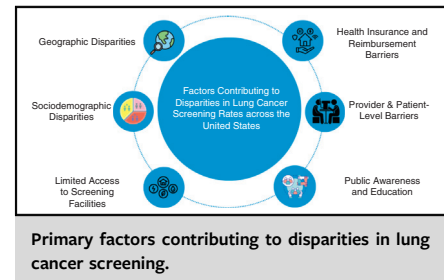


# Lung cancer screening among minority groups: Identifying gaps in screening and opportunities for intervention



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The American Cancer Society projects that approximately 234,500 new cases of lung cancer will be identified in 2024, with more than one-half of these cases resulting in death.<sup>1</sup> The United States Preventive Services Task Force (USPSTF) strongly advocates for annual lung cancer screening (LCS) using low-dose computed tomography (LDCT) for individuals age 50 to 80 years with reasonable life expectancy and a smoking history of at least 20 pack-years, whether they currently smoke or have quit within the past 15 years. Despite compelling evidence from multiple large-scale trials, such as the National Lung Screening Trial (NLST), demonstrating that early detection through LCS can reduce mortality by nearly 25%,<sup>2,3</sup> a persistent gap exists in LCS utilization. The causes of underutilization are multifactorial, with some groups expressing resistance, others lacking access, and finally some lacking knowledge of the guidelines.<sup>4-6</sup> The aim of this article is to highlight patient populations that are being inadequately screened based on current guidelines for high-risk groups, and to identify potential interventions to address barriers to screening.



### CENTRAL MESSAGE

Closing the gaps in lung cancer screening of minority groups requires a multipronged approach that begins at the grassroots level.

### PERSPECTIVE

Tackling the disparities in lung cancer screening requires a multifaceted approach that encompasses education, system-wide engagement, accessibility, cultural competence, and policy refinement. Through collaborative work, meaningful progress can be made to improve screening rates among patients.

## NATIONAL RATES OF SCREENING

Reports show that only ~5.8% of eligible, high-risk individuals receive LCS nationwide,<sup>5,6</sup> with rates ranging from 1% in California to 16.3% in Massachusetts.<sup>6</sup> Fedewa and colleagues<sup>7</sup> found that the national screening rates remained steady in 2016 and 2017 but increased in 2018. This rise was attributed to interventions including pilot LCS programs and increased coverage of LDCT by commercial insurers. They also found that states with a high lung cancer burden, such as Mississippi and Arkansas, had screening rates as low as 4%. Interestingly, Kentucky, which had the highest lung cancer mortality rate, had one

of the highest screening rates (13.7%), suggesting no direct correlation of mortality rate and screening rate.<sup>7</sup>

An important factor in LCS is insurance coverage. Under the Affordable Care Act, most plans must cover preventive services classified as “A” or “B” by the USPSTF. LCS falls under category “B” and thus should be covered by most plans.<sup>8</sup> However, coverage is not guaranteed for patients on Medicaid; fee-for-service state Medicaid programs are among the only health-care payers not required to cover LCS for high-risk populations.<sup>8,9</sup> An analysis of LCS coverage policies in state Medicaid fee-for-service programs conducted to assess the current status of coverage for Medicaid enrollees found that 46 states’ Medicaid fee-for-service programs covered LCS, 3 programs did not provide coverage, and 1 program had no information available on their coverage policy.<sup>8</sup>

In 2015, the Centers for Medicare and Medicaid Services announced that they would provide coverage for LDCT

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screening for asymptomatic persons age 55 to 77 who currently or previously smoked (quit within the last 15 years), with a 30 pack-year tobacco smoking history.<sup>10</sup> Medicaid expansion has allowed more people from low-income settings living in the state to qualify for the health care program based on income. Not all states are required to expand, however. As a result, at-risk populations living in non-expansion states may be unable to take advantage of early screening if they cannot cover the out-of-pocket expenses. There was greater improvement in 2-year overall survival in non-older adult men with non-small cell lung cancer (NSCLC) in states in which Medicaid expansion was adopted compared to states that opted out of Medicaid expansion.<sup>E1-E3</sup> This association was not seen among women.

