

A cross-sectional study of attitudes and behaviors of snuff use and cessation among people with and without HIV in South Africa

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ABSTRACT

BACKGROUND: Despite a high (48%) prevalence of snuff use among women with HIV in South Africa, little is known of the attitudes and behaviors of use, strategies for cessation, and potential health risks.

METHODS: In a cross-sectional study, a questionnaire was administered to adults (≥18 years) with (HIV+) and without HIV (HIV-) who self-reported current snuff use to collect information on demographics, snuff use and cessation attempts, preferred strategies for cessation, other substance use, history of respiratory illness, and mental health.

RESULTS: 150 (74 HIV+, 76 HIV-) participants were enrolled; 115 (77%) were daily snuff users, 6 (4%) were current smokers, and 17 (11%) former smokers. Top reasons for current snuff use included improving health (n = 48, 32%), reducing stress (n = 26, 16%), and “being a habit” (n = 38, 25%). Participants believed snuff use to have mostly positive (n = 68, 46%) or no (n = 54, 36%) health impacts, and 57 (38%) participants believed snuff cures headaches. 103 (69%) participants reported a previous quit attempt, and 110 (73%) indicated high interest in quitting snuff. Although 105 (70%) participants indicated that advice from a healthcare provider would aid them in quitting snuff, only 30 (20%) reported ever receiving that advice. A majority of participants (n = 141, 94%) suffer from moderate to high levels of perceived stress, and overall few differences were seen by HIV status.

CONCLUSIONS: Education on negative impacts of snuff, advice to quit from healthcare providers, and nicotine replacement therapy should be considered in the development of a snuff cessation program.

KEYWORDS: tobacco, snuff, smokeless tobacco, HIV

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Introduction

Worldwide, there are an estimated 352 million smokeless tobacco (SLT) users (67% men, 33% women),¹ resulting in over 650,000 deaths annually, or about 9% of all deaths caused by tobacco use.¹ The majority of the burden of SLT lies in low and middle income countries, where, similar to smoking, its use has been associated with hypertension, metabolic syndrome, and accelerated atherosclerosis.² Mortality associated with SLT use is largely due to upper aerodigestive tract cancer, stomach

cancer, cervical cancer, myocardial infarction, ischemic heart disease (IHD), circulatory disease, coronary heart disease (CHD), and stroke.^{1,3–6} In South Africa, SLT use has also been associated with respiratory conditions, including chronic bronchitis and tuberculosis (TB).^{7,8}

The most common form of SLT in South Africa is snuff, a dry form of tobacco taken nasally.⁷ Snuff can be either homemade or commercially produced; it generally consists of ground tobacco leaves, ash from burnt aloe leaves, tobacco



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stalks, and morula fruits.⁹ In the general South African population, the prevalence of snuff use among women is 13.2%, which is higher than the prevalence of cigarette smoking among women, however less than 1% of men use snuff.¹⁰ In Matlosana, South Africa, 48% of nonsmoking women living with HIV reported using snuff, which is much higher than the prevalence in the general population.⁷ In general, women of lower socioeconomic status and lower education levels have a higher prevalence of snuff use,⁷ and in Africa, the prevalence of SLT use is approximately 34% higher among people with HIV (PWH) as compared to those without HIV.^{11,12} Tobacco use among PWH is of particular concern as it increases the risk of disease, including bacterial pneumonia,¹³ chronic obstructive pulmonary disease,¹⁴ cardiovascular disease,¹⁵ TB,¹⁶ and cancer,¹⁷ for which PWH are already susceptible. Further, tobacco smoking among PWH may increase immune activation and exhaustion when compared to non-smoking PWH and HIV-negative individuals, which may increase the risk of developing infections,¹⁸ and daily tobacco use may decrease the immune and virological response to ART.¹⁹ Surveillance for malignancies may also be lower among PWH as compared to the general population, and human papilloma virus (HPV) infection together with snuff use may put PWH at higher risk of nasopharyngeal cancer.²⁰ Importantly, few tobacco cessation strategies have been developed and tested for PWH, especially in low-resourced settings. PWH are also less likely to quit tobacco use as compared to people without HIV.^{21,22}

Despite the known health risks and high prevalence of use, little is known about snuff use knowledge, beliefs, and behavior among people in South Africa beyond the current prevalence estimates. Further, there are limited SLT cessation resources in this region. With an estimated 7.5 million PWH²³ and a high prevalence of SLT use, a better understanding of snuff use in South Africa is necessary to inform cessation efforts and whether strategies may need to be tailored specifically for PWH. The purpose of this study is to understand snuff use behavior among people in South Africa who are both HIV-positive and HIV-negative to help inform the development of a snuff cessation interventions.

