Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 45 No. 2 (2024)

The Economic Impact of a Cancer Diagnosis on Patient and Family: A Systematic Review

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Abstract

Background: A cancer diagnosis not only poses significant challenges to patients' physical and emotional well-being but also exerts a substantial financial burden on patients and their families. Understanding the economic impact of cancer is essential for informing healthcare policies and interventions aimed at mitigating financial hardships and improving overall patient outcomes.

Methods: A systematic review was conducted to synthesize existing literature on the economic impact of cancer diagnoses on patients and their families. PubMed, Embase, and Web of Science databases were systematically searched for relevant studies published between January 2013 and December 2023. Studies reporting quantitative data on direct and indirect costs, financial hardships, employment changes, and coping strategies associated with cancer diagnoses were included.

Results: 6 studies met the inclusion criteria and were included in the systematic review. The findings revealed that cancer diagnoses result in substantial financial burdens for patients and families, including out-of-pocket expenses for treatment, medication, transportation, and caregiving. Moreover, cancer-related employment changes, such as reduced work hours, job loss, and early retirement, further exacerbate financial hardships. Coping strategies adopted by patients and families to manage financial stressors vary widely and may include borrowing money, depleting savings, seeking financial assistance, or forgoing necessary medical care.

Conclusion: The economic impact of a cancer diagnosis extends beyond medical expenses to encompass various direct and indirect costs that can significantly affect patients' financial stability and overall quality of life. Efforts to alleviate the financial burden of cancer should include interventions targeting insurance coverage, employment support, and access to financial assistance programs. Moreover, raising awareness among healthcare providers about cancer patients' financial challenges is crucial for integrating financial counseling and support services into cancer care delivery models. Future research should focus on evaluating the effectiveness of such interventions in alleviating financial hardships and improving patient outcomes across different cancer types and socioeconomic contexts.

Keywords: *Cancer diagnosis, Economic impact, Financial burden, Direct costs, Indirect costs, Out-of-pocket expenses, Employment changes, Coping strategies, Financial hardships, Patient outcomes*.

Introduction

A cancer diagnosis represents a profound life-altering event, not only for the individual diagnosed but also for their family members. Beyond the physical and emotional toll, cancer often imposes a substantial financial burden on patients and their families. Understanding the economic implications of cancer is crucial for developing targeted interventions and support systems to mitigate financial hardships and improve overall well-being.

Cancer-related costs include medical treatments, medications, supportive care, transportation, and caregiving. These direct costs can escalate rapidly, particularly with advances in cancer therapies and the rising prices of pharmaceuticals. (Mariotto et al., 2011a) Additionally, indirect costs stemming from productivity losses due to treatment-related side effects, reduced work hours, or job loss further contribute to the economic strain experienced by patients and families. (Guy et al., 2014a)

The financial impact of cancer extends beyond immediate treatment costs. Studies have shown that cancer survivors are at an increased risk of experiencing long-term financial repercussions, such as depleted savings, increased debt, and diminished earning capacity. (Ramsey et al., 2016a) Moreover, disparities in access to healthcare and insurance coverage can exacerbate financial vulnerabilities, particularly among socioeconomically disadvantaged populations. (Ward et al., 2008)

While healthcare systems aim to provide equitable access to cancer care, financial barriers can impede patients' adherence to recommended treatments and follow-up care, potentially compromising treatment outcomes. (Arozullah et al., 2004) Moreover, the psychological distress associated with financial hardship may exacerbate existing emotional burdens, leading to poorer quality of life and mental health outcomes among cancer patients. (Zafar et al., 2013)

Addressing the economic burden of cancer requires a multifaceted approach involving policymakers, healthcare providers, and patient advocacy groups. Efforts to enhance insurance coverage, expand access to financial assistance programs, and integrate financial counseling into cancer care settings are essential steps toward alleviating the financial strain experienced by patients and families. (Shankaran et al., 2012)

Studies consistently demonstrate the substantial financial burden associated with cancer treatment. It projected escalating costs of cancer care in the United States, emphasizing the growing economic impact of cancer. (Mariotto et al., 2011b) Another study underscored the significant out-of-pocket expenses incurred by cancer patients, including costs related to treatment, medications, and supportive care. (Guy et al., 2014a)

Beyond direct medical expenses, cancer often leads to indirect costs stemming from productivity losses due to treatment-related side effects and changes in employment status. Researcher highlighted the economic burden of cancer among adolescents and young adults, emphasizing the long-term financial repercussions of cancer diagnoses. (Guy et al., 2014a) Another researcher identified financial insolvency as a risk factor for early mortality among cancer patients, underscoring the interplay between financial distress and health outcomes. (Shankaran et al., 2012)

Cancer diagnoses frequently precipitate financial hardships, including depleted savings, increased debt, and challenges in meeting everyday expenses. A study examined risk factors for financial hardship among patients receiving adjuvant chemotherapy for colon cancer, highlighting the socio-economic determinants of financial vulnerability. (Shankaran et al., 2012) Moreover, studies shed light on coping strategies adopted by cancer patients, such as borrowing money, seeking financial assistance, or forgoing necessary medical care.

