

Study on the Association Between Economic Burden of Cancer Treatment and Social Health Inequality

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ABSTRACT

This study investigates the correlation between cancer treatment costs and social health inequality. Through integrated analysis of hospital records and survey data, combined with regression modeling and correlation analysis, we demonstrate that socioeconomic disparities significantly influence treatment affordability. Economically disadvantaged populations face higher financial burdens, while educational limitations hinder patients' ability to make informed treatment decisions. Geographically, disparities in healthcare resources and insurance coverage between urban-rural and regional areas disproportionately burden patients in rural and economically underdeveloped regions. These findings provide critical insights for reducing cancer treatment costs and advancing social health equity.

KEYWORDS

Cancer treatment; Economic burden; Social health inequality; Medical resource allocation; Health insurance system

1. INTRODUCTION

1.1. Status of the Disease

Malignant tumors, as a serious chronic disease threatening human health, have posed significant public health challenges globally due to their high incidence and mortality rates. Epidemiological data shows that malignant tumors have become one of the leading causes of death worldwide, particularly prominent in developing countries, with both incidence and mortality rates showing a marked upward trend. Taking China as an example, 2018 data indicates that total cancer treatment costs reached 392.462 billion yuan, accounting for a substantial portion of the country's total healthcare expenditure. Major cancers such as lung cancer, breast cancer, gastric cancer, and liver cancer accounted for 83.44% of these treatment costs. [1] Notably, the disease burden of specific tumor types (such as testicular cancer) has also shown a significant upward trend. Although testicular cancer represents a relatively small proportion of urogenital tumors, its new cases, deaths, and age-standardized incidence rates all demonstrate marked growth. [10] These figures not only reveal the severe epidemiological characteristics of cancer diseases but also highlight their immense pressure on medical resources and socioeconomic systems. From a global perspective, high cancer incidence rates are closely related to population aging, lifestyle changes, and environmental exposure factors. Meanwhile, developing countries face more severe challenges in cancer prevention and treatment due to insufficient preventive investments and uneven distribution of medical resources.

1.2. Economic Burden of Cancer Treatment

The economic burden of cancer treatment not only imposes a heavy financial strain on patients and their families but also poses significant obstacles to socioeconomic development. Studies indicate that with the application of innovative medical technologies and diversification of treatment methods, cancer treatment costs continue to rise, causing substantial economic strain on patients and their households. Taking China as an example, cancer-related medical expenditures increased from 63.3 billion yuan in 2008 to 249.56 billion yuan in 2017, with an average annual growth rate of 15.2% [4]. This economic burden manifests not only in direct medical costs but also includes rehabilitation expenses, transportation costs, and indirect costs such as work incapacity caused by illness. The financial strain is particularly acute for patients with advanced or metastatic cancers, many of whom are forced to discontinue treatment or face bankruptcy risks due to inability to afford exorbitant medical fees. Furthermore, the escalating economic burden of cancer treatment has led to widespread poverty caused by illness and relapse into poverty. Research shows that in 2018, over 42% of registered impoverished individuals in China fell into poverty due to illness, with cancer being one of the primary causes. This phenomenon not only severely degrades the quality of life for patients and their families but also poses serious challenges to social stability and economic development.

1.3. Social Health Inequalities in the Context of Cancer Treatment

Social health inequality manifests particularly prominently in cancer treatment, most strikingly in access to medical resources and treatment opportunities. There are significant disparities in cancer treatment choices between socioeconomic groups: high-income populations tend to opt for advanced and costly therapies, while low-income individuals often resort to basic treatments or abandon treatment altogether due to financial constraints. Furthermore, urban-rural disparities and regional development imbalances exacerbate this inequality. A typical manifestation is that urban medical institutions are generally equipped with advanced facilities and technologies, whereas rural areas suffer from relatively scarce healthcare resources, creating more obstacles for patients' diagnosis and treatment processes. Educational differences also affect patients' ability to acquire cancer prevention knowledge and make informed treatment decisions, indirectly impacting their financial burden. These phenomena not only violate the principle of health equity but also reinforce the uneven distribution of economic burdens in cancer treatment, urgently requiring policy interventions and institutional reforms to address.

