Factors Associated with Tobacco Smoking in HIV Infected Persons, Brazil: A Cross Sectional Survey

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Research

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Abstract

Background: The purpose of this study was to assess differences in factors between smoking status of Brazilians living with HIV, as well as assess whether secondhand smoke exposure or sexual orientation was associated with smoking status.

Methods: Over 200 HIV infected individuals were convenience sampled. Permission was granted by the *Universidade de* São Paulo, and trained HIV care nurses conducted the interviews.

Results: Two-hundred and five participants were interviewed of whom 39% currently smoked tobacco. Sexual orientation did not associate with smoking categories, but secondhand smoke exposure did. In the ever-smoking model lower education level was more likely to induce smoking behavior and women were 70% more likely to have smoked. In the current-smoking model, attitudes were significant, and women were 75% more likely to be currently smoking.

Conclusion: Smoking prevalence is high in HIV-infected persons in Brazil. Comprehensive attention is needed to help individuals successfully quit, including emphasis on secondhand smoking risk awareness and offering coping strategies to prevail over stigma and stress, especially for women.

Background

Smoking tobacco increases the risk of cancer, heart attack and stroke, diabetes, asthma, and other chronic conditions [1-4]. It is the number one cause of preventable death in the world [2,5-6]. In Brazil, smoking prevalence in the general population has been steadily decreasing and is currently about 13%, a 6 - 5% decrease from just ten years earlier [7-8]. As in the U.S., smoking rates are greater in Brazilian men than women. Research in Brazil has revealed a range of male smoking prevalence at 13% - 20%, and female smoking prevalence at 8% - 12% [9-10].

Second-hand smoke (SHS) may also lead to health crises such as heart disease or cancer [11-12]. Oberg and colleagues estimate about 20,000 excess deaths in Latin America due to SHS [11]. Additionally, this threat may extend across generations: SHS exposure in women of reproductive age can cause pregnancy complications such as intrauterine growth restriction, preterm delivery, stillbirth, and infant death [13]. In Brazil, 27% of women are exposed to SHS at home [13].

Another public health scourge is the Human immunodeficiency virus (HIV). The natural course of HIV in the body is that, without treatment, the virus wreaks havoc on the individual's immune system. This can cause a decline in the body's ability to combat infections, manifesting in a list of possible opportunistic infections and cancers that define Acquired Immune Deficiency Syndrome (AIDS), and can cascade further to death. Kirk and colleagues [14] found that HIV infection is associated with a significant increase in lung cancer, whether people living with HIV (PLWH) smoked or not.

There is a growing body of literature concerning the juncture between tobacco consumption and HIV infection, and their devastating physiological consequences [15]. One study done in Denmark shows that PLWH who smoke survive 12.3 fewer years (compared to PLWH who do not smoke), and that PLWH who

smoke survive 13.8 fewer years (compared to smokers without HIV)[16]. Other studies mention that antiretroviral therapy (ART) is less effective in smokers than non-smokers [3,17]. Evidence shows that PLWH who smoke have fewer CD4 cells than nonsmokers, and that they have higher viral loads than their nonsmoking counterparts [16,18]. Moreover, smoking in the PLWH population increases their risk of contracting the typical AIDS-related opportunistic infections by weakening the immune system in spite of ART consumption [3,19].

In Brazil, 0.5% of the population are PLWH, a prevalence that is 25% to 35% greater than in the U.S. There are 48,000 new HIV cases each year in Brazil [20-21], of which about a third (31.3%) are women [22]. Approximately 69% of those infected are on ART. Currently, there are 920,000 PLWH in Brazil [20].

The smoking prevalence in Brazilian PLWH is generally higher than in non-infected persons (as is the case in the U.S.)[3,23-24], sometimes reaching twice or three times the proportion smoked in the general population. For example, one research team in Rio de Janeiro found 29.9% of PLWH smoked [25]; in Recife, researchers found a prevalence of 28.9% [26]; in São Paulo, 32.1% to 47.6% [27-28]; and on the higher end of the prevalence spectrum, in Brasilia 54.3% of PLWH smoke tobacco [29]. In none of the previous five references, however, was there mention of second hand smoke (SHS) exposure. Yet SHS associates with just as much physiological damage as direct tobacco consumption [30-31]. There is a paucity of Brazilian studies dealing with the effects of SHS on HIV infected populations.

