

Background

- China is currently facing significant economic and societal burden due to lung cancer. The China’s National Cancer Center 2020 annual report summarized that lung cancer has the highest incidence in males, and the second highest incidence in females among all cancers in China.(1)
- Lung cancer patients require costly medical and caregivers’ services.
- A study reported the total economic burden of lung cancer was estimated to be 25.07 billion USD in China in 2017. The estimated direct expenditure was 11.10 billion USD, up to 1.43% of total healthcare expenditure for China, covering 10.30 billion USD and 0.80 billion USD for medical and non-medical expenditure, respectively. The estimated indirect cost was 13.97 billion USD, including 1.52 billion USD due to disability and 12.45 billion USD due to premature death.(2)

Objective

- The objective of the systematic literature review (SLR) was to summarize the economic burden of lung cancer in China and to identify data gaps in economic research of lung cancer in China.

Method

- Four databases were searched using the OVID search engine for the SLR: Medline In-Process, Embase, EconLit and National Health Service economic evaluation database (NHS EED). The search utilized a combination of disease and economic burden indexed terms and free-text searching to ensure that the most relevant literature was identified and reviewed. Modified Scottish Intercollegiate Guidelines Network (SIGN) filter was adopted for the economic SLR. The searches were also limited to studies:
 - Relevant to China (two terms - “China” and “Chinese” - were applied)
 - Published since 2015 (January 1, 2015–June 4, 2021)
- An additional internet-based grey literature search was conducted to identify any further relevant literature. Annual conference proceedings from the following conferences in the past three years (2019 to 2021) were reviewed, including:
 - International Society for Pharmacoeconomics and Outcomes Research (ISPOR)
 - American Society of Clinical Oncology (ASCO)
 - Chinese Society of Clinical Oncology (CSCO)
 - European Society for Medical Oncology (ESMO)
 - World Conference on Lung Cancer (WCLC)
- All included full text publications were assessed for quality against an adapted version of the DRUMMOND checklist.
- All cost data were converted to a common currency and year (2019 USD\$) based on the Consumer Price Index (CPI) in China and the US published by the China Statistics Yearbooks and International Monetary Fund (IMF), and the currency exchange rate published by the IRS.(3-5)
- Table 1** below lists the eligibility criteria.

