



Understanding determinants of lung cancer preventive care in at-risk urban American Indians and Alaska Natives: A mixed-methods study

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ABSTRACT

Introduction: Lung cancer is the leading cause of cancer death among American Indian and Alaska Native (AI/AN) people, and AI/AN people have the highest rate of smoking of any racial or ethnic group in the US. There is limited research to inform culturally-relevant strategies for lung cancer prevention inclusive of lung cancer screening (LCS). The objective of this study was to understand determinants of LCS and tobacco cessation care in at-risk urban-dwelling AI/ANs.

Materials and Methods: This was a mixed-methods community-based participatory research study including complimentary qualitative discussions and surveys conducted in Seattle, Washington, USA from 2022 to 2023. The study measures and analytic approach integrated the Consolidated Framework for Implementation Research and Tribal Critical Race Theory and qualitative transcripts were analyzed using thematic analysis. Participants were self-identified AI/AN people who were age ≥ 40 and had ≥ 10 -year history of commercial cigarette smoking.

Results: Forty-five participants completed surveys and participated in discussions, 48% were female, the median age was 58 and median smoking history was 24 pack-years of commercial cigarette use. Themes revealed prominent barriers to LCS care including access, costs, awareness, and fear. Many reported previous negative and discriminatory encounters within and outside the health system which may also serve as barriers. Most participants endorsed cancer screening and increased education, recommending Indigenous-centered, delivered, and tailored programs, as well barrier-directed support.

Conclusions: In a broad sample of at-risk urban-dwelling AI/AN people, our findings suggest enthusiasm for preventive care but several complex barriers. Participants endorsed culturally-tailored programs which could provide relevant education and address barriers.

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1. Introduction

Lung cancer is the leading cause of cancer death among AI/AN people (Plescia et al., 2014), and compared to non-Hispanic Whites (NHWs), the incidence of lung cancer is higher in AI/ANs in the Northern and Southern Plains, Alaska, and Pacific Coast regions (Melkonian et al., 2019). While overall lung cancer incidence is declining in the US with decreasing population-level tobacco use, AI/ANs have the slowest rate of decline in incidence over the last 15 years (Kratzer et al., 2024). AI/ANs also have the highest prevalence of cigarette smoking among any racial and ethnic group in the US (Cornelius et al., 2022). In Western Washington state, AI/ANs have more than twice the smoking rate (30 %) of the overall population (13 %) (McDougall, et al., 2023).

The U.S. Preventive Services Task Force recommends lung cancer screening (LCS) with annual low-dose chest CT scans, integrated with smoking cessation, for people with current or recent tobacco use, aged ≥ 50 years with at least a 20 pack-year smoking history (Krist et al., 2021; Centers for Medicare and Medicaid Services, 2022). LCS reduces lung cancer mortality by 20 % and is more beneficial when combined with effective smoking cessation (National Lung Screening Trial Research Team et al., 2011; Tanner et al., 2016). There is lower uptake of LCS in minoritized groups in the US compared to NHWs (Navuluri et al., 2023; Sosa et al., 2021; Kunitomo et al., 2022), which likely reflects social determinants that lead to barriers along the screening care continuum. Eligible AI/AN people, notably the > 70 % who live in urban areas and receive care outside tribal settings, may face additional barriers beyond other groups including a lack of culturally appropriate resources and care pathways and additional medical mistrust in the face of historic and ongoing discrimination (Melkonian et al., 2022; United States Census Bureau, 2021). Studies of tobacco cessation demonstrate lower cessation rates among AI/AN than NHW despite similar interests in quitting smoking, which has been ascribed to limited access and lack of culturally tailored approaches (National Center for Chronic Diseases, 2014; Carroll and Cole, 2022).

The objective of this mixed-methods study was to explore the perspectives of urban AI/AN persons to better understand the determinants of LCS and tobacco cessation care to inform interventions focused on lung cancer prevention in this group.

2. Materials and methods

2.1. Study design

This was a mixed-methods study of qualitative discussions with complementary surveys conducted in parallel to understand attitudes, knowledge, barriers, and facilitators (referred to as determinants) and explore input for program development for LCS inclusive of commercial tobacco cessation among LCS-eligible or near-eligible AI/AN participants. In this manuscript, we use the terms Indigenous, AI/AN and/or Native interchangeably for American Indian and Alaska Native people.

