

Effectiveness of a multilevel integrated intervention for LDCT lung cancer screening and  
smoking cessation among African Americans

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### **Background**

African Americans have both the highest incidence and mortality of lung cancer compared to any other racial/ethnic group. A possible explanation for this disparity is that African Americans (AA) may be less likely to utilize preventative screenings such as low-dose computed tomography (LDCT), which has the potential to encourage smokers to quit smoking successfully. In 2021, the USPSTF expanded their lung cancer screening (LCS) recommendations to include individuals ages 50-80 years with at least a 20 pack-year history, increasing the number of eligible U.S. adults. While the expanded criteria are expected to increase the number of high-risk individuals eligible for screening and reduce lung cancer mortality, the impact on racial and ethnic minorities, including African Americans, has shown mixed findings. This is problematic as previous research has found that African Americans may have different quit behaviors than whites. While use of LCS as a teachable moment for tobacco cessation is important, currently, there is no well-integrated, comprehensive, culturally relevant community-engaged, sustainable program. Still, it is not clear whether the synergy effect of smoking cessation and LDCT LCS intervention was observed in both quitting behaviors and LDCT uptake among African American smokers. To address this urgent public health concern, this study aims to reduce disparities and the burden of lung cancer among AA smokers by supporting a Multiple-level intervention integrating lung cancer screening and smoking cessation (MILS), followed the NIH DEIA strategies using multilevel interventions that impact determinants of health and address health disparities at appropriate time points across the life course.

### **Significance**

In Louisiana, about 3,730 new lung cancers were expected to be diagnosed and about 2,620 patients were expected to die of lung cancer in 2016. In 2009-2013, Louisiana residents had the highest lung and bronchus cancer incidence rates compared with the U.S. national incidence

rates (75.3 vs 65.1 per 100,000). This incidence rate was even higher for African American males in Louisiana (110.6 per 100,000). Therefore, the immediate goals of this study are to expand understanding of the cognitive factors of TPB and develop an evidence-based intervention that targets at-risk African American smokers undergoing LDCT.

These aims directly align with the goals of both the National Cancer Institute (NCI) and PAR-23-122 and will increase knowledge of smoking cessation and LDCT LCS needs for African Americans in an effort to reduce the health burden of lung cancer. In addition, this study can also help build a robust screening program for the Louisiana Cancer Research Center (LCRC). It is not only beneficial for the LCRC population health program but will also reduce the burden of lung cancer within at-risk African American smokers undergoing LDCT. This work has great potential to help reduce the enormous public health burden of lung cancer and carry out the National Health Institute's mission by improving the health for medically underserved minority populations.

The results of our pilot test suggested that our intervention integrating smoking cessation and LDCT Lung cancer screening showed initial effectiveness in improving smoking cessation and knowledge and attitude toward LDCT screening. Yet it failed to address multiple-level Intervention and synergy effects among high-risk A.A. smokers. Beyond having sufficient knowledge about it, **multiple levels of Intervention integrating lung cancer screening and smoking cessation (MILS)** to increase LDCT uptake and quitting behaviors in racially and ethnically diverse populations are needed.

In summary, the proposed study is clinically relevant and significant for the following important reasons:

- It focuses on both smoking cessation and LDCT screening uptake, which are the two leading causes of Lung cancer prevention and control (reduce risk behaviors and earlier detection) in Louisiana.
- It addresses a hard-to-reach African American population in Louisiana, which is medically underserved and suffers from health disparities.

- It will result in the first MILS that can be used as an educational tool to facilitate patient education and increase LDCT understanding and uptake, which can lead to earlier detection and support for lung cancer prevention and control.
- Our MILS is an evidence-based, culturally, and linguistically appropriate multiple level intervention with significant potential to empower smoking cessation and LDCT screening, which is recommended by the U.S. Preventive Services Task Force and the American Cancer Society.
- MILS followed the NIH DEIA strategies, "Objective 3.2, Goal 2, Strategy 1: Design, adapt, test, and implement targeted, multilevel interventions that impact determinants of health and address health disparities at appropriate time points across the life course."
- With our promising pilot data, experienced team members and existing clinical sites (UMC), and newly added research team members with strong statistical and research skills, including community health workers who had a similar personal experience to our participants, our project has a high likelihood of success.