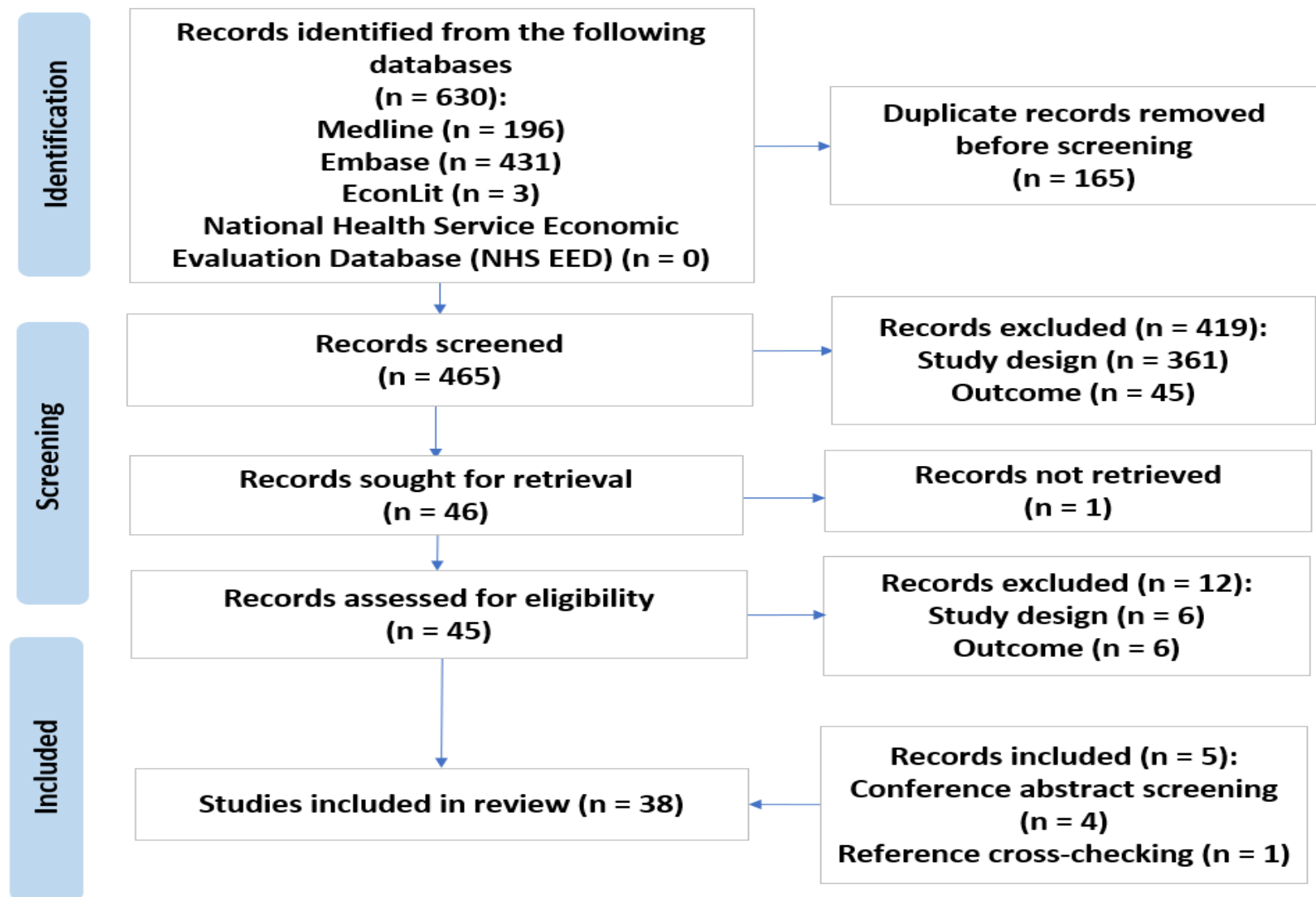
Table 1: Eligibility criteria

	Inclusion criteria	Exclusion criteria
Population	Patients with lung cancer in China, regardless of age	
Study design	Economic studies reporting direct or indirect costs ⁶	- Case studies, animal studies, letters, editorials or commentaries, systematic literature reviews; - Cost models, e.g., cost effectiveness model, cost utility model, most benefit model, cost minimization model
Main outcomes	- Direct costs - Indirect costs	
Other limitations	- Language: no limitation on language, both English and Chinese are included; - Years: 2015 to current; - Geography: China; - Subgroup data in China are also of interest	