This study was grounded in culturally rigorous community-based participatory research methodology (Ward et al., 2018; Wallerstein and Duran, 2006) through bidirectional research partnership with King County, WA organizations. Two organizations served as key community partners. The *həli?il* [haa lee eel, meaning become well/heal in Lushootseed] Program (HP) is a community-facing Indigenous lung health program at the Fred Hutchinson Cancer Center providing community outreach, education and smoking cessation resources. HP staff including the program manager/tribal liaison (UT) and the community health worker (NW) were fully integrated into the research team. The Seattle Indian Health Board (SIHB) is an Urban Indian Organization and federally qualified health center specializing in culturally attuned care for urban AI/AN people, and the largest primary care clinic for AI/AN patients in King County, WA. Staff at SIHB were engaged in the research process through formative meetings with staff, provided space for

recruitment and hosted all focus groups. A division of SIHB, the Urban Indian Health Institute, provided overarching support and regulatory oversight for study processes. An external advisory board, consisting of five stakeholders in Indigenous health external to King County, served as a review body to ensure cultural relevance in study design and interpretation.

Study participation included survey completion and participation in a focus group or semi-structured interview. Participants were eligible for this study if they: 1) self-identified as AI/AN, regardless of tribal enrollment, 2) were between age 40–80, 3) reported ≥ 10 pack-year history of tobacco use, and 4) were able to communicate in English. We focused on this population of participants “at-risk” for lung cancer given age and smoking history, and who were also eligible or near-eligible for LCS. Participants were recruited for participation through in-person weekly outreach at SIHB by the study team, recruitment fliers posted at SIHB and other sites, and a dedicated Facebook ad. All participants provided verbal informed consent and were compensated \$50 for participation. All study assessments were completed between November 28, 2022, and June 1, 2023. The study was approved by both the Fred Hutchinson Cancer Center Institutional Review Board and SIHB Research Review Committee.

2.2. Study assessments

The surveys were designed and piloted by the study team and administered prior to the qualitative portion of the study visit in written or electronic form. The surveys contained items on demographics, commercial tobacco use and tobacco cessation history, health literacy, (Chew et al., 2008) and the Everyday Discrimination Scale (Williams et al., 1997). Items created for this survey included 8 questions related to LCS attitudes, experience, knowledge as well as attitudes towards tailoring preventive care for AI/AN communities, presented on a Likert scale. These survey items were created in parallel with the interview guide to provide quantitative information on key LCS determinants. They were reviewed and revised where necessary by our community partners for literacy level and cultural appropriateness and piloted in 2 mock-visits prior to their use with participants.

Qualitative data were collected through in-person focus groups conducted at SIHB and one-on-one interviews (when requested by participants) conducted virtually. There were 5 focus groups with between 4–10 participants with 3 virtual individual interviews. Qualitative guides were developed iteratively by the study team integrating two frameworks, the Consolidated Framework for Implementation Research (CFIR) and Tribal Critical Race Theory (TribalCrit) (Damschroder et al., 2022; Brayboy, 2005). CFIR is a determinants framework developed to understand context-related barriers and facilitators to successful implementation. TribalCrit was developed to contextualize the social and political realities of AI/AN people as they reflect historic events and ongoing relationships to power (Brayboy, 2005). This was developed in the context of higher education but has been utilized to understand AI/AN health behaviors (Dellinger et al., 2016; Sinclair et al., 2020). At least one qualitative prompt was developed within each domain of CFIR and tenet of TribalCrit to ensure holistic consideration of factors which may impact LCS and smoking cessation (Appendix Tables 1 and 2).

Our approach was to include prompts related to both commercial tobacco use and LCS, as these are necessarily inter-related topics given eligibility criteria for LCS and approximately 50 % of all people eligible for LCS in the US are currently smoking (Agaku et al., 2014). Topics addressed in qualitative discussions included personal and community commercial tobacco use, experience with cessation tools, knowledge and attitudes towards cancer screening, LCS and health care delivery, and participant feedback on AI/AN-tailored programming. Qualitative discussions were designed to take ~ 1.5 hours and were piloted with research staff. Recruitment continued until thematic saturation was reached, the point at which no unique content emerged from analyzed transcripts. Qualitative discussions were led by AI/AN study team

members (UT, CD) with experience in AI/AN community health and leading qualitative sessions.