2. LITERATURE REVIEW

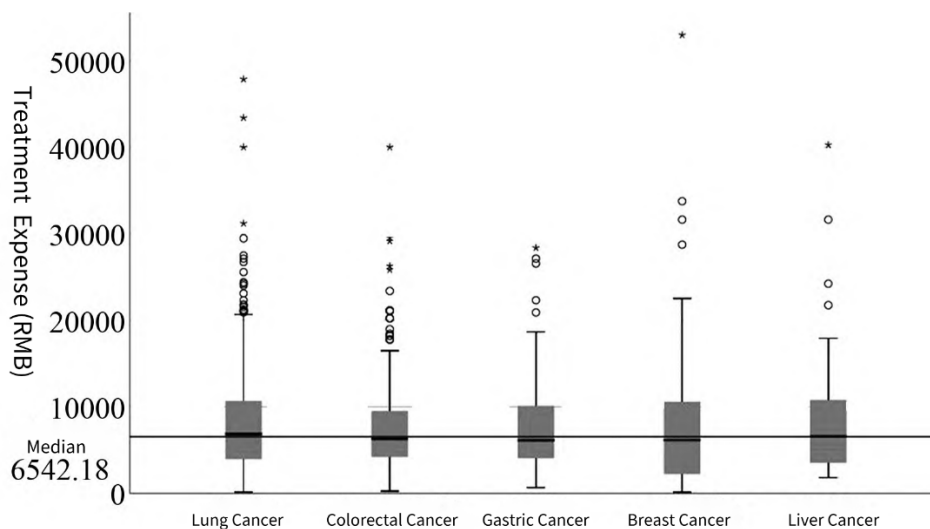
2.1. Economic Burden of Cancer Treatment

The economic burden of cancer treatment is complex and diverse, mainly including direct medical expenses, rehabilitation costs, and indirect costs. Regarding direct medical expenses, studies indicate that cancer treatment costs are primarily concentrated in hospitalization services, particularly in the field of cancer treatment, with a significant proportion of costs for diseases such as lung cancer, breast cancer, and gastric cancer. The accounting method is typically based on the "Health Cost Accounting System 2011", which systematically categorizes and statistically analyzes the distribution of costs across different service types, disease categories, and institutions [2]. For example, a study from a hospital in Jinzhou City, China shows that the per capita hospitalization cost for lung cancer patients is the highest, with treatment fees constituting the main component, and significant cost differences exist between different tumor types. Taking the analysis of medical records of hospitalized patients with lung cancer, colorectal cancer, gastric cancer, breast cancer, and liver cancer in the hospital's medical record management system as an example, the effective study included 1,064 cases, as shown in Table 1 [3].

Table 1. Basic information of hospitalized patients with five kinds of tumors

variable	Number of cases	constituent ratio (%)
sex		
man	606	56.95
woman	458	43.05
occupation		
Cadres/Staff of enterprises and institutions	67	6.30
worker	74	6.95
peasant	262	24.62
Retirees	429	40.32
other	232	21.80
Type of household registration		
city	736	69.17
rural area	328	30.83
Payment method		
Basic medical insurance for urban workers	673	63.25
New Rural Cooperative Medical System	304	28.57
Fully self-funded	68	6.39
other	19	1.79
Type of tumor		
carcinoma of the lungs	473	44.45
colorectal cancer	261	24.53
gastric cancer	143	13.44
mammary cancer	150	14.10
cancer of the liver	37	3.48

Figure 1 shows the median and four quarters of the average hospitalization cost of cancer patients in Jinzhou City in 2019. The five types of cancer with the highest average hospitalization cost are lung cancer, liver cancer, colorectal cancer, breast cancer and stomach cancer, but there is no significant difference between different tumor types.

