

The Incidence, Mortality, and Survival of Malignant Non-Small Cell Lung Cancer (NSCLC) in the United States: A Surveillance, Epidemiology, and End Results (SEER) 2000-2022 Database Analysis

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Introduction

- Non-small cell lung cancer (NSCLC) accounts for 84% of all lung cancers and is commonly diagnosed in advanced or metastatic stages.¹
- Still, NSCLC is associated with low quality of life and high economic burden among diagnosed patients, even in earlier disease stages.¹⁻³

Objective

- Investigating incidence, mortality, and survival of malignant NSCLC in the US using the most recent Surveillance, Epidemiology, and End Results (SEER) database.

Methods

- The SEER program is a population-based cancer registry funded by the National Cancer Institute in the US. It collects detailed patient and cancer data from multiple geographic regions covering approximately half of the US population. The database is maintained through collaboration with local cancer registries, which gather data from all clinical sources diagnosing or treating cancer within their catchment area.⁴
- In this retrospective study, the updated SEER database (released in April 2025) was analyzed. This included fully available data from 17 US cancer registries captured between 2000 and 2022. Data analyses were performed using SEER*Stat analytical software.
- Patients with diagnosed malignant NSCLC were selected by combining the following criteria:

- 1.**Specific cancer site** - lung or bronchus
- 2.**Malignant behavior**
- 3.**ICD-O-3 histology codes** (based on the SEER recommendations)⁵

Codes*	Description
807x3	Squamous or epidermoid carcinoma
814x3	Adenocarcinoma
82503	Bronchioloalveolar carcinoma
80123	Large cell carcinoma
85603	Adenosquamous carcinoma
824x3	Carcinoids
905x3	Mesothelioma
80463	Non-small cell carcinoma

*Note: In each code, 'x' represents a number between 0 and 9

- The study outcomes were crude incidence rate, crude mortality rate, and survival rates (1-year and 5-year). For survival estimation, only patients with known age were included. The results were assessed across available demographic subgroups to explore the impact of social determinants on outcomes.

Limitations

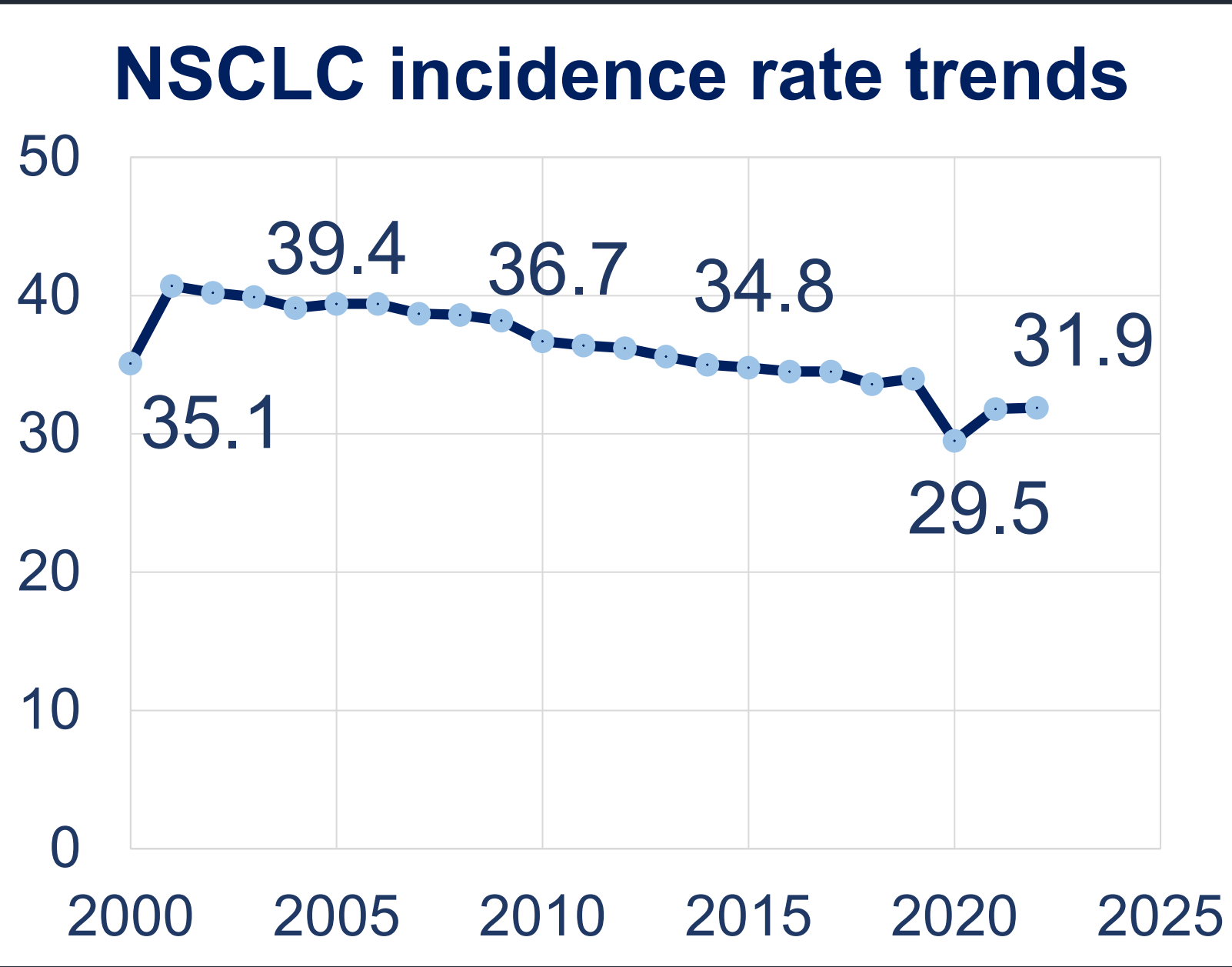
- 1.**Coding and reporting variability** – data collected by local registries without central review, resulting in potential coding inconsistencies
- 2.**No continuous follow-up** – patients may also receive services out of SEER-covered institutions, which could result in a loss to follow-up bias