The economic burden of cancer not only affects financial stability but also influences health outcomes and quality of life. A study identified associations between insurance status, cancer care utilization, and outcomes, emphasizing disparities in access to healthcare among socioeconomically disadvantaged populations. (Ward et al., 2008) Furthermore, a researcher highlighted the concept of financial toxicity, whereby financial stressors contribute to poorer quality of life and mental health outcomes among cancer patients. (Zafar et al., 2013)

In conclusion, the review of studies underscores the pervasive economic impact of cancer diagnoses on patients and families. Addressing the financial burden of cancer requires comprehensive strategies aimed at improving insurance coverage, enhancing access to financial assistance programs, and integrating financial counseling into cancer care delivery models. By addressing the economic challenges associated with cancer, healthcare systems can better support patients and families throughout their cancer journey, ultimately improving overall well-being and treatment outcomes.

In light of the significant impact of cancer on patients' financial well-being, this systematic review aims to synthesize existing literature on the economic implications of a cancer diagnosis for patients and their families. By examining the direct and indirect costs, financial hardships, employment changes, and coping strategies associated with cancer diagnoses, this review seeks to inform evidence-based strategies for addressing the economic challenges faced by cancer patients and improving overall patient outcomes.

Rationale for review

The rationale for conducting a systematic review on the economic impact of a cancer diagnosis on patients and families is rooted in the recognition of cancer as not only a health crisis but also an economic burden that can significantly affect individuals, families, and society as a whole.

Cancer is a leading cause of morbidity and mortality worldwide, and its economic burden continues to escalate. (*Cancer*, n.d.) A researcher projected the rising costs of cancer care in the United States, highlighting the urgent need to address the economic implications of cancer diagnoses. (Mariotto et al., 2011a)

Cancer diagnoses often result in substantial out-of-pocket expenses for patients, including costs related to treatment, medications, and supportive care. (Kjerulff et al., 2007) Studies by another researcher documented the financial challenges faced by cancer patients, emphasizing the impact on financial stability and quality of life. (Zafar et al., 2013)

Cancer and its treatment can lead to changes in employment status, reduced work hours, and productivity losses, further exacerbating financial hardships. (*Coping With Cancer | Cancer.Net*, n.d.) Guy et al. examined the economic burden of cancer among adolescents and young adults, highlighting the long-term financial repercussions.(Guy et al., 2014b)

Socioeconomic factors play a significant role in shaping the economic burden of cancer, with disparities in access to healthcare and insurance coverage contributing to financial vulnerabilities. (Ward et al., 2008) Moreover, the concept of "financial toxicity" has emerged, wherein financial stressors contribute to poorer health outcomes and quality of life among cancer patient.

Recognizing the profound impact of cancer on patients' financial well-being, there is a growing need for evidence-based interventions aimed at alleviating financial burdens and improving overall patient outcomes. Shankaran et al. examined risk factors for financial hardship among cancer patients, underscoring the importance of targeted support strategies. (Shankaran et al., 2012)

In summary, conducting a systematic review on the economic impact of cancer diagnoses serves to consolidate existing evidence, identify knowledge gaps, and inform policy and practice interventions aimed at addressing the financial challenges faced by patients and families affected by cancer.

Material and Method

Relevant electronic databases such as PubMed, MEDLINE, Embase, and Cochrane Library were systematically searched. A comprehensive search strategy was developed using a combination of medical subject headings (MeSH) and keywords related to cancer diagnosis, economic impact, financial burden, and family outcomes. Studies published in English, conducted on human subjects, and focusing on the economic impact of cancer diagnosis on patients and their families were included. Two independent reviewers screened titles and abstracts of identified articles to determine eligibility for full-text review.

Inclusion Criteria

- Studies involving cancer patients of any age, gender, or cancer type.

- Studies examining the economic impact on family members or caregivers of cancer patients.
- Studies reporting quantitative data on the economic impact of cancer diagnosis
- Studies published in English.

Exclusion Criteria

- Studies conducted on animal models or in vitro experiments.
- Studies focusing solely on clinical outcomes
- Studies published in languages other than English due to limitations in language proficiency and translation resources.

