



Review article

Factors influencing economic toxicity and coping strategies in lung cancer patients: A scoping review

Wu XiuCen^b, Chen GuiHua^{a,*}, Li Qin^b, Zhou XiXin^b, Tang Huan^b^a The Second Affiliated Hospital of Chongqing Medical University, Department of Respiratory Medicine, Chongqing, China^b The Second Affiliated Hospital of Chongqing Medical University, Department of Nursing, Chongqing, China

ARTICLE INFO

Keywords:

Economic toxicity
Lung cancer
Influencing factors
Response measures
Scoping review

ABSTRACT

Objective: A scoping review aims to identify the factors that contribute to economic challenges for lung cancer patients, as well as effective responses to these challenges. This review will help in identifying lung cancer patients at risk of financial difficulties, shaping health policies, and allocating healthcare resources effectively.

Data sources: This review includes both published and unpublished empirical studies.

Methods: Following the scoping review guidelines set forth by the Joanna Briggs Institute (JBI), we conducted searches in databases including Pubmed, Embase, OVID, Sinomed, Web of Science, Proquest, Wanfang, and CNKI from the establishment of the repository to February 2024. We organized and analyzed the included literature.

Findings: 16 papers were included in the review. We extracted assessment tools, influencing factors, and responses to economic challenges faced by lung cancer patients from the included literature. The main assessment tools for economic challenges include COST, questionnaires, medical records, burden calculations, and other relevant tools. Factors influencing economic challenges in lung cancer patients mainly include age, occupation, insurance, education, treatment, disease duration, and income. Coping strategies for economic challenges in lung cancer patients primarily include institutional, technological, and managerial reforms, as well as public education and psychological interventions.

Conclusion: The prevalence of economic challenges faced by lung cancer patients is influenced by several complex factors. Healthcare professionals can develop screening tools and intervention protocols based on these influencing factors, providing a foundation for implementing targeted intervention programs for lung cancer patients at high risk of economic challenges.

1. Introduction

1.1. Background

Lung cancer patients hold the distinction of having the world's second-highest incidence rate and the highest mortality rate globally [1]. Despite advancements in diagnostic and treatment technologies, which have incrementally prolonged the survival periods of lung cancer patients, the substantial economic burden associated with these treatments places immense financial strain on patient families.

* Corresponding author.

E-mail address: 300278@hospital.cqmu.edu.cn (C. GuiHua).

<https://doi.org/10.1016/j.heliyon.2024.e37809>

Received 12 April 2024; Received in revised form 30 August 2024; Accepted 10 September 2024

Available online 14 September 2024

2405-8440/© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

The concept of “Financial Toxicity” (FT), introduced by foreign scholars in 2013, encapsulates the tangible economic costs of cancer treatment and care, alongside the ensuing psychological, social disruptions, behavioral alterations, and deterioration in quality of life [2].

Research [3] indicates that the prevalence of FT among Chinese patients with malignant tumors stands at 67.4 %, with a staggering 77 % among lung cancer patients. FT significantly impairs patients’ quality of life by affecting their physical, social, and emotional well-being. This impact often leads to reduced healthcare and care needs, resulting in lower medication adherence, delayed treatments, and further degradation in quality of life. These adverse effects not only compromise patients’ health and well-being but also escalate the risk of poverty and exacerbate social inequalities [4,5]. Consequently, healthcare costs and resource utilisation skyrocket [6].

Given these challenges, there is an immediate necessity to mitigate the economic risks associated with specific vulnerable populations, preventing disease-induced poverty and re-entry into poverty due to disease. It is crucial to identify the determinants of financial toxicity and existing mitigation strategies while optimizing healthcare resource allocation. However, most relevant studies have concentrated on breast cancer, colorectal cancer, and similar conditions [7,8], leaving a gap in comprehensive understanding of FT in lung cancer patients. Liang’s work highlights that FT in lung cancer patients is influenced by numerous factors, yet no study has undertaken a comprehensive synthesis of these elements [9].

This paper aims to bridge this gap by synthesizing existing assessment tools, identifying key influencing factors, and reviewing intervention protocols related to FT in lung cancer patients. The goal is to offer insights for early identification of high-risk lung cancer patients for FT and to facilitate the management of potential and existing economic toxicity issues in lung cancer patients.

1.2. Objective

Understanding the connection between economic challenges and the quality of life and survival is crucial for providing high-value cancer care and survivorship support. Many lung cancer patients are in a chronic state, and economic challenges can significantly impact their quality of life in the later stages. This study aims to investigate the availability and accessibility of support services for patients by reviewing existing literature, to identify any unmet needs, and to lay the groundwork for improving the quality of life for patients in the later stages of the disease.

2. Methods

2.1. Rationale

In contemporary research, studies on FT encompass a variety of perspectives, methodologies, and measurement strategies. This scoping review specifically targets lung cancer patients, aiming to delve into the influencing factors and coping mechanisms associated with FT in this particular cohort. The primary objective is to provide robust evidence supporting the identification and management of FT among lung cancer patients.

It’s important to clarify that the scoping review does not aspire to comprehensively catalog every available publication on the subject. Instead, its purpose is deliberately broad, seeking to broaden the exploration of literature, uncover critical aspects of the topic, pinpoint potential gaps, and highlight pivotal examples. Through this lens, the scoping review contributes to a nuanced understanding of economic toxicity, addressing a broad spectrum of related issues.

2.2. Protocol and registration

This scoping study adheres to the guidelines for conducting scoping reviews as outlined by the Joanna Briggs Institute (JBI), located in Australia [10]. It was meticulously planned and executed according to the latest methodologies recommended by Arksey and O’Malley, as well as Peters et al [11]. Following these established frameworks facilitated a structured approach to mapping concepts and refining definitions encountered throughout the literature review.

Furthermore, this project was formally registered on the Open Science Framework, ensuring transparency and reproducibility in its methodology. The registration took place on February 19, 2024, under the Open Science Sexuality Network, accessible via the following link: <https://doi.org/10.17605/OSF.IO/FSCV5>.

2.3. Conceptual definition

Gordon [12] defined economic toxicity as an economic side effect of cancer treatment, meaning that high out-of-pocket healthcare costs patients to undergo economic suffering from cancer treatment and it leads to a decrease in their quality of life and healthcare behaviors. Higher out-of-pocket medical costs for individuals and reduced income while undergoing treatment and rehabilitation are important causes of economic burden.

Carrera [13] described economic toxicity as the objective economic burden and subjective financial hardship of cancer patients due to the use of innovative drug therapy and its accompanying health services.

Lentz [14] described economic toxicity as the adverse impact of direct or indirect costs associated with a cancer diagnosis on a patient’s economic situation, with potential consequences including material losses, psychological distress, or maladaptive coping strategies.