Methods

Ethics approvals were obtained from the University of the Witwatersrand Human Research Ethics Committee (protocol 190806) and the Colorado State University Institutional Review Board (protocol 19-9246H). Written informed consent was obtained from all participants prior to enrollment.

Between October and December 2019, a cross-sectional survey was administered in five public clinics in Matlosana, South Africa to determine patterns and characteristics of snuff use among PWH and people without HIV who use snuff. The clinics selected for inclusion were chosen given their high-

volume of patients and openness to prior research projects; they are also representative of the HIV epidemic in the district. Research staff recruited patients in the waiting rooms of the selected clinics and referred those interested to the study. To be eligible for enrollment, participants had to be aged 18 years or older and be self-reported current snuff users.

The administered survey included questions to capture participant demographics, personal substance use history, snuff use characteristics, interest in quitting snuff, history of respiratory illness, and mental health. Participants self-reported demographics, snuff use history, and HIV status. Nicotine dependence was measured with the Fagerstrom Test²⁴ and deprivation with the Minnesota Tobacco Withdrawal Scale.²⁵ To capture beliefs around snuff use, the survey was adapted from the Normative Beliefs about Smoking scale.²⁶ The Alcohol Use Disorders Identification Test (AUDIT) was included to determine levels of alcohol dependence.²⁷ Mental health questions were extracted from the 10-item Perceived Stress Scale (PSS),²⁸ the Daily Discrimination Scale from the 20-item Perceived Discrimination Scale,²⁹ and the Social Support Scale.³⁰ For those who self-reported being HIV seropositive, the Adjustment to HIV scale³¹ was administered. Surveys were available in Setswana, Setsotho, and Xhosa, the languages most used in this region, based on the participant's language preference.

Statistical analysis

A convenience sample of 150 participants was chosen due to logistic and financial feasibility. Frequency and percent of responses were calculated for categorical measures and the mean and standard deviation or median and interquartile range (IQR) were calculated for continuous measures. Categorical variables of interest were compared by HIV status using Chi-squared (χ^2) and Fisher's exact test, as appropriate. All continuous variables were measured for normality using the Shapiro Wilk test. Nonparametric continuous data were compared by HIV status using the Wilcoxon rank sum test. Data were analyzed using SAS (Version 9.4).

Results

A total of 150 participants were enrolled, of which 74 (49%) self-reported as having HIV. All (100%) participants identified as Black, 142 (95%) were female, and 71 (47%) were over 40 years of age (Table 1). There was no difference in age ($P = .18$) or gender ($P = .16$) by HIV status. PWH, as compared to those without HIV, were more likely to have less than a high school education [$n = 53$ (72%) and $n = 44$ (43%), respectively], lower household income [$n = 59$ (80%) and $n = 43$ (57%), respectively], be unemployed [$n = 44$ (61%) and $n = 18$ (24%), respectively], and report not owning a mobile phone [$n = 15$ (20%) and $n = 6$ (8%), respectively]. Most participants

Table 1. Sociodemographic characteristics for 150 adults who use snuff in the Matlosana sub-district of South Africa, by HIV status.