Concerning sexual orientation and smoking, there is interesting, emerging research showing very different smoking rates depending on orientation. In a 2004 U.S. study, gay men were found to be 50% more likely to smoke, and gay women were about 70% more likely to smoke compared to their heterosexual counterparts [32]. An online survey assessed smoking in the U.S. by orientation and found that 25.6% of gays smoke tobacco, yet 38.5% of bisexuals smoke tobacco [33]. In Brazil, Torres et al. found that a significantly higher proportion of males with HIV who reported to have had sex with males were more likely to be current smokers compared to those who reported to be heterosexual [25]. We wished to verify this latter finding with PLWH from another area of Brazil.

Two prominent and related health behavior models are the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB), which posit that underlying attitudes and social norms are important because they evoke an intention to change, or maintain, behavior for better health outcomes. TRA was later appended with the addition of self control or self efficacy to become the TPB model [34]. These popular models have public health and behavioral researchers frequently considering attitudes, social norms, and/or self efficacy as implicating, or influencing, a behavior.

The purpose of this study was three-fold: First we assessed differences between Brazilian PLWH smokers and non-smokers with demographic, behavioral and cognitive variables. We hypothesized that smoking prevalence is high among Brazilian PLWH. Second, we assessed if SHS is pervasive in environments surrounding PLWH, in Brazil. We were interested in the notion that PLWH may be exposed to more SHS than non-HIV infected individuals. Third, we assessed if sexual orientation is associated with either smoking or second-hand smoke environments. We hypothesized that there would be a greater association between smoking and lesbian, gay, bisexual and transgender (LGBT) individuals compared to heterosexual individuals.

Methods

Participants & Setting

Two hundred and five PLWH were convenience sampled from two HIV specialty clinics housed in one public hospital, in the state of São Paulo, Brazil. This large hospital contains 815 beds and 23 laboratories [35]. It processed 534 rapid HIV tests, 992 ELISA anti-HIV and 193 HIV western blot tests in 2018 [36] and it serves clients primarily from four Brazilian states (Goiás, Mato Grosso do Sul, Minas Gerais and São Paulo). Data collection for this study started June 2018 and ended August 2019. Trained HIV care nurses conducted the interviews. Outpatient participants composed the majority of the sample (86.8%; vs 13.2% inpatient).

Tool

The questionnaire included a total of 65 items. It captured information on smoking behavior, HIV experience, knowledge, attitudes, social norms, self-efficacy and stress, along with demographics. “HIV experience” included variables to assess risk of infection such as sexual orientation, drug use and number of sexual partners. We also calculated the number of years infected by HIV, by subtracting the present year from the self-reported year of HIV diagnosis. Tool items were first articulated in English, then translated to Portuguese, then back translated for checks in meaning. The questionnaire was content validated by a panel of three Brazilian experts. In addition, the questionnaire was pilot tested with five PLWH and then re-assessed for understandability of questions, as well as data coding.

Cognitive Measures

Knowledge:

Seven items were used to create a knowledge score. Two items dealt with lowering cancer risk or cancer avoidance, three items included knowledge about the consequences of smoking, and the remaining two items concerned the characteristics of lung and other types of cancer. The correct answer(s) were coded 1 while incorrect answers were coded -1. Some questions had multiple answers. The summation of the responses created the knowledge index, which ranged from -7 to 18. Reliability (Cronbach’s alpha) of the items making up the index was .46.

Attitudes:

Fifteen items were included to create an attitudes score. Responses were selected from a five-point Likert scale. Smoking-friendly statements, such as “Smoking must be allowed on trains and buses”, elicited values of 1 (totally agree) to 5 (strongly disagree). Whereas anti-smoking statements, such as “There should be higher taxes on cigarettes”, were flipped in value. Two additional questions were excluded from the index due to ambiguous wording. Responses were summed; the attitude scores ranged from 15 to 75. The Cronbach’s alpha value from these items was calculated at .36.