2.4. Eligibility criteria

The primary objective of this scoping review is to identify and describe a range of factors and interventions that influence economic toxicity in lung cancer patients for a population of lung cancer patients, with specific review questions including.

1. What is the definition of cancer-related economic toxicity?
2. What are the tools for assessing cancer-related economic toxicity in lung cancer patients?
3. What are the factors affecting cancer-related economic toxicity in lung cancer patients?
4. What are strategies to help lung cancer patients cope with cancer-related economic toxicity?

3. What is the clinical significance of cancer-related economic toxicity?

Further detail regarding the inclusion criteria used within the scoping review is included in [Table 1](#).

3.1. Information sources

3.1.1. Search strategy

A combination of subject terms and free words were used to search the databases of CNKI, Wanfang, Sinomed, PubMed, Web of Science, Embase, Proquest, and other databases by computer, and the search period was from the establishment of the database to February 2024, which was the time limit for the search. Chinese search terms included "economic toxicity/economic burden/economic difficulty/economic catastrophe/economic hardship/economic dilemma" and "lung cancer/non-small cell lung cancer/lung tumor/lung malignancy" English search terms included " Lung Neoplasms/Pulmonary Neoplasm*/Lung Neoplasm*/Lung Cancer*/ Pulmonary Cancer*/Cancer*, Pulmonary/Neoplasm*, Pulmonary/Cancer*, Lung/Cancer*, Pulmonary/Non-Small Cell Lung Cancer/ Neoplasm*, Lung/Cancer of the Lung/Cancer of Lung" "financial stress/financial pressure/financial toxicity/financial challenges/ economic burden/financial hardship/economic hardship/financial distress/financial problem/financial catastrophe/financial problems/financial problems/financial problems financial problem/financial catastrophe".

3.1.2. Selection of sources of evidence

The titles of the literature found were entered into Noteexpress software to remove duplicates. Two researchers then reviewed the literature based on specific criteria, first screening titles and abstracts, and then evaluating the full text of the articles. Two other researchers, Wu and Tang, independently repeated this screening process in two stages. In case of any discrepancies, a third researcher was consulted to make the final decision on including the literature.

4. Results

4.1. Selection of sources of evidence

The search initially found 1857 documents, but after removing duplicates, there were 1621 remaining. 1535 pieces were excluded based on title and abstract alone. Full-text reading was done to eliminate literature that didn't match research subjects and methods, resulting in 16 pieces being included. The reasons for exclusion are detailed in [Fig. 1](#).

4.2. Results of individual sources of evidence

Data extraction was performed on the included literature, which included authors, year of publication, country, type of study, sample size, scope, influencing factors, assessment tools, and interventions, See [Table 2](#) for details.

4.3. Synthesis of results

Various studies with diverse populations and methodologies are currently being conducted. This report specifically examines lung cancer patients through a scoping review, concentrating on the factors that contribute to economic challenges in this group and the

Table 1
Inclusion criteria.

	Inclusion
Population	Patients diagnosed with lung cancer after pathologic diagnosis.
Concept	Original literature on factors influencing cancer-related economic toxicity, assessment tools, and responses.
Context	hospital
Type of studies	Empirical studies (not including systematic reviews or other review methodology) Published in peer-reviewed journals
Period	After 2011
Language	English and Chinese

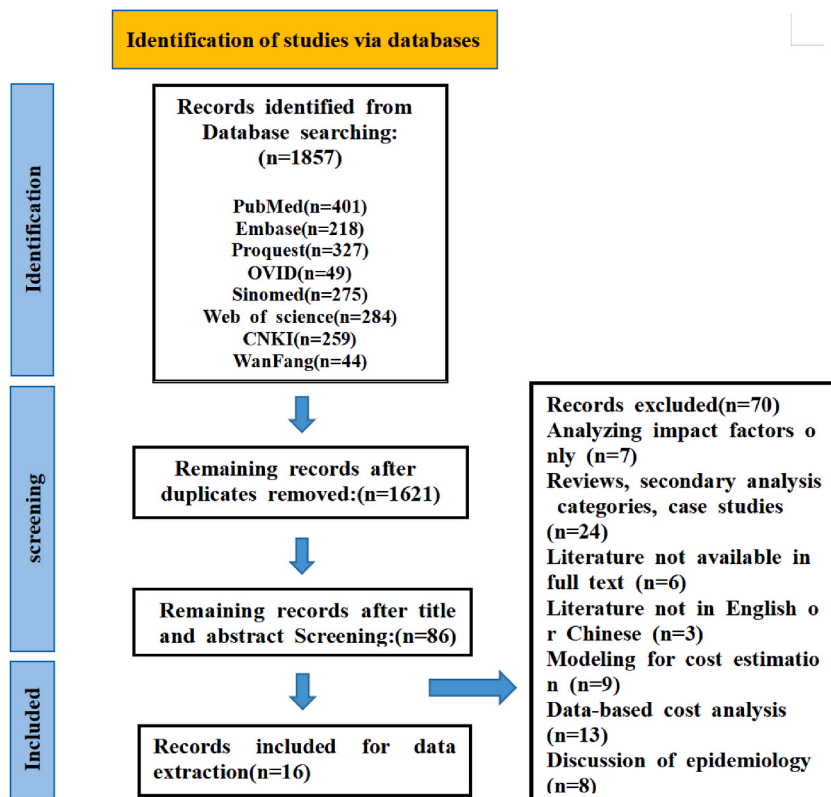


Fig. 1. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flowchart.

strategies they use to cope. The aim is to offer insights for identifying and addressing the economic burdens faced by lung cancer patients.

4.3.1. Assessment tools for cancer-related economic toxicity in lung cancer patients

Measures of economic toxicity include 1. Monetary measures: Monetary measures focus on the tangible financial implications of cancer care, such as the proportion of out-of-pocket healthcare costs to income. These metrics offer a straightforward numerical representation of the financial strain imposed by cancer treatment on patients' budgets; 2. Objective measures: Objective measures delve deeper into the practical solutions patients might employ to mitigate their financial burden. This includes exploring actions like increasing debt levels, borrowing money, selling assets, withdrawing from savings or pensions, and even filing for bankruptcy. These measures highlight the potential sacrifices patients may be willing to make to afford their cancer treatment; 3. Subjective measures: Subjective measures, on the other hand, explore the psychological impacts of financial toxicity. Through question sets designed to gauge perceptions of financial burden and associated psychological stress, these measures capture the emotional toll of dealing with cancer-related financial pressures. This aspect of economic toxicity emphasizes the importance of addressing not just the financial numbers but also the human element of cancer care. A total of five different assessment tools were used in the included studies, including COST and COST-PROM, medical records, economic burden calculations, self-administered questionnaires, and other relevant questionnaires.