### Conceptual Framework

This proposed study using MILS, the development is based on the Social Ecological Model (SEM). The features and detailed information

of the MILS are stated in Table 3 on the following intersect:

#### 1. **Community Engagement (Diversity):**

MILS involve community engagement strategies that empower individuals and communities to actively participate in improving their health. Combining LDCT

screening and smoking cessation with community outreach and interactive social media

Table 3 Conceptual Framework

	MILS Intervention
<b>Individual Level</b>	<ul style="list-style-type: none"> <li>• Smoking cessation and LDCT LCS counseling guide by Theory</li> <li>• Interaction between multiple levels levels</li> </ul>
<b>Healthcare provider Level</b>	<ul style="list-style-type: none"> <li>• Provider training for smoking cessation counseling, assess eligibility for LDCT screening, and provide education about the process</li> <li>• Efforts are made to ensure that access to both LDCT screening and smoking cessation programs is equitable and that individuals from diverse backgrounds have equal opportunities for participation</li> </ul>
<b>Community Level</b>	<ul style="list-style-type: none"> <li>• Community Health Worker(CHW) trained to engage with the community, conduct outreach, and connect individuals to healthcare services, including LDCT screening and smoking cessation programs</li> <li>• CHW bridge the gap between the community and healthcare system levels</li> <li>• CHW tailored to the cultural, linguistic, and social nuances of the community, ensuring that messages and services resonate with diverse populations</li> <li>• Interactive Social media(Facebook)</li> </ul>

education can increase awareness of the importance of early cancer detection and encourage high-risk individuals to seek screening.

2. **Reducing Barriers to Access (Accessibility):** MILS focuses on removing barriers to accessing smoking cessation services or LDCT LCS, may face barriers related to cost, transportation, or awareness. A multilevel approach can address these barriers, making cessation service and LDCT screening more accessible to underserved populations.
3. **Tailored Education and Outreach (Inclusion/ Accessibility):** MILS recognizes the importance of tailoring education and outreach efforts to the unique needs and preferences of diverse communities. Integrating culturally sensitive and linguistically appropriate messaging into smoking cessation and LDCT screening can improve its acceptability and uptake among various populations.

**Equity in Healthcare (Equity):** Both smoking cessation and LDCT screening share the goal of achieving equity in healthcare. MILS aims to reduce health disparities, while smoking is a major risk factor for lung cancer, and LDCT screening contributes to early cancer detection, potentially reducing disparities in cancer outcomes. When used in conjunction, these approaches can address disparities from multiple angles.

### **Impact**

To date, no study has evaluated the synergy effect of smoking cessation intervention and LDCT LCS in African American populations with multilevel intervention strategies. We will move the field forward by providing effective, scalable interventions to improve both smoking cessation and LDCT lung cancer screening adherence to reduce health disparities promised by large clinical trials that motivated screening guidelines. This project will be a first step to exploring and addressing the smoking cessation needs of at-risk African American smokers undergoing lung cancer screening using the Theory of Planned Behavior to expand our understanding of the ideal teachable moment and content (barriers and facilitators) for a smoking cessation

intervention in a lung cancer screening context. An understanding of the cognitive factors associated with smoking cessation among at-risk African American smokers with provider and community engagement will help reduce disparities in lung cancer burden, including incidence and mortality. The proposed research is directly in line with NIH's mission to protect and improve health for medically underserved minority populations and the NIH DEIA strategies, design, adapt, test, and implement targeted, multilevel interventions that impact determinants of health and address health disparities at appropriate time points across the life course. This study prioritizes the examination of cancer and tobacco-related health disparities in underrepresented groups to ensure that findings inform equitable treatment and policy recommendations for everyone, regardless of age, race, income, geography, or sexual orientation. The results of the study will directly guide the development of targeted strategies to improve lung cancer screening rates among minorities.