## SCREENING IN MINORITIES AND UNDERREPRESENTED GROUPS

### Women

Although lung cancer incidence and mortality is approximately twice as high in men as in women,<sup>E4,E5</sup> lung cancer is the foremost cause of cancer-related deaths in women, killing more than breast, ovarian, and cervical cancer combined.<sup>E6</sup> When considering the USPSTF guideline recommendations for LCS, it is important to note that only 16% of the participants in the NLST were women.<sup>E7</sup> It also is important to note that while the percentage of women who have never smoked has increased from 8% in 1990-1995 to ~12.5% in 2016-2018<sup>E8</sup> (females, 15.7%; males, 9.6%), data still suggests a lack of knowledge of LCS recommendations among eligible women. In multivariable-adjusted models, females were 32% less likely to know about a test for early detection of lung cancer (odds ratio [OR], 0.68; 95% confidence interval [CI], 0.47-0.99) and 36% less likely to discuss lung cancer screening with their providers (OR, 0.64; 95% CI, 0.45-0.92).<sup>E9</sup>

### African Americans

According to the American Lung Association's report on the State of Lung Cancer Amongst Racial and Ethnic Minorities, the disparities faced by black Americans with lung cancer are stark.<sup>5,9</sup> Black individuals with lung cancer are 15% less likely to receive an early diagnosis compared to their white counterparts. Multiple studies have found that black participants were less likely to have been screened and less likely to intend to be screened.<sup>E10-E12</sup> The reasons behind the lack of screening are not well described, however.

Despite composing 13% of the US population, blacks/African Americans represented only 4.6% of NLST participants.<sup>E13</sup> Despite their lower representation in the study, a secondary analysis of the NLST revealed a more substantial reduction in mortality among black individuals compared to white individuals.<sup>E14</sup> This suggests that black/African

Americans, especially men, would stand to benefit significantly from screening if identified appropriately.

### Hispanics

Identified barriers to care in Hispanic/LatinX communities have included low income, language barriers, and limited health proficiency.<sup>E15</sup> Studies reveal higher uninsured rates among Hispanics, resulting in delayed or denied care and lower screening rates for various cancers compared to non-Hispanic whites.<sup>E16-E18</sup> One important potential factor is perceptions regarding the benefits of screening. Compared to non-Hispanic patients, Hispanic patients were more likely to believe that NSCLC can be prevented, were less worried about developing NSCLC, and had a greater willingness to be screened when educated about screening.<sup>E12,E19</sup> The true benefits of LCS in populations such as those of the Hispanic community are unclear, as the NSLT had a concerning underrepresentation of this population—composing only 1.8% of the trial cohort.<sup>E14</sup> This highlights the need to more intentionally include Hispanic patients in prospective data collection.

### Asian American, Native Hawaiian, and Pacific Islander

Data on LCS and incidence in individuals those of Asian American, Native Hawaiian, and Pacific Islander (AANHPI) descent are limited, as these individuals often are reported in aggregate with “nonwhite” populations, which include Hispanic, Asian, black, Native American/Alaskan Native and other races/ethnicities.<sup>E20</sup> In 2016, the reported incidence and mortality rates of lung cancer were lower among Asian/Pacific Islander men and women compared to American Indian/Alaska Native men and women. Asian and Pacific Islanders diagnosed with lung cancer in America were 17% less likely to receive an early diagnosis compared to their white counterparts. Indigenous peoples, specifically American Indians/Alaska Natives, were 14% less likely to receive an early diagnosis.

There are some reports of LCS rates as low as 5% in AANHPI individuals.<sup>E21</sup> However, Oshiro and colleagues<sup>E20</sup> found that in a cohort study of 1030 adults in Hawaii, 838 (81%) completed LCS. There was a 14% to 15% screening completion rate gap between Korean individuals (94%) and Filipino (79%), non-Hispanic white (80%), and Pacific Islander (79%) groups, although the differences were not significant. There is a need to better distinguish among subpopulations of patients in the AANHPI community to get an accurate reflection of LCS rates and to identify the specific barriers to screening unique to each group.

### What Are the Gaps?

**Geographic disparities.** Southern and Western states have lower screening rates than several Northeastern states.

Individuals in rural areas are less likely to have access to LCS programs.<sup>E22</sup> Additionally, systemic factors significantly influence LCS rates across different regions. The mix of health-care payers—comprising private insurance, Medicaid, and uninsured individuals—varies significantly by state and should be understood when developing screening programs.

