Journal of Community Health (2020) 45:812–819
https://doi.org/10.1007/s10900-020-00797-w

ORIGINAL PAPER

# Baseline characteristics of American Indian smokeless tobacco users participating in two pilot cessation studies

**Charley S. Lewis[1,2,3] · Niaman Nazir[2,4] · Sean M. Daley[1,5,6] · Joseph Pacheco[1,2,4] · Ryan T. Goeckner[1,2] · Jason W. Hale[1,2,3] · Jordyn A. Gunville[1,2,4] · Fatima Rahman[2,4] · Won S. Choi[1,2,4] · Christine Makosky Daley[1,2,3,4,7]**

Published online: 11 April 2020


## Abstract

American Indians have higher rates of smokeless tobacco (SLT) use than other racial/ethnic groups in the US, yet no efficacious cessation program exists for them. Because tobacco is a sacred plant to many American Indians, it is imperative that a program respect the scared nature of tobacco while encouraging quitting recreational use. All Nations Snuff Out Smokeless (ANSOS) was designed to help American Indian SLT users quit recreational tobacco use while still using it for traditional purposes. We pilot tested the ANSOS 6-month group-based counseling program (N = 48) and a shortened version consisting of a one-time education session (N = 80). Here, we discuss the tobacco characteristics of participants at baseline in both studies. Participants across studies were more likely to be male (74.2%) and have at least a college education (65%). Participants in the one-time education sessions were younger (age 35 vs age 39) and used SLT fewer days per week (4.9 vs 5.7). Two-thirds of those in the full program reported that they often substitute SLT in locations where smoking is not allowed compared to 26%. Participants in the education sessions were more likely to report daily use of traditional tobacco (20% versus 0%). Results suggest that dual use of SLT and cigarettes needs to be addressed, as does the use of SLT to circumvent public smoking rules. The role of traditional tobacco and its relationship to lower SLT use also warrants further investigation.

**Keywords** American Indian · Smokeless tobacco · Pilot study · Intervention

## Introduction

Tobacco is a sacred plant with spiritual significance, used for praying and ceremonial activities in American Indian (AI) communities in the United States [1]. Although sacred tobacco still has traditional significance in AI communities today, recreational use of commercial tobacco has increased in the AI populations. The use of commercially manufactured tobacco (filled with harmful additives such as arsenic and formaldehyde) has increased and presents a pressing health issue for AI communities [2]. In the United States today, AI have the highest prevalence of tobacco use and related mortality across all racial/ethnic groups. In 2016, 37.9% of AI aged 12 or older (compared to 24.2% in Black or African American and 33.4% in multi-racial individuals) reported tobacco use in the past month. The prevalence rate for tobacco use among the adult AI population (31.8%), is more than three times that of non-Hispanic Asians (9.0%) and Hispanics (10.7%), and nearly double that of Whites (16.6%) and Blacks (16.5%) [3].

✉ Charley S. Lewis
clewis4@kumc.edu

1 American Indian Health Research & Education Alliance, Inc, Kansas City, KS, USA

2 Center for American Indian Community Health, University of Kansas Medical Center, Kansas City, KS, USA

3 Department of Family Medicine & Community Health, University of Kansas Medical Center, Kansas City, KS, USA

4 Department of Population Health, University of Kansas Medical Center, Kansas City, KS, USA

5 Center for American Indian Studies, Johnson County Community College, Overland Park, KS, USA

6 Department of Anthropology, Johnson County Community College, Overland Park, KS, USA

7 Indigenous Studies Program, University of Kansas, Lawrence, KS, USA

Smokeless tobacco (SLT), such as chewing tobacco or snuff, is particularly harmful to human health, causing diseases such as mouth, esophagus and neck cancers, nicotine poisoning in children, cerebrovascular diseases, and increase the risk for heart disease, stroke, and stillbirths when used during pregnancy ("Smokeless tobacco and some tobacco-specific *N*-nitrosamines," 2007; [4]. Lifetime SLT use among AI is as high as 26.6% in persons aged 12 or older, followed by Whites (20.7%) and individuals with more than one racial/ethnic group (17.5%). Past year use of SLT among AI (9.5%) is nearly twice that of the Whites and multiracial individuals (both 5.7%) [5]. In the AI population in Kansas, SLT use is as high as 10% among adults and 18% among college students [6].