**Figure 1.** Average hospitalization cost of five kinds of tumors

The average per-capita hospitalization cost for cancer patients accounted for 23.13% of the annual per capita disposable income in that year. Furthermore, rehabilitation expenses, as a crucial component of cancer treatment covering rehabilitation training and nutritional support, significantly

impact patients' financial burden. Indirect costs include work time losses and transportation expenses incurred by patients and their families due to treatment. These hidden costs constitute a substantial portion of the economic burden and progressively increase with disease progression [6].

Current research also explores the specific impacts of different treatment approaches and disease stages on economic burdens. There are significant cost differences between surgical procedures, chemotherapy, radiotherapy, and emerging immunotherapy methods. These variations are influenced not only by the treatment technologies themselves but also closely related to the severity of patients' conditions [5]. For instance, treatment costs for advanced cancer patients are often higher than those for early-stage patients, which is associated with the need for more complex and long-term treatment regimens [4]. Meanwhile, as tumor incidence continues to rise, the issue of insufficient preventive investment has become increasingly prominent. A substantial amount of healthcare resources are being allocated to treating mid-to-late stage patients, further exacerbating overall economic burdens. Therefore, optimizing resource allocation and reducing unnecessary treatment costs have become crucial research topics.

2.2. Social Health Inequalities Research

Social health inequality manifests in diverse forms within cancer treatment, primarily through three dimensions: socioeconomic status, ethnicity, and geographic distribution. First, regarding socioeconomic status, income levels and educational attainment significantly influence access to cancer treatment resources. Studies indicate that high-income individuals have access to superior medical services, while low-income groups face substantial financial pressures and may abandon treatment due to inability to afford costly treatments [8]. Furthermore, patients with limited education often lack sufficient health knowledge, making them susceptible to misleading decisions during prevention and treatment planning, thereby incurring unnecessary financial burdens [9]. This inequality is particularly pronounced in urban-rural disparities, where rural residents' lower disposable income results in cancer treatment costs constituting a disproportionately larger share of household budgets compared to urban populations, further exacerbating economic burdens [3]. Geographically, urban-rural differences and regional economic imbalances profoundly impact the financial burden of cancer treatment. Urban areas boast abundant medical resources, enabling patients to access advanced diagnostic technologies and comprehensive social security systems. In contrast, rural patients frequently require out-of-town medical care due to limited healthcare infrastructure, incurring additional transportation and accommodation costs. Moreover, the generally higher medical standards in eastern coastal regions compared to central and western areas further amplify the inequality in cancer treatment financial burdens.

2.3. Correlation Studies

While research on the correlation between cancer treatment costs and social health inequality has made significant strides, substantial gaps persist in this field. Low-income populations face particularly acute challenges, as studies indicate they must bear higher out-of-pocket expenses due to inadequate health insurance coverage, a situation especially pronounced in rural areas. Furthermore, current research predominantly focuses on single-dimensional analyses, with limited exploration of the complex interactions among multiple dimensions of social health inequality. Notably, comprehensive studies that simultaneously account for income levels, educational attainment, and racial factors remain scarce [9].

Furthermore, the impact of emerging therapeutic technologies on social health inequality has not received sufficient attention. While advancements in gene therapy and precision medicine have brought new hope for cancer treatment, their high costs may further widen health disparities among different social groups [7]. Therefore, this study aims to reveal the underlying mechanisms linking

the economic burden of cancer treatment with social health inequality through multidimensional data analysis, filling existing research gaps and providing scientific evidence for policy-making [6].