**Sociodemographic disparities.** A complex mix of sociodemographic and socioeconomic factors impacts rates of LCS. Areas with a higher proportion of uninsured adults who smoke demonstrate lower screening rates.<sup>E22</sup> Correlations are observed with such factors as sex, ethnicity, education levels, built environment, and income, emphasizing the importance of considering sociodemographic characteristics when designing effective screening programs.<sup>7,E23</sup> Higher annual income was significantly associated with completion of screening or intention to undergo screening.<sup>E10,E12</sup> Additionally, a correlation between patients' education level and their understanding of why they were referred for screening has been identified ( $P = .01$ ).<sup>E24</sup> One study found that Hispanic patients were less likely to report an intention to screen if they had to pay for the test ( $P = .02$ ).<sup>E25</sup> In a qualitative study by Carter-Harris and colleagues,<sup>E26</sup> participants reported a sense of smoking-related stigma from younger health care providers who do not “know the culture [they] grew up in.” They also mentioned fear of the stigma of being blamed for having smoked. Wu and colleagues<sup>E27</sup> found that 80% of LCS-eligible smokers had never heard of LCS, and that a significant proportion of smokers identified shame and stigma as important barriers to screening. Data suggest that minority patients may hold different beliefs than non-minorities related to risk perception, fatalism, and fear of cancer diagnosis.<sup>E25,E28-E30</sup> One such study found that blacks and Hispanics were more likely to hold fatalistic beliefs.<sup>E25</sup> A fear of radiation exposure and anxiety related to computed tomography scans also have been reported among black and Hispanic patients.

**Limited access.** Access to screening facilities is identified as a significant factor influencing screening rates,<sup>E31</sup> and an inverse relationship between population density and distance to an LDCT facility has been demonstrated.<sup>E32</sup> States with higher facility density generally exhibited higher screening rates<sup>E33</sup>; however, there are limitations to measuring access at the state level, suggesting that overall access may be overestimated, especially for rural-dwelling individuals who may have difficulty traveling to urban facilities.<sup>E34</sup>

**Health insurance and reimbursement barriers.** Although Medicare and most commercial insurers began covering LCS in 2015, the lag between expanded coverage and implementation of screening efforts may have contributed to the slow increase in utilization. In a review of the Medicare fee-for-service population, Taylor and colleagues<sup>E33</sup> found geographic variation in the estimated

proportion of people who are eligible for LCS. The limitations to LCS also are observed in screening rates in states based on Medicaid expansion status, highlighting the importance of addressing reimbursement challenges.<sup>E1</sup>

**Provider- and patient-level barriers.** Clinics may face challenges in collecting detailed smoking histories to identify eligible adults. Primary care providers (PCPs) might not recommend screening, owing to competing priorities, pre-authorization requirements, and perceived ineffectiveness compared to other cancer screenings.<sup>9,E34-E37</sup> Individual-level barriers include competing health and financial demands, lack of confidence in the effectiveness of screening, and unique values and beliefs among individuals who smoke.<sup>E37</sup> Among providers, lack of knowledge about LCS guidelines and difficulty identifying people who meet the criteria for LCS are critical barriers. Other barriers include patient concerns regarding false positive rates, potential for complications, and related costs.<sup>E38</sup>

**Public awareness and education.** There is a need for increased educational initiatives to inform eligible patients about the benefits of LCS.<sup>E39</sup> For example, organizations such as the American Lung Cancer Screening Initiative (ALCSI) have chapters across the United States and Canada that spread awareness about the importance of LCS for high-risk patients through community outreach and advocacy initiatives.<sup>E40</sup>

### Opportunities for Intervention

**Increasing awareness through targeted education.** Educational campaigns are necessary to increase awareness of the importance of early detection and availability of screening programs among minority and disadvantaged groups. Campaigns should address fears, misconceptions, and stigma associated with LCS. The importance of these psychosocial factors and the need for education were highlighted by Richmond and colleagues<sup>E41</sup> as barriers to LCS.

The ALCSI spreads awareness about the importance of LCS for high-risk patients. Through public service announcements to educate the public, political involvement through policy and advocacy, providing tools and resources for patients around tobacco cessation and support groups, and partnerships with local LCS centers and clinics, the ALCSI addresses the multifactorial barriers to LCS for high-risk groups. This model has proven effective, and consideration should be given to its replication on a national level.

**Mobile LCS clinics.** Mobile health clinics (MHCs) connect health-care providers to the community and provide an innovative solution to the problem of underutilization of screening services among patients. Via a cost-effective care delivery model, mobile LCS clinics can use LDCT scans to provide effective screening for underserved minority populations.<sup>E42</sup> Additionally, MHCs support targeted allocation of screening resources by health systems.<sup>E34,E43,E44</sup> The use of LDCT

scans in MHCs can mitigate transportation barriers for minorities in underserved communities. Through interactions with their providers, patients also can learn more about the benefits of screening. Finally, mobile LCS clinics empower patients to obtain screening and follow-up independent of referral patterns.<sup>E43</sup> The use of mobile LCS clinics for improving screening access in minority populations should be supported by providers and hospital-based LCS programs.