References

1. Stylianou et al. (2024). DOI:10.3390/medicina60111845
2. Apple et al. (2023). DOI:10.57264/cer-2023-0107
3. Jovanoski et al. (2023). DOI:10.2217/lmt-2023-0003
4. Che et al. (2023). DOI:10.1186/s40779-023-00488-2
5. SEER Training Modules, Cancer Morphology & Grade. Available at: <https://training.seer.cancer.gov/lung/abstract-code-stage/morphology.html>

Results

- There were 685,611 patients with NSCLC captured between 2000 and 2022 in the US. Patients were predominantly **65+ years old** (67.5%), **males** (52.4%), **non-Hispanic Whites** (75.5%), **married** (50.9%), from **metropolitan counties** (84.6%), and most had an **annual household income of \$65,000 - \$90,000** (46.1%).
- The **incidence** of NSCLC was **36.1 per 100,000 population**. The rate significantly decreased from 2000 to 2022 with a -1.1 annual percent change (p<0.050).



NSCLC incidence rates among age, sex, and race/ethnicity subgroups

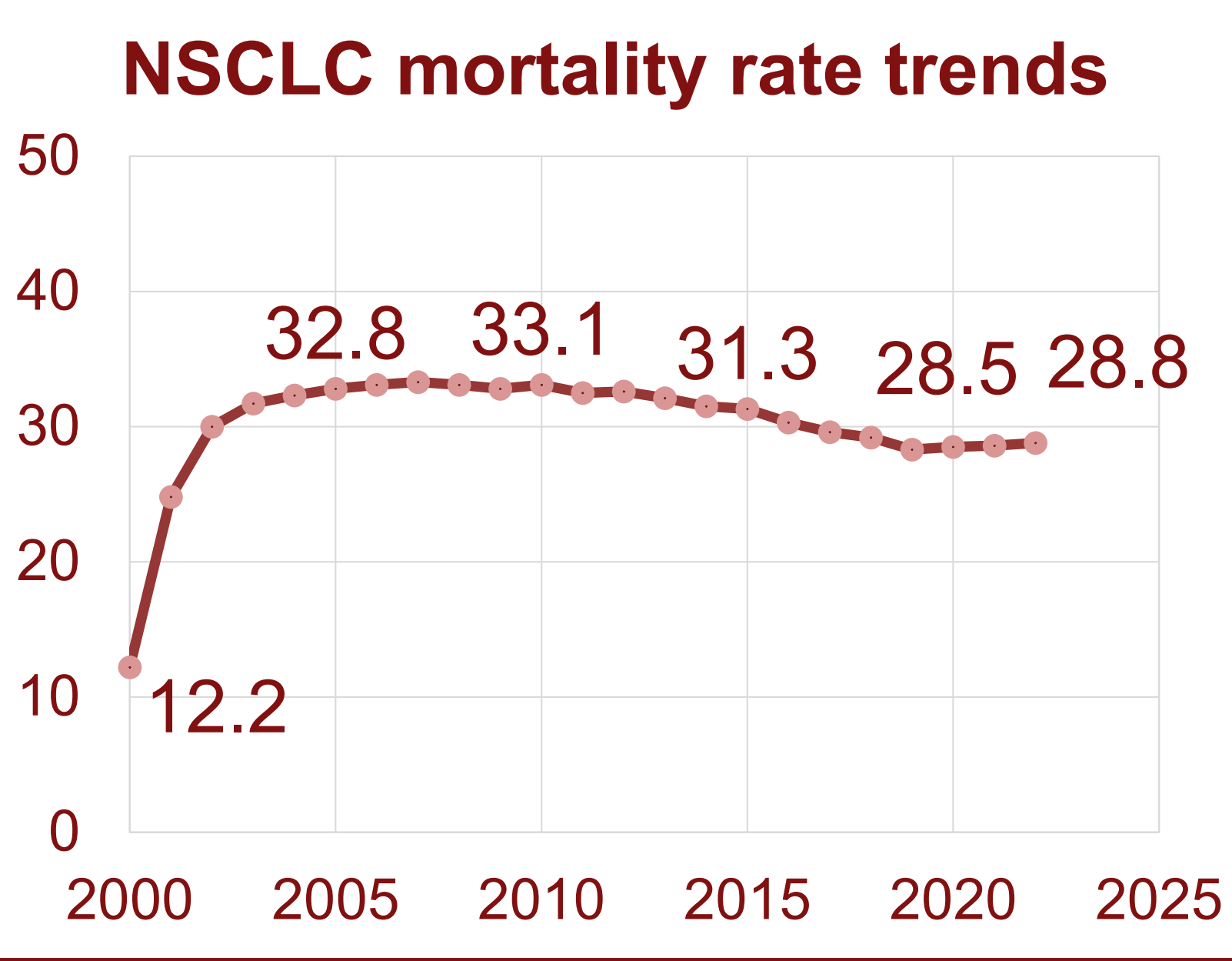
Male	38.2
Female	34.1
<20 years	0.03
20-64 years	19.6
≥65 years	188.7
Non-Hispanic White	50.1
Non-Hispanic Black	34.4
Non-Hispanic American AI/AN	21.6
Non-Hispanic API	24.4
Hispanic (All Races)	9.7