Although tobacco has spiritual significance to many tribal populations, it has been shown that SLT use is higher among some tribes that historically have no spiritual significance to the plant. For example, among Alaska Natives, who historically have no traditional significance of tobacco, SLT use is significantly higher (17.7%) than among AI in the Southwestern United States (8.0%), where tobacco has traditional significance [7]. This is a complex issue that is not fully understood. Regardless, among AI, SLT use is particularly high among individuals with no post-secondary education, those living on a reservation, individuals younger than age 25, and among males [8, 7, 9].

In addition to high rates of tobacco use, AI populations also have the lowest rate for past-year quit attempts (52.1%) compared to other racial or ethnic groups, including Whites (53.3%), Hispanics (56.2%), and multiracial individuals (57.8%); AI are also among the lowest to receive a health professional's advice to quit (38.1% vs. 69.6% in multiracial individuals) [10]. This could be due to higher changeover in physicians that many AI experience or because many AI expect the quitting process to not be problematic so there is no need to seek professional quit advice [11]. Because smoking cessation rates are low among AI groups, it is likely that the rates are just as low among AI SLT users. Opportunities to receive tobacco cessation counseling or any tobacco cessation-related help are sparse and there is a lack of tobacco cessation programs that are suitable for heterogeneous AI populations [12, 13]. Furthermore, traditional tobacco uses and cultural differences make most tobacco cessation interventions limited in reach or show no efficacy for Native communities [12].

In the past, this research team successfully developed and tested for efficacy a culturally-tailored smoking cessation program for AI in the Southern and Northern Plains regions: All Nations Breath of Life (ANBL) [12]. However, currently there are not any studies to date that have attempted to test a culturally-tailored SLT cessation program for AI communities. Presented here are the baseline results from a culturally-tailored, multi-tribal smokeless tobacco cessation program, All Nations Snuff Out Smokeless (ANSOS), based on ANBL and designed to discourage recreational use of commercial SLT among AIs while allowing traditional tobacco for religious and spiritual purposes to continue. AI in local reservations, rural communities, and urban areas participated in focus groups and interviews leading up to the development of ANSOS. Formative research and development of the program are reported in a previous paper [14]. Here, the authors discuss the baseline characteristics of participants in two pilot studies for ANSOS in an effort to begin to better characterize the tobacco characteristics of AI SLT users.

## Methods

### Study design and participants

A community-based participatory research (CBPR) approach was used in the development of the ANSOS SLT cessation program which was based on the successful ANBL smoking cessation program. This approach includes tailoring the program to meet the needs of the communities and including community members in the development and implementation of the program. In order to better accommodate participants, the research team also developed a condensed shortened version of the ANSOS program that could be administered as a one-time education session. This one-time education session could be administered to participants who were still interested in quitting SLT but were less able to access the full program for a variety of reasons (e.g. transportation, availability of the program in their location, could not make the time, etc.) or those who were not interested in participating in the full 6-month program. The research team wanted to understand if any impact could be made on AI SLT users through participation in a one-time education session.

Participants were recruited from the Midwest and the Northern Plains regions, from reservation and rural communities, urban and suburban areas, and from two tribal colleges. Eligibility criteria for participation were (1) self-identification as American Indian or Alaska Native (No participants enrolled in either pilot reported being Alaska Native); (2) age 18 or older; and (3) use of SLT in the past 30 days. Participants were recruited beginning in February 2016; all follow-up to the 6-month endpoint was completed by September 2017.

During the intake process, after successfully completing the eligibility screener, participants were asked to complete a baseline survey consisting of questions related to demographics, SLT behaviors and use, quitting intentions, past use, cigarette smoking and other forms of tobacco use, behaviors and patterns of use, mental health and social support, discrimination, and diet and physical activity.

Participants provided informed consent and were compensated with a $20 gift card for completing the baseline survey and an additional $10 gift card if they provided a saliva sample for cotinine testing. All aspects of the study were approved and monitored by the University of Kansas Medical Center Institutional Review Board, as well as the respective Institutional Review Boards at the participating tribal colleges.