### **Research Question**

We aim to answer the research question: **“How can disparities be rectified by expanding the diversity of individuals who receive screenings and ensuring equitable access to services?”** Answering this research question can help address the challenge of Black individuals experiencing lower success rates in quitting cigarette smoking than their white counterparts.

### **Research Objectives**

**Objective 1. Investigate smokers' and providers' attitudes, knowledge, and experiences with the expanded 2021 USPSTF Lung Cancer Screening (LCS) recommendations.** We will examine it using exploratory sequential mixed methods (integrating quantitative and Qualitative data). We will conduct focus groups for A.A. smokers who are eligible for LDC. Results will be used to expand the understanding of the needs and barriers of LDCT LCS and smoking cessation services to construct multiple levels intervention with the goal of increasing LDCT uptake and quitting behaviors.

**Objective 2. Compare the Effectiveness of a Multiple levels intervention integrating lung cancer screening and smoking cessation (MILS) vs. control group on the biochemically validated 7-day point-prevalence tobacco abstinence rates at 6 months, LDCT uptake, the change in tobacco consumption pattern, nicotine dependence and stage of change was assessed.** We will conduct a multiple level intervention integrating lung cancer screening and smoking cessation (MILS), including individual level: individual-based LDCT/smoking education (with Louisiana Tobacco Cessation Initiative); Institutional level: provider education (with university medical center); and community level: a community navigator (Community Health Worker) with interactive social media to increase LDCT uptake and quitting behaviors in racially and ethnically diverse populations. Multilevel intervention is a holistic approach to addressing health issues that recognize the complexity of health determinants. Multilevel interventions aim to change health behaviors and related outcomes by targeting multiple levels of influence, such as individuals, groups, organizations, and communities. Multilevel interventions can be delivered simultaneously or over time to achieve desired outcomes. For example, interventions integrating lung cancer screening and smoking cessation can work together synergistically to enhance early cancer detection and prevention.

LDCT is an evidence-supported lung cancer screening that is noted to increase early-stage lung cancer diagnosis. Early diagnosis can reduce lung cancer-related mortality and improve prognosis. **For this study, we are not directly providing lung cancer screenings. We are recruiting participants who are eligible for lung cancer screening and increase their knowledge, attitude, and intention to take LDCT.** We hypothesize that A.A. in the MILS group will achieve greater increases in LDCT uptake and quitting behaviors (e.g., biochemically validated 7-day point-prevalence tobacco abstinence rates at 6 months, the change in tobacco consumption pattern, nicotine dependence and stage of change) at post-treatment and follow-up than A.A. in the control group.

**Objective 3. Explore barriers and facilitators that influence primary outcomes at the community, provider, and individual levels for the improvement of a multilevel intervention (MILS).** We will conduct 30 qualitative key informant interviews (10 for each level) to identify barriers and facilitators that influence the adherence and implementation of MILS.

## **Methodology**

### **Study Design**

We used an exploratory sequential mixed method study design to culturally adapt the Smoking and LDCT Questionnaire and address the sociocultural contexts of smoking and LDCT LCS among African Americans. For Objective 1, thirty African American smokers eligible for LDCT LCS completed the qualitative interview/focus group. We integrated qualitative themes from the interview/focus groups were matched to survey domains (Objective 2) and some themes were used to develop a Multiple levels intervention integrating lung cancer screening and smoking cessation (MILS) intervention curriculum for a culturally adapted smoking cessation and LDCT LCS. For Objective 2, we will conduct a randomized control trial (RCT), which is a type of study that compares the effectiveness of different treatments or interventions by randomly dividing participants into groups, with a wait-list control design, which is when the control group serves as the untreated comparison group during the study, but eventually receives the treatment at a later date, to determine the Effectiveness of a Multiple levels intervention integrating lung cancer screening and smoking cessation (MILS) for African Americans undergoing LDCT. For Objective 3, we will conduct 30 qualitative key informant interviews (10 for each level) to identify barriers and facilitators that influence the adherence and implementation of MILS.