Various assessment tools have been utilized in research to quantify economic toxicity, including the Comprehensive Score For Financial Toxicity (COST) and its variant, the Comprehensive Scores For Financial Toxicity based on The Patient-reported Outcome (COST-PROM). Both tools are designed to assess cancer-related financial toxicity, with COST focusing on financial expenditure, economic resources, and psychosocial reactions, and COST-PROM offering a similar framework. Four studies [5,25–27] used the COST, a cancer patient-specific questionnaire for assessing cancer-related financial toxicity, with a score range of 0–44, with lower scores resulting in greater FT, including a total of 11 entries in 3 dimensions, i.e., the patient's financial expenditure situation (1 entry), economic resources (2 entries), and psychosocial reactions (8 entries). The results of the reliability assessment showed that the Cronbach's coefficient of the scale was 0.92, the retest reliability was 0.80, and the factor analysis extracted one common factor, which could explain 93 % of the total variance, and it had good reliability and validity [30].

One study [24] used the COST-PROM, a questionnaire developed by the American scholars Souza et al. [30] in 2014, is a specific tool to measure the level of financial toxicity in cancer patients. The scale consists of 11 entries in 3 dimensions: economic and financial status (1 entry), economic resources (2 entries), and psychosocial reactions (8 entries). A five-point Likert scale was used, with 5 scores ranging from 0 to 4 for each entry, corresponding to "not at all" to "very much", and the scores for each entry were summed up to

Table 2
Scoping review data extraction table.

Author	Year	Nation	Type of Study	Experimental Scope	Sample size	Factors	Tools	Measures
Huang [15]	2012	China	Cross sectional	Single centered	402	1. Age 2. Geographic area 3. Length of hospitalization 4. Treatment plan 5. Income	Questionnaire	1. Three stages of prevention 2. Optimization of single-disease management for lung cancer 3. Assessing needs by considering the patient's location, available treatments, financial situation, and other relevant factors.
Xu [16]	2015	China	Cohort	Single centered	1280	1. Geographic area 2. Length of hospitalization 3. Treatment plan 4. Insurance	Calculation of financial burden	1. Enhance the promotion of lung cancer prevention and treatment, as well as early detection among individuals at high risk. 2. Enhance the quality of diagnosis and treatment. 3. Improve the fee arrangement. 4. Conduct economic studies in healthcare settings to establish a solid foundation for creating successful medical strategies.
Xia [17]	2023	China	Cross sectional	Multicenter	603 pairs	1. Age(Patient caregivers) 2. Educational level 3. Careers 4. Length of hospitalization 5. Disease Progress	Questionnaire	1. Third-level prevention 2. Evaluation of needs 3. Enhancement of identifying and addressing medical conditions. 4. Offer professional guidance and monetary aid
Kang [18]	2015	China	Cross sectional	Multicenter	210	1. Length of hospitalization 2. Treatment plan	Questionnaire	1. Third-level prevention 2. Improving the management of individual diseases, minimizing the use of medications, and shortening hospital stays.
Tian [19]	2022	China	Cohort	Single centered	5012	1. Treatment plan 2. Length of hospitalization 3. Age 4. Sex 5. Disease Progress 6. Complication	Medical record	1. Third-level prevention. 2. Enhancement of identifying and addressing medical conditions. 3. Increasing the scope of healthcare insurance and enhancing the overhaul of the medical and healthcare system.
Zhou [20]	2017	China	Cohort	Multicenter	34678	1. Length of hospitalization 2. Treatment plan 3. Age 4. Marital status 5. Insurance 6. Nation	Medical record	1. Enhanced methods for diagnosing and treating medical conditions, such as emergency surgery, could potentially lower hospitalization expenses and shorten the duration of a patient's stay. 2. Enhance training and rewards for healthcare professionals to encourage the advancement of a collaborative team approach in healthcare. 3. Enhance the healthcare coverage system.
Tian [21]	2014	China	Cohort	Multicenter	731	1. Length of hospitalization 2. Treatment plan	Medical record	1. Enhancing the healthcare insurance system by ensuring the fairness of medical expenses. 2. Regulating the cost of medications and surgical procedures. 3. Implementing a suitable reward system to encourage doctors to enhance their skills in diagnosing and treating patients.

(continued on next page)

Table 2 (continued)

Author	Year	Nation	Type of Study	Experimental Scope	Sample size	Factors	Tools	Measures
Zarogoulidou [22]	2015	Greece	Cohort	Single centered	113	1. Treatment plan. 2. Age 3. Smoking	1. Use of the system for economic burden calculation 2. Lung Cancer Symptom Scale 3. Quality of Life Questionnaire	1. Improve the quality and efficiency of medical services. 2. Improve patient education and support to enhance their comprehension of the treatment procedures and expenses. 3. Enhance the healthcare insurance system. 4. Urge all parts of society to be mindful of the well-being of individuals with lung cancer and their loved ones, and offer the assistance and support they need.
Yang [23]	2023	China	Cross sectional	Multicenter	611pairs	1. Age(Patient caregivers) 2. Careers 3. Treatment plan	Questionnaire	1. Increasing health insurance coverage, expanding access to treatment services, and providing reimbursement for additional cancer-related expenses. 2. Enhancing diagnostic and treatment methods to improve cancer care.
Xu [24]	2021	China	Cross sectional	Single-centered	222	1. Age 2. Careers 3. Insurance 4. Household savings	1. Questionnaire 2. COST-PROM 3. Medical record	1. Government should implement policies and establish a comprehensive system for prevention and control. 2. Professional assistance should be offered by medical professionals, including doctors, oncology nurses, and health service providers, to help prevent and control economic toxicity. Doctors should improve communication with patients regarding medical expenses, collaborate on selecting cost-efficient treatment options, and identify high-risk groups for cost-effective treatment programs.
Hazell [25]	2020	America	Cohort	Single centered	143	1. Age 2. Careers 3. Income (household savings) 4. Insurance 5. Racist	1. Questionnaire 2. COST 3. Medical record 4. FACT-L	1. Improve the evaluation of patients' financial requirements. 2. Offer professional assistance to alleviate the financial strain on patients
Friedes [26]	2021	America	Cohort	Single-centered	215	1. Household savings 2. Financial Knowledge	COST	1. Conducting screenings to assess basic needs can assist patients in preparing for out-of-pocket expenses, while also raising awareness about patient financial literacy and available resources.
Liu [5]	2022	China	Cross-sectional	Multicenter	843	1. Geographic area 2. Sex 3. Educational level 4. Insurance 5. Household savings 6. Self-reported health status 7. Complication 8. Treatment plan	COST	1. Enhance the scope of health insurance benefits. 2. Give financial aid. 3. Lessen the mental strain on patients by offering psychological assistance and other forms of support. 4. Enhance the financial literacy of lung cancer patients, increase their understanding of financial information and support options, and motivate them to proactively seek assistance and resources.
Xu [27]	2022	China	Cross-sectional	Single-centered	152	1. Age 2. Careers 3. Household savings	1. COST 2. FACT-L	1. Offer professional assistance and counseling 2. Enhance the healthcare coverage system.