Result

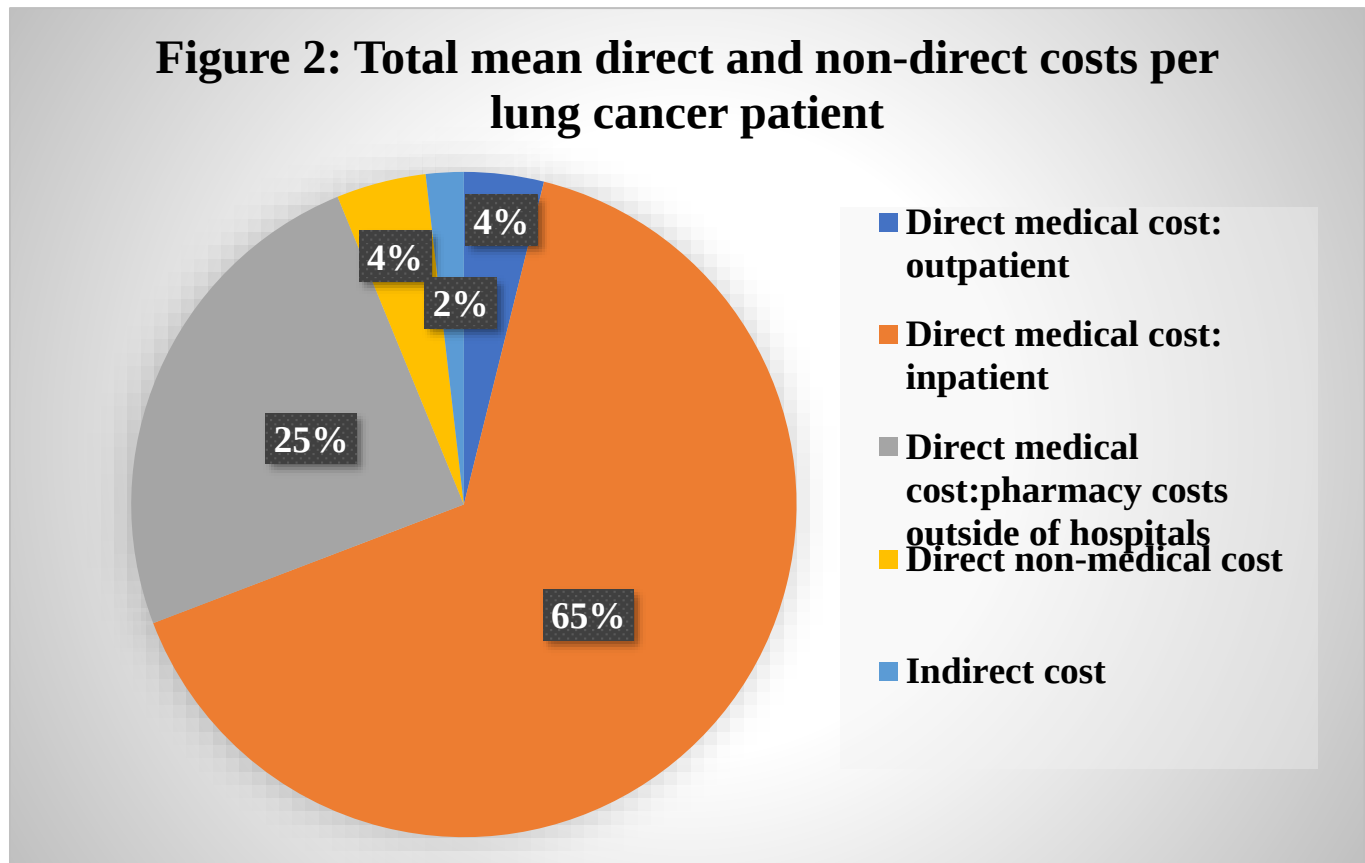
- In total, 465 references were searched, and 38 studies were included in the SLR. **Figure 1** presents the PRISMA diagram.
- Most were observational studies (36 studies) using real-world data and two were clinical trials. The most common data sources were hospitals, followed by insurances, surveys, national databases, bureau of statistics, etc. Twelve were national studies. Other commonly studied regions include Shanghai, Beijing, Hunan province, etc. Twenty-six studies examined all types of lung cancer and 12 studies focused on non-small cell lung cancer (NSCLC) only.

Figure 1: PRISMA diagram



Direct and indirect costs

- Total cost of care related to lung cancer included direct and indirect costs.
- Thirty-four, one, and three studies reported direct, indirect and both costs, respectively. Only cost per lung cancer patient is presented here.
- Among studies reporting both direct and indirect costs, Zhang et al. reported the mean total cost per lung cancer patient (**Figure 2**).(6) It examined lung cancer patients in Nangang, Heilongjiang and reported that the average economic burden per patient was \$46,767.56, including direct cost (98% of the total cost; \$45,909.12), and indirect cost due to productivity loss among caregivers and patients (2%; \$858.44). Direct cost included direct non-medical cost (4%; \$2,039.92) and direct medical cost (94%; \$43,869.20). The latter one covered inpatient expense (65%; \$30,548.85), outpatient expense (4%; \$1,811.82) and pharmacy cost outside of hospitals (25%; \$11,508.52).