Social Norms.

Two questions were used to create a social norms score. Responses were returned on a Likert scale (1= totally agree to 5= totally disagree) yielding the lowest score of 2 and highest score of 10. The lower the score implied more social inclination. Reliability of these items making up the index was high at .87.

Self efficacy:

Six items were included to create a self-efficacy score. The original Likert scale coded 1 (totally agree) to 5 (totally disagree) was transposed so that the higher score meant higher self efficacy. Scores were summed; the final range spanned 6 to 30. The Cronbach's alpha value from these items amounted to .27.

Stress.

Perceived stress indicators were collected on the expectation that the Minority Stress Model would be important in PLWH environments. This model states that minority status induces more stress [33]. The Perceived Stress Scale (PSS) underpinned the stress index; it has been shown to be reliable in many international studies and across different languages, revealing Cronbach alpha ranges of .82 to .87 [37]. The PSS is composed of 10 questions and utilizes a 5-point Likert scale. Our tool originally was composed of four of these questions. The question pertaining to participants' experience of work stress incurred many non-responses because many of the participants were not formally working. Therefore, the work-related stress item was dropped, and the remaining three items composed the index for analysis, consisting of social, household, and health related perceived stress. A Likert scale of 1 = Never to 5 = At all times was used to quantify perceived stress. The summation of the three items produced an index ranging from 3 to 15, with the higher score revealing more stress that a participant perceived. Reliability of this index was .67.

Analysis

Participants were grouped by smoking status: Current smoker, previous smoker and non-smoker. One individual outlier was excluded from analysis dealing with duration of HIV infection. Descriptive statistics and correlations were achieved. Bivariate statistical analysis was completed using ANOVA (for continuous outcomes) or Chi-square (for categorical outcomes) testing techniques. Significant findings from the bivariate analyses were used for multiple logistic analysis in two different models: past-smokers combined with nonsmokers vs. current smokers, or past-smokers combined with current smokers vs. nonsmokers (never smoked).

Ethics

Permission was granted by the *Universidadede São Paulo* in Ribeirão Preto, College of Nursing, along with hospital permission (May 2018). Informed consent was explained to, and collected from, each participant. No identifiers were collected except for the medical record number in case retrospective checks were called for; the medical record number was masked from any analysis.

Results

Over one-third of the participants (39.0%; n=80) currently smoked tobacco, compared with 28.8% (n=59) who were previous smokers and 32.2% (n=66) who never smoked. The average participant age was 46.8 years;

age was marginally different between smoking status categories (p=0.091) with previous smokers as the eldest group (average 49.6 years). The majority of the participants were men (55.1% n=113). Ever-smokers smoked an average of 21 years, and started smoking, on average, at 16 years of age.

Significant determinants to being a current smoker included work status (more likely to be unemployed or work informally; p=.040), education (lower education level; p=.036), and ethnicity (blacks were least likely to be current smokers; p=.041). Sex was not proportionally different between smoking categories. Furthermore, neither sexual orientation, number of sexual partners, nor frequency of alcohol consumption had an association with smoking status (data not shown). Average years of being HIV infected was 12.6 years (range 0 to 36.9); there was no statistical difference between the smoking status categories and duration of HIV infection. Other demographic information can be seen in Table 1.

We tested whether there was an association between sexual orientation or other HIV related variables and SHS. No association was found (data not shown).

Correlations with continuous variables were scrutinized (Table 2). Age, smoking duration and HIV duration all significantly correlated with each other; these variables are clearly co-linear with time. Age and stress were significantly and negatively related (as one gets older one is less stressed). Smoking duration with self-efficacy had a significant negative correlation (as years of smoking increase then self-efficacy decreases). In addition, stress and attitudes about smoking had a significant positive correlation (as stress increases, attitudes about smoking became more health-oriented) as well as knowledge and attitudes (as knowledge of smoking consequences increases then attitudes about smoking became more health-oriented). Unexpectedly, the social norms index did not correlate with any other variable.