(continued on next page)

Table 2 (continued)

Author	Year	Nation	Type of Study	Experimental Scope	Sample size	Factors	Tools	Measures
Sun [28]	2021	China	cohort	Multicenter	2565	1. Age 2. Insurance 3. Income 4. Disease Progress	1. Questionnaire 2. Medical record	1. Resource allocation in the three-tier system of hospitals should be optimized to avoid patient concentration in three-tier hospitals to avoid the clustering of patients into tertiary hospitals. 2. Policymakers should work towards creating policies that aim to manage the expenses associated with medical procedures.
Jeon [29]	2019	Korea	cohort	Multicenter	2919	1. Treatment plan 2. Disease Progress	1. Use of the system for economic burden calculation	1. Three stages of prevention 2. Optimization of treatment plan and provision of diagnostic and therapeutic technologies.

COST : (Costs and Outcomes of Survivorship Tool , COST) ; NSCLC:(Non-Small Cell Lung Cancer , NSCLC) ; FACT-L : (Functional Assessment of Cancer Therapy - Lung , FACT-L) ; OOP: (Out-Of-Pocket , OOP).

obtain the total score, which ranged from 0 to 44, based on the subjective feelings of the patients during the 7-d period. Economic toxicity increased with decreasing scores. A total score of less than 22 was determined to be the presence of high economic toxicity, otherwise low economic toxicity. In 2017, Yu [31] Chineseized the scale, and the results showed that the Cronbach's coefficient of the Chinese version of the COST-PROM scale was 0.889, the re-test reliability was 0.77–0.98, and the content validity index was 0.83–1.00.

Additionally, three studies [16,22,29] explored the economic burden of cancer patients, one of which [16] used two components to calculate the direct economic burden of patients, namely, direct medical costs and direct non-medical costs, where direct medical costs include medical costs such as outpatient and inpatient registration fees, drug costs, examination and laboratory fees, treatment costs, bed costs and other costs; direct non-medical costs include nursing care and nutritional Costs. Another study [22] calculated the economic burden of patients using the form of direct costs plus indirect costs, where direct costs include the costs of diagnosis, treatment and medication, and indirect costs include the lost work time of patients and family caregivers due to the disease.

Eight studies [15,17,18,22–25,28] investigated patients' financial burden using questionnaires, all of which were self-designed questionnaires in the form of structured questionnaires that included basic characteristics of the patient and/or caregiver, characteristics of the patient's disease, and use of expenses, which were able to measure the subjective financial pressure of patients.

Six studies [19–21,24,25,28] demonstrated the use of medical record reviews, which have offered another avenue for investigating patients' financial burden, allowing researchers to analyze personal and medical visit information to gain a clearer picture of the financial challenges faced by cancer patients.

4.3.2. Factors influencing cancer-related economic toxicity in lung cancer patients

The exploration of sixteen influencing factors provides a comprehensive understanding of the multifaceted nature of FT in cancer patients. These factors are meticulously categorized into four main areas: sociodemographic, disease-related, economic-related, and psychosocial, each contributing uniquely to the overall financial burden experienced by patients.

Sociodemographic factors include age, geography, gender, occupation and occupational status, education, ethnicity, race, marriage, and smoking. Nine studies [15,17,19–22,25,27,28] revealed that younger and middle-aged oncology patients are at higher risk for FT compared to older patients, Two of the studies [17, 23] examined the relationship between the age of the caregiver and FT. The results indicated that younger caregivers (under 60 years of age) experienced greater loss of productivity and economic burden due to missed work compared to older caregivers. Patients employed but on sick leave exhibited higher economic toxicity [17,23–25,27] and civil servants had greater economic toxicity losses compared to farmers. Three studies [5,15,16] examined the relationship between FT and geographic location, and the results showed that Patients living in less developed areas of western China were found to be more likely to experience economic toxicity. Two studies [5,17] examined the relationship between education and FT, and the results showed that individuals with higher education were less likely to experience economic toxicity. Two studies [5,19] examined the relationship between gender and FT and showed that males were more likely to experience FT than females. A study [20] showed that patients from ethnic minority areas were less likely to experience FT. Another cohort study [25] demonstrated that non-white lung cancer patients were more likely to develop FT. Another study [20] indicated that married patients were less likely to have FT than unmarried patients.

Disease-related factors that contribute to FT include the treatment regimen, disease complications, and length of hospitalization. Ten studies [5,15,16,18–23,29] have investigated the connection between FT and treatment regimens. The results indicate that an increase in the total number of chemotherapy cycles is associated with a higher likelihood of FT. Additionally, patients who underwent surgical procedures were found to be more likely to experience FT. Seven studies [15–21] have explored the relationship between FT and the length of hospitalization. These studies revealed that longer hospital stays were linked to a higher likelihood of FT.

Furthermore, one study [17] examined the duration of caregiver care and found that longer caregiver support was associated with a higher likelihood of FT. Three studies [17,28,29] have examined the link between FT and disease progression, indicating that early-stage patients have a relatively lower financial burden due to receiving less costly surgical treatments. Two studies [5,19] have investigated the relationship between FT and disease complications, revealing that patients with complications were more likely to experience FT.

The impact of financial factors such as household savings, insurance, and financial knowledge on cancer-related FT was examined in several studies. Seven studies [5,15,24–28] looked at the relationship between FT and household savings and found that patients with greater household savings were less likely to experience FT. Similarly, six studies [5,16,20,24,25,28] explored the relationship between FT and insurance, indicating that patients with insurance were less likely to experience cancer-related financial toxicity. Additionally, one study [26] investigated the link between FT and financial literacy and revealed that patients with higher levels of financial literacy were less likely to experience cancer-related financial toxicity.

In the realm of psychosocial factors, one study [5] explored the connection between FT and self-perceived health status, finding that patients with poor self-reported health were more likely to experience financial toxicity.

4.3.3. Response strategy for cancer-related economic toxicity in lung cancer patients

The comprehensive response to addressing the challenges faced by lung cancer patients encompasses two overarching themes: institutional, technical, and management reforms, alongside public education and the assessment of patients' psychological well-being. These initiatives aim to tackle the multifaceted issues surrounding the diagnosis, treatment, and post-treatment care of lung cancer patients, ensuring they receive the most effective and compassionate care available.