## Measures

### Demographic measures

Demographic questions collected information about participants' age, gender, education (elementary/grade school, some high school, high school graduate/GED, post-high school certification, some college, 2-year college graduate, 4-year college graduate, graduate degree, or never attended college), where the participant grew up (on a reservation, on tribal trust land, in a rural area, in a suburban area, in an urban area, or on a military base), children or no children, employment status (full-time, part-time, or not employed), and lastly, their participation in athletic activities.

### Smokeless tobacco use characteristics

To ascertain information about SLT use, participants were asked the age they started using SLT and the number of days per week they used SLT. Other SLT questions included the number of days a tin or pouch lasts and their preferred brand of SLT, as well as "How many people of your five closest friends use chewing tobacco?" (none, 1–2, 3–4, 5+) and "Not including yourself, does anyone in your home currently use chewing tobacco?" (yes/no). Lastly, participants were asked to complete three SLT dependence measures, including the Fagerström Tolerance Questionnaire for Smokeless Tobacco (FTQ-ST), the Severson Smokeless Tobacco Dependency Scale (SSTDS), and the Glover-Nilsson Smokeless Tobacco Behavior Questionnaire (GN-STGQ), which were previously compared by Ebbert et al. [15]. These three scales were used in an effort to determine which is best suited for AI populations. Further analysis to validate these scales in this population are planned.

### Smoking characteristics

To assess information about cigarette use, participants were asked the age at which they first smoked, if they had smoked at least 100 cigarettes in their lifetime, how often they currently smoke (not at all, some days, everyday day), and how soon after waking they smoked their first cigarette (within 5 min, 6–30 min, 31–60 min, after 60 min). Participants were also asked if they ever substituted chewing tobacco for smoking in places where smoking was not allowed (no/rarely, yes-sometimes, yes-often) to better understand dual use.

### Traditional tobacco

The following questions were asked related to traditional use of tobacco: "Have you ever used tobacco for ceremonial, prayer, or traditional purposes?" (yes/no), and "What type(s) of tobacco do you usually use for ceremonial, prayer, or traditional purposes?" (cigarettes, whole leaf commercial tobacco, non-tobacco plant mixture, home grown tobacco, pouch/packaged pipe tobacco).

### SLT motivation and confidence to quit, quitting history, and interest in cessation

To assess participant level of motivation and confidence to quit SLT, the following questions were asked, "On a scale of 1 (not motivated) to 10 (highly motivated), how motivated are you to quit smokeless tobacco?" and "On a scale of 1 (not confident) to 10 (highly confident), how confident are you to quit SLT?" Quitting history was assessed with the following question, "In the past year, how many times have you quit SLT for at least 24 h?" Lastly, participants' interest in quitting was accessed with the following question, "Are you seriously interested in quitting SLT?" (in the next 30 days, next 6 months, next year, not interested in quitting or in the future).

### Data analysis

One hundred twenty-eight participants from both pilot studies were included in these analyses. All data were live captured using Research Electronic Data Capture (REDCap), a secure web-based application designed to support data capture for research studies. In areas where an Internet connection was an issue, paper surveys were used to collect data and were later double entered for accuracy before data cleaning. Discrete variables are described with frequencies and percentages and means and standard deviations (SD) are used to describe continuous variables. Parametric tests were used for comparisons between pilot groups. Chi-square tests were used for comparisons of categorical variables and t-tests were used for comparisons of continuous variables. All analyses were performed using SAS 9.3 (Copyright 2002–2010 by SAS Institute Inc., Cary, NC).

## Results

Table 1 includes the demographic distribution of the 128 AI SLT users who participated in the two pilot studies (N = 48 for the full program; N = 80 for the one-time

education session). Approximately 75% of participants across studies were male; the mean age of participants who enrolled in the full program (age 39) was slightly higher than that of those in the one-time education session (age 35). Also, those participants enrolled in the full program were significantly more likely to be employed compared to those in the one-time education session.

SLT use characteristics and quitting interest of the participants in both pilot studies are described in Table 2. Though the mean number of days per week using SLT was higher for participants in the full program compared to those in the one-time education session, dependence scores were largely similar across groups. The only difference in dependence scores was for the GN-STGQ, for which participants in the one-time education program had a higher mean score compared to participants in the full program. Other SLT characteristics were similar across groups. Although not statistically not significant, it is worth mentioning that participants in the one-time education session reported more quit attempts in the past year compared to those in the full program, 65% vs 50%. They also reported a higher interest in quitting in the next month (38% vs 26%) than those in the full program.