	TOTAL (N = 150)	HIV- (N = 76)	HIV+ (N = 74)	P-VALUE
Age, n (%)				
<40	79 (53)	46 (61)	33 (45)	.18
40-49	41 (27)	16 (21)	25 (34)	
50-59	24 (16)	12 (16)	12 (16)	
60+	6 (4)	2 (3)	4 (5)	
Gender, n (%)				
Female	142 (95)	74 (97)	68 (92)	.16
Male	8 (5)	2 (3)	6 (8)	
Highest level of school completed, n (%)				
< High school	86 (57)	33 (43)	53 (72)	.0005
≥ High school	64 (43)	43 (57)	21 (28)	
Employment status, n (%)				
Employed	86 (58)	58 (76)	28 (39)	<.0001
Unemployed	62 (42)	18 (24)	44 (61)	
Total family income per month, n (%)				
≥5000	48 (32)	33 (43)	15 (20)	.003
<5000	102 (68)	43 (57)	59 (80)	
Disability grants, n (%)				
No	144 (96)	72 (95)	72 (97)	.68
Yes	6 (4)	4 (5)	2 (3)	
Current living situation, n (%)				
House/Flat	135 (90)	72 (95)	63 (85)	.60
Shack	15 (10)	4 (5)	11 (15)	
People per room, median (IQR)	1.17 (.75, 1.50)	1.13 (.73, 1.55)	1.17 (.75, 1.50)	.86
Own a mobile phone, n (%)				
No	21 (14)	6 (8)	15 (20)	.03
Yes	129 (86)	70 (92)	59 (80)	
Substance use				
Smoking History, n (%)				
Current	6 (4)	1 (1)	5 (7)	.09
Former	17 (11)	6 (8)	11 (15)	
Never	127 (85)	69 (91)	58 (78)	
Alcohol use, n (%)				
None	49 (33)	25 (33)	24 (32)	.09
Low-risk consumption	48 (32)	18 (24)	30 (41)	
Harmful consumption	37 (25)	22 (29)	15 (20)	
Dependence	16 (11)	11 (15)	5 (7)	
Recreational marijuana use, n (%)				
Current	5 (3)	2 (3)	3 (4)	.90
Former	5 (3)	3 (4)	2 (3)	
Never	140 (93)	71 (93)	69 (93)	

had no history of smoking (n = 127, 85%) and had never used recreational marijuana (n = 140, 93%), and many believed that snuff use was less harmful than cigarette use for their health (n = 101, 67%). Alcohol misuse was moderately prevalent among participants, with 16 (11%) reporting alcohol dependence, 48 (25%) reporting harmful consumption, and the remaining reporting either low-risk or no consumption. PWH were less likely to report a history of never smoking (n = 58,

78%) than people without HIV (n = 69, 91%), and also less likely to report harmful alcohol consumption [n = 15 (20%) and n = 22 (29%), respectively], but no difference was seen by HIV infection status for marijuana use (P = .90).

Among all participants, 115 (77%) used snuff daily, nearly all (n = 145, 97%) used dry nasal snuff, and snuff was primarily store-bought (n = 144, 97%) as compared to homemade (n = 4, 3%) (Table 2). The median age of snuff use initiation was

25 years (IQR: 17, 32); reasons most frequently reported for first starting snuff use included peer pressure ($n = 19$, 13%), curiosity ($n = 19$, 13%), influence from family members ($n = 16$, 11%), and “other reasons” ($n = 88$, 59%). When participants were asked to specify these other reasons, 40 (45%) specified reasons related to stress. Reasons most frequently reported for maintaining current snuff use included to improve health ($n = 48$, 32%), because it was a habit ($n = 38$, 25%), and “other reasons” ($n = 39$, 26%). When asked to specify these other reasons, 26 (67%) participants reported using snuff to reduce stress and 8 (21%) for treating headaches. Among all participants, 72 (48%) use snuff within 5 minutes after waking in the morning, and there were moderate levels of tobacco dependence (median 5.5, IQR: 4, 8) and low levels of snuff deprivation (median 1.9, IQR: 1.4, 2.6). Additionally, 68 (46%) believed snuff had positive health impacts, 54 (36%) believed there were no health impacts, and 27 (18%) believed snuff had negative health impacts. The most reported perceived positive health impact was that it cures headaches ($n = 57$, 38%), followed by reducing stress ($n = 16$, 10%). The largest perceived negative health impacts were causing dizziness ($n = 8$, 5%), sinus blockages ($n = 6$, 4%), and general sinus problems ($n = 6$, 4%). Among PWH, 58 (78%) indicated they thought that snuff had no impact on HIV treatment and 16 (22%) that they did not know. Overall, 106 (71%) believe snuff use is very acceptable.