Table 3 shows the average cognition scores against two sets of categories. First, one sees differences between the sexes, and the second set between smoking categories. Notable differences between male and female participants were seen with smoking attitudes (women had more health-oriented attitudes toward smoking; p=.034), social norms (men were more socially influenced; p=.007), and stress (women were more stressed; p=.002). Notable significant differences between smoking status categories manifested in knowledge of smoking consequences (current smokers and those who never smoked were more knowledgeable; p=.006) and attitudes about smoking (previous smokers and those who never smoked had more health-oriented attitudes; p=.001). Neither knowledge, self efficacy, nor self reported stress showed differences according to sex. Self efficacy with smoking status revealed a marginally significant difference between current smokers versus others (current smokers were less self efficacious; p=.078).

Table 4 shows the results from self-reports of second-hand smoke exposure against two sets of categories. The first set is with sex differences, and the second set shows differences between smoking status categories. The majority of smokers (58.4%) were sometimes or often around second-hand smoke in their home and about half (48.8%) were around someone else who smoked, at least daily. There were no statistical differences between male and female PLWH in terms of SHS, even though, proportionately, more men reported being around SHS the majority of the time. There were significant differences in SHS exposure between the smoking categories, showing that current smokers were exposed to SHS most often, whether or not the exposure was “around other people” or “in the house”.

Two logistic regression models (Tables 5a and 5b) were completed using the significant variables from the bivariate analyses. In the ever-smoking model (combining current with past smokers against non smokers), a low education level was shown to be 2½ times more likely to induce a smoking history, controlling for age, sex, ethnicity, working status, and four other cognitions. The variable sex was robust enough to remain in the model after eight iterations. Women were about 70% more likely to have a history of smoking compared to men, yet this variable was not significant. In the other model highlighting current-smoking (against the combination of past smokers with never smokers), attitude was significant, revealing a 10% increase in the chance of being a current smoker for every health-oriented attitude point gained, controlling for sex, age, ethnicity, education, working status, and three other cognitions. Sex was marginally significant in this model; women were shown to be 75% more likely to be current smokers than men.

Discussion

The first goal of this study with Brazilian PLWH was to assess differences between smoking status within a context of demographic, behavioral and cognitive factors. Second, we sought to assess if SHS is pervasive in environments surrounding PLWH. Third, we assessed if sexual orientation was associated with either smoking or SHS environments.

In our sample, 39.0% of participants were current smokers and 28.8% were previous smokers. Of the men, 45.1% were current smokers; of the women, 31.5% were current smokers. This proportion is about twice the smoking rates seen in the general Brazilian population (8% - 20%). The U.S. experience with PLWH also reveals high smoking rates (37.9% - 59.0%) [3,23,38]. One study in Spain recorded PLWH smoking prevalence at a staggering 63.9% [39]. Another study sampled PLWH from 33 countries and identified a smoking prevalence of 40.5% [40]. High smoking rates with PLWH seem to be global phenomena and their smoking rates are double or triple compared to the smoking rates in the general population. The question that arises is, why would the HIV infected community tend to smoke tobacco at these higher rates?

According to one of our models (Table 5a), lower education level is the major factor that predicts ever-smoking, when controlling for age, ethnicity, work status, sex, and four cognitions. Current smokers had the least education, and those who had never smoked had higher education levels, proportionately. Low education attainment often correlates with low income, and is supported by research [3,16,19,38]. Though our results confirm other studies that implicated low education levels, it does not confirm studies citing lower income as a factor. Furthermore, even though lower education predicted ever-smoking, current smokers also had a high level of knowledge concerning the consequences of smoking tobacco. This suggests that they have been targeted before with anti-smoking campaigns or counseled to quit, and that they have paid attention. This raises optimism that even if one endures a poor quality educational experience (fixed factor), one still may retain an alert intellect (plastic factor).