2.3. Analysis

Survey data were summarized across all participants with counts and percentages for categorical data and medians with interquartile range for continuous data. The Everyday Discrimination Scale is summarized across the 9 items using frequency-based coding with a range of 9 (no reported discrimination) to 54 (representing near daily discrimination across contexts) (Williams et al., 1997) and has demonstrated scale score reliability among AI/AN ($\alpha = 0.92$) (Gonzales et al., 2016). The health literacy measure was summarized from 3 validated health literacy items with a range 3–15 with lower scores representing more limited health literacy (Chew et al., 2008; Chew et al., 2004). All quantitative data analysis was performed in Stata (v16.1).

Focus groups were recorded, professionally transcribed and analyzed using Atlas.ti software. Transcripts were coded using principles of thematic analysis and an inductive coding process, with codes not bound to specific framework constructs (National Cancer Institute Division of Cancer Control and Population Sciences, 2020). Four authors were part of the coding team (UT, NA, NW, MT). An early focus group transcript was reviewed and discussed by the team to develop the initial codes and then iteratively adapted while coding 2 additional transcripts together. Once the code book was finalized, the transcripts were coded independently by the 4 team members who met on a weekly basis to review codes and adjudicate discrepancies by consensus. Quantitative inter-coder reliability was not assessed as each discrepancy in coding was discussed and adjudicated by the entire team. Codes across focus groups were organized into a matrix display with exemplar quotations to allow for constant comparison to reduce the data to memos and subsequently themes. All coding was done while focus groups were ongoing to allow real-time assessment for thematic saturation, which occurred prior to the final focus group. Two coding team members (UT, MT) finalized themes and mapped them onto CFIR (Damschroder et al., 2022). Complementary qualitative and survey data was compared to enhance themes and conclusions.

3. Results

There were 45 AI/AN participants, with a median age of 58 and equal proportions of men and women (48 % each), with 18 % reporting multiracial identities (Table 1). The majority reported having Medicare and/or Medicaid insurance (75 %) and earned less than \$15,000 annually (64 %). The median smoking pack-years was 24, with 44 % currently smoking. Sixteen percent reported receiving LCS, though in qualitative discussions many participants discussed what they interpreted as LCS were actually symptomatic diagnostic imaging with a chest CT (Table 2). Twenty-eight percent of participants reported experiencing discrimination in a healthcare setting. The median Everyday Discrimination Scale score was 27 (IQR 17–40), representing a moderate level of discrimination in everyday activities. A majority preferred to receive healthcare information (91 %) and have healthcare delivered in places (91 %) that were designed by and for AI/AN people.

Themes were organized onto the 5 domains of CFIR given their utility to systematically assess barriers and facilitators to implementation. Working definitions of these domains are provided in Appendix Table 1. A key theme within the *Outer Setting* domain was that experiences at the family, community, healthcare and larger societal level influenced both smoking and screening behavior (Table 3). For some participants this included associating tobacco use with prior trauma, feeling directly marketed to and targeted to use commercial tobacco as an AI/AN person, and strong influences from tobacco use in their families and communities. Regarding connections with trauma, one person said, “Because we’re all wounded, we wouldn’t pick up a cigarette and kill ourselves each day unless we were wounded.” Negative interactions

Table 1
Demographics of American Indian/Alaska Native People Who Participated in the Study (n = 45) (2022–2023).

