

# Factors Associated with Low Dose Computed Tomography Lung Cancer Screening in the United States: Results from Individual and State-Level Analysis

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## Background

Low-dose computed tomography (LDCT) screening can identify lung cancer early in at-risk individuals, which can improve prognosis and decrease mortality rates. 2013 clinic guidelines recommend that individuals aged 55-80 with a 30-pack-year history who are current smokers or have quit in the past 15 years obtain LDCT screening. LDCT screening uptake is low in the United States. Factors associated with LDCT screening across different research studies include physician attainment status, physician's attitudes and knowledge, employment status, income, education attainment, race, geographic location, and logistic barriers.

## Purpose

Factors associated with LDCT screening using current clinical guidelines have been understudied nationally. Previous research evaluated individual-level factors while rarely considering multi-level factors.

**The aim of the study was to investigate multi-level factors associated with LDCT screening using national data.**

## Methods

The relationships between multi-level factors and LDCT screening among participants who met the 2013 United States Preventative Services Task Force (USPSTF) screening guidelines were evaluated the 2017-2021 BRFSS data and other state-level variables (Medicaid expansion status and the number of screening facilities). Multi-level predictors included demographics, health-related factors, health behaviors, and health care factors. These relationships were identified using logistic regressions. Individual and state-level analyses were weighted to account for the BRFSS's complex sampling design.

## Results

- 15,640 residents and 29 states were included.
- 18.4% of individuals eligible for LDCT screening per the 2013 USPSTF Guidelines received screening.
- Demographic factors significantly associated with LDCT uptake includes employment (p= <.001) and marital status (p=0.028).
- Health care- and health-related factors significantly associated with LDCT uptake can be found in Table 1 & 2.
- Health disparities in access to care and among those with poorer health status are significantly associated with LDCT uptake.
- LDCT screening rates were not associated with the number of lung cancer screening facilities but were associated with the number of lung cancer screening facilities per 10,000 smokers.

**Table 1. Health behaviors and health care factors associated with LDCT Screening**

Factors	LDCT Screening N (wt%)	No LDCT Screening N (wt%)	p-value
<b>Could not see a doctor because of cost problem</b>			
No	2400 (18.9)	11796 (81.1)	0.022
Yes	197 (13.7)	1208 (86.3)	
<b>Routine checkup</b>			
Never	3 (1.2)	71 (98.8)	<.0001
Within past year	2440 (20.3)	10984 (79.7)	
Within the past 2 years	96 (7.9)	925 (92.1)	
Within the past 5 years	30 (6.4)	430 (93.6)	
5 or more years ago	20 (3.0)	513 (97.0)	
<b>Flu vaccine</b>			
No	915 (15.9)	6215 (84.1)	0.019
Yes	1675 (20.7)	6770 (79.3)	

**Table 2. Health-related factors associated with LDCT screening**

Factors	LDCT Screening N (wt%)	No LDCT Screening N (wt%)	p-value
<b>Health status</b>			
Very good	552 (14.0)	3806 (86.0)	0.001
Good	791 (16.8)	4561 (83.2)	
Fair	745 (21.4)	3019 (78.6)	
Poor	506 (25.6)	1610 (74.4)	
<b>Number of Days Physical Health Not Good in past 30 days</b>			
0	1052 (14.9)	6707 (85.1)	<0.001
1 to 15	664 (19.2)	3171 (80.8)	
>15	805 (24.6)	2833 (75.4)	
<b>Any cancer</b>			
No	1644 (16.2)	9992 (83.8)	<.0001
Yes	960 (25.1)	3044 (74.9)	
<b>Asthma</b>			
No	2058 (17.1)	11110 (82.9)	0.004
Yes	531 (25.5)	1871 (74.5)	
<b>COPD</b>			
No	1151 (12.7)	8557 (87.3)	<.0001
Yes	1434 (28.3)	4362 (71.7)	

## Discussion

- LDCT screening rates in the U.S. remain low thus, following the trend of similar research.
- Factors significantly associated with LDCT screening stem from access to preventive care and financial barriers that hinder people from seeking necessary medical care.
- Individual factors remained influential on LDCT uptake after adjusting for multi-level factors.
- Health disparities persist among those with poor access to health services and can result in late-stage prognosis for those not connected with care.
- LDCT screening rates varied from state to state.
  - State-level factors like the availability and accessibility of certified LDCT facilities may contribute to rate variations.
- LDCT screening rates are influenced by the number of treatment centers available and individuals who smoke in the area. Thus, areas that have low smokers may benefit from increased centers.

## Future Research

- BRFSS and other data since 2021 should be analyzed using the 2021 USPSTF guidelines to evaluate overarching uptake and disparities.
  - The guideline change is expected to decrease the prevalence of LDCT screening among eligible individuals.
- Some individual-level and state-level factors are unknown but may be influential. These should be investigated to understand how to best target future programs.
  - Factors that may be beneficial to gather include individual attitudes and knowledge, as well as the number of healthcare providers and tobacco cessation programs in the state.

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