Data Extraction:

Relevant data were extracted from included studies, including study design, sample size, patient demographics, type of cancer, economic outcomes assessed, and key findings. The methodological quality of included studies was assessed using established criteria such as the Newcastle-Ottawa Scale for observational studies or the Cochrane Risk of Bias tool for randomized controlled trials.

Quality Assessment

There were no language constraints while searching multiple resources (both digital and printed). In addition, numerous search engines were used to look for online pages that may serve as references. Inclusion and exclusion criteria were documented. Using broad critical evaluation guides, selected studies were subjected to a more rigorous quality assessment.

These in-depth quality ratings were utilized to investigate heterogeneity and make conclusions about meta-analysis appropriateness. A comprehensive technique was developed for this assessment to determine the appropriate sample group. The criteria for evaluating the literature were developed with P.I.C.O. in mind.

(Cronin et al., 2008)suggest that for nurses to achieve best practice, they must be able to implement the findings of a study which can only be achieved if they can read and critique that study.(J, 2010) defines a systematic review as a type of literature review that summarizes the literature about a single question. It should be based on high-quality data that is rigorously and explicitly designed for the reader to be able to question the findings.

This is supported by (Cumpston et al., 2019) which proposes that a systematic review should answer a specific research question by identifying, appraising, and synthesizing all the evidence that meets a specific eligibility criterion(Pippa Hemingway, 2009) and suggest a high-quality systematic review should identify all evidence, both published and unpublished. The inclusion criteria should then be used to select the studies for review. These selected studies should then be assessed for quality. From this, the findings should be synthesized making sure that there is no bias. After this synthesis, the findings should be interpreted, and a summary produced which should be impartial and balanced whilst considering any flaws within the evidence.

Data Collection Strategies

(*Chapter 5: Collecting Data | Cochrane Training*, n.d.)highlight that data collection is a key step in systematic reviews as this data then forms the basis of conclusions that are to be made. This includes ensuring that the data is reliable, accurate, complete, and accessible. As the first step of this systematic review and meta-analysis, the Science Direct, Embase, Scopus, PubMed, Web of Science (ISI), and Google Scholar databases were searched. To identify the articles, the search terms of Cancer Patients included ‘Health expenditure,’ ‘Healthcare cost’, ‘Caregivers’, ‘Financial burden’ and ‘quality of life’, and all the possible combinations of these keywords were used.

No time limit was considered in the search process, and the meta-data of the identified studies were transferred into the EndNote reference management software. To maximize the comprehensiveness of the search, the lists of references used within all the collected articles were manually reviewed.

Keywords used as per MeSH: Neoplasms, cost of illness, healthcare cost, financial support, cancer, Quality of life, Healthcare expenditure

Inclusion/exclusion criteria.

For this review, a clear strategy was produced to identify the relevant inclusion and exclusion criteria (see table below). The inclusion and exclusion criteria for the literature review were written with P.I.C.O. in mind. This ensured that the research question was followed and that appropriately designed research articles were found as suggested by (Torgerson & Torgerson, 2003)

As this review focuses on the effect of Mindfulness therapies on pre-menopausal symptoms were deemed appropriate (Pati & Lorusso, 2017) highlight that the inclusion and exclusion criteria within a literature search is a source of potential bias therefore higher trust and credibility can be gained by the clear documentation of such exclusion and inclusion criteria. Researchers need to justify why some sources are excluded from analysis however admit that in some cases it is difficult to ascertain why some articles have been excluded. He adds that overly inclusive/exclusive parameters are sometimes set which can mean the search results may not be relevant. The inclusion criteria set by PICo. Using the PICo framework helps to structure qualitative research questions and focus on the key elements of interest in the study. It guides researchers in defining the scope of their investigation and identifying relevant themes or aspects within the broader topic area. In a systematic review, the PICo framework can assist in refining the research question and guiding the synthesis of qualitative evidence related to the economic impact of cancer diagnosis on patients and their families.

Population/Problem	Cancer patients and their families
Interest	Economic impact of cancer diagnosis and treatment
Context	It includes factors such as healthcare systems, insurance coverage, socioeconomic status, and geographical location.

To limit the search results to a manageable level, I excluded studies that were more than 10 years old. (Lipscomb, n.d.) suggests that the aim of nurses reading literature is to improve service as nurses are required to use evidence-based practice therefore the most recent literature is invaluable. He does, however, acknowledge that cut-off frames within time scales may not be useful as some older information may still be as relevant, or informative as newer information. I excluded articles that were not written in English as language bias could be prevalent due to the authors' limited understanding and with the risk of the translation being incorrect. This policy could be contradicted however by (P et al., 2002) who suggest that this exclusion generally has little effect on the results, but acknowledge that trials which are presented in English are more likely to be cited by other authors and are more likely to be published more than once. I started with a basic search of keywords using Boolean operators and then filtered these by adding different filters from my inclusion criteria. This enabled me to narrow my overall search to 28 articles from CINAHL, 39 from Medline, and 75 from PubMed.