Self-reported Characteristic of Focus Group Participants	n(%) or median +/- IQR ¹
Age ²	58 (52–63)
Gender ³	
Female	21 (48)
Male	21 (48)
Transgender or Non-binary	1 (2.3)
Two-Spirit	1 (2.3)
Race (more than one selection allowed)	
American Indian/Alaska Native	45 (100)
Asian	0
Black or African American	4 (8.9)
Native Hawaiian/Pacific Islander	1 (2.2)
White	3 (6.7)
Hispanic ethnicity	7 (18)
Employment status ³	
Employed full-time	1 (2.3)
Employed part-time	3 (6.8)
Retired	10 (23)
Disabled	13 (30)
Unemployed	13 (30)
Other	4 (9.1)
Highest grade of education completed ³	
8th grade or less	4 (9.1)
Some high school	6 (14)
High school graduate or GED	19 (48)
Some college	11 (25)
College graduate	2 (4.6)
Graduate or professional school	2 (4.6)
Annual household income ⁴	
Less than \$5000	16 (38)
\$5000–15,000	11 (26)
\$15,001–30,000	3 (7.1)
\$30,001–50,000	2 (4.8)
\$50,001–75,000	0
Over \$75,000	1 (2.4)
Prefer not to answer	5 (12)
Don't Know/Unsure	4 (10)
Type of health insurance coverage (more than one response allowed) ³	
Private health insurance or HMO	5 (11.4)
None	2 (4.6)
Medicare	13 (30)
Medicaid	20 (45)
Charity care or reduced cost program	1 (2.8)
Don't know/Unsure	1 (2.8)
Other	2 (4.6)
Smoking status ²	
Currently smoking	19 (44)
Previous smoking	24 (56)
Pack-years smoking ⁵	24 (15–34)
Prior smoking cessation support (more than one response allowed)	
Telephone Quit Lines	4 (8.9)
In-person counseling	6 (13)
Nicotine replacement therapy	20 (44)
Pharmacotherapy	6 (13)

¹ Percentages and medians based on total respondents for individual items.

² Missing 2 responses.

³ Missing 1 response.

⁴ Missing 3 responses.

⁵ Calculated based on 35 participants who provided start and quit dates (if applicable) and average cigarettes smoked per day.

with the health system related or unrelated to cancer, either through personal or family experiences, led many to perceive that AI/AN people receive substandard external healthcare services leading to apprehension to pursue care like LCS.

Themes organized within the *Inner Setting* domain revealed many positive experiences with Indigenous-centered and tailored care delivered in a community care setting, that often contrasted with care at outside facilities (Table 3). Participants also expressed several barriers

Table 2
Responses to Survey Questions by American Indian/Alaska Native Study Participants (2022–2023).

Survey Question Responses of Focus Group Participants	n(%) or median +/- IQR ¹
Reports previous lung cancer screening ²	7 (16)
Reports any type of cancer screening ²	17 (40)
Self-reported lung cancer risk ³	
No risk	3 (6.8)
Very low risk	4 (9.1)
Low risk	12 (27)
Moderate risk	14 (32)
High risk	8 (18)
Very high risk	3 (6.8)
Reports hearing of lung cancer screening ³	28 (64)
Reports provider recommendation for lung cancer screening ³	17 (39)
Somewhat or strongly agrees with the following statement	
"I follow my provider's recommendations on which health care services to get" ³	32 (73)
"I have difficulty accessing healthcare when I need it." ²	13 (30)
"I have been discriminated against in healthcare settings" ²	12 (28)
"I have been discriminated against in health research settings." ²	11 (26)
"I want healthcare information designed by and for American Indian/Alaska Native people." ³	40 (91)
"I prefer to have healthcare in places designed by and for American Indian/Alaska Native people" ³	40 (91)
Everyday Discrimination Scale (median +/- IQR) ⁴	27 (17–40)
3-item health literacy measure (median +/- IQR) ⁵	11 (9–14)

¹ Percentages and medians based on total respondents for individual items.
² Missing 2 responses.
³ Missing 1 response.
⁴ Calculated based on 41 participants who completed all EDS items.
⁵ Calculated based on 43 participants who completed all health literacy responses.

to pursuing LCS, with real or perceived costs and transportation being the most frequently cited barriers. As one participant said, "...I think the reason why I've never requested [LCS] is because there's a fear of the price, the cost."

Themes within the *Individuals* domain reflected attitudes and beliefs related to tobacco and cancer screening (Table 4). A key theme was that many have complex relationships with commercial tobacco use, and this impacts LCS and cessation behavior and uptake. This included tobacco serving as a stress-management or harm-reduction strategy for many participants and some reporting hesitancy and prior negative experiences with cessation therapies. Participants largely held a positive view of both LCS and other cancer screening, and reported limited prior knowledge of LCS which may serve as a prominent barrier to uptake. Some participants reported fear of screening procedures or possible cancer outcomes discouraged them from pursuing LCS. Discussing LCS, one participant said, "Too scared to go, frightened, I know I'd be afraid if somebody told me I had that cancer."

