Lung Cancer Screening in Low-income Populations in Chicago Health Disparities

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Lung Cancer and Health Disparities
Lung Cancer and Health Disparities

• **Smoking**
  - Rates are highest among:
    - **Race/Ethnicity**: American Indians and Alaskan Natives 26.1%, White 19.4%, Black/African Americans 18.3%, Hispanics 18%
    - **Education Status**: no diploma 27.1%, high school 21.7%, some college 20%, college degree 9.1%
    - **Poverty Status**: Below poverty level 26%, at or above poverty level 14%
  - Cigarette advertising is targeted at minorities
  - Minorities are least likely to be screened for smoking by primary care providers and receive smoking cessation resources

• **Lung Cancer**
  - Black/African Americans (AA):
    - AA men have the highest incidence and mortality of lung cancer
    - More likely to smoke longer in years but less cigarettes per day
    - More likely to smoke menthol (more addictive)
    - More likely to be diagnosed at a late stage
    - More likely to be diagnosed at a younger age

American Lung Association, IDPH 2010
American Journal of Public Health 2015
Social Determinants of Health
Interplay Between Host, Agent, And Environment

• Health Care
• Housing
• Food
• Built Environment
• Community
• Domestic Violence & Crime
• Pollution
• Employment
• Education
• Governance
• Economic Stability

*Your zip code is a better predictor of your health than your genetic code*

Kaiser Family Foundation; Photo: Progress Chicago
United States Preventative Services Task Force (USPSTF)  
Lung Cancer Screening Recommendation

National Lung Screening Trial

Results:
- 20% decrease in lung cancer deaths in those who received Low-Dose CT vs. chest x-ray
- 1.1% lung cancer detection rate

Population Screened:
- 91% White, 4.5% African American, 1.8% Hispanic

Research Needs and Gaps

Smoking prevalence and lung cancer incidence are higher among socioeconomically disadvantaged populations, and more research is needed in these groups. In addition, if lung cancer screening with LDCT is implemented more widely in diverse community settings, it is important to evaluate whether variability in follow-up protocols of positive results on LDCT scans results in a different balance of benefits and harms than that observed in RCTs.

JAMA INTERN MED. 2015;160; 175(5; 6):330; 89-338; 900.
UI Health’s
Lung Cancer Screening Program
Disparities in Chicago

Racial & Ethnic Group Distribution

Chicago: 2.7 million

45% White
33% Black

Poverty Distribution

Lung Cancer Mortality Rates
Lung Cancer Mortality and UI Health’s Service Area

- 24 community areas in the West and South-side of Chicago
- 465 bed hospital, 21 outpatient clinics, and a network of 11 FQHCs (Mile Square)
Results of UI Health’s Lung Cancer Screening Program
Outcomes From a Minority-Based Lung Cancer Screening Program vs the National Lung Screening Trial (JAMA Oncology, 2018)

Outcomes From a Minority-Based Lung Cancer Screening Program vs the National Lung Screening Trial (JAMA Oncology, 2018)

Table 1. Baseline Demographic Factors and Smoking Status of Participants Included in the UIC’s Lung Cancer Screening Program and the LDCT Arm of the National Lung Screening Trial.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>UIC (n = 500)</th>
<th>NLST (n = 26 722)*</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, mean (SD)</strong></td>
<td>62.8 (5.69)</td>
<td>61.4 (5.03)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>262 (52.4)</td>
<td>15 770 (59.0)</td>
<td>.01</td>
</tr>
<tr>
<td>Female</td>
<td>238 (47.6)</td>
<td>10 952 (41.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>White</td>
<td>144 (28.8)</td>
<td>24 289 (90.9)</td>
<td></td>
</tr>
<tr>
<td><strong>African American</strong></td>
<td>348 (69.6)</td>
<td>1195 (4.5)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>7 (1.4)</td>
<td>559 (2.1)</td>
<td></td>
</tr>
<tr>
<td>Other/&gt;1</td>
<td>1 (0.2)</td>
<td>516 (1.9)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>163 (0.6)</td>
<td></td>
</tr>
</tbody>
</table>

**Ethnicity**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic or Latino</td>
<td>53</td>
<td>10.6%</td>
</tr>
<tr>
<td>Neither Hispanic nor Latino</td>
<td>447</td>
<td>89.4%</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

**Smoking status**

<table>
<thead>
<tr>
<th>Smoking Status</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>364</td>
<td>72.8%</td>
</tr>
<tr>
<td>Former</td>
<td>136</td>
<td>27.2%</td>
</tr>
</tbody>
</table>

Abbreviations: LDCT, low-dose computed tomography; NLST, National Lung Screening Trial; UIC, University of Illinois at Chicago.