According to our other model (Table 5b), attitude predicts current smoking status when controlling for sex, age, ethnicity, work status, education and three other cognitions. Interestingly, a health oriented attitude toward smoking leads to a higher likelihood of smoking. We found that female PLWH displayed significantly more positive attitudes than their male counterparts. This finding is similar to a Jordanian study that reveals that women discerned and expressed more proactive public health attitudes (both smokers and non smokers)

than their male counterparts [41]. However, this conclusion seems to contradict differences shown in Table 3, that is, non smokers and previous smokers showed better attitudes than current smokers (a finding supported by other research [42]). Nonetheless, the logistic regression analysis (Table 5b) is the standard for interpretation purposes because it controls for possible confounders. For instance, it is reasonable to expect that previous smokers have more positive health related attitudes than current smokers. Yet when age is taken into account (on average previous smokers are older) the attitude index shifts to favor current smokers. Coincidentally, we observed that current smokers are more knowledgeable about smoking hazards than previous smokers, and that knowledge significantly correlated with attitudes.

Is there anything in common between the two models? Interestingly, sex robustly stayed in both models after eight regression iterations. In both models, women were more likely to either show a history of smoking (Table 5a) or to be current smokers (Table 5b). Our analysis indicates that HIV infected women are 75% more likely to be current smokers than HIV infected men, though this was a marginally significant ($.05 < p < .10$) factor in predicting current smoking.

A new question arises, why would women impart a greater tendency for a poor health behavior more so than men? We offer two ideas and both ideas connect to one's attitude, as if attitude mediates between smoking and another third factor. Recall from our study that female PLWH were more likely to be current smokers compared to male PLWH, despite having better attitudes toward smoking regulation. The first idea comes from the view that women are more likely to be the caregiver of the family, caring for both household individuals and the well-being of others [41,43]. This idea also advances the notion that women are more connected to the wider community. Weisberg et al. mentioned that women display more compassionate qualities, including investing emotionally and having traits of warmth and empathy, in comparison to their male counterparts. These researchers suggest that men have an independent self-construal quality, meaning that their sense of self is separate from others. While women can be described as interdependent. Women find a sense of self by including all others in their community [44]. This could explain why women in our study displayed higher scores on the attitude scale- it shows that they are willing to protect others from harm.

The second idea comes from the notion that, in our data, positive attitudes significantly correlated with stress (Table 2). The stress index was constructed by one's perception of social, household, and health related stressors. Therefore, a positive attitude may be a mediator between stress and smoking. We found a significant difference between men and women in stress scores; female PLWH expressed higher levels of stress compared to male PLWH. This could help explain why in our study stress influenced the likelihood of women to become smokers [44-45].

The field of HIV/AIDS stigma may further shed light on stress. Stigma explains why PLWH have worse morbidity and mortality outcomes due to avoidance of, or irregular access to, treatment. Stigma may explain why PLWH do not reveal their HIV status to partners, or why they are more likely to avoid social contact [47]. Cardona-Garzón and colleagues found that about half (50.7%) of their sample of Colombian PLWH reported stigma. Furthermore, infected women were nearly 2½ times more likely to experience stigma than men. They revealed a trend whereby lower educated PLWH experienced more stigma, as well as those without work, but these latter findings were not significant [47]. Therefore, the reason why HIV infected women are more likely to be current smokers may be because of the increasing impacts of stigma that they endure. In addition, in a

Latin American country such as Brazil, this social pressure may be further exacerbated because of *machismo* [48]. Indeed, HIV infected women in this study may experience stigma from multiple sources (disproportionate wage earnings, disproportionate domestic violence, etc.).

We speculate that women in our study may use smoking as a way to self-medicate or self-soothe in order to cope with the added stress and stigma of being female and HIV infected. Kaplan et al. used focus groups to understand the association among perceived stress and poorer health related variables in disadvantaged communities. They concluded that participants engaged in riskier behaviors like smoking, substance abuse, and over-eating as a way to self-medicate, despite knowing these behaviors can lead to poorer health outcomes. Smoking was a common theme; several of their participants expressed using smoking as a way to mellow out or calm down, or as a coping mechanism in moments of stress, stigma and distress [45]. This may explain why female PLWH smokers are less likely to attempt to quit smoking. Mamary and colleagues found that HIV infected women were half as likely to have made attempts at smoking cessation than HIV infected men [24].