Within the *Innovation and Implementation Process* domains, themes reflect participant feedback and suggestions for interventions and care delivery that could address barriers to LCS (Table 5). Patient education and support through the care continuum were largely endorsed by participants. In response to prompts which discussed patient navigation, this was endorsed as a model to help address multiple and individualized barriers to LCS care, with the caveat that some participants had negative prior experiences, in smoking cessation and other care, with care coordination and navigation interventions. More information and education on LCS were desired by most participants. Another key theme which emerged was a desire for education and LCS programs tailored to the AI/AN experience, which included visibility in materials and staff, incorporating AI/AN culture, and extending education, outreach and screening delivery beyond the clinical environment. One participant shared a prior experience stating, "I went to a gathering at the Center for Native Americans. They had an education program there for Native

Table 3
Themes mapped to the Outer Setting domain, describing the external context which may influence interventions, and the Inner Setting domain, which describes the clinical environment.

Theme	Representative Quote
Theme: Family, community and experience as an AI/AN person influence smoking and screening behavior	
Subtheme: Prior or ongoing smoking history sometimes associated with trauma	"We would go outside, and we would share secrets. We would talk about trauma that he had experienced in foster care. And we would smoke a cigarette." "When I was assaulted by the police, the first thing I did was go there [to my family's house]...they gave me a cigarette and I just started smoking. I didn't even inhale."
Subtheme: Many associate smoking with being directly targeted to use tobacco	"I was Native American. And I get mass coupons for cigarettes for like \$1 off a pack the \$2s off a pack. My friend... he filled out a form. He put on there that he was Caucasian. He never got a coupon" "And I know clean Natives who live really good lives who smoke. And if you look at the tribal reservation smoke shops that sell cigarettes at a much cheaper price."
Subtheme: Prior negative experiences and discrimination in health system can lead to apprehension to receive screening care	"Yeah, well, my brother had cancer, and they [medical provider] waited for a whole year and it went into his lungs and up to his head. And, you know, they [medical provider] thought he just had a cold... he kept going in and you know, asking them about it." "They'd never did anything. They blamed everything on arthritis. It was either arthritis, or alcohol was the cause for everything. I don't think that people really screen Native Americans for anything."
Subtheme: Family and community can both facilitate smoking but may also represent a facilitator for cessation and getting screened	"So when you respect your elders, then they're smoking, and it just gets in your mindset that maybe that's something you should try and then you start getting addicted." "What I fear for is that I have five children of my own, and so...when I quit like I that was the first thing I thought like I lost my father and I didn't want to die with lung disease." "I need to get a screening because I want to make sure that I didn't develop it already ... I have a granddaughter and I need to be here to chase her when she's 21 right now, she's three...I have a responsibility in this world."
Theme: Positive experiences with Indigenous-centered care contrasts with care at outside facilities	"... I love Doctor and I know Doctor has my best interest in mind at all times. I know that, I don't doubt it." "Having a medical doctor or clinic that is consistent. That that's why I enjoy coming here [SIHB]. I believe they have kept me alive a lot longer than I would have on my own." "Yeah, they sent me over to [another hospital] for a mammogram. And when I went...the lady just kind of made me feel like, I really wasn't at high-risk. Like I was overreacting."
Theme: Most frequent immediate barriers to undergo LCS include costs and transportation	"I'm like, a lot of them [referring to AIAN people]. They don't drive or yeah, they are too old. Yeah. No means of transportation." "...honestly, I think the reason why I've never requested [lung cancer screening] is because there's a fear of the price the

(continued on next page)

Table 3 (continued)

Theme	Representative Quote
	cost.... Because it sounds like a really, expensive procedure.”

Table 4

Themes mapped to the Individual domain which reflect characteristics, beliefs and attitudes of intervention recipients.