3. ECONOMIC BURDEN ANALYSIS OF CANCER TREATMENT

3.1. Elements of Economic Burden and Personal Financial Burden

The economic burden of cancer treatment primarily consists of three components: medical expenses, rehabilitation costs, and indirect costs. Medical expenses form the core component of this financial burden, covering direct expenditures such as surgery and chemotherapy. Hospitalization costs account for a significant 87.53% of total expenditures, particularly notable in major cancers like lung cancer. The high costs of immunotherapy and targeted therapy further exacerbate patients' financial pressures. Rehabilitation costs, another crucial element, involve ongoing expenses like physical therapy and nutritional support—often overlooked—and impose substantial financial strain on mid-to-late stage patients. Indirect costs include hidden expenses such as lost work capacity and transportation fees, typically manifested through income loss for caregivers and exorbitant travel costs for patients in remote areas. These may constitute the primary financial burden, sometimes even surpassing direct medical expenses. Research by Davidoff et al. [16, 17] indicates that compared to non-cancer populations, cancer patients bear higher out-of-pocket (OOP) costs during treatment, facing greater financial pressure. This can mildly alter patients' lifestyles or severely lead to bankruptcy and treatment discontinuation. Ramsey et al. [18] found that cancer patients in Washington State face 2.65 times higher bankruptcy risks than non-cancer patients.

3.2. Economic Burden of Different Treatment Modalities and Disease Stages

The economic burden of cancer treatment varies significantly depending on therapeutic approaches and disease stages. First, different treatment modalities exhibit distinct cost characteristics: surgical interventions involve higher upfront costs but lower subsequent expenses; chemotherapy and radiotherapy generate cumulative costs due to their cyclical nature; while immunotherapy and targeted therapies impose substantially greater financial burdens. A typical example is the high incremental cost-effectiveness ratio (ICER) observed with antineoplastic in lung cancer treatment [7]. Therefore, treatment plan selection must comprehensively consider patients' financial capacity. Second, disease stage significantly impacts economic burden: early-stage patients face relatively lighter costs primarily concentrated in surgical procedures; mid-to-late stage patients experience marked increases in medical expenses due to more complex treatments and prolonged treatment cycles. The combination of multiple therapeutic approaches leads to exponentially growing financial burdens, with late-stage patients facing even higher rehabilitation maintenance costs. This phenomenon of escalating economic pressure is globally prevalent. Thus, disease progression emerges as the key driver of growing economic burdens.

3.3. Family and Socio-Economic Burdens

The economic burden arising during cancer treatment often escalates into a family's financial burden and may even negatively impact socioeconomic development. A 2011 survey revealed that one-third of Americans live in households bearing medical costs. China's traditional family values differ from the individualistic concepts prevalent in Western societies, and family involvement in patients' medical decisions is common in Chinese healthcare practices. Therefore, when a family member unfortunately develops cancer, treatment plans may be jointly determined by both individuals and families. Considering the exorbitant treatment costs, patients' families may attempt to address the growing financial burden by cutting daily expenses. The economic burden caused by cancer not only severely impacts socioeconomic development but also results in productivity losses. Statistics show that cancer treatment costs in the United States reached \$124.57 billion in 2010 [19]. In 2014, the EU

spent approximately € 83.2 billion on cancer treatments [20]. China's 2008 national malignant tumor mortality survey indicated that annual medical expenses for cancer patients exceeded 100 billion yuan [17]; the economic burden of cancer treatment extends beyond mere cost accumulation, encompassing total resource consumption during the disease progression from onset to death, as well as economic losses from disability and premature mortality.

In conclusion, the economic burden of cancer treatment shows significant differences between different treatment methods and disease stages, which not only reflects the complexity of medical resource allocation, but also provides an important research direction to alleviate the economic pressure of patients.