For those participants who reported also being smokers (N = 50), the mean age at which they first smoked was similar across studies (about age 13). About 75% of participants in each of the pilot studies had smoked at least 100 cigarettes in their lifetimes. Other smoking characteristics were also similar across pilot studies (see Table 3). A difference between studies that approached significance (p = 0.0576) was that over 60% of those in the full program reported that they often substituted chewing tobacco in locations where smoking was not allowed compared to 26% of participants in the one-time education session.

Approximately 70% of participants in the one-time education session reported use of tobacco for traditional purposes compared to only 60% of those in the full program (not a significant difference, p = 0.2481). Figure 1 depicts the frequency of traditional tobacco use among participants in each pilot study. Though the difference in frequency was not significant (p = 0.0699), the data trend toward participants in the one-time education sessions who use traditional tobacco doing so more frequently. Almost 20% of participants in the

**Table 1** Demographic characteristics of participants by program type (N = 128)

| Demographic variables | N (%) full program | N (%) education session | p-value | N (%) total |
|---|---|---|---|---|
| Age (mean, SD) | 39.46 (12.23) | 34.64 (12.58) | 0.0243[a]* | 36.45 (12.62) |
| Gender | | | 0.1589[b] | |
| Female | 9 (18.75) | 24 (30.00) | | 33 (25.78) |
| Male | 39 (81.25) | 56 (70.00) | | 95 (74.22) |
| Education | | | 0.4523[b] | |
| High school or less | 18 (39.13) | 26 (32.50) | | 44 (34.92) |
| College+ | 28 (60.87) | 54 (67.50) | | 82 (65.08) |
| Where did you grow up? | | | 0.6991e[c] | |
| On a reservation/tribal trust land | 29 (60.42) | 54 (69.23) | | 83 (65.87) |
| In a rural area | 6 (12.50) | 6 (7.69) | | 12 (9.52) |
| Sub(urban)/military | 9 (18.75) | 12 (15.38) | | 21 (16.67) |
| Multiple places | 4 (8.33) | 6 (7.69) | | 10 (7.94) |
| Do you have children? | | | 0.2849[b] | |
| No | 13 (27.08) | 29 (36.25) | | 42 (32.81) |
| Yes | 35 (72.92) | 51 (63.75) | | 86 (67.19) |
| Are you currently employed? | | | 0.0007[b] | |
| No | 5 (10.87) | 31 (39.24) | | 36 (28.80) |
| Yes | 41 (89.13) | 48 (60.76) | | 89 (71.20) |
| Do you participate in athletic activities? | | | 0.4804[b] | |
| No | 26 (59.09) | 42 (52.50) | | 68 (54.84) |
| Yes | 18 (40.91) | 38 (47.50) | | 56 (45.16) |