The need for tertiary disease prevention and early screening of high-risk groups is underscored by several studies [15–17,19,29]. Eight studies [16,17,20–23,28,29] have indicated the necessity of enhancing diagnostic and treatment technologies in hospitals, as well as developing innovative methods for early diagnosis and treatment to improve cure and survival rates. Two studies [20,21] demonstrated that an incentive system could be used to promote the development of medical technology. Seven studies [5,19–23,27] highlighted the need to improve the healthcare insurance system, and suggested that policies should be formulated to expand the scope of healthcare insurance coverage. Five studies [15,16,18,21,28] indicate that hospital management should verify the reasonableness of medical costs and strengthen the management of lung cancer mono-cases. Six studies [16,17,22,24,25,27] emphasized the importance of providing professional counseling and support. They also suggested establishing an economic toxicity prevention and control system involving physicians, oncology caregivers, and health service providers,

Seven studies [5,15,17,22,24–26] demonstrated the need to strengthen the assessment and education of the financial needs of lung cancer patients, to enhance patients' awareness of financial management, to consider the patient's geographic region, treatment options, and personal financial ability, to improve their knowledge of financial knowledge and resources, and to promote joint decision-making between doctors and patients. Two studies [5,22] showed the need to pay attention to patients' psychology and reduce their psychological burden.

5. Discussion

5.1. Further refinement of FT assessment tools for lung cancer patients is urgently needed

The concept of Economic Toxicity in the context of cancer treatment encompasses both the tangible financial strain and the intangible emotional distress faced by patients navigating their healthcare journey. This multifaceted issue is particularly poignant for individuals battling cancer, as it not only impacts their personal finances but also their mental well-being and overall quality of life. The assessment of Economic Toxicity among cancer patients is primarily facilitated through the COST tool, a comprehensive evaluation method that integrates both subjective and objective data to gauge the financial situation of patients. This tool, having undergone localization and validation within China, demonstrates a credible and valid approach to assessing the economic challenges faced by cancer patients. Its structured format ensures efficient assessment, combining elements of both qualitative and quantitative analysis to offer a holistic view of the patient's financial state.

The multifaceted nature of economic toxicity in cancer care requires a comprehensive approach that considers both the monetary and subjective aspects of financial burden. Economic toxicity hurts both patients and their families, so it is suggested that future instrument development could design a patient caregiver-specific economic toxicity assessment scale, There is a need to focus on the influence of family and caregivers on their disease regression, and future tools could involve the development of patient caregiver-specific economic toxicity assessment scales.

5.2. Identifying at-risk patient populations is crucial for developing precise interventions

The identification and targeting of at-risk populations within the realm of oncology, specifically focusing on FT among lung cancer patients, is paramount for the development of effective, tailored interventions. Recent research and surveys [15,17,19,20,22,25,27,28], including those conducted through the Canadian Public Health System [32], underscore the heightened vulnerability of younger lung cancer patients to FT. This demographic is identified as a priority, necessitating the allocation of dedicated support resources to mitigate the financial pressures they face during their treatment journey. A particular emphasis [15] is placed on the age bracket of 50-59-year-old lung cancer patients, who exhibit a notable predisposition to FT. This observation is attributed to the critical role these individuals often play within their families, coupled with a potential scarcity of available caregivers. Consequently, there is a pressing

need to intensify efforts aimed at evaluating and addressing the financial requirements of this cohort, alongside a concerted effort to bolster familial support structures. Furthermore, the interplay between various socio-economic factors—such as employment status, educational attainment, marital status, and gender—and susceptibility to FT cannot be overstated. Patients who remain employed but are on sick leave, for instance, are found to be more closely associated with FT [26]. This scenario arises from the dual challenge of ongoing treatment expenses and the loss of income, potentially leading to long-term financial instability or even unemployment. Thus, a thorough assessment of the financial needs of these patients, coupled with a supportive network of family members, becomes imperative. Interestingly, patients with higher levels of education tend to experience lower levels of FT. This phenomenon is linked to the assumption that such individuals possess greater earning capabilities and access to social security benefits, thereby equipping them with a stronger ability to manage healthcare costs. Conversely, men are observed to bear a higher burden of FT compared to women [6], possibly due to societal expectations that place men in the role of primary breadwinners, subjecting them to amplified psychological and economic stressors. Marital status emerges as another significant determinant, with married patients exhibiting a lesser propensity for FT [21]. This is consistent with the findings of Hastert [33] that married individuals may enjoy enhanced support and care throughout their treatment, thereby easing the financial implications of their healthcare journey. Based on these insights, healthcare professionals are encouraged to prioritize interventions for male patients, those who are unmarried, and middle-aged lung cancer patients with lower levels of education, acknowledging the unique challenges each of these groups faces.

The profound impact of treatment choices on the economic toxicity experienced by cancer patients, particularly those diagnosed with lung cancer, cannot be understated [34]. Research [35,36] has illuminated the critical role that the type of treatment regimen plays in shaping the financial landscape for patients. This is largely due to the varying costs associated with different therapeutic approaches, such as surgery, chemotherapy, and radiotherapy. For instance, initial surgical interventions might dominate the cost profile for early-stage patients, transitioning to chemotherapy and radiotherapy as the disease progresses, along with the associated costs of inpatient care [37,38]. This dynamic underscores the importance of selecting treatment paths that not only address the disease effectively but also consider the financial implications for the patient.

Further insights into the cost escalation with advancing disease stages come from studies demonstrating that patients in later stages incur higher treatment costs [18], partly due to extended periods of radiotherapy and the inherent complexity of managing advanced cases. The contrast between hospital-based chemotherapy and oral targeted agents, which can be administered outside of a hospital setting, highlights another layer of cost variation, with chemotherapy generally incurring higher overall costs. The presence of comorbidities significantly amplifies the financial toxicity experienced by cancer patients [20]. These conditions often necessitate more complex and expensive treatment plans, leading to increased hospitalizations and care costs. This finding [39] is supported by evidence showing that patients with non-small cell lung cancer, especially those experiencing metastatic recurrence, face substantial cost increases due to the intensive and lengthy nature of first-line treatments. This underscores the critical need for developing more efficacious, safer, and cost-efficient therapies, alongside strategies for early detection and treatment to mitigate the economic burden on patients. Insurance coverage emerges as a significant protective factor against financial toxicity [17], enabling patients to offset a larger portion of their medical expenses. Moreover, insured patients often benefit from broader social security nets and support systems, further alleviating the financial stress associated with cancer treatment. Interestingly, higher household savings correlate inversely with financial toxicity [6,16,25–28], suggesting that financial preparedness can serve as a buffer against the economic challenges posed by cancer care.

Self-reported health status also plays a pivotal role in the likelihood of experiencing financial toxicity [6]. Poorer health statuses are associated with increased anxiety and depression, potentially leading to avoidance behaviors that exacerbate the financial burden. Hrishikes [40] showed that disorder-related financial burden was associated with lower health-related quality of life, increased risk of depressed mood, and higher frequency of fear of cancer recurrence in patients. The interconnectedness of financial toxicity with psychological well-being highlights the importance of comprehensive care approaches that address not just the physical aspects of cancer but also the emotional and financial toll it takes on patients. Nursing staff, playing a crucial role in patient care, can contribute significantly to mitigating economic toxicity by fostering emotional support platforms. These platforms not only provide a space for patients to share their experiences and feelings but also enable nursing staff to tailor interventions that address the unique financial challenges faced by each patient.