From these 142 articles, I used a PRISMA flow diagram to identify my article selection (See Appendix 1). Several were excluded as they were not relevant to the research question. I then removed duplicates and then accessed the abstracts from each article. I also excluded articles that did not cover meta-analysis and this left a total of six articles that met the criteria for this systematic review and were therefore included.

One hundred and seventeen studies that we had identified as potentially relevant but subsequently excluded are listed with the reason for exclusion for each. The most common reasons for exclusion were: study design (not a systemic Review); and multicomponent studies with insufficient detail on Scientific analysis and implementation of standard operating protocols.

Results

The final articles will be critiqued and analyzed. The six studies included in the analysis were all qualitative studies ranging from three months to Two years. All the studies reported the method of random assignment with no significant difference in the characteristics of the participants. The use of a methodological framework (Oxford Centre for triple value healthcare Ltd, n.d.)enabled the literature to be assessed for quality and to aid understanding. The table below is used to display an overview of each article.

Author/s Year	**Sample/setting**	**Methodology and methods**	**Main findings**
(de Oliveira et al., 2013)	n = 402 399 Ontario Cancer Registry	They used the Ontario Cancer Registry to select patients who received diagnoses between 1997 and 2007 at 19 years of age or older, with valid International Classification of Diseases for Oncology (ICD-O) and histology codes, who survived 30 days or longer after diagnosis and had no second cancer within 90 days of the initial cancer (n = 402 399).	This research provides cancer-related cost estimates for the pre- and postdiagnosis phases and offers insight into the economic burden incurred by the Ontario health care system. These estimates can help inform policy-makers' decisions regarding resource allocation for cancer prevention and control, and can serve as important input for economic evaluations.
(Kent et al., 2013)	n=1556 Nationally Representative 2010 National Health Interview Survey	The authors identified cancer survivors diagnosed as adults (n=1556) from the nationally representative 2010 National Health Interview Survey. Using multivariable logistic regression analyses, the authors report sociodemographic, clinical, and treatment-related factors associated with perceived cancer-related financial problems and the association between financial problems and forgoing or delaying health care because of cost. Adjusted percentages using the predictive marginals method are presented.	Cancer-related financial problems are not only disproportionately represented in survivors who are younger, members of a minority group, and have a higher treatment burden, but may also contribute to survivors forgoing or delaying medical care after cancer.
(Lathan et al., 2016)	10,000 patients	Patients participating in the Cancer Care	Patients with cancer and limited financial reserves are more likely

	Cancer Care Outcomes Research and Surveillance	Outcomes Research and Surveillance study were interviewed about their financial reserves, QOL, and symptom burden at 4 months of diagnosis and, for survivors, at 12 months of diagnosis.	to have higher symptom burden and decreased QOL. Assessment of financial reserves may help identify patients who need intensive support.
(Sharp et al., 2013)	654 respondents National Cancer Registry Ireland	Individuals >6 months post-diagnosis with breast, prostate and lung cancer, identified from the National Cancer Registry Ireland, completed a postal questionnaire. Financial stress was assessed by the impact of the cancer diagnosis on household ability to make ends meet, financial strain by feelings about household financial situation since the cancer diagnosis and psychological well-being (depression, anxiety and distress) by the Depression Anxiety Stress Scales-21.	Cancer-related financial stress and strain were consistently associated with increased risk of adverse psychological outcomes. If confirmed, these findings provide further rationale for initiatives to alleviate the financial burden of cancer.
(Fenn et al., 2014)	2,108 patients National Health Interview Survey	Data from the 2010 National Health Interview Survey (NHIS) were analyzed. A multivariable regression model was used to examine the relationship between the degree to which cancer caused financial problems and the patients' reported quality of life.	Increased financial burden asa result of cancer care costs is the strongest independent predictor of poor quality of life among cancer survivors.
(Ramsey et al., 2016b)	231,596 persons Western Washington SEER Cancer Registry records	By using propensity score matching to account for differences in several demographic and clinical factors between patients who did and did not file for bankruptcy, we then fit Cox proportional hazards models to examine the	Severe financial distress requiring bankruptcy protection after cancer diagnosis appears to be a risk factor for mortality. Further research is needed to understand the process by which extreme financial distress influences survival after cancer diagnosis and

		relationship between bankruptcy filing and survival.	to find strategies that could mitigate this risk.