Most participants were interested in quitting snuff; 110 (73%) were interested, 16 (11%) were somewhat interested, and 24 (16%) were not interested in quitting (Table 2). Additionally, 103 (69%) participants had previously tried to quit snuff. Among those who tried to quit, most tried quitting cold turkey ($n = 60$, 40%) or by cutting down ($n = 33$, 22%). Their biggest reasons for trying to quit included health concerns ($n = 55$, 37%), cost concerns ($n = 16$, 11%), and “other reasons” ($n = 29$, 19%). No participants indicated trying to quit due to advice from a healthcare professional. Preferred methods to aid in quitting included healthcare advice ($n = 105$, 70%), peer support groups ($n = 61$, 41%), telephone counseling ($n = 28$, 19%), prescription medication ($n = 26$, 17%), and text message support ($n = 24$, 16%). Although health care advice was the most preferred method for cessation assistance, only 30 (20%) participants reported ever receiving a recommendation to quit snuff from a healthcare provider. PWH reported wanting to discuss snuff with their health care provider ($n = 63$, 85%) more frequently than participants without HIV ($n = 53$, 70%) ($P = .02$).

Among all participants, 20 (13%) likely suffered from a major depressive disorder, 19 (13%) likely suffered from a generalized anxiety disorder, and 141 (94%) suffered from moderate or high levels of perceived stress (Table 3). At least 69 (46%) participants sometimes or often experienced at least one form of perceived daily discrimination, with a mean (SD) score of 1.8 (.7). Among all participants, there were high levels of overall social support (median: 4.0, IQR: 3.7, 4.3). When asked about history of respiratory illness, 11 (7%) participants likely suffered from asthma, 28 (19%) likely suffered from chronic bronchitis,

54 (36%) likely suffered from allergic rhinitis, 20 (13%) likely suffered from chronic rhinitis, and 80 (53%) likely suffered from sleep-related problems. While not statistically significant, PWH tended to report a higher prevalence of these conditions, with the exception of asthma, and were significantly more likely to have ever been diagnosed with TB than participants without HIV ($P < .0001$).

Discussion

To our knowledge, this study is the first of its kind to quantitatively evaluate the patterns and behaviors of snuff use among individuals with and without HIV in South Africa or the region. It was found that most people are daily users of dry nasal snuff and initiated use as young adults. Moderate levels of dependence were observed, and symptoms of withdrawal, primarily headaches, were common. It was also found that snuff users often suffer from sleep-related health issues, allergic rhinitis, and chronic bronchitis which may be related to their chronic snuff use. Regardless of HIV status, participants self-reported moderate to high levels of stress and nearly half reported perceived daily discrimination due to race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristics. Stress was listed as a main reason for both initiating and maintaining snuff use. In addition to stress, some participants were found to likely suffer from major depressive disorder and generalized anxiety disorder.

Previous qualitative research has found that throughout South Africa, but especially in more rural regions, snuff is used for traditional and ceremonial purposes, such as divination, communicating with ancestors, engaging in important activities, and during marriage ceremonies.^{9,32} Some also believe it has medicinal and psychosocial value.^{9,32} It is used as a cure for several ailments including, but not limited to, headaches, nose bleeds, TB, dizziness, constipation, and insomnia, as well as an energy booster, mood stabilizer, and anger/stress reducer.^{9,32} While some South Africans acknowledge that there are negative health outcomes associated with snuff use, the general perception is that the benefits outweigh the drawbacks.⁹ There was also a lack of understanding of the true health effects of snuff use; nearly half of all participants believed snuff use has positive health impacts. These perceived positive health impacts included curing headaches, reducing stress, and curing dizziness, which are likely all attributed to withdrawal. Despite these positive health beliefs, most participants had previously attempted to quit, and their primary motivation to quit was due to health concerns over snuff use. These health concerns included cancer, dizziness, poor overall health, blood circulation issues, and mouth sores. In general, education on the health effects of snuff use is needed.