In conclusion, the economic toxicity experienced by cancer patients is a multifaceted issue influenced by a myriad of factors, including treatment choices, comorbidities, insurance coverage, and self-reported health status. Addressing this issue requires a comprehensive approach that considers the financial, psychological, and social dimensions of cancer care, aiming to create more equitable and supportive healthcare environments for all patients.

5.3. Reflections on enhancing FT supportive strategies for lung cancer patients

The exploration of FT among lung cancer patients underscores the critical intersection of healthcare economics, policy, and patient-centric care. Jeon's work highlights the significance of institutional, technological, and managerial reforms in addressing FT [41], emphasizing the economic sustainability of lung cancer patients. This perspective serves as a call to action for prioritizing pre-treatment assessments and early prevention strategies, which not only enhance patient outcomes but also significantly reduce the financial burden associated with medication and metastatic management costs [42]. The American Society of Clinical Oncology (ASCO) has taken a pivotal stance on this issue through its Value Framework, which assesses cancer treatments based on clinical efficacy, side effects, symptom relief, quality of life improvement, and cost. This framework signals a growing recognition of the importance of balancing treatment benefits with economic considerations. To combat the economic toxicity of cancer treatments effectively, policy changes that incentivize high-value care are essential [43]. Chung's findings underline the limitations in resource

allocation and referral systems for supporting financially distressed patients, reinforcing the need for collaborative efforts between national policies and hospital initiatives [44]. Zhu's research reveals that out-of-pocket expenses constitute a significant proportion of total lung cancer costs [45], underscoring the urgency for national-level interventions such as increased tobacco excise taxes and improved environmental pollution controls to curb lung cancer incidence. Additionally, enhancing the innovation capacity of domestic pharmaceutical companies, reforming healthcare payment mechanisms, and improving referral systems are crucial steps toward reducing treatment costs. At the hospital level, upgrading the diagnostic and treatment capabilities of outpatient and lower-level facilities is essential, alongside expanding the inclusion of anti-cancer drugs in formularies to improve accessibility and reduce patient out-of-pocket expenses. Considering the reason that the biggest cost of lung cancer treatment is the drugs, and that there is an urgent need to improve healthcare services and control the cost of treatment.

Zhu [46] advocates for the integration of emotionally focused coping strategies and multidisciplinary team approaches to assist survivors in managing treatment-related financial issues and developing emotional resilience. While systemic interventions are vital, the realization of their benefits requires time. Consequently, individual patient-level strategies are equally important in mitigating economic toxicity. Establishing a patient-centered management model, incorporating basic needs assessments, and optimizing health outcomes through the provision of essential resources are foundational steps. Ju's study [47] illustrates the potential impact of reducing smoking prevalence on the incidence of severe adverse events (SAE) and associated costs, highlighting the importance of smoking cessation clinics and patient education.

Friedes [26] emphasizes the necessity of considering patient values, preferences, and financial situations to facilitate informed decision-making and proactive communication about costs. This approach not only aids in treatment initiation but also facilitates the rational allocation of health resources. Nursing staff play a crucial role in addressing economic toxicity by creating emotional sharing platforms, which foster social connections, emotional expression, and cognitive restructuring among patients. Interventions that enhance patient and caregiver psychological resilience are also recommended to improve family functioning and risk-taking capacities. The psychological resilience of patients and caregivers is also extremely important to FT, and it is recommended that intervention programs be designed based on a binary patient-caregiver perspective to achieve an overall improvement in patient-caregiver family functioning, enhance patient psychological resilience, and improve family risk-taking capacity. Given the evolving nature of FT risk factors, future research should employ real-world data to inform decision-making. Platforms like Bridge, which integrate with electronic medical records to identify suitable financial assistance options, exemplify innovative solutions for navigating the complexities of cancer care financing. Ultimately, policy interventions that support non-medical costs and invest in healthcare infrastructure are essential for efficient resource allocation and the mitigation of financial toxicity among lung cancer patients [48].

6. Limitations

The number of literature in this scoping review is relatively small, and the influencing factors may not have been fully considered, focusing only on the direct economic burden without addressing other socio-economic issues related to lung cancer, such as patients' psychological pressure and the strength of family support. Therefore, future studies may consider including these factors in the scope of the study, and at the same time, it is necessary to expand the total number and breadth of studies, to develop an FT assessment tool specific to lung cancer patients to improve the accuracy of the assessment, and to improve the related supportive coping strategies to support the comprehensive implementation of the subsequent interventions. The cross-sectional design cannot reflect the cost of the entire survival period, and it is recommended that more high-quality longitudinal, multicenter studies be conducted in the future to accurately assess patients' financial status and enhance their ability to cope with disease and risk.

7. Conclusions

Focusing on the lung cancer patient population, this scoping review investigated the FT assessment tools, FT influencing factors, and coping strategies used by lung cancer patients, aiming to provide suggestions for the fine-tuned management of lung cancer patients, to assist patients to better cope with and manage the disease, to reduce the psychological burden of patients, to enhance the ability of patients' families to cope with the risks and to improve the quality of life of patients. In conclusion, Economic Toxicity represents a complex challenge in cancer care, affecting patients' financial stability and psychological well-being. The adoption and adaptation of tools like COST, alongside targeted interventions and policy changes, are crucial steps towards mitigating this issue. By recognizing the unique vulnerabilities of different patient populations and advocating for personalized care, we can begin to alleviate the financial hardships faced by cancer patients and their families, paving the way for more equitable and compassionate healthcare systems.

Declaration of interest's statement

The authors have no conflict of interest to report.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Additional information

The protocol for this scoping review was prospectively registered with the Open Science Network on February 19, 2024 (<https://doi.org/10.17605/OSF.IO/FSCV5>). This report is not registered with the International Prospective Register of Systematic Reviews (PROSPERO (PROSPERO)) as this is a scoping review and therefore not eligible for that register.

Ethical approval

Not applicable.

Data availability statement

Data included in article/supp. material/referenced in the article.

CRedit authorship contribution statement

Wu XiuCen: Methodology. **Chen GuiHua:** Supervision. **Li Qin:** Methodology. **Zhou XiXin:** Visualization. **Tang Huan:** Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This study was supported by the Science and Technology Bureau and the Health Care Commission of Chongqing, China [Grant No. 2022MSXM067].