### **Study Sample/Recruitment**

Participants of the study will be recruited from the University Medical Center (UMC). Eligibility criteria will include: (1) self-identified as African American; (2) eligible for a LDCT (i.e., 50-77 years old; 20+ pack years of smoking) or have received a LDCT exam in the past; (3) current

smoker; and (4) English speaking. Eligible participants will be recruited from Tobacco Control Initiative (TCI) staff at UMC. Objective 1: Based on our previous qualitative studies, we anticipate reaching saturation after 30 in-depth interviews; however, we will consider increasing the number of interviews if needed. Objective 2: Two hundred fifty eligible A.A. smokers at UMC will be identified and recruited by TCI staff or UMC clinic and referred/enrolled to evaluate the Effectiveness of a Multiple levels intervention integrating lung cancer screening and smoking cessation (MILS) utilize a two-arm, parallel groups, randomized, controlled design. Objective 3: Ten participants, 10 providers and 10 community members will be asked to complete an in-depth interview.

### **Study Questionnaires/ Assessment Tools**

Primary outcomes were measured by survey before intervention, immediately after intervention, and 6-month after intervention. Outcomes include stage of change, 7-day PPA rate, 24-hour PPA rate, daily cigarette use, and the Fagerstrom Test for Nicotine Dependence score. Stage of Change was measured based on the TTM model. 7-day PPA at follow-up was measured with the question "Have you smoked any tobacco products in the last 7 days?" 24-hour PPA was measured using the question "Have you smoked any tobacco products in the last 24 hours?" Daily cigarette use was measured using a multiple-choice question with 4 answers: 1) 10 or less, 2) 11-20; 3) 21-30; or 4) 31 or more. The Fagerstrom Test for Nicotine Dependence was based on a 6-item validated questionnaire (Etter et al., 1999) Second, the LDCT uptake and intent to LCS constructs were measured by previously validated questionnaires. An additional amendment will be submitted for Year 2 measurements and aims. All surveys and questionnaires will be submitted in an amendment for Year 2 of the study, including all intervention materials.

## Project Timeline

Study Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Project Preparation					
Aim 1: Recruitment					
Aim 1: Qualitative interview					
Aim 1: analysis of qualitative data and preparation for					
Aim 2: Community Health Worker /staff training					
Aim 2: MILS Intervention material preparation					
Aim 2: Recruitment and pre-intervention assessment					
Aim 2: MILS Intervention implementation					
Aim 2: Post-intervention assessment					
Aim 2: 6 Month Post-intervention assessment					
Aim 2: Wait-list social media					
Aim 2: Analysis of the Effectiveness of MILS					
Aim 3: Recruitment					
Aim 3: Qualitative participant feedback on MILS					
Aim 3: Analysis of qualitative data					
Community feedback					
Project report					
Conferences, manuscripts					
Disseminate MILS					

**\*\*Year 1 highlighted in blue**

## Study Methods

### Procedure

**Objective 1:** The research assistant (RA) is in charge of the patient schedule (list provided by the Radiology department and sends the schedule to UMC to reserve the patient room before the interview. The R.A. contacts the patient and confirms he/she will attend the interview. Eligible participants will be approached in the clinic by staff recruiters. The recruiter will briefly explain the study. If the participant is interested, they will meet with a research assistant (RA) in a private room to learn more about the study and will be provided with an information sheet on the details of the study and complete the interview. R.A.s will be trained to recruit, consent and conduct interviews for the proposed study. During the interviews, the project coordinator will follow a semi-structured interview guide with a list of questions to ask participants to share their personal perspectives and experiences about their experience, awareness, intention, and barriers about smoking cessation and LDCT LCS. These in-depth interviews will last about 45 minutes and will be recorded for transcription. These findings will guide Objective 2. If the participant agrees to participate in the study, the research staff will then conduct the interview.