To conclude with Goal 1, we advance three possible reasons why PLWH in Brazil smoke at a high rate: lower education level, more positive health attitudes, and female sex.

Regarding SHS (Goal 2), we found a clear, significant connection between current smoking and being exposed to SHS, although we cannot claim that SHS exposure causes smoking, or vice versa. Another Brazilian study found that a high proportion (85%) of current or former smokers were exposed to SHS at home or work [49]. In addition, Humfleet and colleagues found that, of PLWH who smoke, 43.2% of their social support was also made up of smokers [50]. A harm reduction model of removing environmental risks to SHS, or launching SHS awareness campaigns, may help reduce the rates of tobacco smoking in PLWH.

Concerning Goal 3, we found no association between sexual orientation and smoking status, nor with sexual orientation and SHS. Some research cites that sexual orientation is a factor influencing tobacco consumption, with LGBT orientations presenting more risk [22,33]. We uncovered only one other Brazilian study which examined possible connections between sexual orientation and smoking. Contrary to our results, Torres et al. found that a significantly higher proportion of homosexual men with HIV were more likely to be current smokers, compared to men who reported being heterosexual [25]. Our sexual orientation proportions were 80.0% heterosexual (69% male, 94% female), 15.6% homosexual, 3.9% bisexual, and .5% transsexual; this distribution is unusual for Latin American PLWH populations. For example, Cardona-Garzón et al. reported in their Colombian HIV/AIDS sample that 39.1% were heterosexual and 50.9% homosexual [47]. Interestingly, these authors show no association between stigma and sexual orientation, or number of years infected [47], corroborating our results. Another study done in the same Brazilian state as ours reported a 70.3% heterosexual and 24.1% homosexual proportion in a sample of people with HIV/AIDS [27]. Our sexual orientation data trended more toward reports of heterosexuality which did not allow us to pinpoint smoking differences by orientation. This can be explained partly by having nearly half of our participants composed of women- most of whom were heterosexual.

Strengths & Limitations

One limitation incurred by our research are consequences of convenience sampling (either over or underestimation of the true estimate). Another limitation is the possibility of recall bias. A third limitation is that our attitude index did not register a high Cronbach alpha measure. However, our strengths include a high response rate (99.5%) to counter non-response bias. Furthermore, our demographic results, including smoking prevalence, match other studies with PLWH, lending validity through generalizability [27,51]. Lastly, research about the risks of smoking often relies on applying only one of two analysis strategies. One strategy is finding differences between participants who consume tobacco, currently, versus non smoking participants. The other strategy is finding differences between those with a history of smoking versus those who never smoked. In this study, we use both methods in order to better examine factors leading to tobacco consumption.

Conclusions

Smoking prevalence among Brazilian PLWH is high (our first hypothesis was confirmed). Lower education level, more positive health attitudes, and being female are factors that seem to militate against smoking avoidance. Moreover, HIV infected Brazilians are largely surrounded by second-hand smoke (our second hypothesis was confirmed). Our third hypothesis, however, was not supported (no association between sexual orientation and smoking status).

On average, PLWH from our sample have smoked for decades, and they started smoking as early as adolescence (data not shown). Yet they seem to be aware of the benefits of tobacco avoidance. Nearly half (45%) of the current smokers claimed that they wanted to quit within a month, and the current smokers have tried to quit an average of 1.3 times (data not shown). Similar to our findings, Tesoriero and colleagues mention that 75% of current smokers in their PLWH sample were interested in quitting tobacco smoking, and about 65% had attempted to quit over the previous year [3]. More can be done to tap into this willingness to change.

Brazil as a nation is an innovator in HIV services [52-53] as well as in smoking cessation policy [54]. In Brazil, the effort to bridge clinicians' excellent innovations in HIV care with tobacco awareness and cessation efforts can have a positive synergistic effect. Specifically, comprehensive counseling and tobacco cessation campaigns should emphasize SHS risk awareness, and counseling may assist with coping strategies to persist and prevail over stigma and stress, helpful especially for women.