**Community partnerships.** Community-based partnerships have proven vital in engaging patients and improving compliance with recommended healthcare guidelines.<sup>E34,E36</sup> In addition to the ALCSI, the Veterans Administration has several efforts aimed at increasing LCS nationally and locally. Through such programs as the National Oncology Program's Lung Cancer Screening awareness initiative<sup>E45</sup> and partnerships with such organizations as the Lung Cancer Foundation of America,<sup>E46</sup> some funding is focused on grassroots efforts to equip veterans with information and resources about who is eligible for LCS and getting connected with their PCP. The Boston VA holds a Lung Cancer Screening Day,<sup>E47</sup> an event publicized through collaboration with the American Cancer Society, American College of Radiology, and Radiology Healthy Equity Coalition. Another example is that of Oatmeal Health, an organization that partners with the Lowell (Mass) Community Health Center to identify high-risk Medicare/Medicaid patients. Through the use of advanced machine learning services that scrub electronic health record (EHR) and claims data, they work to determine which patients may be eligible for a no-cost LCS.<sup>E48</sup>

Engagement of community health advisors to provide education to patients about the need for LCS has resulted in increased knowledge about screening.<sup>E49</sup> Community navigators have demonstrated a significant benefit in improving engagement in LCS and minimizing loss to follow-up among patients. In trials encompassing the general cancer patient population, navigated patients had higher uptake of colorectal and lung cancer screenings when compared to patients who received usual care.<sup>E50,E51</sup> Percac-Lima and colleagues<sup>E51</sup> conducted a randomized controlled trial from February 2016 to January 2017 to evaluate the impact of a patient navigation program on LCS among current smokers in 5 community health centers affiliated with an academic primary care network and found that patient navigation improved cancer screening and follow-up in underserved populations. Navigators with cultural and linguistic skills tailored to allow for connection with paired outreach workers help patients receive the screening for which they are eligible.

**Research and literature on LCS disparities.** There is a need for more region-specific prospective data collection focused on disparities related to LCS. National databases do not accurately represent the diversity of the United States and might not provide the most reliable information for program and guideline creation. For example, using data from

the 2021 Behavioral Risk Factor Surveillance System, Maki and colleagues<sup>E52</sup> examined the prevalence of LCS in Maine, Michigan, New Jersey, and Rhode Island and found that among 112,399 respondents, the likelihood of LCS was higher in those who self-reported belonging to racial and ethnic groups other than white, black, Hispanic, or multiracial (OR, 8.89; 95% CI, 1.81-43.71;  $P = .01$ ). These findings might not reflect rates of screening in other parts of the country, such as the southeast, where there is evidence of disparities in screening rates based on racial and ethnic groups, including persons of black and Hispanic descent. Thus, interpretation of published work should consider the patient population represented by the data.

Historically, there has been a notable disparity in government funding allocated to research on lung cancer in women compared to similar studies focusing on men.<sup>E16,E17</sup> Until recently, women have been underrepresented in clinical trials, as evidenced by numerous studies highlighting sex-based disparities in lung cancer clinical trial enrollment between 2000 and 2019.<sup>E16,E53</sup> Furthermore, minorities such as African Americans and Hispanics are also less likely to participate, as evidenced by the demographics of the NLST.<sup>E7</sup> Further research focused on LCS among underrepresented groups, including women, is needed. Importantly, researchers should investigate and record data on racial and ethnic groups separately. Rather than a global "white" or "nonwhite" classification (nonwhite = Hispanic, Asian, black, Native American/Alaskan Native), each of these groups should be reported independently so that barriers specific to their ability to be screened are identified.

