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## BACKGROUND AND PURPOSE

Lung cancer is the leading cause of cancer-related deaths in the U.S. Although curable in its early stages, treatment is ineffective during the cancer's final stages, resulting in a five-year survival rate of 17%.<sup>1</sup>

In August 2011, results from the National Lung Screening Trial were released, showing a 20% relative reduction in lung-cancer related mortality from annual screening with low-dose computed tomography (LDCT) compared to traditional chest radiography.<sup>2</sup>

The US Preventive Services Task Force subsequently updated its screening recommendation to include annual LDCT screening for persons at high-risk for lung cancer in late 2013 (i.e., aged 55-80 with ≥30 pack-year smoking history, currently smoke or quit within the past 15 years).<sup>3</sup>

**Purpose:** To highlight geographic differences in access to, eligibility for, and utilization of LDCT screening for lung cancer in the U.S.

## METHODS

### Survey Analysis:

- Analyzed data on smoking history and lung cancer screening from the 2015 National Health Interview Survey (NHIS).<sup>4</sup>
- Determined lung screening eligibility based upon the 2013 USPSTF guidelines
- Used Urban Influence Codes developed by the U.S. Department of Agriculture to designate counties as urban (metropolitan) or rural (micropolitan/rural).
- Calculated screening rates among eligible participants by urban and rural status and U.S. Census Bureau region.

### Spatial Analysis:

- Obtained and geocoded locations of American College of Radiology or Lung Cancer Alliance designated lung cancer screening centers.
- Determined populations of recommended screening age (55-79) at the census block level.
- Measured spatial accessibility by determining what proportion of residents of recommended screening age lived >30 miles/minutes travel time from a designated screening center.
- Developed bivariate choropleth maps to examine state level access to screening centers relative to lung cancer mortality burden (from NCI State Cancer Profiles).

## RESULTS

### Survey Results

**Table 1: Metropolitan/Nonmetropolitan Comparisons of Population Eligibility and Utilization of Lung Cancer Screening, National Health Interview Survey, 2015**

Population Eligible for Lung Cancer Screening,* Unweighted n (Weighted %, 95% CI)		Percentage of Eligible Population Undergoing Lung Cancer Screening, Weighted % (95% CI)	
Metropolitan	Nonmetropolitan	Metropolitan	Nonmetropolitan
760 (77.00, 73.75-80.24)	371 (23.00, 19.76-26.25)	3.89 (1.80-5.98)	3.72 (1.77-5.68)

\* Eligibility based on the 2013 U.S. Preventive Services Task Force Guidelines

**Table 2. Regional distribution of LDCT screening eligibility, screening center density, and screening utilization, National Health Interview Survey, 2015**