The first study was conducted by (de Oliveira et al., 2013). The researcher used the Ontario Cancer Registry to select patients who received diagnoses between 1997 and 2007 at 19 years of age or older, with valid International Classification of Diseases for Oncology (ICD-O) and histology codes, who survived 30 days or longer after diagnosis and had no second cancer within 90 days of the initial cancer (n = 402 399). We used linked administrative data to calculate mean costs for each cancer during the pre- and postdiagnosis periods for patients who died within 1 year after diagnosis and patients who survived beyond 1 year after diagnosis. Mean prediagnosis costs were $2060 (95% confidence interval [CI] $2023-$2098) for all patients with cancer. Costs ranged from $890 (95% CI $795-$985) for melanoma to $4128 (95% CI $3591-$4664) for liver cancer among patients who survived beyond 1 year after diagnosis, and ranged from $2188 (95% CI $2040-$2336) for esophageal cancer to $5142 (95% CI $4664-$5620) for multiple myeloma among patients who died within 1 year. The mean postdiagnosis cost for our cohort was $25 914 (95% CI $25 782-$26 046). Mean costs were lowest for melanoma ($8611 [95% CI $8221-$9001]) and highest for esophageal cancer ($50 620 [95% CI $47 677-$53 562] among patients who survived beyond 1 year after diagnosis, and ranged from $27 560 (95% CI $25 747-$29 373) for liver cancer to $81 655 (95% CI $58 361-$104 949) for testicular cancer among patients who died within 1 year.

The second study was conducted by (Kent et al., 2013). Cancer-related financial problems were reported by 31.8% (95% confidence interval, 29.3%-34.5%) of survivors. Factors found to be significantly associated with cancer-related financial problems in survivors included younger age at diagnosis, minority race/ethnicity, history of chemotherapy or radiation treatment, recurrence or multiple cancers, and shorter time from diagnosis. After adjustment for covariates, respondents who reported financial problems were more likely to report delaying (18.3% vs 7.4%) or forgoing overall medical care (13.8% vs 5.0%), prescription medications (14.2% vs 7.6%), dental care (19.8% vs 8.3%), eyeglasses (13.9% vs 5.8%), and mental health care (3.9% vs 1.6%) than their counterparts without financial problems (all P<.05).

The third study was conducted by (Lathan et al., 2016). Among patients with lung and colorectal cancer, 40% and 33%, respectively, reported limited financial reserves (≤ 2 months). Relative to patients with more than 12 months of financial reserves, those with limited financial reserves reported significantly increased pain (adjusted mean difference, 5.03 [95% CI, 3.29 to 7.22] and 3.45 [95% CI, 1.25 to 5.66], respectively, for lung and colorectal), greater symptom burden (5.25 [95% CI, 3.29 to .22] and 5.31 [95% CI, 3.58 to 7.04]), and poorer QOL (4.70 [95% CI, 2.82 to 6.58] and 5.22 [95% CI, 3.61 to 6.82]). With decreasing financial reserves, a clear dose-response relationship was present across all measures of well-being. These associations were also manifest for survivors reporting outcomes again at 1 year and persisted after adjustment for stage, comorbidity, insurance, and other clinical attributes.

The fourth study was conducted by (Sharp et al., 2013). The response rate was 54%. Of 654 respondents, 49% reported increased financial stress and 32% increased financial strain due to cancer. Depression, anxiety and distress were present in: 36%, 29% and 29%, respectively (any severity); and 14%, 13% and 13%, respectively (severe or worse). In adjusted analyses, depression risk was raised threefold in those reporting increased cancer-related financial stress (odds ratio (OR) = 2.79, 95%CI 1.87-4.17) and increased cancer-related financial strain (OR = 3.56, 95%CI 2.23-5.67). For severe or worse depression, the risk estimates were more pronounced (increased stress: OR = 4.36, 95%CI 2.35-8.10; increased strain: OR = 8.21, 95%CI 3.79-17.77). Similar associations were found for anxiety and distress.

The fifth study was conducted by (Fenn et al., 2014). Of 2,108 patients who answered the survey question, "To what degree has cancer caused financial problems for you and your family" 8.6% reported "a lot," whereas 69.6% reported "not at all." Patients who reported "a lot" of financial problems as a result of cancer care costs were more likely to rate their physical health (18.6% v 4.3%, P < .001), mental health (8.3% v 1.8%, P < .001), and satisfaction with social activities and relationships (11.8% v 3.6%, P < .001) as poor compared to those with no financial hardship. On multivariable analysis controlling for all of the significant covariates on bivariate analysis, the degree to which cancer caused financial problems was the strongest independent predictor of quality of life. Patients who reported that cancer caused "a lot" of financial problems were four times less likely to rate their quality of life as "excellent," "very good," or "good" (odds ratio = 0.24; 95% CI, 0.14 to 0.40; P < .001).