NSCLC incidence rates among AHI and residing area subgroups

AHI < \$40,000	67.9
AHI \$40,000 to \$64,999	47.7
AHI \$65,000 to \$89,999	33.7
AHI \$90,000 to \$119,999	33.8
AHI ≥ \$120,000	29.4
Metropolitan Area	34.1
Non-Metropolitan Area	53.9
Unknown Residing Area	33.6

*AHI – Annual Household Income; AI/AN – American Indian/Alaska Natives; API – Asian/Pacific Islanders

- The **mortality** of NSCLC was **30.2 per 100,000 population**. The rate increased from 12.2 per 100,000 population in 2000 to 28.8 per 100,000 population in 2022.



NSCLC incidence rates among age, sex, and race/ethnicity subgroups

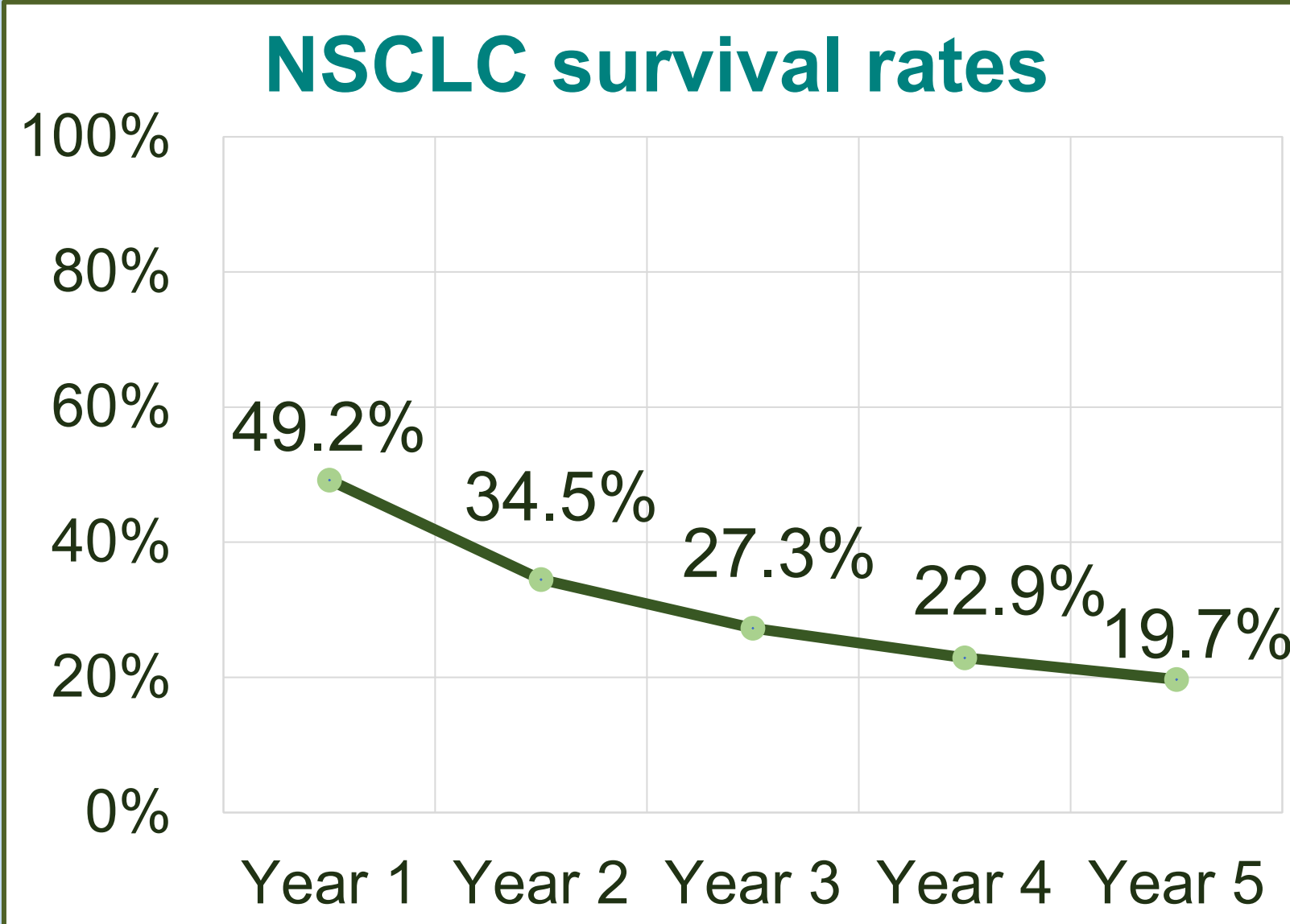
Male	33.2
Female	27.2
<20 years	0.0
20-64 years	13.3
≥65 years	171.9
Non-Hispanic White	42.3
Non-Hispanic Black	29.4
Non-Hispanic AI/AN	18.2
Non-Hispanic API	18.7
Hispanic (All Races)	7.7

NSCLC incidence rates among AHI and residing area subgroups

AHI < \$40,000	60.2
AHI \$40,000 to \$64,999	41.2
AHI \$65,000 to \$89,999	28.0
AHI \$90,000 to \$119,999	27.5
AHI ≥ \$120,000	24.0
Metropolitan Area	28.4
Non-Metropolitan Area	46.0
Unknown Residing Area	29.0

*AHI – Annual Household Income; AI/AN – American Indian/Alaska Natives; API – Asian/Pacific Islanders

- The NSCLC **survival rates** were **49.2% at 1-year** and **19.7% at 5-year** endpoints. Rates were lower among older patients and those with lower annual household income.



NSCLC survival rates (1-year after diagnosis)

Male	45.0%
Female	54.2%
Non-Hispanic White	49.1%
