

Zixuan.Lyu¹, Ni.Yuan² and Jian.Wang¹

1 Dong Fureng Institute of Economic and Social Development, Wuhan University, Wuhan, China.

2 School of Public Health, Dalian Medical University, Dalian, China.

INTRODUCTION

In recent years, China's **National Reimbursement Drug Negotiation (NRDN)** mechanism has significantly improved the accessibility and affordability of anti-tumor drugs. The inclusion of innovative and high-value medicines in the **National Reimbursement Drug List (NRDL)** has led to notable price reductions and alleviated patients' financial burdens. However, regional disparities persist, as negotiated drugs continue to face challenges such as limited supply, uneven hospital distribution, and high out-of-pocket expenses. Understanding how these policy initiatives affect drug utilization and patients' economic burden at the local level is essential for promoting equitable access to cancer therapies.

OBJECTIVE

This study aims to evaluate the changes in the **utilization and costs of anti-tumor drugs**, as well as the economic burden on patients, following their inclusion in China's NRDL through the NRDN mechanism. Using data from a city-level **Health Insurance Reimbursement and Settlement System**, the study further explores the impact of these policy changes on drug **accessibility and affordability**, providing empirical evidence and policy insights to enhance equity in medical insurance coverage.

METHOD

We analyzed 21,241 medical insurance settlement records from 2,925 cancer patients between 2018 and 2021.

- Descriptive statistics were applied to examine anti-tumor drug costs, **defined daily doses (DDDs)**, ranking ratios, **defined daily drug cost (DDDc)**, and household **catastrophic health expenditure (CHE)**, in order to assess changes in medication utilization and the level of financial protection among patients.
- Non-parametric tests were further conducted to identify differences in drug costs across patient subgroups.

RESULTS

Table 1 Drug information

Drug Name*	Dosage Form	Indications	NRDL TIME	DDD** (mg)
Bevacizumab	Injection	Colorectal cancer, non-small cell carcinoma, recurrent glioblastoma, hepatocellular carcinoma	2017	25.00
Rituximab	Injection	Lymphoma	2017	115.90
Erlotinib Hydrochloride Tablets	Oral	Non-small cell lung cancer	2017	150.00
Pemetrexed Disodium	Injection	Non-small cell lung cancer, malignant pleural mesothelioma	2017	23.80
Bortezomib	Injection	Multiple myeloma, mantle cell lymphoma	2017	0.40
Trastuzumab	Injection	Breast cancer, gastric cancer	2017	20.00
Imatinib Mesylate	Oral	Leukemia, gastrointestinal stromal tumor (GIST)	2017	400.00
Abiraterone Acetate	Oral	Prostate cancer	2017	1000.00
Vemurafenib Tablets	Oral	Melanoma	2018	1920.00
Ibrutinib Capsules	Oral	Mantle cell lymphoma, chronic lymphocytic leukemia, small lymphocytic lymphoma, Waldenström macroglobulinemia	2018	420.00
Alectinib Hydrochloride Capsules	Oral	Non-small cell lung cancer	2019	1200.00

From 2018 to 2021, a total of 2,925 cancer patients were included, with the majority aged 60–70 years (32.55%). Females (62.50%) outnumbered males (37.50%), and participants were almost evenly covered by urban and rural residents' medical insurance (50.77%) and urban employees' medical insurance (49.23%). Most patients (91.76%) sought care at tertiary hospitals, and outpatient special drugs were the predominant treatment type (83.01%).(Table 2)

Both the cost and utilization of anti-tumor drugs increased annually, and after the implementation of the NRDN, growth in utilization became the main driver of rising drug costs. The average annual growth rates of drug cost and utilization were 27.30% and 42.73%, respectively—this trend reflects factors such as population aging, higher cancer prevalence, medical advances, and expanded insurance coverage. Notably, the overall DDDs of anti-tumor drugs has also shown an upward trend after their inclusion in medical insurance; inclusion in NRDL allows more patients to obtain reimbursement, thereby improving the accessibility of such drugs.

Following NRDL, the DDDc showed a steady downward trend, with an average annual decline of 10.03%. Over half of the drugs (54.55%) recorded reductions exceeding 10%, mainly due to policy measures such as renewal negotiations and centralized procurement, which lowered reimbursement standards and dynamically adjusted prices¹. As a result, patients' economic burden decreased². The incidence of CHE also declined among both urban and rural households, indicating enhanced financial protection³. However, rural households continued to show higher CHE incidence and intensity due to lower disposable incomes⁴, suggesting persistent vulnerability to illness-induced poverty⁵. These findings highlight the need for further policy improvement to ease rural patients' financial burden.