Most participants, regardless of HIV status, were interested in quitting snuff. When asked about strategies to support snuff cessation, the interventions most preferred were advice from a

Table 2. Snuff use characteristics for 150 adults in the Matlosana sub-district of South Africa, by HIV status.

	TOTAL (N = 150)	HIV-(N = 76)	HIV+ (N = 74)	P-VALUE
Daily snuff use, n (%)	115 (77)	56 (74)	59 (80)	.38
Uses per day (daily users), median (IQR)	4 (3, 6)	3.5 (2, 5.5)	4 (3, 6)	.31
Age of initiation (years), median (IQR)	25 (17, 32)	25 (18, 31)	23.5 (16, 35)	.66
Time to first use after waking (minutes), n (%)				
≤5	72 (48)	38 (50)	34 (46)	.53
6-30	37 (25)	15 (20)	22 (30)	
31-60	8 (5)	4 (5)	4 (5)	
>60	33 (22)	19 (25)	14 (19)	
Tobacco dependence, median (IQR)	5.5 (4, 8)	5.5 (3.5, 8)	5.5 (4, 8)	.59
Deprived of snuff, median (IQR)	1.9 (1.4, 2.6)	2.1 (1.5, 2.7)	1.8 (1.3, 2.5)	.13
Family member uses snuff, n (%)	102 (69)	53 (71)	49 (66)	.56
Money spent on snuff per month (in Rand), median (IQR)	60 (50, 110)	60 (50, 100)	60 (36, 120)	.88
Reason for current use, n (%)				
Social life	7 (5)	2 (3)	5 (7)	.27
To improve health	48 (32)	22 (29)	26 (35)	.42
Traditions	15 (10)	11 (15)	4 (5)	.10
Habit	38 (25)	24 (32)	14 (19)	.07
Prevent snuff cravings	2 (1)	1 (1)	1 (1)	1.00
Fun/personal enjoyment	13 (9)	9 (12)	4 (5)	.25
Other	39 (26)	15 (20)	24 (32)	.08
Health beliefs				
Perceived health impacts, n (%)				
Positive	68 (46)	29 (38)	39 (53)	.14
Negative	27 (18)	17 (22)	10 (14)	
None	54 (36)	30 (40)	24 (33)	
Snuff vs cigarettes for health, n (%)				
Better than	101 (67)	52 (68)	49 (66)	.82
Same as	31 (21)	16 (21)	15 (20)	
Worse than	7 (5)	4 (5)	3 (4)	
Do not know	11 (7)	4 (5)	7 (10)	
Snuff use impact HIV treatment, n (%)				
No	—	—	58 (78)	—
Yes	—	—	0 (—)	
Do not know	—	—	16 (22)	
Social acceptance of Snuff				
Parents think it is very important to not use snuff, n (%)	90 (70)	47 (67)	43 (74)	.49
Friends think it is very important to not use snuff, n (%)	109 (73)	50 (66)	59 (81)	.11
People of a similar age think it is very important to not use snuff, n (%)	113 (76)	52 (69)	61 (84)	.10
Personally think snuff use is unacceptable opinion of snuff use, n (%)	21 (14)	14 (18)	7 (10)	.16
Cessation behavior and interest				
Ever recommendation to quit from healthcare provider, n (%)	30 (20)	16 (21)	14 (19)	.74
Desire to discuss snuff use with a healthcare provider, n (%)	116 (77)	53 (70)	63 (85)	.02
Interest in quitting snuff, n (%)				
Very interested	110 (73)	55 (72)	55 (74)	.93
Somewhat interested	16 (11)	8 (11)	8 (11)	
Not interested	24 (16)	13 (17)	11 (15)	

(Continued)

Table 2. Continued.