After the interview, the patient will be required to sign two sign in sheets to confirm he/she received the \$100 clinic card.

**Objective 2:** The proposed study will conduct a randomized clinical trial examining the effectiveness of a multiple levels intervention integrating lung cancer screening and smoking cessation (MILS) for African Americans undergoing LDCT. The developed MILS Intervention using the Theory of Planned Behavior and the Transtheoretical Model as a guiding framework, the content of the targeted smoking cessation intervention and LDCT uptake.

**Objective 3:** The research assistant (RA) will recruit/invite ten participants, 10 providers and 10 community members, to complete an in-depth interview after the MILS intervention. We will invite 10 intervention completers on the first complete first invited rule until data saturation is reached. This will result in a total of 30 participants for the interviews. Our team will schedule an interview time with the participants within one week after the participant fills out the post-intervention assessment. The interviews will be conducted through phone calls and will be audio-recorded. During the interviews, the interview facilitator will follow a semi-structured interview guide to ask participants to share their personal perspectives and experiences about the quality, usability, and user-friendliness about and experiences about barriers and facilitators that influence primary outcomes at the community, provider, and individual levels for the improvement of a multilevel intervention (MILS) to smoking cessation and LDCT LCS. Participants will also be asked to comment on why they are satisfied or unsatisfied with the MILS and the intervention and provide suggestions for intervention improvement and dissemination. These in-depth interviews will last about 45 minutes and will be recorded for transcription. After the interview, the patient will be required to sign two sign in sheets to confirm he/she get the \$100 clinic card.

### **Data Collection Methods**

Quantitative surveys will be distributed to survey participants. All qualitative interviews will be conducted via Zoom and analyzed with Atlas.ti software. Atlas.ti software is compliant with HIPAA, FERPA, and meets ADA compliances and will be encrypted on LSUHSC computers.

### **Data Management**

To safeguard confidentiality, all data is maintained in an electronic form that can only be accessed by the study personnel. The information obtained throughout the experimental study will be stored electronically using password-protected computers on encrypted drives.

### **Data Analysis**

**Objective 1:** Qualitative data collected from semi-structure interviews, which is a research method that combines a set of predetermined questions with the ability for the interviewer to explore specific themes or responses. These interviews allow for a mix of predetermined questions and others that are not based on the participant's responses. The interviews will be transcribed, de-identified, and enter into Atlas.ti for data analysis. A thematic analysis will be conducted to understand participants' perspectives on smoking cessation and LDCT LCS. The primary analysis will be performed by two researchers independently. These two researchers will review the first 5 interviews to open code the data and to identify emergent themes. The multidisciplinary research team will then have meetings to discuss, operationalize, and refine the codes and themes to develop a coding scheme. The two researchers will use the developed coding scheme to independently code all the transcripts. They will have regular meetings to review coded transcripts together, identify and reconcile any coding discrepancies, and add newly merged codes and themes into the coding scheme. We will calculate the code frequencies to identify the most frequently mentioned points by participants under each theme. The final coding results will be reviewed and shared with all research team members for feedback and revision.

**Objective 2:** We plan to enroll a total of 250 participants (125 for each group; experiment and control group). Assuming a 20% attrition rate, we estimated 200 (100 per group) participants at the end of the study at the 6-month follow-up visit. A significant level of 0.05 is applied. We estimated that the biochemically validated 7-day point-prevalence tobacco abstinence rates at 6 months are 20-30% for the MILS group and 5% for the control group (Martha Andritsou et al., 2016). A sample size of 200 achieves 85.6-99.6% power to detect the group difference in tobacco abstinence rates at 6 months based on the two-sided Fisher's exact test. For the LDCT uptake, we estimate that the LDCT uptake at 6 months is 32-40% for the MILS group and 15% for the control group (Young PC et al., 2020; Coral Olazagasti et al., 2022). A sample size of 200 achieves 76.5-97.2% power to detect the group difference of the LDCT update based on the two-sided Fisher's exact test (Ryan, 2013).