Numbers do not always add up to the total N of the study due to missing data

[a]Wilcoxon test

[b]Chi-square

[c]Fisher's exact test

*p-value calculated using median

**Table 2** SLT use and quitting characteristics by program type (N = 128)

| SLT characteristics | N (%) full program | N (%) education session | p-value | N (%) total |
|---|---|---|---|---|
| Age started using (mean, SD) | 16.79 (5.92) | 15.64 (6.14) | 0.1012[a]* | 16.08 (6.06) |
| Days used in a week (mean, SD) | 5.70 (1.71) | 4.86 (2.21) | 0.0429[a]* | 5.17 (2.07) |
| Days a tin or pouch lasts (mean, SD) | 3.65 (2.10) | 4.31 (2.58) | 0.2614[a]* | 4.06 (2.42) |
| Preferred brand of chewing tobacco | | | 0.6970[b] | |
| Copenhagen | 16 (33.33) | 27 (36.00) | | 43 (34.96) |
| Skoal | 12 (25.00) | 18 (24.00) | | 30 (24.39) |
| Grizzly | 8 (16.67) | 17 (22.67) | | 25 (20.33) |
| Other brands | 12 (25.00) | 13 (17.33) | | 25 (20.33) |
| FTQ-ST (mean, SD) | 10.06 (3.23) | 9.39 (3.24) | 0.2153[a]* | 9.64 (3.24) |
| SSTDS (mean, SD) | 7.79 (3.41) | 7.03 (4.49) | 0.2581[a]* | 7.31 (4.12) |
| GN-STBQ (mean, SD) | 15.13 (6.45) | 17.06 (7.17) | 0.0789[a]* | 16.34 (6.95) |
| How many of your five closest friends use chewing tobacco? | | | 0.9517[b] | |
| None | 6 (12.50) | 9 (11.25) | | 15 (11.72) |
| 1–2 | 20 (41.67) | 33 (41.25) | | 53 (41.41) |
| 3–4 | 10 (20.83) | 20 (25.00) | | 30 (23.44) |
| 5+ | 12 (25.00) | 18 (22.50) | | 30 (23.44) |
| Anyone in home who currently use chewing tobacco? | | | 0.1613[b] | |
| No | 40 (83.33) | 58 (72.50) | | 98 (76.56) |
| Yes | 8 (16.67) | 22 (27.50) | | 30 (23.44) |
| SLT quitting interest | | | | |
| Motivation to quit (mean, SD) | 6.58 (2.43) | 6.11 (2.87) | 0.3784[a]* | 6.29 (2.72) |
| Confidence to quit (mean, SD) | 6.67 (2.65) | 6.73 (3.19) | 0.7936[a]* | 6.70 (2.99) |
| Number of quit attempts in past year | | | 0.4202e[c] | |
| None | 23 (50.00) | 28 (35.44) | | 51 (40.80) |
| 1–2 | 14 (30.43) | 29 (36.71) | | 43 (34.40) |
| 3–9 | 8 (17.39) | 20 (25.32) | | 28 (22.40) |
| 10+ | 1 (2.17) | 2 (2.53) | | 3 (2.40) |
| Interest in quitting | | | 0.0721[b] | |
| Next 30 days | 11 (25.58) | 27 (37.50) | | 38 (33.04) |
| Next 6 months | 11 (25.58) | 6 (8.33) | | 17 (14.78) |
| Next year | 9 (20.93) | 14 (19.44) | | 23 (20.00) |
| No/in future/not sure | 12 (27.91) | 25 (34.72) | | 37 (32.17) |

Numbers do not always add up to the total N of the study due to missing data

*p-value calculated using median

[a]Wilcoxon test

[b]Chi-square

[c]Fisher's exact test

one-time education session reported daily use of traditional tobacco while no participants in the full program reported daily use. More participants in the full program reported traditional tobacco use a few times a year or less than those in the one-time education session (59% vs 49%).

## Discussion

Tobacco use continues to be a problem among AI, even though decreases in prevalence of use can be seen across

**Table 3** Smoking characteristics by program type (N = 128)

| Smoking characteristics | N (%) full program | N (%) education session | p-value | N (%) total |
|---|---|---|---|---|
| Age first smoked (mean, SD) | 13.69 (3.64) | 13.30 (3.25) | 0.6549[a]* | 13.45 (3.39) |
| Smoked at least 100 cigarettes in your entire life? | | | 0.8903[b] | |
| No | 10 (25.64) | 18 (26.87) | | 28 (26.42) |
| Yes | 29 (74.36) | 49 (73.13) | | 78 (73.58) |
| Current smoker | | | 0.0099[b] | |
| No | 27 (69.23) | 29 (43.28) | | 56 (53.33) |
| Yes | 12 (30.77) | 38 (56.72) | | 49 (46.67) |
| Substitute chewing tobacco when smoking is not allowed | | | 0.0576e[c] | |
| No/rarely | 1 (8.33) | 10 (26.32) | | 11 (20.00) |
| Yes, sometimes | 3 (25.00) | 18 (47.37) | | 21 (42.00) |
| Yes, often | 8 (66.67) | 10 (26.32) | | 18 (36.00) |