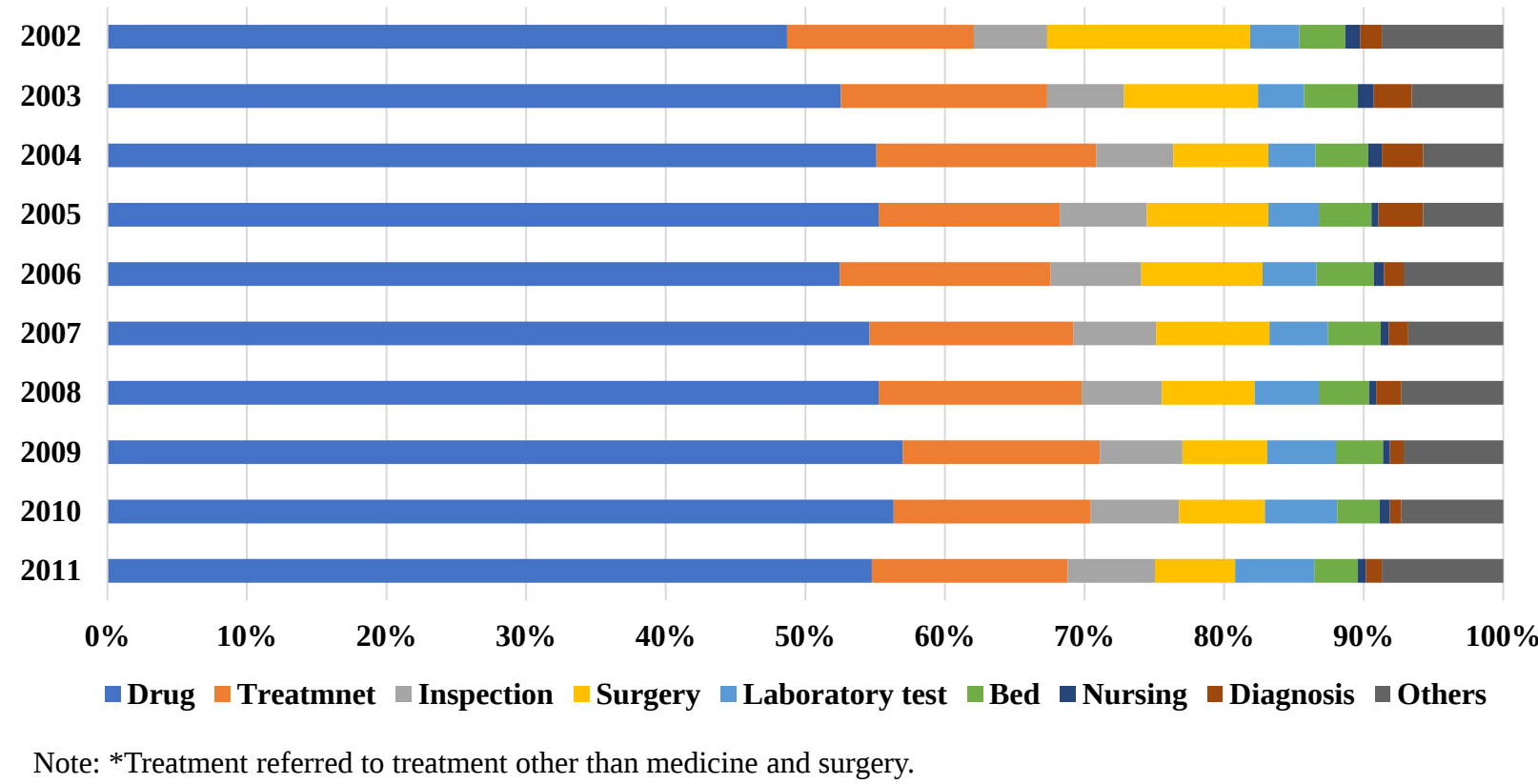


Note: *This refers to drugs that patients bought in pharmacies for their own lung cancer treatment after the initial diagnosis. Expenditures for medicine prescribed by the doctors and purchased in medical institutions were included in outpatient or inpatient costs.
^Total direct nonmedical costs included transportation, accommodation, nutrition, caregiver, and other costs.