**Objective 3:** Feasibility (e.g., recruitment rates, attrition rates, attendance rate, register and use social media) will be documented. The questionnaire will assess the intervention's overall usefulness, content/context, interest, burden, cultural sensitivity. Satisfactory measurements were conducted during the process evaluation using a short survey. All questionnaires concerning feasibility, intervention usefulness, content/context, interest, burden, cultural sensitivity, and satisfactory measurements will be distributed during the follow-up period of the intervention. Thus, these documents will be submitted in an amendment at a later date once the process evaluation is completed.

Qualitative data collected from semi-structure interviews will be transcribed, de-identified, and enter into Atlas.ti for data analysis. A thematic analysis will be conducted to understand participants' perspectives on smoking cessation and LDCT LCS. The primary analysis will be performed by two researchers independently. These two researchers will review the first 5 interviews to open code the data and to identify emergent themes. The multidisciplinary research team will then have meetings to discuss, operationalize, and refine the codes and themes to develop a coding scheme. The two researchers will use the developed coding

scheme to independently code all the transcripts. They will have regular meetings to review coded transcripts together, identify and reconcile any coding discrepancies, and add newly merged codes and themes into the coding scheme. We will calculate the code frequencies to identify the most frequently mentioned points by participants under each theme. The final coding results will be reviewed and shared with all research team members for feedback and revision.

### **Participant Protections**

All participants' privacy will be fully protected by the research team during the study. (\$100 per participant for Aim1 & Aim 3, \$150-300 per participant for Aim 2; Aim 2 conducted in year 2 and 3). All participants received payment for completing a baseline assessment (\$50) and follow-up assessment (\$50) and a biochemically verified abstinence at the 6-month assessment (\$50). Intervention group participants also received compensation for attending counseling (\$50) or accessing social media (\$40) and for at least two community section (\$60). Intervention group participants could receive up to \$300 in incentive payments. Control participants could receive up to \$150.

Each participant will receive an oral and written explanation of the purpose, procedure, and risks of the study before participating in the research study. Verbal consent will be obtained prior to any data collection and before participating in the research study. The principal investigator and sub-investigators will be available to answer all questions before and after the study is conducted. The greatest risk in the study, which is minimal and low risk, is a breach of confidentiality. The study is focused on a non-sensitive topic, and the participants are not at risk for mental or emotional reactions. There may be no direct benefit to participants participating in the study.

Approval to conduct this study will be obtained prior to conducting the study through the LSUHSC-NO IRB.

**Consent Forms**

Two separate consent forms will be distributed to study participants. Those participating in the quantitative (Aim 2) and qualitative (Aim 1 and 3) aspects of the study will read and verbally agree to their respective consent forms, which detail information about the study, before being enrolled and participating in the study.

**Protection of Privacy**

Study participants will be identified through a participant ID number on questionnaires. Personal information will not be available to anyone in any form other than grouped summary data. The results of the study may be released to the funding agency: NIMHD/NIH, National Institute on Minority Health and Health Disparities. A Data Transfer and Use Agreement (DUA) will be requested from the NIMHD/NIH before any information is released to a third party. Additionally, the results of the study may be published. If the study's results are published or discussed at conferences, subjects' privacy will be protected as de-identified data.

**Potential Risks**

This is a minimal risk study. All laboratory data is confidential and will be released within legal limits.

**Potential Benefits**

Participants will receive no direct benefits.

Information sheet will be provided to participants regarding details of the study through the consent forms.

