

# Using Unique Social Determinants of Health to Identify Patients At Risk of Not Receiving Lung Cancer Screening



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## Background

- Lung cancer screening (LCS) rates are far lower than other comparable screenable cancers such as breast or colorectal<sup>1</sup>
- Socioeconomic factors such as race, geography, income, and insurance have been shown to affect screening rates.<sup>2,3</sup>
- The effect of other more abstract social determinants of health (SDOH) on LCS is unclear
- Our institution collects 13 unique social determinants of health (SDOH) by patient self-reporting on an online questionnaire (**Figure 1**) which are monitored in the electronic medical record (EMR) (**Figure 2**)

## Objective

- We sought to determine if any of the unique SDOH impact LCS uptake rates

## Methods

### Study design and population:

- Retrospective review of all LCS-eligible patients from Jan – May 2024 across our single health system.
- LCS-eligibility defined by current USPSTF 2021 criteria
  - Patients aged 50-80 years with a  $\geq 20$  pack-year smoking history who either currently smoke or quit within the past 15 years
- Patients defined as “screened” or “unscreened” by EMR feature that calculates criteria
  - Unscreened group subdivided into 3 subgroups
    - Overdue**- truly unscreened group with no documentation of screening and no documentation of reason for missing
    - Postponed**- unscreened but shared decision making to delay screening
    - Discontinued**- unscreened but shared decision making to cease screening

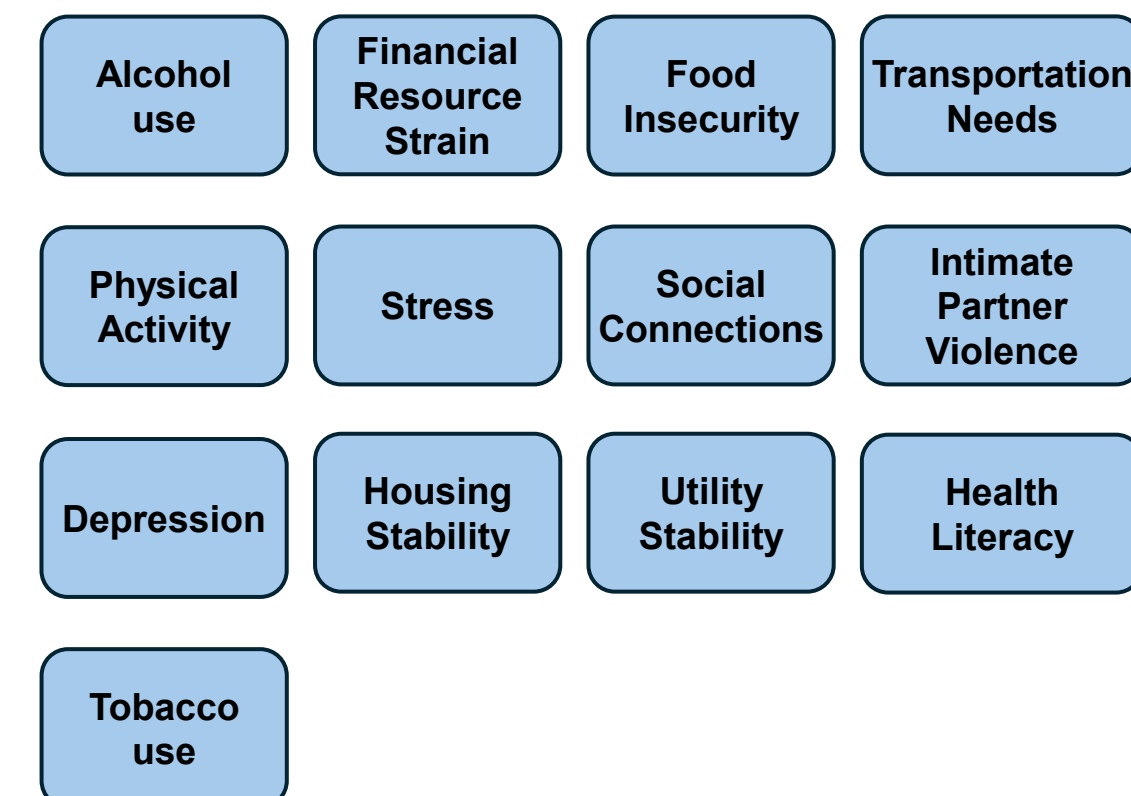
### Data collection:

- Clinical factors collected included demographics, employment, language, zip code, insurance, PCP, smoking history, family cancer history, and SDOH

