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**Population-based Research to Optimize the Screening Process:  
Effect of Distance to Screening Site  
on Screening Adherence**

Destiny Jackson

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# Intro

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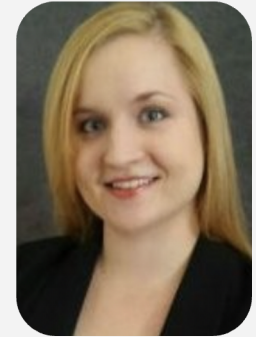
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**Penn PROSPR Site-Principal  
Investigator**



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# 01 Background

- I. Overview of PROSPR, LOTUS, & UPHS
- II. Details of Project
- III. Significance
- IV. Aims

# What is PROSPR?

> National Cancer Institute Research Network

## Focus Areas:

> Breast Cancer

> Colorectal Cancer

> Lung Cancer

> University of Pennsylvania Health System

## > PROSPR objectives for this project:

→ Evaluate multilevel determinants, uptake, and patterns of lung cancer screening longitudinally over time in screen-eligible individuals (1)



→ Aid in the optimization of the lung cancer screening process (1)



Figure I. PROSPR Locations (1)

1. "National Cancer Institute." PROSPR II Coordinating and Research Centers." [https://healthcaredelivery.cancer.gov/prospr/coordinating\\_centers.html](https://healthcaredelivery.cancer.gov/prospr/coordinating_centers.html).