Theme	Representative Quote
Theme: Many have complex relationship with tobacco which impacts LCS and cessation uptake	
Subtheme: Tobacco is often used as a day-to-day coping mechanism for stressors.	“And I smoked out a stress, I ain’t gonna lie, I knew exactly why I was smoking... The world is an extremely stressful place right now, you know.” “I just I have a bad habit, stressors. When I drink a cup of coffee, I need a cigarette. When I’m driving in my car. I need a cigarette. When I get triggered by anxiety or stress.”
Subtheme: Some prioritize cessation from other addictions and view (or previously viewed) tobacco as potentially less harmful or a substitution.	“I don’t know how everybody else but we were brought up [believing] it was okay for us to smoke...our parents thought, well, they’d rather see us smoke cigarettes than smoking dope. And that’s why they said it was okay for us to smoke...this is the way we were raised...” “Well the funny things is, that’s why I started smoking because of the 12 steps [program], my mom was a 12 step. And they’re always smoking and drinking coffee.”
Subtheme: Many participants have negative experiences with smoking cessation.	“I really don’t want to take the chemicals that are in the Chantix... And the intense feelings while I’m taking the Chantix like, I am so numb while taking them...” “No, they didn’t work. The chewing gum made me sick. The patches helped a little bit but then my friend scared me. She said if I wear the patch and smoke, I could have a heart attack. But I don’t know if that’s true.”
Theme: Most viewed cancer screening as important to improve and maintain health for themselves and their families.	“Like you know some of the people that I talked to who did lung cancer screening are getting help for it... a lot of my relatives probably would have survived [if they would have had a screening].” “I had that colonoscopy many, many years ago, because at the time I had stomach cancer, but the results came out fine. It’s good to have that [a screening] to prevent problems later in your life.”
Theme: Most had limited experience or knowledge of LCS	“The only lung screening I ever had was for pneumonia. Not for cancer. And I didn’t know that there’s a difference.” “We don’t know anything about screening like none of us have even heard of it. That’s the main thing I think.”
Theme: For some, fear of cancer diagnosis and immediate discomfort has led some participants to avoid cancer screening	“Too scared to go, frightened, I know I’d be afraid if somebody told me I had that cancer ...that’s the scariest part to find out if we do got cancer.” “And what you gonna do, go home and tell your family ... you got to face the fact that you’ve got cancer...”

Table 5

Themes mapped to the Intervention domain which describes attitudes and beliefs about lung cancer prevention interventions, and Implementation Process domain, which describes attitudes and suggestions about intervention delivery.

Themes and subthemes	Representative Quote
Theme: Many felt education and support were needed to overcome barriers to LCS care.	
Subtheme: Patient navigation was endorsed as a care model to provide support including assist with paperwork, scheduling, reminders, explanations, locating physical facilities.	“That would be helpful. Because I’m so intimidated by getting lost in hospitals and it’s hard to ask for help” “...helping them through the process of a lot of paperwork... there’s a lot of paperwork.” “That’ll be helpful because some of us don’t know how to read that well, and I don’t understand what’s going on...” “When my best friend and my brother went through a series of things, the navigation process didn’t help. We were confused. I’m the one that had to put my foot down and say, excuse me, and I don’t like that tone of voice...” “Well, I guess, if you’re trying to quit, you know, it was kind of like, you get a sponsor or something...I didn’t really care for it, because they kept calling and they seemed like, they were just imposing themselves upon me. And, and I didn’t like it.”
Subtheme: Some have negative prior experiences with navigation and care coordination	“... I wasn’t aware of cancer screening. I wanted to come here today because to get more information and, you know, just to learn more information from it.” “There’s no knowledge, there’s no passing on information, no nothing... you’re not going to just go to the doctor and be like I smoke and I need some help like nobody wants to do that.”
Subtheme: More education on lung cancer screening desired	
Theme: Desire for education and LCS delivery tailored to AI/AN experience and culture	
Subtheme: Importance of visible AI/AN people in program materials and in staff members.	“...have more pamphlets with Native people in them, [have] Native people talking about what their experience...” “Yeah, that would be really helpful is to have more indigenous [staff].”
Subtheme: Enthusiasm for inclusion of cultural elements (traditional medicine, cultural references, discussions of ceremonial tobacco)	“I think that like learning about the original intention of tobacco is one of the most important things that we could do.” “...It’s really hard helping people get off drugs and quit smoking cigarettes and all that other stuff. But your natural medicines are in your spirit. And as Natives have a spiritual connection with God, much more than the white man.”
Subtheme: Lung cancer screening and education should extend beyond clinical environments to center the community.	“Honestly, I think like the arena, the tribal arena, like you know, the pow wows and stuff ... because that’s where I’m mainly in...I think they need to be advertising tobacco cessation.” “I went to a gathering at the Center for Native Americans. They had an education program there for Native American’s at high risk of cancer, and that we should get tested, so I went and got tested.”