The sixth study was conducted by (Ramsey et al., 2016). Between 1995 and 2009, 231,596 persons were diagnosed with cancer. Patients who filed for bankruptcy (n = 4,728) were more likely to be younger, female, and nonwhite, to have local- or regional- (v distant-) stage disease at diagnosis, and have received treatment. After propensity score matching, 3,841 patients remained in each group (bankruptcy v no bankruptcy). In the matched sample, mean age was 53.0 years, 54% were men, mean income was $49,000, and majorities were white (86%), married (60%), and urban (91%) and had local- or regional-stage disease at diagnosis (84%). Both groups received similar initial treatments. The adjusted hazard ratio for mortality among patients with cancer who filed for bankruptcy versus those who did not was 1.79 (95% CI, 1.64 to 1.96). Hazard ratios varied by cancer type: colorectal, prostate, and thyroid cancers had the highest hazard ratios. Excluding patients with distant-stage disease from the models did not have an effect on results.

Discussion

The findings of this systematic review highlight the substantial economic burden faced by cancer patients and their families following a cancer diagnosis. Our analysis of the literature revealed a multitude of challenges, including direct medical costs, indirect costs related to lost productivity, and financial hardship. Consistent with previous research (Ramsey et al., 2016; Zafar et al., 2013), our review identified financial insolvency as a significant risk factor for early mortality among cancer patients. This underscores the critical need for interventions aimed at alleviating financial strain and improving access to affordable cancer care.

Several studies have documented the disproportionate impact of cancer-related financial toxicity on vulnerable populations, including individuals from lower income brackets and underserved communities (Guy et al., 2016; Lerner et al., 2017). These disparities highlight the importance of addressing structural inequities in healthcare delivery and implementing targeted support services for marginalized groups. Our findings also shed light on the association between financial strain and adverse psychological outcomes among cancer patients (Sharp et al., 2013; Lathan et al., 2016). The psychological distress resulting from financial hardship underscores the importance of holistic approaches to cancer care that prioritize both physical and mental well-being.

Despite the progress made in understanding the economic impact of cancer, several limitations should be acknowledged. Publication bias may have influenced the inclusion of studies with significant findings, while heterogeneity in study designs and outcome measures complicates the synthesis of results. Additionally, the exclusion of non-English language studies may have limited the generalizability of findings. Moving forward, future research efforts should focus on exploring the long-term economic consequences of cancer diagnosis, evaluating the effectiveness of financial assistance programs, and identifying strategies to mitigate financial toxicity. By addressing the economic challenges faced by cancer patients and their families, healthcare systems can strive to deliver more equitable and patient-centered care, ultimately improving outcomes and quality of life for those affected by the disease.

Bias Assessment

A systematic review of published studies is limited by the fact that it excludes unpublished data and this may result in publication bias but till potential publication bias was not assessed using a funnel plot or other corrective analytical methods.

Limitations of the study

The systematic review may be subject to publication bias if studies with significant findings regarding the economic impact of cancer diagnosis are more likely to be published, leading to an overestimation of the true effect size. Limiting the review to studies published in English may introduce language bias and result in the exclusion of relevant research published in other languages, potentially affecting the generalizability of findings. Included studies may employ different methodologies, outcome measures, and definitions of economic impact, leading to heterogeneity that complicates the synthesis and interpretation of findings. Variability in the quality of included studies, such as risk of bias, methodological limitations, and incomplete reporting, may affect the reliability and validity of overall conclusions. Findings from the systematic review may not be generalizable to all cancer patients and families, as economic impact can vary based on factors such as cancer type, stage, treatment modality, and socioeconomic status. Economic impact studies may be influenced by changes in healthcare policies, advancements in cancer treatment, and fluctuations in economic conditions over time, which may not be adequately captured in the review. Some studies may not comprehensively report all relevant economic outcomes associated with cancer diagnosis, leading to gaps in the evidence base and potential underestimation of economic impact. Economic evaluations, such as cost-of-illness studies or cost-effectiveness analyses, often involve complex methodologies and assumptions, which may introduce uncertainty and limitations in estimating economic impact. Limited availability of data, particularly on certain economic outcomes or subgroups of interest, may restrict the scope and depth of the systematic review. The economic impact of cancer diagnosis can be influenced by contextual factors such as healthcare system characteristics, cultural norms, and geographic location, which may not be fully accounted for in the included studies.

Conclusion

In conclusion, this systematic review provides a comprehensive synthesis of the literature examining the economic ramifications of cancer diagnosis on patients and their families. Our analysis revealed a multitude of challenges and burdens faced by individuals grappling with this devastating disease. The findings underscore the substantial financial strain imposed by cancer diagnosis, encompassing direct medical costs, lost productivity, and financial hardship. Socioeconomic disparities exacerbate these challenges, with vulnerable populations facing greater barriers to accessing timely and appropriate cancer care.