Breakdown of medical expenditure

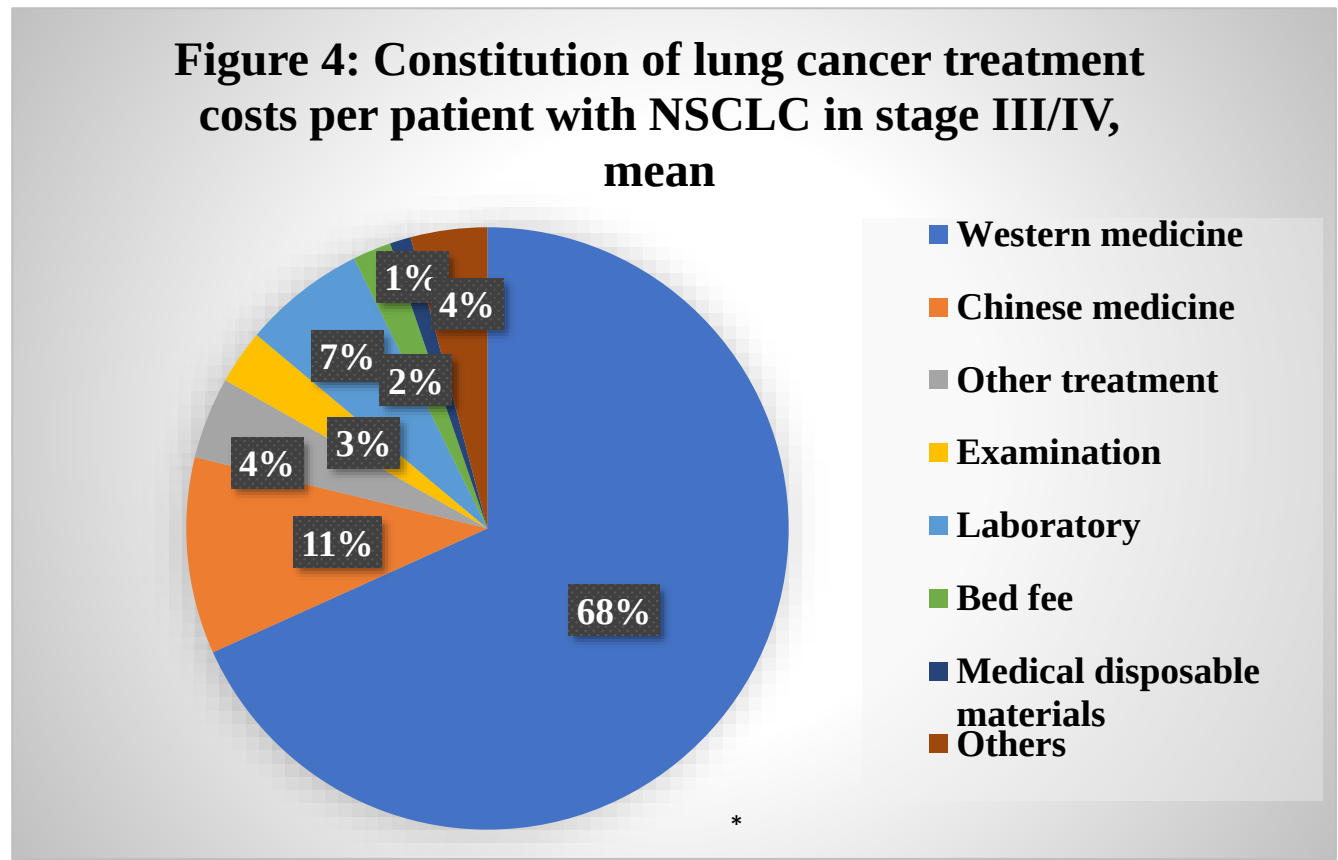
- Zhang et al., 2021 reported the proportional breakdown of medical expenditure for lung cancer diagnosis and treatment per case in China from 2002 to 2011.(7) The highest cost was for drug, followed by treatment (other than drug and surgery), surgery, etc. The breakdown varied slightly from 2002 to 2011 (**Figure 3**).

Figure 3: Breakdown of medical expenditure for lung cancer diagnosis and treatment per case



Note: *Treatment referred to treatment other than medicine and surgery.

- Shi et al. reported the total medical cost per patient with stage III or IV non-small cell lung cancer (NSCLC) in hospital in Shanghai from 2013 to 2014 (**Figure 4**).(8) The mean total cost was \$15,286.72, with the highest proportion of cost in Western medicine (68%), followed by Chinese medicine (11%), laboratory (7%), etc.