References

- [1] H. Sung, J. Ferlay, R.-L. Siegel, et al., Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries, *CA A Cancer J. Clin.* 71 (3) (2021) 209–249, <https://doi.org/10.3322/caac.21660>. Epub 2021 Feb 4.
- [2] S.-Y. Zafar, A.P. Abernethy, Financial toxicity, Part I: a new name for a growing problem, *Oncology (Williston Park)* 27 (2) (2013) 80–81, 149.
- [3] L. Liu, M.Z. Su, J.X. Zhang, et al., Meta-analysis of the incidence of economic toxicity in Chinese patients with malignant tumors: based on the Patient-Reported Economic Toxicity Composite Rating Scale, *Chin. J. Evidence-Based Med.* 23 (11) (2023) 1269–1274, <https://doi.org/10.7507/1672-2531.202306083>.
- [4] M. Kavanaugh, B.J. Kramer, Mcwalsh, et al., Factors contributing to economic burden in lung cancer spousal caregivers, *Palliat. Support Care* 13 (3) (2015) 691–700, <https://doi.org/10.1017/S1478951514000443>.
- [5] M.C. Liu, D.M. Huang, Y.L. Liu, Financial toxicity of patients with lung cancer in China: results from a national survey study, *Cancer Med.* 12 (4) (2023) 4751–4760, <https://doi.org/10.1002/cam4.5244>.
- [6] J.Y. Byun, J.E. Lee, Y.B. Shim, et al., Economic burden of recurrence in completely resected stage IB-IIIa non-small cell lung cancer: a retrospective study using nationwide claims data of South Korea, *Adv. Ther.* 40 (2) (2023) 550–567, <https://doi.org/10.1007/s12325-022-02358-0>.
- [7] L. Apostolidis, K. Mehlis, J. Witte, et al., Financial toxicity in patients with colorectal cancer and neuroendocrine tumors, *J. Clin. Oncol.* 36 (15) (2018), https://doi.org/10.1200/jco.2018.36.15_suppl.6533.
- [8] A. Arevalo, J.S. Nunes, T. Nakakogue, et al., Financial toxicity among patients with breast cancer in a publicly funded health care system in Brazil, *J. Clin. Oncol.* 40 (16) (2022) E18818, https://doi.org/10.1200/jco.2022.40.16_suppl.e18818.
- [9] L. Fu, M.L. Zhuang, C.C. Luo, et al., Financial toxicity in patients with lung cancer: a scoping review protocol, *BMJ Open* 12 (5) (2022), <https://doi.org/10.1136/bmjopen-2021-057801>.
- [10] C. Lockwood, K.B. Dos Santos, R. Pap, Practical guidance for knowledge synthesis: scoping review methods, *Asian Nurs. Res.* 13 (5) (2019) 287–294, <https://doi.org/10.1016/j.anr.2019.11.002>.
- [11] Arksey, H and O'Malley. This is a repository copy of Scoping studies: towards a methodological framework. White Rose Research Online URL for this paper: <https://eprints.whiterose.ac.uk/1618>. <https://doi.org/10.1080/1364557032000119616>.
- [12] L.-G. Gordon, K.M.D. Merollini, A. Lowe, et al., A systematic review of financial toxicity among cancer survivors: we can't pay the Co-pay, *Patient* 10 (3) (2017) 295–309, <https://doi.org/10.1007/s40271-016-0204-x>.
- [13] P.M. Carrera, H.M. Kantarjian, V.S. Blinder, The financial burden and distress of patients with cancer: understanding and stepping-up action on the financial toxicity of cancer treatment, *CA A Cancer J. Clin.* 68 (2) (2018) 153–165, <https://doi.org/10.3322/caac.21443>.
- [14] R. Lentz, ABRd Benson, S. Kircher, Financial toxicity in cancer care: prevalence, causes, consequences, and reduction strategies, *J. Surg. Oncol.* 120 (1) (2019) 85–92, <https://doi.org/10.1002/jso.25374>.
- [15] H.H. Huang, Y. Feng, Z.H. Dong, Analysis of factors influencing the economic burden of hospitalized medical lung cancer patients, *Journal of Hospital Management of the People's Liberation Army* 19 (9) (2012) 839–843, 0.16770/j.cnki.1008-9985.2012.09.017.
- [16] R.Y. Xu, H. Peng, L. Ye, Study on factors influencing the direct economic burden of disease in lung cancer patients in Shanghai, *China Health Economics* 34 (8) (2015) 74–77, <https://doi.org/10.7664/CHE20150821>.
- [17] Y. Xia, Y.Y. Chen, Y. Yang, Analysis of indirect economic burden of advanced non-small cell lung cancer and its influencing factors, *China Health Economics* 42 (8) (2023) 70–73, <https://doi.org/10.3969/j.issn.1007-953X.2022.06.009>, 77.
- [18] Y.X. Kang, X.L. Wu, J.H. Rao, Analysis of economic burden and influencing factors of hospitalized lung cancer patients in Nanchang, *China Health Industry* 12 (23) (2015) 16–19, <https://doi.org/10.16659/j.cnki.1672-5654.2015.23.016>.
- [19] G. Tian, L. Bian, S. Xu, et al., Analysis of morbidity and economic burden of lung cancer patients, *Chin. J. Lung Cancer* 25 (3) (2022) 167–173, <https://doi.org/10.3779/j.issn.1009-3419.2022.101.09>.
- [20] L.-F. Zhou, M.X. Zhang, L.Q. Kong, et al., Costs, trends, and related factors in treating lung cancer patients in 67 hospitals in Guangxi, China, *Cancer Invest.* 35 (5) (2017) 345–357, <https://doi.org/10.1080/07357907.2017.1296156>.