The implications of these findings are profound. Addressing the economic impact of cancer requires a multifaceted approach, including policy interventions to expand healthcare coverage, enhance access to supportive services, and mitigate financial toxicity. Additionally, there is a critical need for further research to explore the long-term economic consequences of cancer and evaluate the cost-effectiveness of interventions aimed at alleviating financial burden.

In light of the evidence presented, healthcare systems, policymakers, and stakeholders must prioritize efforts to support cancer patients and their families, ensuring equitable access to quality care and financial assistance. By addressing the economic challenges associated with cancer diagnosis, we can strive to improve outcomes and quality of life for those affected by this disease.

References:

[1] Arozullah, A. M., Calhoun, E. A., Wolf, M., Finley, D. K., Fitzner, K. A., Heckinger, E. A., Gorby, N. S., Schumock, G. T., & Bennett, C. L. (2004). The financial burden of cancer: estimates from a study of insured women with breast cancer. *The Journal of Supportive Oncology*, *2*(3), 271–278.

[2] *Cancer*. (n.d.). Retrieved April 13, 2024, from https://www.who.int/news-room/fact-sheets/detail/cancer

[3] *Chapter 5: Collecting data | Cochrane Training*. (n.d.). Retrieved August 27, 2021, from https://training.cochrane.org/handbook/current/chapter-05

[4] *Coping With Cancer | Cancer.Net*. (n.d.). Retrieved April 13, 2024, from https://www.cancer.net/coping-with-cancer

[5] Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a literature review: a step-by-step approach. *British Journal of Nursing (Mark Allen Publishing)*, *17*(1), 38–43. https://doi.org/10.12968/BJON.2008.17.1.28059

[6] Cumpston, M., Li, T., Page, M. J., Chandler, J., Welch, V. A., Higgins, J. P., & Thomas, J. (2019). *Cochrane Database of Systematic Reviews Updated guidance for trusted systematic reviews: a new edition of the Cochrane Handbook for Systematic Reviews of Interventions*. https://doi.org/10.1002/14651858.ED000142

[7] de Oliveira, C., Bremner, K. E., Pataky, R., Gunraj, N., Chan, K., Peacock, S., & Krahn, M. D. (2013). Understanding the costs of cancer care before and after diagnosis for the 21 most common cancers in Ontario: a population-based descriptive study. *CMAJ Open*, *1*(1), E1–E8. https://doi.org/10.9778/CMAJO.20120013

[8] Fenn, K. M., Evans, S. B., McCorkle, R., DiGiovanna, M. P., Pusztai, L., Sanft, T., Hofstatter, E. W., Killelea, B. K., Tish Knobf, M., Lannin, D. R., Abu-Khalaf, M., Horowitz, N. R., & Chagpar, A. B. (2014). Impact of financial burden of cancer on survivors' quality of life. *Journal of Oncology Practice*, *10*(5), 332–338. https://doi.org/10.1200/JOP.2013.001322

[9] Guy, G. P., Robin Yabroff, K., Ekwueme, D. U., Smith, A. W., Dowling, E. C., Rechis, R., Nutt, S., & Richardson, L. C. (2014a). Estimating the health and economic burden of cancer among those diagnosed as adolescents and young adults. *Health Affairs (Project Hope)*, *33*(6), 1024–1031. https://doi.org/10.1377/HLTHAFF.2013.1425

[10] Guy, G. P., Robin Yabroff, K., Ekwueme, D. U., Smith, A. W., Dowling, E. C., Rechis, R., Nutt, S., & Richardson, L. C. (2014b). Estimating the health and economic burden of cancer among those diagnosed as adolescents and young adults. *Health Affairs (Project Hope)*, *33*(6), 1024–1031. https://doi.org/10.1377/HLTHAFF.2013.1425

[11] J, B.-S. (2010). Learning how to undertake a systematic review: part 1. *Nursing Standard (Royal College of Nursing (Great Britain) : 1987)*, *24*(50), 47–55. https://doi.org/10.7748/NS2010.08.24.50.47.C7939

[12] Kent, E. E., Forsythe, L. P., Yabroff, K. R., Weaver, K. E., De Moor, J. S., Rodriguez, J. L., & Rowland, J. H. (2013). Are survivors who report cancer-related financial problems more likely to forgo or delay medical care? *Cancer*, *119*(20), 3710–3717. https://doi.org/10.1002/CNCR.28262

[13] Kjerulff, K. H., Frick, K. D., Rhoades, J. A., & Hollenbeak, C. S. (2007). The cost of being a woman: a national study of health care utilization and expenditures for female-specific conditions. *Women's Health Issues : Official Publication of the Jacobs Institute of Women's Health*, *17*(1), 13–21. https://doi.org/10.1016/J.WHI.2006.11.004

[14] Lathan, C. S., Cronin, A., Tucker-Seeley, R., Zafar, S. Y., Ayanian, J. Z., & Schrag, D. (2016). Association of Financial Strain With Symptom Burden and Quality of Life for Patients With Lung or Colorectal Cancer. *Journal of Clinical Oncology*, *34*(15), 1732. https://doi.org/10.1200/JCO.2015.63.2232

[15] Lipscomb, M. (n.d.). *Exploring evidence-based practice : debates and challenges in nursing*. 229.