### Statistical Analyses

- Univariate analysis and multivariable logistic regression with significant factors from univariate comparison to determine independent factors associated with LCS
- Primary comparison: **Screened vs. Overdue**
- Secondary comparison: **Screened vs. all Unscreened**

**Figure 1.** 13 unique SDOH collected



**Figure 2.** EMR representation of SDOH



**Table 1.** Univariate comparison of SDOH between Screened and Overdue

	Screened (n=1028)	Overdue (n=2332)	p-value
<b>Food Insecurity, n (%)</b>			<b>0.014</b>
No food insecurity	737 (95.1%)	1495 (92.4%)	
Food insecurity present	38 (4.9%)	123 (7.6%)	
<b>Physical Activity, n (%)</b>			<b>0.0007</b>
Sufficiently or insufficiently active	586 (80.7%)	1034 (73.3%)	
Inactivity	140 (19.3%)	376 (26.7%)	
<b>Social Connections, n (%)</b>			<b>0.027</b>
Fully/mildly socially integrated	439 (73.4%)	750 (67.0%)	
Socially Isolated	159 (26.6%)	369 (33.0%)	
<b>Financial Resource Strain, n (%)</b>			<b>0.0015</b>
Low strain	624 (86.0%)	1193 (79.9%)	
Moderate strain	74 (10.2%)	201 (13.5%)	
High strain	28 (3.9%)	99 (6.6%)	
<b>Housing Stability, n (%)</b>			<b>0.010</b>
Low risk	644 (95.4%)	1216 (92.4%)	
High risk	31 (4.6%)	100 (7.6%)	
<b>Transportation Needs, n (%)</b>			<b>0.0014</b>
No transportation needs	805 (98.1%)	1608 (95.5%)	
Transportation needs present	16 (1.9%)	76 (4.5%)	
<b>Health Literacy, n (%)</b>			<b>0.016</b>
Adequate	553 (91.1%)	994 (87.3%)	
Inadequate	54 (8.9%)	145 (12.7%)	

**Table 2.** Screened vs. Overdue. Multivariable regression for likelihood of being overdue

	Odds Ratio	95% Confidence Limits
$\geq 1$ vs. 0 Significant SDOH risk factors present	1.29	1.09 — 1.52
Unemployed vs. Employed	3.41	2.44 — 4.76
No Family History of Cancer	1.35	1.14 — 1.60

**Table 3.** Screened vs. Unscreened. Multivariable regression for likelihood of being unscreened

	Odds Ratio	95% Confidence Limits
$\geq 1$ vs. 0 Significant SDOH risk factors present	1.31	1.06 — 1.62
Unemployed vs. Employed	2.74	1.78 — 4.24
Male-gendered primary care provider	1.24	1.01 — 1.51
Older age	1.02	1.01 — 1.03

## Results

- Cohort: N = 4398
  - Screened: 1028 (23.4%), Unscreened: 3370 (76.6%)
  - Overdue: 2332 (69.2%)
- Demographic univariate analysis, overdue patients were more likely to be or to have:
  - Unemployed: 275 (15.4%) vs. 50 (5.0%),  $p < 0.001$
  - Non-white race: 663 (29.3%) vs. 255 (25.5%),  $p = 0.013$
  - Non-English primary language: 148 (6.5%) vs. 43 (4.2%),  $p = 0.035$
  - No family cancer history: 1344 (57.6%) vs. 674 (65.6%),  $p < 0.0001$
  - Male PCP: 918 (60.1%) vs. 433 (65.2%),  $p = 0.024$
- Seven SDOH risk factors were more common in overdue patients (**Table 1.**)
- There was significant co-variability among the SDOH risk factors, and no one factor was independently associated with an increased likelihood of being overdue.
- The 7 factors were combined into a composite risk score, and registering  $\geq 1$  risk factors was associated with an increased likelihood of being overdue (odds ratio 1.29; 95%CI 1.09 – 1.52) (**Table 2.**)
- Unemployment and no family cancer history were also associated with an increased likelihood of being overdue. (**Table 2.**)
- Analyses were repeated for Screened vs. Unscreened with similar results.  $\geq 1$  present risk factors on a composite score was associated with of being unscreened (**Table 3.**)

## Conclusions

- SDOH can influence whether a patient undergoes LCS
- We identified multiple SDOH such as financial instability, transportation needs, and inadequate health literacy that were associated with a lower likelihood of screening
- Recognizing the barriers posed by SDOH can further inform interventions to increase LCS uptake

## References

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