American’s at high risk of cancer, and that we should get tested, so I went and got tested.”.

4. Discussion

Given the high rate of commercial tobacco use in AI/AN, particularly in certain regions, improving lung cancer prevention care inclusive of LCS could have a substantial population benefit and reduce lung cancer

disparities. While there has been limited study of LCS in this population, prior work suggests barriers to preventive care, as AI/AN people have lower uptake of other screening modalities and may have less access to and less success with tobacco cessation (Guadagnolo et al., 2009; Kratzer et al., 2023; Fu et al., 2010; Stahre et al., 2010). This study is the most extensive evaluation to date to explore perspectives on LCS and tobacco cessation in a large sample of at-risk AI/AN for the purpose of clarifying barriers and facilitators to develop effective interventions to improve these inter-related care processes.

Our results suggest prominent barriers to lung cancer prevention care which are similar to those in other minoritized communities (Lee et al., 2023; Rivera et al., 2020), with barriers related to healthcare access being most common. This is particularly salient to receiving LCS which requires access to low dose chest CT not available in most primary or community care settings. Difficulties accessing healthcare external to the community clinic, related to costs, transportation and fear were frequently reported. Surveys confirmed that a large proportion of the sample (30 %) reported difficulties accessing healthcare when needed. Limited knowledge and awareness of LCS was frequent as well. This was highlighted by several participants reporting prior LCS on surveys, but in discussions, reporting that what they considered LCS was often actually diagnostic chest CTs performed for concerning respiratory symptoms. While we were unable to confirm whether participants had, or had not, had LCS, this finding suggests that self-report of LCS behavior may not represent a reliable method of determining LCS uptake.

Beyond these barriers, utilizing TribalCrit tenets to tailor our prompts allowed participant reflection on larger issues related to AI/AN identity, culture, and political status and how these may interact with commercial tobacco and LCS. These included complex relationships with tobacco as both individuals and AI/AN people, which were often discussed alongside LCS barriers. These included associations of tobacco with trauma, the penetration of commercial tobacco into their families and communities, a contrast between ceremonial and commercial forms of tobacco, and an awareness that AI/AN people were directly marked to and targeted to become addicted to commercial cigarettes. Previous qualitative studies with diverse AI/AN groups including discussions of tobacco use confirm a complex relationship between AI/AN identity and tobacco (Angstman et al., 2009; Forster et al., 2008; Burgess et al., 2007), and our results suggest these issues are important to acknowledge to deliver effective and acceptable cessation alongside LCS in this population.

Many also reported negative experiences and discrimination in healthcare settings which served as a barrier to receiving LCS, and appear to be common among AI/AN people (Daley et al., 2012; Call et al., 2006; Findling et al., 2019). Surveys revealed 28 % of participants reported discrimination in a healthcare setting, and the median Everyday Discrimination Scale score reflects frequent experiences of discrimination in everyday life for many participants. Many participants described experiences which have led to distrust and dissatisfaction with the larger healthcare system and beliefs of inferior care for AI/AN people, and these often included stories related to cancer in family members. These experiences have, unfortunately, been frequently described among AI/AN people in both healthcare and non-healthcare settings, and are associated with worse health outcomes (Findling et al., 2019; Johansson et al., 2006; Chae and Walters, 2009). For our participants, this contrasted with positive regard for healthcare received at an Indigenous community-based clinic.