# PROSPR Screening Process

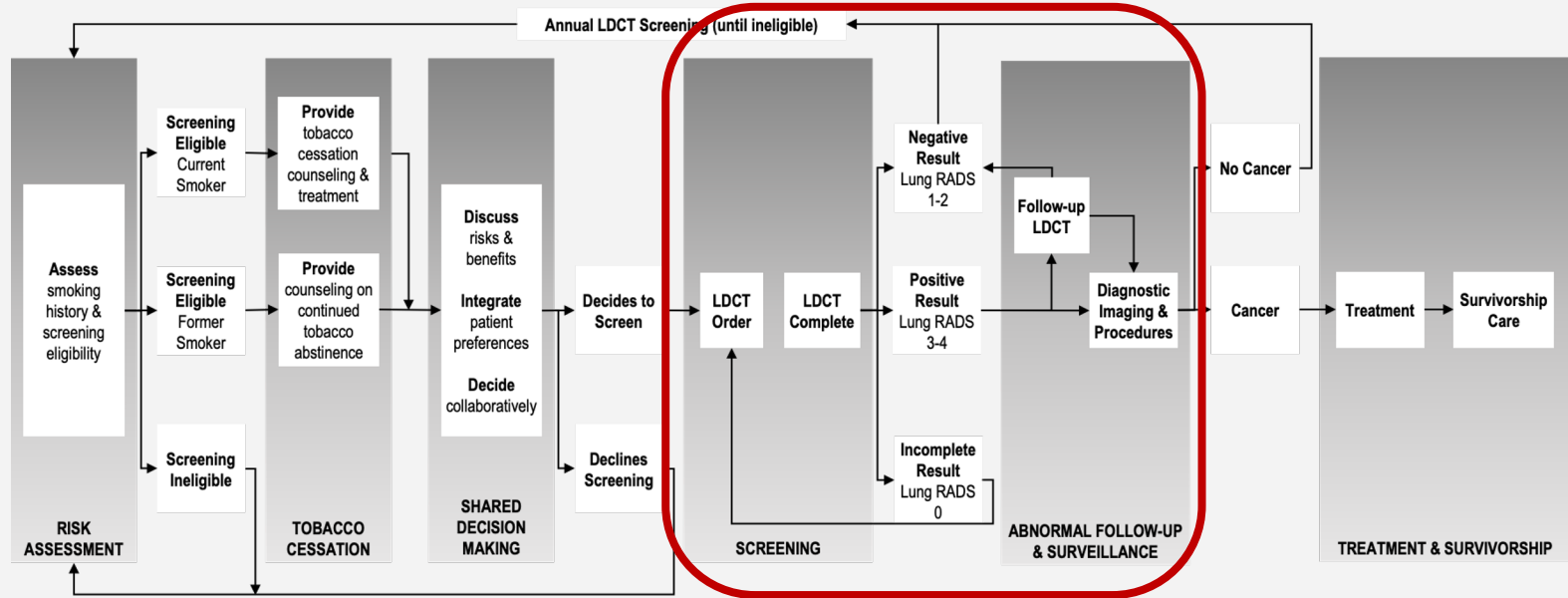


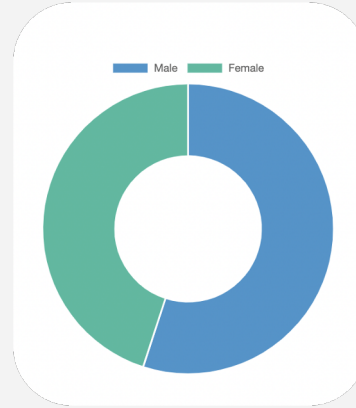
Figure 1. PROSPR Lung Cancer Screening Process Map

Rendle KA, Burnett-Hartman AN, Neslund-Dudas C, et al. Evaluating Lung Cancer Screening Across Diverse Healthcare Systems: A Process Model from the Lung PROSPR Consortium. *Cancer Prevention Research*. 2020;13(2):129-136.

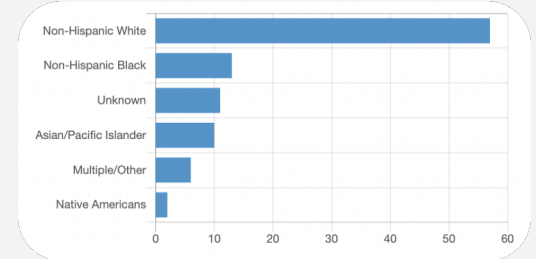


# LOTUS

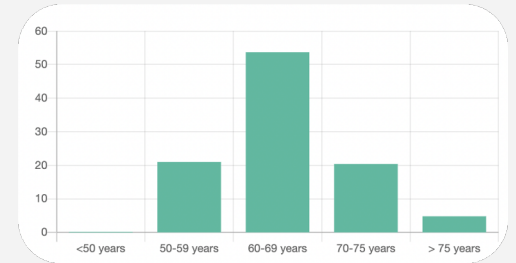
- **LOTUS: Lung Cancer Screening (LCS) Optimization in the U.S.**
- **Consortium of 5 Healthcare Systems**
  - ◆ > 5 Lung cancer research sites from PROSPR
- **500,000 study participants in cohort**
- **18,127 completed LCS**



Gender Demographics



Race & Ethnicity Demographics



Age Demographics

"AboutLOTUS." <http://www.optimizeLungCancerscreening.org/About-LOTUS.html>.



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## University of Pennsylvania Health System (UPHS) Screening Demographics

### UPHS Lung Cancer Screening (LCS) total scans (2014-2019):

- **4,686** LCS total scans
- **3,584** individual patients
  - ◆ **51.5%** Males
  - ◆ **28.6%** Non-Hispanic Black
  - ◆ **51.9%** Current Smokers

### Across all UPHS LCS scans

- **81.6%** were negative
- **11.9%** were positive



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# Distance to Screening Site

## Overall Goal:

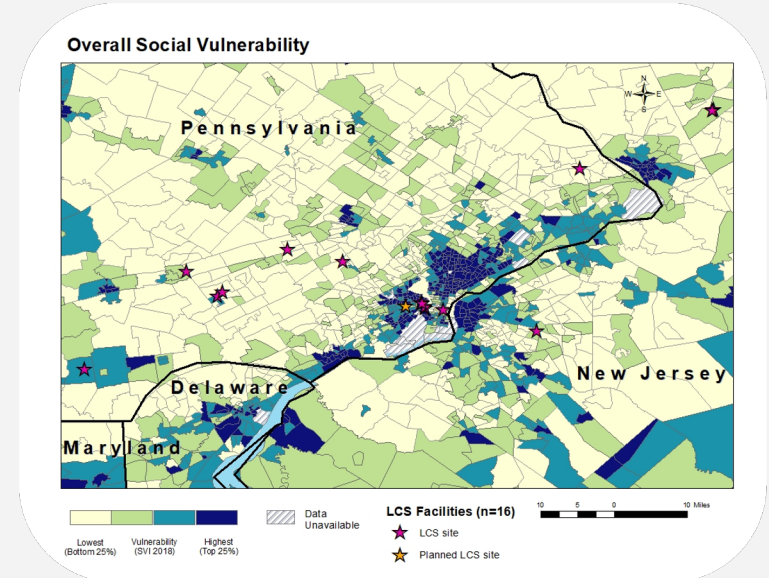
The goal of the broader project is to measure and assess the potential effect of **distance from patient residence** and **primary care facility to lung cancer screening location** on **adherence to LCS** within the UPHS catchment area.