4. ANALYSIS OF SOCIAL HEALTH INEQUALITIES

4.1. Socio-Economic Status Dimension

4.1.1. Income levels

Income level, as one of the core indicators of socioeconomic status, significantly influences the access to cancer treatment resources and treatment choices. High-income populations typically have access to superior medical services and advanced treatment methods, while low-income populations face greater financial pressures and are often forced to choose less costly but potentially less effective options in treatment decisions. Moreover, disparities in medical insurance reimbursement rates among patients with different income levels further exacerbate this inequality. For instance, survey data from China's tertiary public medical institutions show that patients with lower annual household incomes perceive heavier economic burdens, a phenomenon particularly pronounced in rural areas. Therefore, income level not only directly impacts patients' treatment choices but also indirectly determines the severity of their economic burden through the compensatory mechanism of the medical insurance system [14, 15].

From a macro perspective, the economic inequality in cancer treatment costs caused by income disparities has profound implications for socioeconomic development. On one hand, low-income families may cut daily expenses or take out loans to cope with exorbitant medical bills, leading to deteriorating financial conditions. On the other hand, the accumulation of such economic burdens could trigger productivity losses at the societal level, further constraining economic growth. Research indicates that the rapid increase in cancer treatment costs has become a key factor contributing to poverty caused by illness and relapse into poverty among Chinese residents. Therefore, narrowing the economic burden gap in cancer treatment between different income groups through policy interventions is crucial for addressing social health inequality.

4.1.2. Education

Educational attainment plays a crucial role in patients' acquisition of cancer prevention and treatment knowledge, while also indirectly affecting their financial burden. Research indicates that individuals with lower educational levels often lack comprehensive understanding of oncology and treatment options, which may result in reduced treatment adherence. For instance, a study on gynecological cancer patients revealed that those with lower education tend to abandon or interrupt chemotherapy, primarily due to insufficient knowledge about tumors and treatments, as well as excessive concerns about adverse reactions [13]. This disparity in treatment compliance not only prolongs treatment duration but also increases overall healthcare costs, thereby exacerbating patients' financial burdens.

Furthermore, educational attainment exacerbates economic disparities in cancer treatment by affecting patients' ability to comprehend healthcare policies. In China, while urban-rural residents' medical insurance and urban employees' medical insurance differ in reimbursement rates and coverage, some patients fail to fully utilize these policies due to limited knowledge. In contrast, better-educated individuals demonstrate greater capacity to access information through multiple channels

and make rational treatment decisions. For instance, they are more likely to participate in early screening programs, thereby reducing the substantial treatment costs associated with late-stage diagnoses. This demonstrates that educational level not only constitutes a critical dimension of social health inequality but also serves as a key factor in alleviating the financial burden of cancer treatment.

4.2. Regional Dimension

4.2.1. Urban-rural disparities

The urban-rural disparity in cancer treatment costs highlights unequal financial burdens, primarily reflected in healthcare resource distribution, medical insurance coverage levels, and patients' economic capacity. Rural residents face significantly higher cancer treatment expenses relative to their income—data from Jinzhou City in 2019 shows this ratio reached 49.02% in rural areas compared to just 23.13% in urban regions. This stark contrast underscores the greater financial strain on rural populations and uneven distribution of medical resources. While actual reimbursement rates at tertiary hospitals show minimal variation between urban and rural areas, gaps persist in the overall effectiveness of medical insurance policies. Therefore, optimizing policies to reduce healthcare disparities between urban and rural areas remains a crucial pathway to alleviate economic burdens.

4.2.2. Regional variations

Regional disparities stemming from uneven economic development significantly impact the financial burden of cancer treatment, particularly evident in the imbalance of economic development levels, healthcare resource allocation, and medical insurance policies across eastern, central, and western regions. While eastern China faces higher absolute treatment costs, these expenses account for a relatively lower proportion of residents' income. In contrast, central and western regions bear a disproportionately higher proportion, exacerbating health inequality between regions. Furthermore, the structure of medical insurance financing features high out-of-pocket expenditures. As demonstrated by research in Anhui Province, this situation may hinder impoverished populations from accessing essential medical services [11]. Therefore, increasing fiscal investment and improving the social security system to reduce personal cash payments are key solutions to address this issue.