* Table adapted from Aberle et al.,1 adjusted with UIC results and data provided from the NLST data set at the National Cancer Institute.
Outcomes From a Minority-Based Lung Cancer Screening Program vs the National Lung Screening Trial (JAMA Oncology, 2018)

Table 2. Lung-RADS Classification From the UIC Cohort and the LDCT Arm of the NLST.

<table>
<thead>
<tr>
<th>Lung-RADS Classification</th>
<th>UIC, No. (%)</th>
<th>UIC With Cancer, No./No. (%)</th>
<th>NLST, No. (%)</th>
<th>NLST With Cancer, No./No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>136 (27.2)</td>
<td>0/136</td>
<td>14 709 (55.6)</td>
<td>15/14 709 (0.1)</td>
</tr>
<tr>
<td>2</td>
<td>241 (48.2)</td>
<td>0/241</td>
<td>8 145 (30.8)</td>
<td>29/8 145 (0.4)</td>
</tr>
<tr>
<td>3</td>
<td>77 (15.4)</td>
<td>0/77</td>
<td>1 697 (6.4)</td>
<td>21/1 697 (1.2)</td>
</tr>
<tr>
<td>3, 4A</td>
<td>0</td>
<td>0/0</td>
<td>97 (0.4)</td>
<td>0/97</td>
</tr>
<tr>
<td>3, 4A, 4B</td>
<td>0</td>
<td>0/0</td>
<td>193 (0.7)</td>
<td>22/193 (11.4)</td>
</tr>
<tr>
<td>4A</td>
<td>33 (6.6)</td>
<td>4/33 (12.1)</td>
<td>1 107 (4.2)</td>
<td>78/1 107 (7.0)</td>
</tr>
<tr>
<td>4B</td>
<td>10 (2.0)</td>
<td>6/10 (60.0)</td>
<td>358 (1.4)</td>
<td>124/358 (34.6)</td>
</tr>
<tr>
<td>4X</td>
<td>3 (0.6)</td>
<td>3/3 (100)</td>
<td>149 (0.6)</td>
<td>3/149 (2.0)</td>
</tr>
<tr>
<td>All</td>
<td>500 (100)</td>
<td>13/500 (2.6)</td>
<td>26 455 (100)</td>
<td>292/26 455 (1.1)</td>
</tr>
</tbody>
</table>

Abbreviations: LDCT, low-dose computed tomography; NLST, National Lung Screening Trial; UIC, University of Illinois at Chicago.

* Adapted from Pinsky et al to compare NLST and UIC data.

** Lung-RADS category descriptor: 0 (incomplete scan), 1 (negative: no nodules and definitely benign nodules), 2 (benign-appearing nodules with low likelihood of becoming cancer owing to size or lack of growth), 3 (probably benign and short-term follow-up is suggested), 4 (suspicious; additional diagnostic testing and/or tissue sampling is recommended); subcategories 4A, 4B, and 4X indicate nodules with additional features increasing the degree of suspicion of malignancy.

* The distributions of Lung-RADS categories were significantly different between UIC and NLST cohorts (P < .001).

* Percentages may not sum to 100 due to rounding.

* These classifications were consistent with more than 1 Lung-RADS category in the NLST.

Outcomes From a Minority-Based Lung Cancer Screening Program vs the National Lung Screening Trial

(JAMA Oncology, 2018)

UI Health’s minority, low income, urban population:

• Significantly different from the NLST
• Higher rates of positive LDCT screens
• >2x rate of diagnosed lung cancer cases
Southern Community Cohort Study (N=48,364):

Population: from 12 Southern States in the US, age 40-79, current and former smokers:

- 17% African American vs. 31% White met USPSTF eligibility criteria ($p < 0.001$)

- Diagnosed with lung cancer: 32% African American vs. 55% White would have been eligible for screening ($P <.001$)

Current USPSTF Lung Screening Criteria:

• Disproportionally under selects African American ever-smokers

• Current lung screening that is skewed toward the white population could paradoxically increase racial disparities in lung cancer outcomes.
Lung Cancer Screening: Where Do We Go From Here?  
Modifications to the USPSTF Lung Screening Criteria Needed

**Decrease age and pack-year limit?**  
Example: Nelson Trial, Multicentric Italian Lung Detection (MILD)

**Risk Stratification:** NCCN group 2 (age 50>, 20 pys, + additional risk factor), PLCOm2012

**PLCOm2012 – Tammemagi Lung Cancer Risk Calculator** (6-year lung cancer risk of 1.3% similar to the USPSTF)  
Race/ethnicity  
Education  
COPD/emphysema/chronic bronchits  
Family history of lung Cancer  
Personal history of cancer  
BMI  
Age  
**Smoking:** Current/former, duration, intensity, years quit

Tammemagi et al. Selection Criteria for Lung-Cancer Screening. NEJM. 2013;368(8):728-36  
The NLCRT and its activities are supported by an educational grant from AstraZeneca.