When discussing approaches to lung cancer prevention including LCS, which may necessitate connections between trusted community sources and external healthcare to undergo specialized testing such as a low dose CT or follow-up, participants endorsed several elements. Culturally tailored interventions arose as an essential element, which would be particularly effective if delivered by trusted Indigenous staff and/or community members. The concept of patient navigation, or assistance delivered by a navigator who can interface between the patient and the health system, was strongly endorsed as a potential

solution, essentially “bridging the gap” between community and health systems to help patients with their individual needs (Paskett et al., 2011). Patient navigation has been used as an approach to reduce disparities among minoritized populations to increase awareness, knowledge and assist with barriers along a care continuum (Paskett et al., 2011; Liu et al., 2021). A few studies have specifically explored navigation among AI/AN participants in the context of cancer-related care, and though the navigation processes are not fully described, there appear to be improvements in engagement and satisfaction in care using these models (Menon et al., 2022; Grimes et al., 2017; Petereit et al., 2008). Participants endorsed outreach and screening delivery outside the clinical setting, affirming that patient navigation may need to be combined with interventions impacting other levels, such as community-targeted outreach, to improve uptake of LCS (Dignan et al., 2024; Robichaux et al., 2023).

Our discussions also revealed facilitators and motivators which could support lung cancer prevention programming for AI/AN people. Almost all participants had positive beliefs towards cancer screening with many discussing the importance of maintaining health for family, community, and passing down traditions. There was also strong engagement during these sessions, with many wanting more information about LCS and tobacco, and many advocating for lung cancer prevention education delivered in community settings. Further, participants strongly endorsed participating in programs that were Indigenous-centered, and shared unique ideas including incorporating reflections on ceremonial uses of tobacco and delivering prevention care at community events. Further work will be needed to rethink, refine and co-design LCS programming to be most effective for AI/AN communities.

There are few studies specific to LCS for AI/AN people, but our results confirm and extend the findings that there are both limitations in knowledge in this population and several barriers to LCS (Welch et al., 2024; Anderson et al., 2023). Welch et al., also highlighted the impact of multigenerational smoking behavior among native elders, a theme that arose in the present study (Welch et al., 2024), and Anderson, et al., also identified interest in culturally-tailored programming delivered in a community setting among a small sample of LCS-eligible or near-eligible urban AI/AN participants from Minnesota (Anderson et al., 2023). Studies have similarly found negative attitudes held towards some smoking cessation modalities, which could be a barrier to providing LCS and discussing commercial tobacco cessation (Burgess et al., 2007; Gryczynski et al., 2010).

This study has several strengths. It utilized both quantitative and qualitative data to yield a robust description of barriers and facilitators to LCS inclusive of commercial tobacco cessation in an urban AI/AN population and participant insights on approaches which may be needed to effectively address lung cancer prevention in this population. The qualitative methodology was rigorous using inductive coding and multiple coders for a robust analysis. The study was implemented using a community-based participatory research approach with a trans-disciplinary team which enhance its contextual relevance and translation to community settings. The study also has several limitations. Most participants were recruited from a single urban community care setting in the Pacific Northwest, which may limit generalizability to a broader AI/AN population. Also, validated survey instruments to assess knowledge and perceptions of smoking cessation resources and LCS specific to AI/AN were not available.

5. Conclusions

This study is among the first to examine the attitudes, barriers and facilitators to LCS with commercial tobacco cessation among urban AI/AN people. Results suggest there are substantial access-related barriers, and that discriminatory healthcare encounters and preference for culturally-centered healthcare may contribute to the low uptake of LCS through standard care models. However, there was general enthusiasm for interventions which provide education and resources that are

tailored, community-focused and provide support for barriers. These findings suggest a tailored navigation program may assist with immediate and personal barriers to care, but multi-level approaches including outreach, education and novel culturally-centered approaches are likely needed to improve awareness and uptake.

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CRediT authorship contribution statement

Ursula Tsosie: Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Nicolas Anderson:** Writing – review & editing, Project administration, Investigation, Formal analysis, Data curation. **Nicholas Woo:** Writing – review & editing, Investigation, Formal analysis. **Craig Dee:** Writing – review & editing, Methodology, Investigation. **Abigail Echo-Hawk:** Writing – review & editing, Resources, Project administration, Investigation. **Lanessa Baker:** Writing – review & editing, Resources, Project administration, Investigation. **Ann M. Rusk:** . **Wendy Barrington:** Writing – review & editing, Validation, Supervision, Methodology, Investigation. **Myra Parker:** Writing – review & editing, Validation, Supervision, Investigation, Conceptualization. **Matthew Triplette:** Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

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Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

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