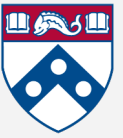
# Significance

- In the UPHS cohort, only ~25% of those with a normal baseline scan returned for an annual screening.
- Determining predictors of adherence to annual and diagnostic scans is a high priority for the Lung PROSPR Research Center.
- Development of targeted interventions can be developed to improve LCS adherence.
- High Social Vulnerability in UPHS catchment area.



## Social Vulnerability Index in Greater Philadelphia

- >Created by Chelsea Saia at Penn
- >Center for Disease Control and Prevention. “The Social Vulnerability Index (SVI): Interactive Map | CDC.”  
<https://svi.cdc.gov/map.html>.



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# Aims

- 1) Identify and understand existing literature on cancer screening adherence and distance as a determinant of cancer screening adherence
- 2) Understand the methodology used within literature
- 3) Cross-reference the social determinant of health variables from **IMS (NIH)** and **CDM (Kaiser Permanente)** that were used in existing literature
- 4) Document the services provided across Penn Medicine facilities
- 5) Contribute to the overall progress of the distance as a determinant of LCS adherence paper



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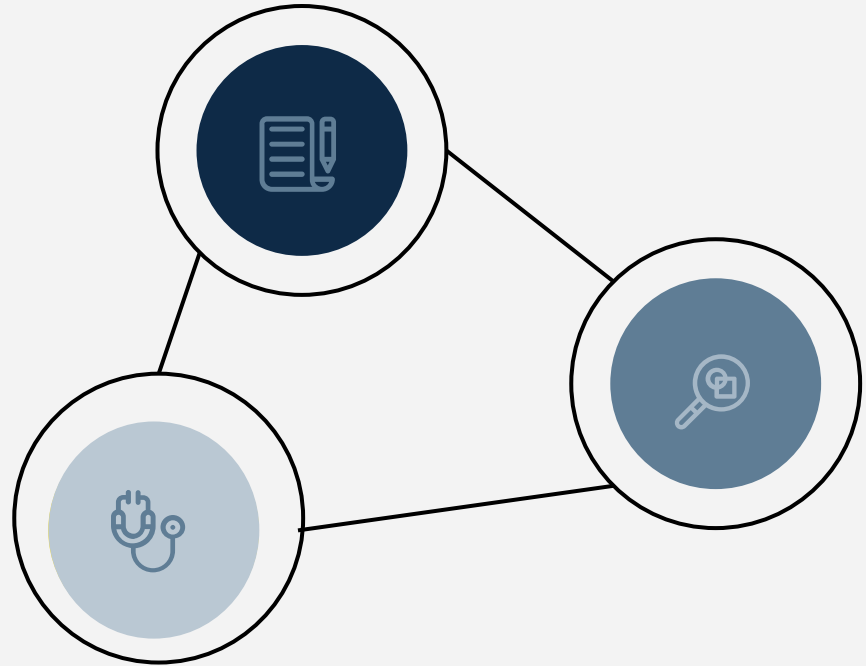
# 02

# Methodology

- I. Research Process
- II. Literature Review
- III. SDOH Variables
- IV. PennMedicine Services
- V. ArcGIS

# Research Process

- **Literature Review**
- **SDOH Variables**
- **PennMedicine Services**





# Literature Review

- Robust search of literature focused on:
  - ◆ Cancer screening adherence
  - ◆ Social determinants of adherence
  - ◆ Distance from patient residence and/or primary care facility to screening site

- Main Findings
  - ◆ Primary focus on breast and colorectal cancer screening
  - ◆ No discussion of co-location
  - ◆ Distance to screening site has been shown to contribute to non-adherence or reduced adherence to screening schedule
  - ◆ Travel distance vs longitudinal/latitudinal distance
  - ◆ Spatial accessibility
  - ◆ Adherence determined by risk assessment