Numbers do not always add up to the total N of the study due to missing data

[a]Wilcoxon test

[b]Chi-square

[c]Fisher's exact test

*p-value calculated using median

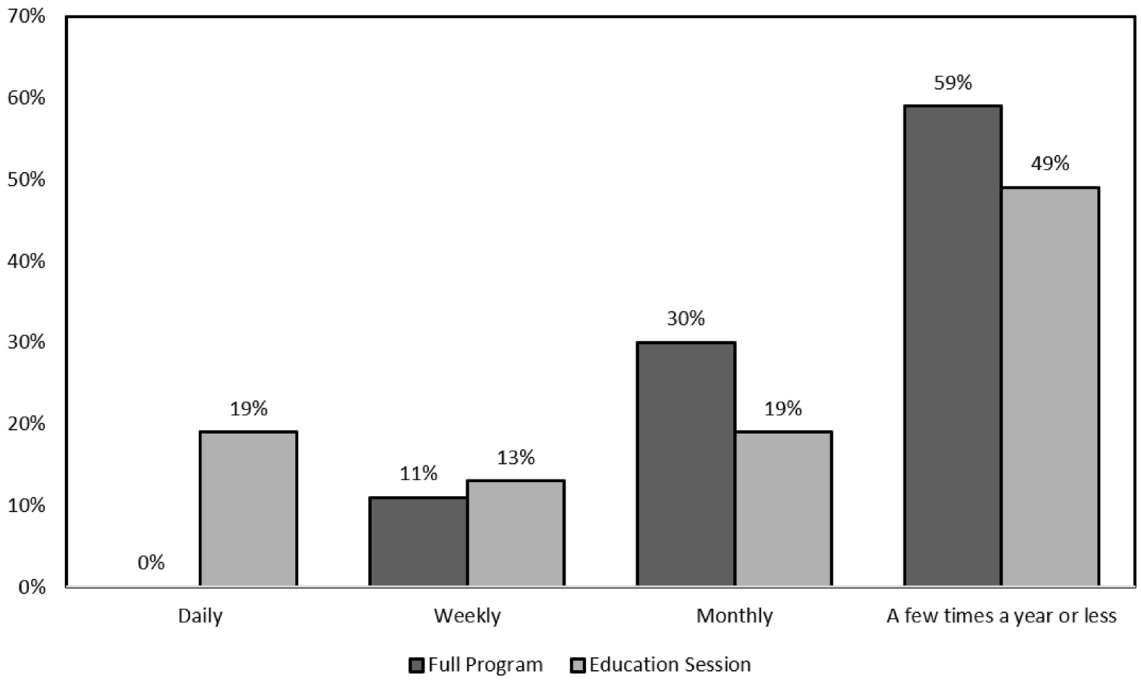


**Fig. 1** Frequency of traditional tobacco use

all racial and ethnic groups. Decreases in prevalence among AI have lagged behind other populations. Based on this research team's successful work in smoking cessation among AI, the ANSOS program, including versions of the program discussed here, represent their first attempt to create and pilot test a culturally tailored SLT cessation program for AI.

The baseline findings presented here show similarities and differences in tobacco characteristics between AI and other populations. Across both of these pilot studies, there were similarities in the number of friends who also use SLT and the number of quit attempts when compared to other recent behavioral SLT interventions [16, 17], showing that AI are similar to other racial or ethnic groups in these

aspects of social behavior. However, participants in these pilot studies reported SLT pouches/tins lasting longer than those from other studies and substantially more participants in these pilots were current smokers compared to other interventions [16, 17]. Additional, larger studies are needed to further characterize tobacco characteristics in this unique population. These differences could be the key to helping AI SLT users quit successfully.

Participants in these two studies also differed from each other in key ways. Participants who opted for the one-time education program were younger and more likely to be unemployed (partially due to status as a student) when compared to those participants in the full program. In terms of SLT use, those in the one-time education program had a lower mean number of days per week they used SLT compared to those in the full program type and reported a higher interest in quitting in the next 30 days compared to those in the full program. These findings suggest that younger SLT users are more likely to be light SLT users when compared to older SLT users, and that they are interested in quitting sooner, while preferring a shorter, more condensed SLT cessation program. It is possible that these individuals do not believe that they need a longer program because they use less SLT or have not been using it at as long and, therefore, have what they believe is less of a dependence on it. They also prefer the program where they receive everything promptly not having to wait to receive other program components later on, which may be generational. Younger individuals are more used to immediate results and a faster-paced lifestyle due to things like the Internet and faster transportation and delivery services. It is also possible that they simply do not feel comfortable committing to a longer program. Process data from the studies may help determine the reasons for these differences. It is possible that multiple programs may be needed to reach all AI SLT users who wish to quit.