- [21] Z.Y. Tian, Z. He, Q. Zhou, et al., Analysis of the factors influencing lung cancer hospitalization expenses using data mining, *Thorac Cancer* 6 (3) (2015) 338–345, <https://doi.org/10.1111/1759-7714.12147>.
- [22] V. Zarogoulidou, E. Panagopoulou, D. Papakosta, et al., Estimating the direct and indirect costs of lung cancer: a prospective analysis in a Greek University Pulmonary Department, *J. Thorac. Dis.* 7S12-S19 (2015), <https://doi.org/10.3978/j.issn.2072-1439.2015.01.57>.
- [23] Y. Yang, Y. Xia, C.X. Su, et al., Measuring the indirect cost associated with advanced non-small cell lung cancer: a nationwide cross-sectional study in China, *J. Cancer Res. Clin. Oncol.* 149 (8) (2023) 4205–4214, <https://doi.org/10.1007/s00432-022-04258-w>.
- [24] K. Xu, N. Zhang, J.F. Liu, et al., Analysis of economic toxicity and influencing factors in lung cancer patients, *Chin. J. Cancer Prev. Treat.* 28 (20) (2021) 1578–1582, <https://doi.org/10.16073/j.cnki.cjcp.2021.20.11>.
- [25] S.-Z. Hazell, F. W. C. H, et al., Financial toxicity in lung cancer: an assessment of magnitude, perception, and impact on quality of life, *Ann. Oncol.* 31 (1) (2020) 96–102, <https://doi.org/10.1016/j.annonc.2019.10.006>.
- [26] C. Friesel, S.Z. Hazell, W. Fu, et al., Longitudinal trends of financial toxicity in patients with lung cancer: a prospective cohort study, *JCO ONCOLOGY PRACTICE* 17 (8) (2021) 496–1109, <https://doi.org/10.1200/OP.20.00721>.
- [27] T.-Q. Xu, L.D. Xu, H.T. Xi, et al., Assessment of financial toxicity among patients with advanced lung cancer in western China, *Front. Public Health* 9 (2022), <https://doi.org/10.3389/fpubh.2021.754199>.
- [28] C.Y. Sun, J.F. Shi, W.Q. Fu, et al., Catastrophic health expenditure and its determinants in households with lung cancer patients in China: a retrospective cohort study, *BMC Cancer* (2021) 211–219, <https://doi.org/10.1186/s12885-021-09030-w>.
- [29] S.-M. Jeon, J.W. Kwon, S.H. Choi, et al., Economic burden of lung cancer: a retrospective cohort study in South Korea, 2002–2015, *PLoS One* 14 (2) (2019) e212878, <https://doi.org/10.1371/journal.pone.0212878>.
- [30] J.-A. de Souza, B.J. Yap, F.J. Hlubocky, et al., The development of a financial toxicity patient-reported outcome in cancer: the COST measure, *Cancer* 120 (20) (2014) 3245–3253, <https://doi.org/10.1002/cncr.28814>.
- [31] Y. Kuang, Y.L. Sun, F. Jing, et al., Conceptual analysis of cancer-related economic toxicity, *Nurs. Res.* 35 (20) (2021) 3695–3700, <https://doi.org/10.12102/j.issn.1009-6493.2021.20.025>.
- [32] D.-A. Ezeife, B.J. Morrstein, S. Lau, et al., Financial burden among patients with lung cancer in a publicly funded health care system, *Clin. Lung Cancer* 20 (4) (2019) 231–236, <https://doi.org/10.1016/j.clcc.2018.12.010>.
- [33] T.A. Hastert, M.P. Banegas, L.M. Hamel, et al., Race, financial hardship, and limiting care due to cost in a diverse cohort of cancer survivors, *JOURNAL OF CANCER SURVIVORSHIP* 13 (3) (2019) 429–437, <https://doi.org/10.1007/s11764-019-00764-y>.
- [34] X.H. Zeng, J. Karnon, S.Y. Wang, et al., The cost of treating advanced non-small cell lung cancer: estimates from the Chinese experience, *PLoS One* 7 (10) (2012), <https://doi.org/10.1371/journal.pone.0048323>.
- [35] K.H. Yang, S.S. Hua, W.T. Wei, et al., Economic burden of advanced lung cancer patients treated by gefitinib alone and combined with chemotherapy in two regions of China, *J. Med. Econ.* 26 (1) (2023) 1424–1431, <https://doi.org/10.1080/13696998.2023.2272536>.
- [36] N. Jovanoski, S. Abogunrin, D. Di Maio, et al., Systematic literature review to identify cost and resource use data in patients with early-stage non-small cell lung cancer (NSCLC), *Pharmacoeconomics* 41 (11) (2023) 1437–1452, <https://doi.org/10.1007/s40273-023-01295-2>.
- [37] J. De Castro, A. Insa, R. Collado-Borrell, et al., Economic burden of locoregional and metastatic relapses in resectable early-stage non-small cell lung cancer in Spain, *BMC Pulm. Med.* 23 (1) (2023), <https://doi.org/10.1186/s12890-023-02356-0>.
- [38] K.H. Yang, S.S. Hua, W.T. Wei, et al., Economic burden of advanced lung cancer patients treated by gefitinib alone and combined with chemotherapy in two regions of China, *J. Med. Econ.* 26 (1) (2023) 1424–1431, <https://doi.org/10.1080/13696998.2023.2272536>.
- [39] L.E. McLouth, C.L. Nightingale, B.J. Levine, et al., Unmet care needs and financial hardship in patients with metastatic non-small-cell lung cancer on immunotherapy or chemoimmunotherapy in clinical practice, *JCO ONCOLOGY PRACTICE* 17 (8) (2021) 497–1119, <https://doi.org/10.1200/op.20.00723>.
- [40] H.P. Kale, N.V. Carroll, Self-reported financial burden of cancer care and its effect on physical and mental health-related quality of life among US cancer survivors, *N Cancer* 122 (8) (2016) 283–289, <https://doi.org/10.1002/cncr.29808>.
- [41] S.M. Jeon, J.W. Kwon, S.H. Choi, et al., Economic burden of lung cancer: a retrospective cohort study in South Korea, 2002–2015, *PLoS One* 14 (2) (2019), <https://doi.org/10.1371/journal.pone.0212878>.
- [42] I. Cicin, E. Oksuz, N. Karadurmus, et al., Economic burden of lung cancer in Turkey: a cost of illness study from payer perspective, *Health Econ Rev* 11 (1) (2021) 22, <https://doi.org/10.1186/s13561-021-00322-2>.
- [43] M. Boulanger, C. Mitchell, J. Zhong, et al., Financial toxicity in lung cancer, *Front. Oncol.* 12 (2022), <https://doi.org/10.3389/fonc.2022.1004102>.
- [44] H. Chung, A. Hyatt, S. Kosmider, et al., Availability and accessibility of services to address financial toxicity described by Australian lung cancer patients and healthcare professionals, *Support. Care Cancer* 31 (9) (2023), <https://doi.org/10.1007/s00520-023-08019-4>.
- [45] D.W. Zhu, X.F. Shi, S. Nicholas, et al., Estimated annual prevalence, medical service utilization and direct costs of lung cancer in urban China, *Cancer Med.* 10 (8) (2021) 2914–2923, <https://doi.org/10.1002/cam4.3845>.
- [46] Z. Zhu, W.J. Xing, X.J. Zhang, et al., Cancer survivors' experiences with financial toxicity: a systematic review and meta-synthesis of qualitative studies, *Psycho Oncol.* 29 (6) (2020) 945–959, <https://doi.org/10.1002/pon.5361>.
- [47] J.F. Shi, C.C. Liu, J.S. Ren, et al., Economic burden of lung cancer attributable to smoking in China in 2015, *Tobac. Control* 29 (2) (2020) 191–199, <https://doi.org/10.1136/tobaccocontrol-2018-054767>.
- [48] Z.J. Wang, F. Si, Y.Q. Zhou, et al., Progress of financial navigation model in cancer patients, *Military Nursing* 40 (12) (2023) 81–84, <https://doi.org/10.3969/j.issn.2097-1826.2023.12.020>.