Abbreviations

AIDS: Acquired immune deficiency syndrome

CI: Confidence interval

ELISA: Enzyme-linked immunosorbent assay

HIV: Human immune deficiency virus

LGBT: Lesbian, gay, bisexual, transsexual

OR: Odds ratio

PLWH: People living with HIV

PSS: Perceived stress scale

SHS: Second hand smoke

TPB: Theory of planned behavior

TRA: Theory of reasoned action

Declarations

Ethics approval and consent to participate:

Approval was obtained from the ethics committee of the University of São Paulo in Ribeirão Preto, College of Nursing (May 11, 2018/Number 2.663.591). Informed consent was given to, and collected from, all participants.

Consent for publication:

All authors give their consent for publication.

Availability of data and materials:

The data may be found on icpsr.umich.edu under NAHDAP-122581.

Competing interests:

The authors have no conflicts of interest to declare.

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Authors' contributions:

WS conceptualized the study and drafted the manuscript. NMVPC conducted the data collection activities including data entry. JB conducted the data analysis and helped with manuscript editing; LAFR worked on the design of the study and sought ethics permission. EG coordinated the research team and helped with the study design. All authors read and approved the final manuscript.

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Tables

Table 1: Demographics of HIV Persons, n (%) by Smoking Status

	Total (n=205)	Current smoker (n=80)	Previous smoker (n=59)	Never smoked (n=66)	P
Age[a] (average)	46.8	45.6	49.6	45.6	.091*
Sex[b]					.134
Male	113	51 (45.1)	30 (26.5)	32 (28.3)	
Female	92	29 (31.5)	29 (31.5)	34 (40.0)	
Marital status[b]					.460
Married	48	16 (33.3)	19 (39.6)	13 (27.1)	
Single	92	37 (40.2)	24 (26.1)	31 (33.7)	
Other	65	27 (41.5)	18 (40.9)	22 (33.8)	
# Dependents[a] (average)	2.6	2.7	2.8	2.3	.164
Ethnicity[b]					.041**
While	81	32 (39.5)	17 (21.0)	32 (39.5)	
Black	30	10 (33.3)	7 (23.3)	13 (43.3)	
Mixed	94	38 (40.4)	35 (37.2)	21 (22.3)	
Education[b]					.036**
=<8th grade	111	48 (43.2)	36 (32.4)	27 (24.3)	
8th +	92	31 (33.7)	23 (25.0)	38 (41.1)	
Salary[b]					.229
<=3 salaries	160	66 (41.3)	43 (26.9)	51 (31.9)	
4+ salaries	29	8 (27.6)	12 (41.4)	9 (31.0)	
Working status[b]					.040**
Unemployed	72	32 (44.4)	17 (23.6)	23 (31.9)	
Formal work	41	12 (29.3)	8 (19.5)	21 (51.2)	
Informal work	38	18 (47.4	10 (26.3)	10 (26.3)	
Retired	44	17 (38.6)	18 (40.9)	9 (20.5)	
Sexual Orientation[b]					.153
Heterosexual	164	60 (36.6)	52 (31.7)	52 (63.6)	

Other	41	20 (48.8)	7 (17.1)	14 (34.1)	
# Sex Partners in last 3 months[a]	.74	.73	.75	.76	.982
# Years HIV infected[a] (average)	12.6	12.6	12.6	12.8	.983

**p<=.05; *.05<=p<.10; a= ANOVA, b= Chi Square test

Table 2: Bivariate Correlation: Continuous Factors

	HIV duration	Smoking duration	Stress	Self efficacy	Social norms	Knowledge	Attitude
Age	.337**	.405**	-.168**	-.035	-.077	-.135	-.056
HIV infected duration (years)		.212**	-.018	-.162	.025	-.052	.083
Smoking duration (years)			.074	-.304**	-.010	-.042	-.092
Stress				-.021	.107	-.050	.232**
Self efficacy					-113	-.071	.062
Social norms						-107	-.041
Knowledge							.160**