There was an approaching significant difference between studies for individuals who substitute SLT for smoking when smoking was not allowed. These findings continue to suggest the notion that participants in the full program are heavier tobacco users in general when compared to those in the one-time education session. It is possible that their heavier levels of dependence made them more likely to need to have nicotine at all times and more immediately and are, thus, less able to abstain for periods of time when they are in locations where smoking is not allowed. Many of these individuals began smoking at an earlier age than using SLT; they may have begun to use SLT as a substitute when smoking was not allowed. This is an unintended consequence of environmental tobacco laws. Changes in these laws may be having negative impacts on SLT uptake in AI communities. More research is needed in this area, particularly qualitative research for a greater understanding of uptake of polytobacco use and the reasons behind it.

Though many tobacco characteristics across pilot study participants were similar, traditional use of tobacco varied. Individuals in the one-time education program reported a higher frequency of daily traditional tobacco use, while participants in the full program reported a higher frequency of using traditional tobacco just a few times a year or less. Though the results are not statistically significant, the trend in the data suggests there may be a relationship between more frequent traditional use and less dependence on SLT. Previous work by this team shows that among AI smokers, there is a greater likelihood of remaining quit for 12 months among those who use traditional tobacco, specifically those who use traditional tobacco but do not smoke it (e.g. use it as an offering or burn it but not smoke it, among other non-smoking uses) [18]. The relationship is likely complex and different between smokers and SLT users. Therefore, the impact of traditional tobacco use should be investigated further to examine its relationship with lower SLT use, as well as with smoking and polytobacco use.

In each of these pilot studies there were higher percentages of females (19%—full program and 30%—one-education) compared to other recent interventions in the U.S. described in the literature, which tend to be primarily among men. This is likely due to the significantly higher prevalence of SLT use among AI females compared to non-AI females (2.3% vs 0.4%) [8]. Differences in SLT use and quitting behaviors must be examined by biological sex as data become available. These data and results from these two pilot studies will represent a beginning to understand and address this significantly higher prevalence of SLT use among AI women.

Limitations for these pilot studies include the low sample size in both studies and limited geographic locations where recruitment occurred. However, these limitations are small in comparison to the importance of these results which provide a much-needed look at the characteristics of AI SLT users, which are very limited in the literature. These studies are an important initial step to addressing SLT use among AI. As final outcomes are compiled, the next steps are to start full-scale efficacy testing of these programs to ultimately decrease the disparities in SLT use among AI.

**Acknowledgements** This work was supported by funding from the National Institute on Minority Health and Health Disparities (R01MD007800; PI: CM Daley). The authors would like to thank the members of the Center for American Indian Community Health for their work on this project. We would also like to thank the communities and tribal colleges who participated in this study.

**Funding** This study was funded by the National Institute on Minority Health and Health Disparities (R01MD007800; PI: CM Daley).

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical Approval** This study was approved by the KUMC Human Subjects Committee, and appropriate tribal college and tribal review boards.