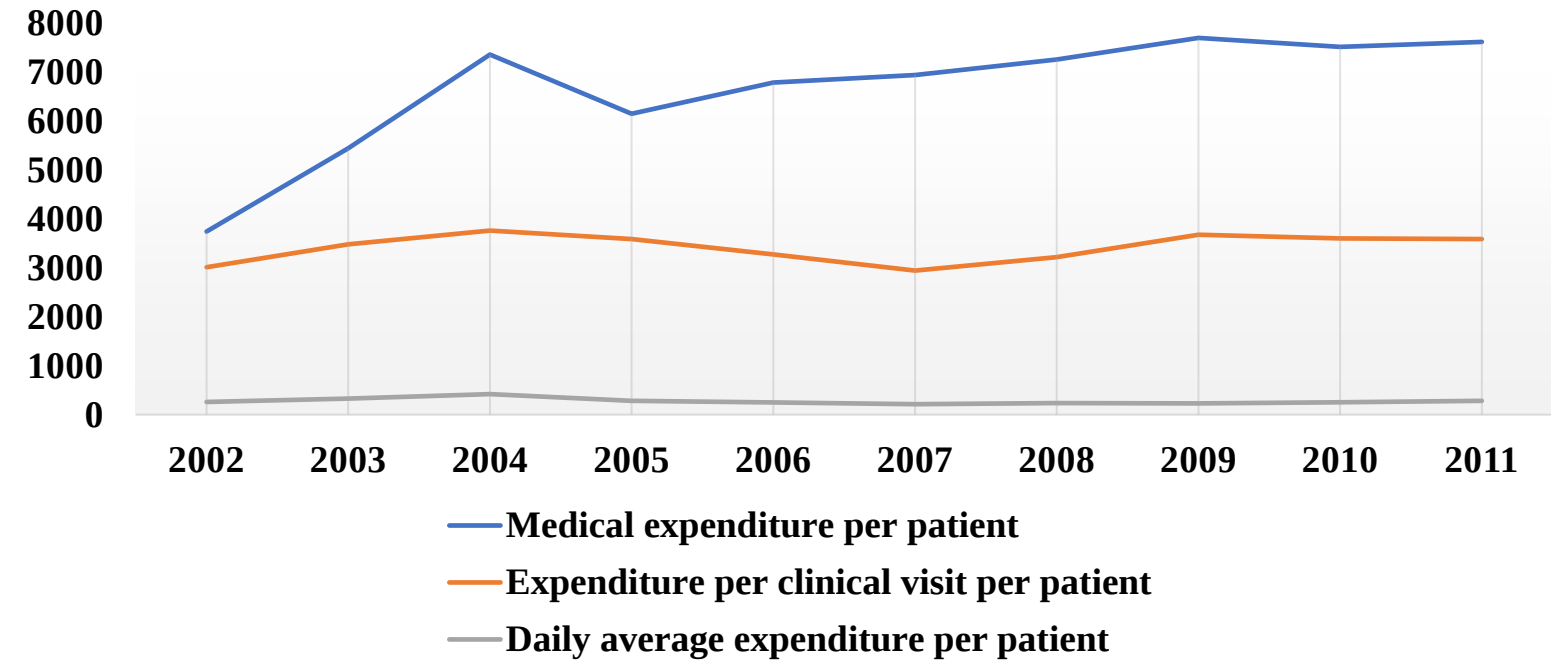


Note: *In this study, patients were with stage III or IV NSCLC, who were ineligible for surgery; therefore, surgery was not included in the graph.

Trend of increased direct medical costs

- A recent study (Zhang et al.) reported the mean medical expenditure for lung cancer diagnosis and treatment per case in hospitals in China, which gradually increased from \$3,728.95 in 2002 to \$7,594.83 in 2011 (**Figure 5**).(7) The average annual medical expenditure per case also rose from \$6,711.19 (2002-2011) to \$7,707.84 (2011-2014). Other studies reported similar total direct medical cost in hospitals annually , e.g., it was \$5,705.65 (2013-2016) in Zhu et al., and \$8,701.33 (2005-2014) in Shi et al.(9,10)
- In Zhang et al., the mean cost per visit and the mean expenditure per day for each patient remained similar with a range of \$2,933.90 to \$3,749.08, and \$212.61 to \$414.90, respectively (Figure 5).(7)
- Some studies also presented the mean cost of each hospitalization per patient, which slightly varied by region, for examples, it was \$1,625.64 in Guangxi (2013 to 2016), \$1,695 in Chongqin (2018 to 2020), and \$2,339.52 in Shanghai (2014 to 2015).(11-13)

Figure 5: Time trend of medical expenditure for lung cancer diagnosis and treatment per case in China, 2002–2011, mean



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