## References

- Ahmad, A., & Singh, J. (2022). Influence of Processes of Change on Stages of Change for Smoking Cessation. *Journal of Applied Social Science*, 16(1), 209–222. <https://doi.org/10.1177/19367244211036994>
- Andritsou, M., Schoretsaniti, S., Litsiou, E., Saltagianni, V., Konstadara, K., Spiliotopoulou, A., Zakynthinos, S., & Katsaounou, P. (2016). Success rates are correlated mainly to completion of a smoking cessation program. *European Respiratory Journal*, 48. <https://doi.org/10.1183/13993003.congress-2016.PA4599>
- Baker, T. B., Burris, J. L., & Fiore, M. C. (2022). Helping African American individuals quit smoking: Finally, some progress. *JAMA*, 327(22), 2192-2194.
- Baker, T. B., Mermelstein, R., Collins, L. M., Piper, M. E., Jorenby, D. E., Smith, S. S., Christiansen, B. A., Schlam, T. R., Cook, J. W., & Fiore, M. C. (2011). New methods for tobacco dependence treatment research. *Annals of Behavioral Medicine*, 41(2), pp.192–207. <https://doi.org/10.1007/s12160-010-9252-y>
- Collins, L. M., Baker, T. B., Mermelstein, R. J., Piper, M. E., Jorenby, D. E., Smith, S. S., ... & Fiore, M. C. (2011). The multiphase optimization strategy for engineering effective tobacco use interventions. *Annals of Behavioral Medicine*, 41(2), pp.208-226.
- Cornelius, M. E., Loretan, C. G., Jamal, A., Lynn, B. C. D., Mayer, M., Alcantara, I. C., & Neff, L. (2023). Tobacco Product Use Among Adults—United States, 2021. *Morbidity and Mortality Weekly Report*, 72(18), pg.475.
- Etter, J. F., Vu Duc, T., & Perneger, T. V. (1999). Validity of the Fagerström test for nicotine dependence and of the Heaviness of Smoking Index among relatively light smokers. *Addiction (Abingdon, England)*, 94(2), 269–281. <https://doi.org/10.1046/J.1360-0443.1999.94226910.X>
- Fedewa, S. A., Kazerooni, E. A., Studts, J. L., Smith, R. A., Bandi, P., Sauer, A. G., ... & Silvestri, G. A. (2021). State variation in low-dose computed tomography scanning for lung cancer screening in the United States. *Journal of the National Cancer Institute*, 113(8), pp.1044-1052.
- Krist, A. H., Davidson, K. W., Mangione, C. M., Barry, M. J., Cabana, M., Caughey, A. B., ... & U.S. Preventive Services Task Force. (2021). Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. *JAMA*, 325(10), pp.962-970.
- Maki, K. G., Talluri, R., Toumazis, I., Shete, S., & Volk, R. J. (2023). Impact of U.S. Preventive Services Task Force lung cancer screening update on drivers of disparities in screening eligibility. *Cancer Medicine*, 12(4), pp.4647-4654.
- Meza, R., Cao, P., Jeon, J., Taylor, K. L., Mandelblatt, J. S., Feuer, E. J., & Lowy, D. R. (2022). Impact of joint lung cancer screening and cessation interventions under the new recommendations of the U.S. Preventive Services Task Force. *Journal of Thoracic Oncology*, 17(1), pp.160-166.
- National Center for Health Statistics [NCHS]. (2023). Percentage of fair or poor health status for adults aged 18 and over, United States, 2022. *National Health Interview Survey*. Retrieved from: [https://wwwn.cdc.gov/NHISDataQueryTool/SHS\\_adult/index.html](https://wwwn.cdc.gov/NHISDataQueryTool/SHS_adult/index.html)
- Olazagasti, C., Seetharamu, N., Kohn, N., & Steiger, D. (2023). Implementing physician education to increase lung cancer screening uptake. *Lung Cancer Management*, 11(2), LMT55. <https://doi.org/10.2217/lmt-2022-0008>
- Ostroff, J. S., Shelley, D. R., Chichester, L. A., King, J. C., Li, Y., Schofield, E., ... & Kenney, J. (2022). Study protocol of a multiphase optimization strategy trial (MOST) for delivery of smoking cessation treatment in lung cancer screening settings. *Trials*, 23(1), 664.