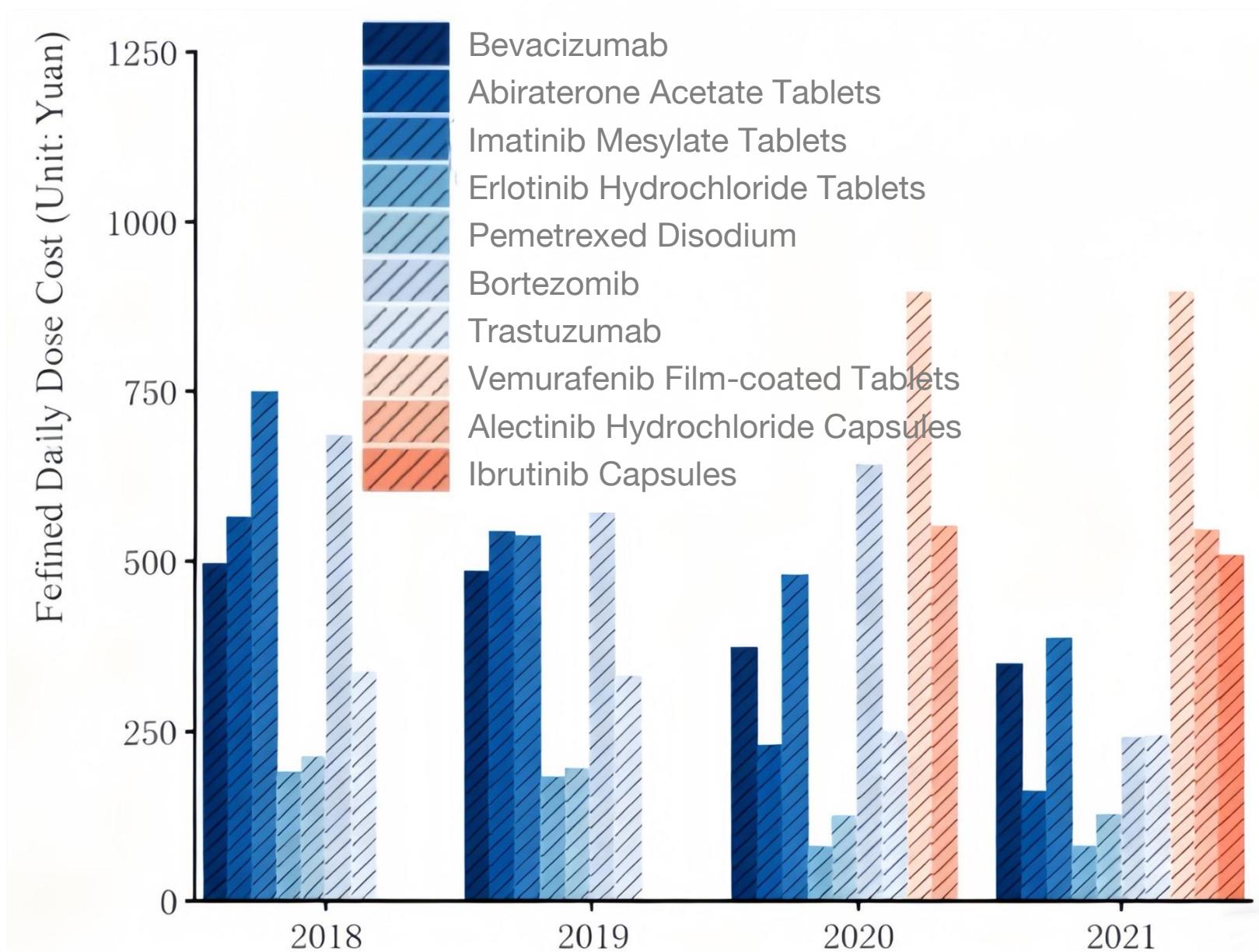


Figure 3 The changes in the cost of anti-tumor drugs on limited days, 2018-2021

Table 2 Demographic Characteristics of Patients, 2018-2021

Category	Ratio (%)
Age*	
<10 years	0.03
10-19 years	0.21
20-29 years	0.38
30-39 years	4.62
40-49 years	16.41
50-59 years	29.16
60-69 years	32.55
70-79 years	14.56
≥80 years	2.09
Gender	
Male	37.50
Female	62.50
Type of Medical Insurance	
URRMI	50.77
UEMI	49.23
Grade of Treatment Hospital	
Tier-3	91.76
Tier-2	0.68
Tier-1	7.56
Type of Medical Service	
Outpatient	0.58
Outpatient Special Drugs	83.01
Inpatient	16.41
Total	100.00

Note: *Drug names uniformly use generic drug names; **Drug DDD (Defined Daily Dose) is calculated based on drug package inserts.