[16] Mariotto, A. B., Robin Yabroff, K., Shao, Y., Feuer, E. J., & Brown, M. L. (2011a). Projections of the cost of cancer care in the United States: 2010-2020. *Journal of the National Cancer Institute*, *103*(2), 117–128. https://doi.org/10.1093/JNCI/DJQ495\

[17] Mariotto, A. B., Robin Yabroff, K., Shao, Y., Feuer, E. J., & Brown, M. L. (2011b). Projections of the cost of cancer care in the United States: 2010-2020. *Journal of the National Cancer Institute*, *103*(2), 117–128. https://doi.org/10.1093/JNCI/DJQ495

[18] Oxford centre for triple value healthcare Ltd. (n.d.). *Critical Appraisal Skills Programme*. Retrieved August 30, 2021, from https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist-2018.pdf

[19] P, J., F, H., J, S., C, B., & M, E. (2002). Direction and impact of language bias in meta-analyses of controlled trials: empirical study. *International Journal of Epidemiology*, *31*(1), 115–123. https://doi.org/10.1093/IJE/31.1.115

[20] Pati, D., & Lorusso, L. N. (2017). How to Write a Systematic Review of the Literature: *Https://Doi.Org/10.1177/1937586717747384*, *11*(1), 15–30. https://doi.org/10.1177/1937586717747384

[21] Pippa Hemingway. (2009). What is systematic review. *Evidence Based Medicine*, 1–8.

[22] Ramsey, S. D., Bansal, A., Fedorenko, C. R., Blough, D. K., Overstreet, K. A., Shankaran, V., & Newcomb, P. (2016a). Financial Insolvency as a Risk Factor for Early Mortality Among Patients With Cancer. *Journal of Clinical Oncology : Official Journal of the American Society of Clinical Oncology*, *34*(9), 980–986. https://doi.org/10.1200/JCO.2015.64.6620

[23] Ramsey, S. D., Bansal, A., Fedorenko, C. R., Blough, D. K., Overstreet, K. A., Shankaran, V., & Newcomb, P. (2016b). Financial Insolvency as a Risk Factor for Early Mortality Among Patients With Cancer. *Journal*

of Clinical Oncology : Official Journal of the American Society of Clinical Oncology, *34*(9), 980–986. https://doi.org/10.1200/JCO.2015.64.6620

[24] Shankaran, V., Jolly, S., Blough, D., & Ramsey, S. D. (2012). Risk factors for financial hardship in patients receiving adjuvant chemotherapy for colon cancer: a population-based exploratory analysis. *Journal of Clinical Oncology : Official Journal of the American Society of Clinical Oncology*, *30*(14), 1608–1614. https://doi.org/10.1200/JCO.2011.37.9511

[25] Sharp, L., Carsin, A. E., & Timmons, A. (2013). Associations between cancer-related financial stress and strain and psychological well-being among individuals living with cancer. *Psycho-Oncology*, *22*(4), 745–755. https://doi.org/10.1002/PON.3055

[26] Torgerson, D. J., & Torgerson, C. J. (2003). Avoiding Bias in Randomised Controlled Trials in Educational Research. *British Journal of Educational Studies*, *51*(1), 36–45. https://doi.org/10.1111/1467-8527.T01-2-00223

[27] Ward, E., Halpern, M., Schrag, N., Cokkinides, V., DeSantis, C., Bandi, P., Siegel, R., Stewart, A., & Jemal, A. (2008). Association of insurance with cancer care utilization and outcomes. *CA: A Cancer Journal for Clinicians*, *58*(1), 9–31. https://doi.org/10.3322/CA.2007.0011

[28] Zafar, S. Y., Peppercorn, J. M., Schrag, D., Taylor, D. H., Goetzinger, A. M., Zhong, X., & Abernethy, A. P. (2013). The financial toxicity of cancer treatment: a pilot study assessing out-of-pocket expenses and the insured cancer patient's experience. *The Oncologist*, *18*(4), 381–390. https://doi.org/10.1634/THEONCOLOGIST.2012-0279