- Paskett, E., Thompson, B., Ammerman, A. S., Ortega, A. N., Marsteller, J., & Richardson, D. (2016). Multilevel interventions to address health disparities show promise in improving population health. *Health Affairs*, 35(8), pp.1429-1434.
- Ostroff, J. S., Shelley, D. R., Chichester, L. A., King, J. C., Li, Y., Schofield, E., ... & Kenney, J. (2022). Study protocol of a multiphase optimization strategy trial (MOST) for delivery of smoking cessation treatment in lung cancer screening settings. *Trials*, 23(1), 664.
- Qiao, E. M., Voora, R. S., Nalawade, V., Kotha, N. V., Qian, A. S., Nelson, T. J., Durkin, M., Vitzthum, L. K., Murphy, J. D., Stewart, T. F., & Rose, B. S. (2021). Evaluating the clinical trends and benefits of low-dose computed tomography in lung cancer patients. *Cancer Medicine*, 10(20), pp.7289–7297. <https://doi.org/10.1002/cam4.4229>
- Ryan, T. P. (2013). Sample Size Determination and Power. *Sample Size Determination and Power*, 1–374. <https://doi.org/10.1002/9781118439241>
- Sosa, E., D'Souza, G., Akhtar, A., Sur, M., Love, K., Duffels, J., ... & Erhunmwunsee, L. (2021). Racial and socioeconomic disparities in lung cancer screening in the United States: A systematic review. *A Cancer Journal for Clinicians*, 71(4), pp. 299–314.
- Surveillance, Epidemiology, and End Results Program [SEER]. (2023). Cancer stat facts Lung and bronchus cancer. *National Cancer Institute*. Retrieved from: <https://seer.cancer.gov/statfacts/html/lungb.html>
- Tsai, J., Homa, D. M., Gentzke, A. S., Mahoney, M., Sharapova, S. R., Sosnoff, C. S., ... & Trivers, K. F. (2018). Exposure to secondhand smoke among nonsmokers—United States, 1988–2014. *Morbidity and Mortality Weekly Report*, 67(48), 1342. <http://dx.doi.org/10.15585/mmwr.mm6748a3>
- Tseng, T.S., Gross, T. T., Celestin, MD Jr., Dang, W., Kao, Y.H., Li, m., Smith, D. L., Bok, L.R., Fuloria, J., Moody-Thomas S. Knowledge and Attitudes towards LDCT Lung Cancer Screening and Smoking among African Americans-A Mixed-Method Study. *Translational Cancer Research*. 2019. 8(S4) s431-s442. DOI: 10.21037/tcr.2019.04.18. PMID: 35117119
- United States Public Health Service Office of the Surgeon General, & National Center for Chronic Disease [USPHSOSG] Prevention and Health Promotion (U.S.) Office on Smoking and Health. (2020). Smoking Cessation: A Report of the Surgeon General. *U.S. Department of Health and Human Services*.
- Williams, P. J., Philip, K. E., Alghamdi, S. M., Perkins, A. M., Buttery, S. C., Polkey, M. I., ... & Hopkinson, N. S. (2023). Strategies to deliver smoking cessation interventions during targeted lung health screening- A systematic review and meta-analysis. *Chronic Respiratory Disease*, 20, 14799731231183446.
- Webb Hooper, M., Carpenter, K., Payne, M., & Resnicow, K. (2018). Effects of a culturally specific tobacco cessation intervention among African American Quitline enrollees: a randomized controlled trial. *BMC Public Health*, 18(1), 1–8.
- Yong, P., Sigel, K., Rehmani, S., Wisnivesky, J., & Kale, M. (2020). Lung Cancer Screening Uptake in the United States. *Chest*, 157(1), 236–238. <https://doi.org/10.1016/j.chest.2019.08.2176>