Non-Hispanic Black	45.6%
Non-Hispanic AI/AN	46.5%
Non-Hispanic API	56.0%
Hispanic (All Races)	48.9%
Metropolitan Area	49.7%
Non-Metropolitan Area	46.5%

NSCLC survival rates (5-year after diagnosis)

Male	16.2%
Female	23.9%
Non-Hispanic White	20.0%
Non-Hispanic Black	16.3%
Non-Hispanic AI/AN	18.0%
Non-Hispanic API	21.8%
Hispanic (All Races)	20.1%
Metropolitan Area	20.2%
Non-Metropolitan Area	17.4%

*AHI – Annual Household Income; AI/AN – American Indian/Alaska Natives; API – Asian/Pacific Islanders

Key Takeaways

- This analysis showed a decrease in NSCLC incidence and an increase in NSCLC mortality from 2000 to 2022. However, in the final three years of data (2020-2022), the incidence of NSCLC was increased, while NSCLC mortality was stable. Patient subgroups with the highest NSCLC incidence and mortality were males, the elderly, non-Hispanic Whites, non-metropolitan county residents, and those with less than \$40,000 annual household income
- The observed survival rates of NSCLC were generally low, with around half of the patients reaching the 1-year endpoint. Additionally, only 1 in 5 patients survived a 5-year period after being diagnosed with NSCLC. Patient subgroups associated with worse prognosis (lower survival rates) were older male patients, non-Hispanic Blacks, non-metropolitan county residents, and individuals with an annual household income of less than \$40,000
- The updated SEER data showed concerning NSCLC burden in the US. It indicates a need for new effective treatments