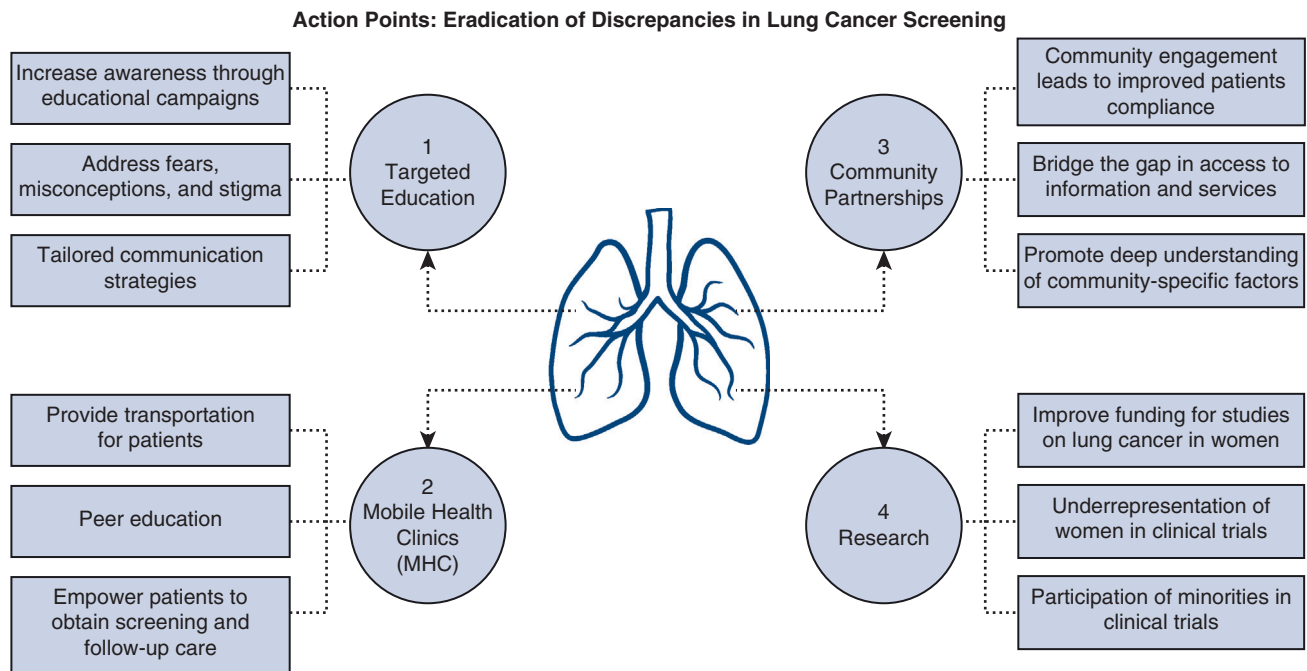
**Increased PCP access and engagement.** It has been reported that having a primary health professional was associated with a higher likelihood of LCS compared to not having a primary health professional (OR, 5.62; 95% CI, 1.19-26.49];  $P = .03$ ).<sup>E52</sup> However, in an investigation of the impact of community health advisors on knowledge about LCS, Nirajan and colleagues<sup>E49</sup> found that of the 100 participants eligible for screening, only 23 underwent screening due to lack of access to PCPs and reluctance of PCPs to provide referral to LCS. There would be a benefit in actively engaging PCPs in education about the role of LCS and ways to increase enrollment. Their findings also highlight a potential benefit of Medicare coverage for LCS, which would allow patients greater access to PCPs.<sup>E54</sup>

**System-level interventions.** The EHR should be streamlined for tracking and enrollment in LCS. Data have shown improved screening rates when providers are prompted during clinic visits.<sup>E55</sup> This information can then be tracked system-wide and used as a quality metric for screening enrollment.

### LCS in Nonsmokers

The rates of lung cancer diagnosis among women who never smoked is rapidly increasing.<sup>E8,E56,E57</sup> This is of particular interest among women of East Asian descent.<sup>E58</sup>





This is a challenging topic with limitations in evaluating the data as there are no existing randomized controlled trials similar to the NLST assessing this population. The TALENT study, the first prospective LDCT lung cancer screening study in never-smokers, evaluated the rates of lung cancer diagnosis using LDCT scans in a cohort of Taiwanese individuals who had never smoked.<sup>E51</sup> The lung cancer detection rate was twice that observed in the major randomized trials of CT screening in heavy smokers (2.1% vs 1.1% in the NLST and 1.0% in the Dutch NELSON trial).<sup>2,E59</sup> Although there are concerns about overdiagnosis when LDCT is used in low-risk patient populations, the TALENT study highlights a potential benefit of targeted screening of low-risk groups using a risk-based screening model.<sup>E60</sup>

The inclusion of selected criteria in a risk-based algorithm demonstrates potential benefits to considering such factors as race/ethnicity, genetics, environmental exposures, hormonal differences, and occupational exposures as independent risk predictors that are not all included in the NLST or NELSON. Although further assessment of this topic is essential to address LCS rates nationwide, an in-depth assessment is beyond the scope of this article.

## CONCLUSIONS

The persistent gap in the utilization of LCS by minority groups nationwide is alarming. Analysis of the groups being screened has unveiled a concerning disparity in LCS access. Healthcare policies and guidelines should continually evolve to reflect the latest advancements in screening technologies and recommendations, including the use of MHCs

and EHRs. Tackling the disparities in LCS utilization requires a multifaceted approach that encompasses education, accessibility, cultural competence, and policy refinement (Figure 1). By addressing these challenges comprehensively, we can tackle this formidable healthcare challenge and create a healthcare landscape in which the benefits of early detection are realized by all, irrespective of background or circumstance.

## Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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