and Social Drivers of Racial Disparities

While racial disparities in cancer treatment outcomes are well-documented, the interplay between **biological, social, and systemic factors** remains poorly understood. More **genomic research** is needed to assess whether differences in tumor biology contribute to disparities in cancer progression and treatment response among racial and ethnic minorities (Chen et al., 2021).

At the same time, future studies must **deconstruct the role of implicit bias in cancer care delivery**. Research should focus on:

- How physician **decision-making biases** contribute to differences in treatment recommendations.
- The impact of **culturally tailored patient education programs** on improving treatment adherence.
- The role of **community-based interventions** in reducing mistrust in healthcare systems.

Increasing minority participation in **clinical trials** is another research priority. Future studies should evaluate the effectiveness of policy-driven strategies, such as **mandated diversity reporting for trial enrollment**, in improving representation and ensuring that emerging therapies are effective across all racial and ethnic groups (Ford et al., 2020).

4.4 Policy-Oriented Research for Systemic Change

Despite policy interventions like the **Affordable Care Act (ACA)**, disparities in cancer care persist. Future research should assess:

- The long-term impact of **Medicaid expansion on cancer outcomes** in different states.

- The effectiveness of **state-funded early detection programs** in increasing screening rates among low-income populations.
- Policy strategies to improve **care coordination between primary care providers and oncologists** to ensure timely diagnosis and referral.

Additionally, research should explore how **value-based reimbursement models**—which tie healthcare provider payments to patient outcomes rather than the volume of services provided—affect **equity in cancer care delivery** (Ward et al., 2021).

CONCLUSION

Cancer remains a leading cause of mortality worldwide, and despite advancements in early detection and treatment, significant disparities persist in cancer care. These disparities—rooted in economic, geographic, and racial inequities—contribute to variations in diagnosis, treatment access, survival rates, and overall patient outcomes. This review highlights the critical role of social determinants of health in shaping cancer treatment disparities and underscores the need for targeted interventions to promote equitable healthcare access.

Economic barriers, including income level, insurance status, and healthcare affordability, continue to limit timely access to cancer screening, diagnosis, and treatment. Patients from lower socioeconomic backgrounds face challenges such as delayed diagnoses, reduced access to advanced therapies, and lower survival rates. Geographic disparities further compound these challenges, particularly for individuals in rural and underserved areas who experience healthcare provider shortages, transportation difficulties, and limited oncology services. Racial and ethnic disparities, deeply intertwined with historical injustices, implicit biases in medical practice, and systemic discrimination, result in unequal treatment experiences and suboptimal outcomes for minority populations.

Addressing these disparities requires a multifaceted approach, including policy reforms, improved healthcare infrastructure, and culturally tailored interventions. Expanding Medicaid coverage, increasing funding for community-based cancer programs, and enhancing telemedicine services can improve access for economically and geographically disadvantaged populations. Additionally, integrating diversity and equity training into medical education, investing in targeted research on racial disparities in cancer, and strengthening patient navigation programs can help mitigate racial and ethnic inequities.

Ultimately, achieving cancer health equity requires sustained efforts from policymakers, healthcare providers, researchers, and community organizations. By implementing evidence-based strategies and fostering inclusive healthcare systems, we can bridge the gaps in cancer treatment, reduce mortality rates, and ensure that advancements in oncology benefit all individuals—regardless of socioeconomic status, geographic location, or racial background. Future research should continue to explore innovative solutions and policy interventions to eliminate disparities and promote a more just and equitable healthcare system.

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