	TOTAL (N = 150)	HIV-(N = 76)	HIV+ (N = 74)	P-VALUE
Ever tried to quit snuff, n (%)	103 (69)	54 (71)	49 (66)	.52
Methods tried to quit snuff ^a , n (%)				
Cold turkey	60 (40)	33 (43)	27 (37)	.39
Cutting down	33 (22)	16 (21)	17 (23)	.78
Counseling	2 (1)	2 (3)	0 (—)	.50
Other	19 (13)	12 (16)	7 (10)	.24
Reasons for trying to quit, n (%)				
Health concerns	55 (37)	27 (36)	28 (38)	.77
Cost	16 (11)	8 (11)	8 (11)	1.00
Motivation from family/friends	3 (2)	3 (4)	0 (—)	.25
Public does not approve	3 (2)	1 (1)	2 (3)	.62
Advice from healthcare professional	0 (—)	0 (—)	0 (—)	—
Peer pressure	2 (1)	1 (1)	1 (1)	1.00
Other	29 (19)	15 (20)	14 (19)	.90
Methods that would aid in quitting, n (%)				
Peer support group	61 (41)	30 (40)	31 (42)	.76
Telephone counseling	28 (19)	13 (17)	15 (20)	.62
Text message support	24 (16)	12 (16)	12 (16)	.94
Healthcare advice	105 (70)	49 (65)	56 (76)	.13
Prescription medication	26 (17)	12 (16)	14 (19)	.61
Written materials	12 (8)	6 (8)	6 (8)	.96
Being paid money	20 (13)	10 (13)	10 (14)	.95
Other	24 (16)	15 (20)	9 (12)	.21

^aAmong those who have previously tried to quit.

healthcare professional and peer support. As most participants reported a strong social support system, this social infrastructure may aid in snuff intervention efforts. Contingency management options were not widely supported, however anecdotally it seemed that the way this question was presented may have taken participants off-guard or made them uncomfortable, and therefore these findings may be inaccurate. Given withdrawal symptoms were also widely reported and indicated as a reason for continued use, nicotine replacement therapy should be considered as part of a cessation intervention program. Further, while smoking and marijuana use were rare, alcohol misuse may be a barrier to successful cessation. Behavioral counseling may need to consider the moderate prevalence of stress in this population, although the prevalence of likely generalized anxiety and depressive disorder was relatively low. Ensuring cessation efforts are culturally sensitive will be essential to the success of any future programs. Many of the key components of the South African Tobacco Smoking Cessation Clinical Practice Guidelines may be applicable to snuff users. While the Guidelines currently do not address interventions for snuff use, future cessation strategies should extend key components of the Guidelines such as setting a quit date, providing adequate and appropriate guidance and support, conducting regular follow-ups, and monitoring for side effects, success, and failures to address snuff use in the clinical setting.³³ Further, the Guidelines should be updated to include snuff use in their recommendation.

Most differences between people with and without HIV were limited to sociodemographic characteristics with few meaningful differences with regards to snuff use beliefs and behaviors. PWH generally experienced lower socioeconomic conditions, which may make accessing resources for quitting more difficult. A previous study in Matlosana, South Africa found that socioeconomic conditions such as unemployment and poverty served as barriers to smoking cessation.³⁴ This disparity should be considered when developing snuff cessation programs. With regards to snuff use patterns and behaviors, PWH had used snuff for a longer period of time and were more likely to want advice from a healthcare provider on snuff cessation. Despite a dearth of literature on the impact of snuff use on HIV treatment, most PWH believed that snuff use had no impact on HIV treatment. Overall, mental health did not appreciably differ between groups.

This study has several limitations. The sample size was small and limited to subjects with access to and who were actively receiving care from specified public health clinics in one district in South Africa, limiting the generalizability of this study. Study participants, however, were from a peri-urban setting that is largely representative of the target population. Factors such as HIV status, history of respiratory illness, and ever having TB were self-reported and were not validated with medical records. This was a cross-sectional study using survey data, and additional qualitative work would help elucidate depth to some of these concepts.

Table 3. Mental health and history of respiratory disease in 150 adult snuff users in the Matlosana sub-district of South Africa, by HIV status.