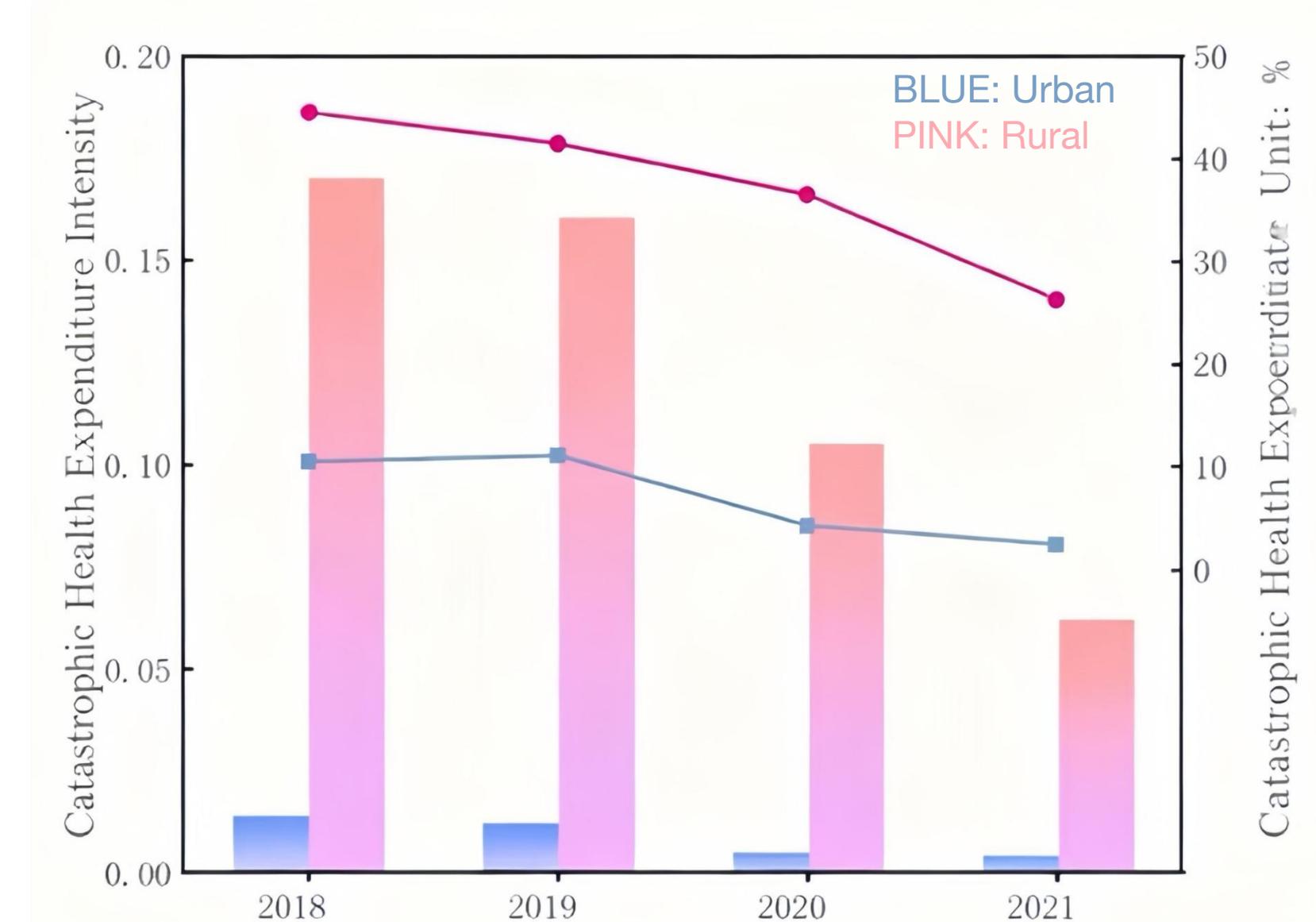


Figure 4 Incidence and intensity of catastrophic health expenditures by urban and rural households, 2018-2021

Statistical analysis showed age, gender, insurance type, hospital grade, and dosage form significantly affected drug costs: expenditures centered on 50–80-year-olds (peak cancer incidence); female costs ~twice males' (breast cancer-related ~40% of female spending⁶); most expenses in tertiary hospitals (concentrated resources, advanced capacity, better innovative drug access); injectables cost ~ten times oral preparations (clinicians' belief in higher efficacy drives preferential use⁷).

CONCLUSIONS

Advancements in China's NRDN mechanism, together with improved national and local supporting policies, have **substantially enhanced the accessibility and utilization of anti-tumor drugs within medical institutions**. City-level insurance settlement data indicate increased drug use and improved financial protection for patients, reflected in reduced defined daily drug costs and a lower overall economic burden. However, to sustain these gains, further policy refinement and strengthened regulatory implementation are required to ensure continued accessibility, alleviate patients' financial pressure, and promote a more equitable and sustainable medical insurance system.

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CONTACT INFORMATION

Email: lvzixuan0524@163.com; TEL: +86 15002764647