5. STUDY ON THE ASSOCIATION BETWEEN ECONOMIC BURDEN OF CANCER TREATMENT AND SOCIAL HEALTH INEQUALITY

5.1. Data Collection and Regression Analysis

The data for this study were collected through questionnaire surveys using the "Research Survey on the Association Between Economic Burden of Cancer Treatment and Social Health Inequality" developed by the author. The survey included 23 questions, with 143 valid responses collected to examine the impact of geographical factors on social health inequality. As shown in Table 2, multiple linear regression analysis was conducted to explore the relationships between educational attainment (dependent variable), household monthly per capita income, regional location, family economic status influenced by cancer treatment costs, regional perceptions of cancer treatment resource disparities, and income-level differences in accessing high-quality cancer treatment resources (all independent variables). The regression equation was: Educational attainment = $4.74 + 0.21 \times \text{household monthly per capita income} + 0.24 \times \text{regional location} - 0.13 \times \text{family economic status influenced by cancer treatment costs} - 0.17 \times \text{regional perceptions of cancer treatment resource disparities} - 0.08 \times \text{income-level differences in accessing high-quality cancer treatment resources}$. The regression model results showed statistically significant overall significance ($F(5,59)=4.002$, $p=0.003$) with an adjusted R^2 of 0.190, indicating that these five independent variables collectively explained 19.0% of the variance in educational attainment. Specifically, after controlling for other variables, household monthly per capita income demonstrated a significant positive predictive effect on educational attainment ($\beta=0.21$,

$t=2.06$, $p=0.044$), meaning higher household income tends to correlate with higher educational attainment. The region of residence showed a nearly significant negative correlation with educational attainment ($\beta=-0.24$, $t=-1.93$, $p=0.059$). However, three independent variables—treatment cost impact on household economic status ($\beta=-0.13$, $t=-0.86$, $p=0.393$), perception of regional disparities in oncology resources ($\beta=-0.17$, $t=-0.89$, $p=0.378$), and awareness of access differences in premium oncology care among income groups ($\beta=-0.08$, $t=-0.47$, $p=0.639$)—all failed to reach statistical significance ($p>0.05$). All independent variables demonstrated variance inflation factors (VIF) below 2, indicating no severe multicollinearity issues in the model.

Table 2. Multivariate linear regression analysis of education and family income

Project	Regression coefficient	t price	p price	VIF
constant	4.74	6.09	0.000**	-
Your family's monthly per capita income:	0.21	2.06	0.044*	1.25
Your region:	-0.24	-1.93	0.059	1.26
Impact of the cost of cancer treatment on the family's financial situation:	-0.13	-0.86	0.393	1.05
Do you think there are differences in tumor treatment resources (such as medical equipment, expert level, etc.) between different regions (e.g., between urban and rural areas, between different city levels, etc.):	-0.17	-0.89	0.378	1.30
Do you think there are differences in access to quality cancer treatment resources among people with different income levels?	-0.08	-0.47	0.639	1.23
sample capacity	65			
R ²	0.253			
adjust R ²	0.190			
F	F(5, 59)=4.002, p=0.003			
* p<0.05, ** p<0.01				

5.2. Analysis Results of Questionnaire on Core Related Issues

5.2.1. Economic impact of cancer treatment costs on families

Most regions have limited sample sizes for educational attainment combinations. In first-tier cities, 50% of respondents with high school or vocational school education reported no impact, while 50% of those with bachelor's degrees or higher considered the impact manageable. Among respondents with high school or vocational school education in emerging first-tier cities, 50% reported a significant decline in quality of life, whereas 70.59% of those with bachelor's degrees or higher found it bearable. In second-tier cities, 60% of respondents with high school or vocational school education generally perceived the impact as significant, while most bachelor's degree holders found it manageable. In third-tier and lower cities, 60% of respondents with junior high school education considered the impact significant, with most bachelor's degree holders finding it manageable. In rural areas, both respondents with primary school education or below and those with high school/vocational school education perceived the impact as significant, while all bachelor's degree holders agreed it was bearable.