## References


1. Daley, C. M., James, A. S., Barnoskie, R. S., Segraves, M., Schupbach, R., & Choi, W. S. (2006). "Tobacco Has a Purpose, Not Just a Past": Feasibility of developing a culturally appropriate smoking cessation program for a pan-tribal native population. *Medical Anthropology Quarterly, 20*(4), 421–440.
2. Beauvais, F., Thurman, P. J., Burnside, M., & Plested, B. (2007). Prevalence of American Indian adolescent tobacco use: 1993–2004. *Substance Use & Misuse, 42*(4), 591–601.
3. Jamal, A., Homa, D. M., O'Connor, E., Babb, S. D., Caraballo, R. S., Singh, T., et al. (2015). Current cigarette smoking among adults—United States, 2005–2014. *MMWR-Morbidity and Mortality Weekly Report, 64*(44), 1233–1240.
4. Timberlake, D. S., Nikitin, D., Johnson, N. J., & Altekruse, S. F. (2017). A longitudinal study of smokeless tobacco use and mortality in the United States. *International Journal of Cancer, 141*(2), 264–270. https://doi.org/10.1002/ijc.30736.
5. Center for Behavioral Health Statistics and Quality. (2018). *2017 National Survey on Drug Use and Health: Detailed tables*. Rockville, MD: Substance Abuse and Mental Health Services Administration.
6. Choi, W. S., Cantrell, J., Comiford, A., Dhatiwat, N., D'Silva, J., Hayward, G., & Henderson, J. A. (2018). *Engaging indigenous communities in tobacco control research*. Paper presented at the Nicotine & Tobacco Research, Baltimore, MD.
7. Redwood, D., Lanier, A. P., Renner, C., Smith, J., Tom-Orme, L., & Slattery, M. L. (2010). Differences in cigarette and smokeless tobacco use among American Indian and Alaska Native people living in Alaska and the Southwest United States. *Nicotine & Tobacco Research, 12*(7), 791–796.
8. Odani, S., Armour, B. S., Graffunder, C. M., Garrett, B. E., & Agaku, I. T. (2017). Prevalence and disparities in tobacco product use among American Indians/Alaska Natives—United States, 2010–2015. *MMWR-Morbidity and Mortality Weekly Report, 66*(50), 1374.
9. Sugarman, J. R., Warren, C. W., Oge, L., & Helgerson, S. D. (1992). Using the behavioral risk factor surveillance system to monitor year 2000 objectives among American Indians. *Public Health Reports, 107*(4), 449–456.
10. Babb, S. (2017). Quitting smoking among adults—United States, 2000–2015. *MMWR-Morbidity and Mortality Weekly Report, 65*, 1457–1464.
11. Hendricks, P. S., Westmaas, J. L., Ta Park, V. M., Thorne, C. B., Wood, S. B., Baker, M. R., et al. (2014). Smoking abstinence-related expectancies among American Indians, African Americans, and women: potential mechanisms of tobacco-related disparities. *Psychology of Addictive Behaviors, 28*(1), 193–205. https://doi.org/10.1037/a0031938.
12. Choi, W. S., Beebe, L. A., Nazir, N., Kaur, B., Hopkins, M., Talawyma, M., et al. (2016). All nations breath of life: A randomized trial of smoking cessation for American Indians. *American Journal of Preventive Medicine, 51*(5), 743–751.
13. Moghaddam, J. F., Dickerson, D. L., Yoon, G., & Westermeyer, J. (2014). Nicotine dependence and psychiatric and substance use disorder comorbidities among American Indians/Alaska Natives: Findings from the National Epidemiologic Survey on Alcohol and related conditions. *Drug and Alcohol Dependence, 144*, 127–133.
14. Rollins, K., Lewis, C., Smith, T. E., Goeckner, R., Hale, J., Nazir, N., et al. (2018). Development of a culturally appropriate smokeless tobacco cessation program for American Indians. *Journal of Health Disparities Research and Practice, 11*(1), 4.
15. Ebbert, J. O., Severson, H. H., Danaher, B. G., Schroeder, D. R., & Glover, E. D. (2012). A comparison of three smokeless tobacco dependence measures. *Addictive Behaviors, 37*(11), 1271–1277. https://doi.org/10.1016/j.addbeh.2012.06.011.
16. Danaher, B. G., Severson, H. H., Andrews, J. A., Tyler, M. S., Lichtenstein, E., Woolley, T. G., et al. (2013). Randomized controlled trial of MyLastDip: A web-based smokeless tobacco cessation program for chewers ages 14–25. *Nicotine & Tobacco Research, 15*(9), 1502–1510. https://doi.org/10.1093/ntr/ntt006.
17. Danaher, B. G., Severson, H. H., Zhu, S. H., Andrews, J. A., Cummins, S. E., Lichtenstein, E., et al. (2015). Randomized controlled trial of the combined effects of web and quitline interventions for smokeless tobacco cessation. *Internet interventions, 2*(2), 143–151. https://doi.org/10.1016/j.invent.2015.02.005.
18. Daley, C. M., Faseru, B., Nazir, N., Solomon, C., Greiner, K. A., Ahluwalia, J. S., et al. (2011). Influence of traditional tobacco use on smoking cessation among American Indians. *Addiction, 106*(5), 1003–1009. https://doi.org/10.1111/j.1360-0443.2011.03391.x.