** p<=.05

Table 3: ANOVA: Average Cognition Scores by Sex and Smoking Status

	Total	Male	Female	P	Current Smoker	Previous Smoker	Never Smoked	P
Knowledge	9.13 (n=200)	9.1	9.2	.945	9.5	8.0	9.6	.006**
Attitude	64.5 (n=199)	63.6	65.4	.034**	62.5	64.5	65.6	.001**
Social norms	5.7 (n=199)	5.1	6.4	.007**	5.4	5.3	6.4	.132
Self efficacy	21.7 (n=130)	22.1	21.2	.227	21.0	22.7	22.5	.078*
Stress	6.8 (n=201)	6.1	7.8	.002**	6.6	7.3	6.7	.559

**p<=.05; *.05<=p<.10

Table 4: Chi Square Analysis: Second-Hand Smoke by Sex, Smoking Status; n (%)

	Total n	Male	Female	P	Current Smoker	Previous Smoker	Never Smoked	P
How often are you around people who smoke?								
Majority of time	67	40 (59.7)	27 (40.3)	.300	47 (70.1)	14 (20.9)	6 (9.0)	.001**
Some of time	54	25 (46.3)	29 (53.7)		12 (22.2)	26 (48.1)	16 (29.6)	
Little to none	84	48 (57.1)	36 (42.9)		21 (25.0)	19 (22.6)	44 (52.4)	
How often are you exposed to cigarette smoke in your house?								
A lot	65	39 (60.0)	26 (40.0)	.305	44 (67.7)	12 (18.5)	9 (13.8)	.001**
Somewhat	48	22 (45.8)	26 (54.2)		22 (45.8)	11 (22.9)	15 (31.3)	
Never	92	52 (56.5)	40 (43.5)		14 (15.2)	36 (39.1)	44 (45.7)	

**p<=.05; *.05<=p<.10

Table 5a: Multivariate logistic regression: Factors associated with Ever Smoking (vs. Never)

	Unadjusted P-value	Unadjusted Odds Ratio (95% C.I.)	Adjusted P-value	Adjusted Odds Ratio (95% C.I.)
Age	.987	1.000 (.972 - 1.029)	N/A	.
Sex	.146		.101	
Male		1 (reference)		1 (reference)
Female		1.693 (.833 - 3.442)		1.698 (.902 – 3.195)
Ethnicity	.448		N/A	
White		1 (reference)		
Other		1.319 (.645 - 2.696)		
Education	.118		0.005**	
<= 8th grade		1 (reference)		1 (reference)
>8th grade		1.787 (.862 - 3.703)		2.461 (1.307 - 4.634)
Work status			N/A	
No work	.187	1 (reference)		
Some work		1.627 (.790 - 3.354)		
Knowledge	.979	.999 (.918 – 1.087)	N/A	
Attitudes	.142	1.045 (.985 – 1.108)	N/A	
Social Norms	.344	1.050 (.949 – 1.161)	N/A	
Stress	.567	.972 (.881 – 1.072)	N/A	

**p<.05; *.05<=p<.10; 8 iterations

Table 5b: Multivariate logistic regression: Factors associated with Currently Smoking

	Unadjusted P-value	Unadjusted Odds Ratio (95% C.I.)	Adjusted P-value	Adjusted Odds Ratio (95% C.I.)
Age	.103	1.025 (.995 - 1.056)	N/A	
Sex	.048**		.084*	
Male		1 (reference)		1 (reference)
Female		2.054 (1.005 - 4.199)		1.750 (.928 – 3.298)
Ethnicity	.542		N/A	
White		1 (reference)		
Other		0.798 (.386 - 1.648)		
Education	.287		N/A	
<= 8th grade		1 (reference)		
>8th grade		1.504 (.710 - 3.187)		
Work status			N/A	
No work	.159	1 (reference)		
Some work		1.681 (.816 - 3.465)		
Knowledge	.112	.936 (.862 – 1.016)	N/A	
Attitudes	.000**	1.115 (1.050 – 1.183)	.000**	1.101 (1.044 – 1.161)
Social Norms	.896	.993 (.898 – 1.099)	N/A	
Stress	.863	1.008 (.920 – 1.105)	N/A	

**p<.05; *.05<=p<.10; 8 iterations