5.2.2. Measures to address payment of treatment costs

All subgroups exhibited insufficient sample sizes. In first-tier cities, 50% of respondents with bachelor's degrees or higher reported taking measures (including those without such education). Among respondents with high school or vocational school diplomas in emerging first-tier cities, 60%

reduced expenses while 40% had family members temporarily leaving their jobs. Notably, 29.03% of respondents with bachelor's degrees or higher took no action. In third-tier and lower cities, 62.5% of respondents with college diplomas implemented cost-cutting measures – the highest proportion across all groups. Regarding rural residents with primary school education or below: 50% reduced expenses while 50% took part-time jobs, whereas 40% of high school/vocational school graduates adopted similar measures.

5.2.3. Perception of difficulty in obtaining medical information

The analysis was constrained by significant sample size limitations. Among respondents with college degrees in new first-tier cities, 66.67% found it relatively easy to obtain qualifications, while 33.33% in third-tier and lower cities with bachelor's degrees or higher reported similar ease. However, those holding high school/secondary vocational education qualifications and rural respondents with lower educational levels predominantly found it more challenging to acquire qualifications in these cities.

5.2.4. Perception of income differences in quality treatment resources

All respondents in all regions chose neither "little difference" nor "no difference". In first-tier cities, all respondents identified "significant differences". Among college-educated individuals in emerging first-tier cities, 100% reported "significant differences". In second-tier cities, 75% of respondents with bachelor's degrees or higher agreed with this view. For those with high school or vocational school education in third-tier and lower cities, 66.67% expressed similar perceptions of "significant differences".

5.2.5. Perception of treatment resource differences between regions

All respondents in first-tier cities rated the disparity as "extremely significant". In second-tier cities, 100% of respondents with bachelor's degrees or higher agreed with this assessment. Among those holding high school or vocational school diplomas in third-tier and lower-tier cities, 83.33% considered the disparity to be "extremely significant".

5.2.6. Impact of economic burden on health inequity

Most respondents believe this will exacerbate inequality. Among those with bachelor's degrees or higher in first-tier cities, 50% consider the situation to be significantly worsened. In new first-tier cities, over 40% of respondents perceive it as severe. The proportion rises to 75% in second-tier cities and 66.67% in third-tier and lower cities. Notably, no respondents chose the option "completely won't worsen."

5.3. Discussion of the Reasons for Association

The correlation between the economic burden of cancer treatment and social health inequality primarily stems from multiple factors including uneven distribution of medical resources, disparities in social security systems, and inadequate health education. First and foremost, the imbalance in medical resource allocation serves as a key driver of economic disparities. High-quality healthcare resources are disproportionately concentrated in urban and developed areas, while rural and underdeveloped regions face acute shortages. This distribution pattern forces many patients to travel long distances for treatment, resulting in substantial transportation costs and caregiving expenses that significantly exacerbate financial burdens.

Secondly, disparities in social security systems are a key factor contributing to economic burden inequality. Currently, China's social medical insurance and commercial health insurance remain underutilized, with out-of-pocket (OOP) expenses constituting a significant portion of healthcare costs. This leaves impoverished and vulnerable populations struggling to access essential medical services. Particularly during cancer treatment, the exorbitant medical expenses plunge many families into financial hardship, resulting in cases of poverty caused by illness and relapse into poverty due to

medical costs. Furthermore, variations in insurance coverage scope and reimbursement rates across different regions and demographics further exacerbate economic burden inequality.