	TOTAL (N = 150)	HIV- (N = 76)	HIV+ (N = 74)	P-VALUE
Major depressive disorder likely, n (%)				
No	130 (87)	64 (84)	66 (89)	.37
Yes	20 (13)	12 (16)	8 (11)	
Generalized anxiety disorder likely, n (%)				
No	131 (87)	65 (86)	66 (89)	.50
Yes	19 (13)	11 (15)	8 (11)	
Perceived stress, n (%)				
Low	9 (6)	6 (8)	3 (4)	.66
Moderate	132 (88)	65 (86)	67 (91)	
High	9 (6)	5 (7)	4 (5)	
Perceived daily discrimination (sometimes/often), n (%)				
Treated with less courtesy	56 (37)	31 (41)	25 (34)	.38
Treated with less respect	58 (39)	35 (46)	23 (31)	.06
Receive poorer service at restaurants/stores	29 (19)	20 (26)	9 (12)	.03
People act as if they think you are not smart	69 (46)	38 (50)	31 (42)	.32
People act as if they are afraid of you	63 (42)	36 (47)	27 (37)	.18
People act as if they think you are dishonest	56 (37)	28 (37)	28 (38)	.90
People act as if they think you are not as good as they are	65 (43)	34 (45)	31 (42)	.73
Called names or insulted	63 (42)	29 (38)	34 (46)	.33
Threatened or harassed	44 (29)	21 (28)	23 (31)	.64
Perceived daily discrimination, mean (SD) ^a	1.8 (.7)	1.9 (.75)	1.8 (.7)	.27
Perceived daily discrimination, median (IQR) ^a	1.9 (1.2, 2.3)	1.9 (1.1, 2.5)	1.7 (1.2, 2.1)	.38
Social support, median (IQR)				
Number of people in support system	4.5 (2.0, 10.0)	4.0 (2.0, 7.5)	6.0 (2.0, 20.0)	.13
Tangible support	4.0 (3.5, 4.3)	4.0 (3.3, 4.3)	4.0 (3.8, 4.3)	.31
Emotional/informational support	4.0 (3.8, 4.4)	4.0 (3.6, 4.5)	4.0 (3.9, 4.1)	.58
Affectionate support	4.0 (4.0, 4.3)	4.0 (3.7, 4.7)	4.0 (4.0, 4.3)	.84
Positive social interaction	4.0 (4.0, 4.3)	4.0 (3.8, 4.3)	4.0 (4.0, 4.0)	.28
Overall support index	4.0 (3.7, 4.3)	4.0 (3.6, 4.3)	4.0 (3.8, 4.2)	.94
Adjustment to HIV, median (IQR)				
Helplessness-hopelessness	—	—	27 (25.0, 28.0)	—
Fighting spirit	—	—	23 (22.0, 25.0)	
Belief in influencing course of disease	—	—	24 (23.0, 25.0)	
Denial-avoidance	—	—	12 (11.0, 13.0)	
Fatalism-preoccupation	—	—	17 (16.0, 18.0)	
History of respiratory disease				
Asthma, n (%)	11 (7)	7 (9)	4 (5)	.37
Chronic bronchitis, n (%)	28 (19)	12 (16)	16 (22)	.42
Allergic rhinitis, n (%)	54 (36)	26 (34)	28 (38)	.60
Chronic rhinitis, n (%)	20 (13)	8 (11)	12 (16)	.31
Sleep-related problems, n (%)	80 (53)	38 (50)	42 (57)	.41
Ever diagnosed with TB, n (%)	37 (25)	8 (11)	29 (39)	<.0001

^aPossible range = 1 to 4; higher scores indicate higher reports of perceived daily discrimination.

Snuff use in South Africa has been understudied and likely overshadowed by cigarette use and other competing public health concerns. Given the high prevalence of snuff use and its negative health impacts, evidence-based cessation strategies are needed for snuff users both with and without HIV, however there is currently

very little evidence of the efficacy of interventions for either population in low-resource settings. These data suggest that snuff cessation interventions using a combination of nicotine replacement therapy, educational outreach on health impacts, and healthcare provider involvement should be explored. Importantly, evaluating

knowledge, attitudes, and beliefs of healthcare professionals with regards to clinic-based interventions should be a priority.

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