Rural vs Urban Residence Affects Risk-Appropriate Colorectal Cancer Screening

Distance to screening site and non-participation in screening for breast cancer: a population-based study <sup>FREE</sup>

## Sociodemographic Characteristics, Distance to the Clinic, and Breast Cancer Screening Results

Travel distance to screening facilities and completion of abnormal mammographic follow-up among disadvantaged women

Snapshot of Articles from Lit Review



# Social Determinants of Health Variable Identification

→ Identification of social determinants of health (SDOH) variables from IMS and CDM explored in existing literature

→ Main Findings:

- ◆ Primarily community-level variables (census-tract level and/or zip code level)
- ◆ Education, median income, and race were common
- ◆ Interesting variables studied:
  - Season
  - Full-time vs part-time status

10	EDUCATION4	Num	8	#REF!	some college, no degree	Any proportion between 0 and 1.	ACS Field Numbers B15002012 B15002013 B15002029
11	EDUCATION5	Num	8	#REF!	associate degree	Any proportion between 0 and 1.	ACS Field Numbers B15002030 B15002031
12	EDUCATION6	Num	8	#REF!	bachelor degree	Any proportion between 0 and 1.	ACS Field Numbers B15002015 B15002032
13	EDUCATION7	Num	8	#REF!	graduate or professional degree	Any proportion between 0 and 1.	ACS Field Numbers B15002016 B15002017 B15002033 B15002034
14	EDUCATION8	Num	8	#REF!	Doctorate degree	Any proportion between 0 and 1.	ACS Field Numbers B15002018 B15002035
15	MEDFAMINCOME	Num	8	#REF!	Median Family Income	Any integer.	ACS Field Numbers B19113001
16	FAMINCOME1	Num	8	#REF!	less than \$10,000	Any proportion between 0 and 1.	ACS Field Numbers B19101002
17	FAMINCOME2	Num	8	#REF!	\$10,000 - \$14,999	Any proportion between 0 and 1.	ACS Field Numbers B19101003
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31	FAMINCOME16	Num	8	#REF!	\$200,000+	Any proportion between 0 and 1.	ACS Field Numbers B19101017
32	FAMPOVERTY	Num	8	#REF!	Proportion of family households in the geography with below-poverty level income.	Any proportion between 0 and 1.	ACS Field Numbers B17001002
33	MEDHOUSINCOME	Num	8	#REF!	median household income	Any integer.	ACS Field Numbers B19013001
34	HOUSINCOME1	Num	8	#REF!	< \$10,000	Any proportion between 0 and 1.	ACS Field Numbers B19001002
35	HOUSINCOME2	Num	8	#REF!	\$10,000-\$14,999	Any proportion between 0 and 1.	ACS Field Numbers B19001003
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37	HOUSINCOME4	Num	8	#REF!	\$20,000-\$24,999	Any proportion between 0 and 1.	ACS Field Numbers B19001005

## SDOH Variable Sheet



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# Identifying Services across Penn Medicine System

## Goal:

Identify where low-dose computed tomography (LDCT) for lung cancer can be ordered, where the screening is actually performed, where biopsies and other diagnostic procedures take place, and where patients can receive treatment for lung cancer.



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# ArcGIS

- **Bonus:** Opportunity to meet with Chelsea Saia from the PROSPR team to get an overview of ArcGIS
- Learn about ArcGIS in the context of this study



**ArcGIS**



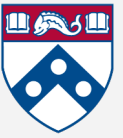


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# 03

## Closing Remarks

- I. Looking Ahead
- II. Takeaways
- III. Acknowledgements



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# Conclusion

- Gap in the literature to study distance from screening site in the case of LCS
- Distance to screening site provides insight into numerous barriers to LCS, especially at the community-level
- The more nuanced SDOH variables from IMS and CDM have not been robustly or extensively studied in previous literature
- Studying distance to screening site aids in the development of effective and informed patient intervention initiatives (e.g., patient navigation)



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# Looking Ahead

- Completing facility services list
- PROSPR team will continue towards completing paper
- ArcGIS license and training



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# Takeaways

- SDOH > social determinant of healthcare accessibility
- Social/environmental barriers to cancer screenings have large impact on patient health outcomes
- Leveraging resources to mitigate health disparities
- Insight into being a part of a larger research team



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# Acknowledgements

Dr. Farouk Dako

PROSPR Research Team

SUMR Program & Cohort