Finally, inadequate health literacy further amplifies the economic burden of social health inequality. Research shows that patients lacking knowledge about cancer and chemotherapy are more likely to experience poor treatment adherence, leading to suboptimal outcomes and increased financial strain. For instance, some patients delay diagnosis due to insufficient understanding of early screening's importance, resulting in disease progression to advanced stages and significantly higher treatment costs. Therefore, strengthening health education and raising public awareness play a crucial role in addressing the connection between the economic burden of cancer treatment and social health inequality.

6. POLICY RECOMMENDATIONS TO MITIGATE ASSOCIATED NEGATIVE IMPACTS

6.1. Optimize the Allocation of Medical Resources

Proper spatial planning of medical resources can help alleviate the economic burden of cancer treatment and improve social health equity. Current healthcare distribution shows significant regional disparities, with primary care facilities and remote areas lagging in diagnostic capabilities. It is crucial to strengthen primary healthcare systems by channeling high-quality resources to grassroots levels through policy guidance, while optimizing the allocation of large medical equipment to reduce cross-regional referral burdens. A differentiated resource allocation strategy is recommended: prioritize establishing specialized oncology institutions in underdeveloped regions, improve county-township-village three-tier cancer prevention networks in rural areas to enhance early screening accessibility, and scientifically plan human resource distribution through incentive mechanisms to attract healthcare professionals to grassroots services while establishing systematic continuing education programs.

6.2. Improve the Medical Security System

Establishing a robust medical security system is the cornerstone for alleviating the direct financial burden on cancer patients. The current healthcare insurance system faces challenges such as limited coverage and high out-of-pocket expenses. We should progressively increase reimbursement rates for cancer diagnosis and treatment services, dynamically expand the coverage of innovative anti-cancer drugs and advanced treatment technologies in the medical insurance catalog, reform medical expense payment mechanisms by implementing prepayment systems like Diagnosis-Related Group (DRG) payments to control unreasonable cost growth, and strengthen the effective integration of basic medical insurance, commercial health insurance, and critical illness insurance to build a multi-tiered healthcare security framework. Government authorities must continuously increase fiscal investment in medical insurance funds and enhance fund supervision mechanisms to ensure sustainable system operation.

6.3. Strengthen Health Education Interventions

Systematic health education can reduce disparities in economic burdens caused by limited health knowledge. Public awareness of cancer prevention and control significantly influences healthcare decision-making, with lower-educated populations often bearing heavier financial burdens from diseases. It is recommended to disseminate scientific cancer prevention knowledge through diversified channels such as online platforms and community health lectures. Targeted intervention programs should be developed for high-risk groups (e.g., rural residents and low-income populations), incorporating localized cultural characteristics to conduct precise educational campaigns. Health

education should be deeply integrated into medical service systems, combining standardized health guidance with in-hospital promotional boards to enhance residents' self-health management capabilities.

7. SUMMARY AND OUTLOOK

This study investigates the mechanisms linking the economic burden of cancer treatment to social health inequality, elucidates the pathways through which different social factors influence patients' financial burdens, and provides policy references to advance health equity. While emerging therapies like gene therapy and precision medicine have significantly improved treatment efficacy and patient survival rates, their high costs exacerbate health inequities, particularly affecting low-income populations who face significant barriers to affordability. The uneven distribution of medical resources further widens urban-rural disparities, with urban healthcare institutions generally equipped with advanced technologies while rural areas lack corresponding facilities and technical support. Policy efforts should prioritize enhancing medical insurance coverage systems, establishing a dynamic balance between promoting advanced technologies and controlling healthcare costs, and strengthening health economics evaluation research. Future studies should focus on: (1) adopting interdisciplinary approaches that integrate theoretical frameworks from medicine, economics, and sociology to systematically analyze the mechanisms behind economic burdens; (2) conducting prospective cohort studies spanning the entire treatment cycle to reveal temporal patterns of economic burden evolution; (3) implementing cross-national comparative studies to examine how different healthcare systems impact health equity; (4) establishing evidence-based decision-making mechanisms to translate research findings into policy practices, providing empirical support for global health equity strategies.

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