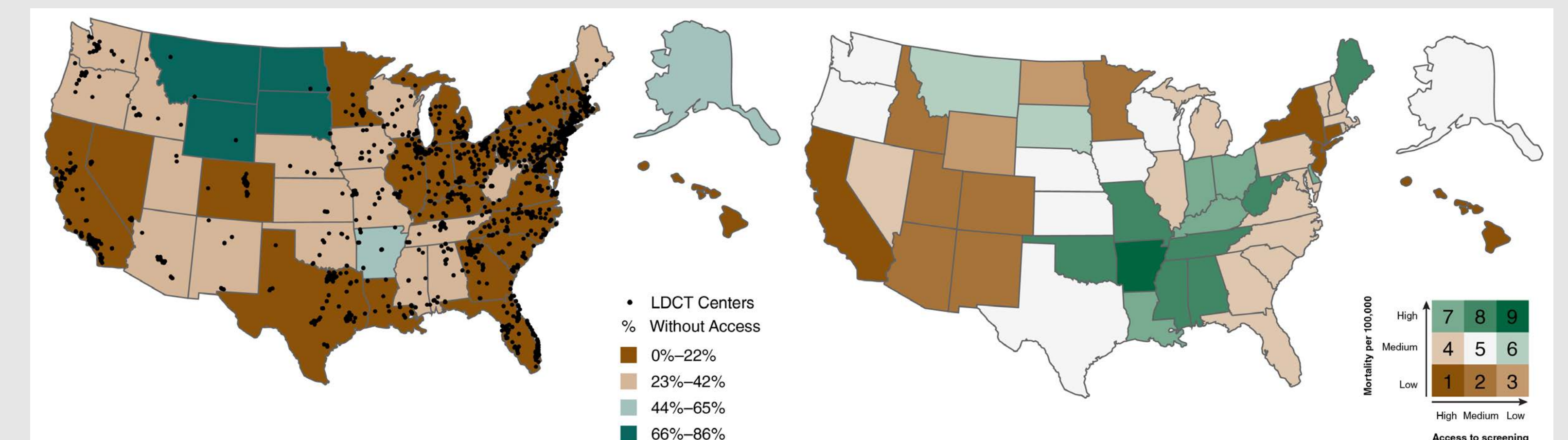
	Population Eligible for LDCT Screening,* Unweighted n (Weighted %, 95% CI)	Density of LDCT Screening Centers per 100,000 Eligible Persons†	Percentage of Eligible Population Undergoing LDCT Screening in Past Year, Weighted % (95% CI)
<i>Nationwide</i>	1131 (100)	2.98	3.85 (2.16-5.55)
<i>Census Region</i>			
Midwest	273 (26.16, 23.45-28.87)	2.35	2.18 (0.49-3.86)
Northeast	184 (15.71, 13.36-18.06)	5.32	10.11 (0.52-19.70)
South	394 (40.25, 37.46-43.03)	2.26	3.51 (1.88-5.13)
West	280 (17.88, 15.84-19.92)	3.44	1.58 (0.92-2.24)

\* Eligibility based on the 2013 U.S. Preventive Services Task Force guidelines

† LDCT screening providers were collated in 2014 from the Lung Cancer Screening Alliance Screening Centers of Excellence, National Lung Screening Trial, and International Early Lung and Cardiac Program Directories<sup>5</sup>

### Spatial Analysis Results

**Figure 1: Geographic access to LDCT screening centers and related lung cancer mortality rates**



**Panel A: Percent of population aged 55-79 without access to a center within 30 miles**

**Panel B: Lung cancer mortality vs. accessibility to LDCT screening centers**

Data Sources: NCI State Cancer Profiles, 2010-2014, US Census Bureau American Community Survey, 2011-2015, American College of Radiology and Lung Cancer Alliance designated lung cancer screening centers, 2017

### Key Findings

- Utilization of LDCT screening in rural and urban populations was equally low (<4%) in the 2015 NHIS.<sup>6</sup>
- LDCT screening use varied by region (1.58% in the West to 10.11% in the Northeast).
- An average of 28.1% of those aged 55-79 did not have access to a screening facility within 30 minutes' drive time.
- Rural residents were more likely than urban residents to not have access to a designated LDCT screening center within a 30-minute drive (77.8% rural vs 16.8% urban).
- Arkansas was the only state simultaneously in the high lung cancer mortality and low access to LDCT screening groups.

## DISCUSSION

- LDCT eligibility, screening use, and access varies by geography.
- Rural-urban differences in screening uptake were not observed, likely due in part to small sample sizes in NHIS. However, rural residents were >4 times more likely to not have access to a screening center within a 30-minute drive.
- Identified geographic variation in screening access and eligibility suggests the "Inverse Care Law" in action—the principle that the availability of quality care tends to be inversely related to the needs of the population served.
- As LDCT screening expands, future research should examine time trends in uptake relative to increased accessibility to screening.
- Future research should explore LDCT screening uptake among different geographic and sociodemographic groups to elucidate disparities and help inform interventions and resource allocation decisions.

## ACKNOWLEDGEMENTS & REFERENCES

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