Cigarette Smoking Behaviors and Beliefs in Persons Living With HIV in Nairobi, Kenya

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ABSTRACT

INTRODUCTION: Persons living with HIV (PLWH) use tobacco at higher rates than the general population in both high-income countries and low- and middle-income countries. Tobacco use rates are increasing in sub-Saharan Africa, the home to most of the world's PLWH. As the reach of antiretroviral therapy (ART) expands and HIV-related morbidity and mortality wanes, tobacco use is emerging as a leading cause of disease and death in PLWH. A better understanding of tobacco use behaviors in various settings will be crucial to designing optimal tobacco control strategies.

METHODS: In late 2019, we enrolled 50 PLWH cigarette smokers from 6 clinical sites in Nairobi, Kenya (4 HIV care clinics and 2 methadone maintenance programs) for one-on-one interviews focusing on their behaviors and beliefs related to tobacco use.

RESULTS: Fifty PLWH smokers completed the interviews. The mean age was 38.5 ± 9.7 years (range 20-57 years) and 68% were male. All were currently receiving ART. They smoked a mean of 14.9 ± 12.4 cigarettes per day, and 82% reported smoking every day. Only 6% reported dual use of smokeless tobacco products. Nicotine dependence was moderate or high in 74%. More than a third (36%) reported a prior history of tuberculosis. In our sample, use of other substances was common, especially alcohol, marijuana, and methadone. On the motivation to quit scale, 90% were at least in the contemplation stage, but only 2% had ever received behavioral cessation counseling, and only 8% had ever used pharmacotherapy (exclusively nicotine replacement therapy). Participants reported significant concern about developing smoking-related illness, exposing others to secondary smoke, and the financial burden associated with their tobacco use. Measures of intrinsic and extrinsic motivation to quit, smoker and abstainer self-concept, and social support yielded encouraging results regarding the possibility of successful quitting.

CONCLUSIONS: Tobacco use is an important health concern in PLWH in Kenya. A more thorough understanding of their tobacco use behaviors and beliefs will provide critical information for providers, public health officials, and policy makers as they redouble their efforts to confront this urgent health challenge.

KEYWORDS: HIV, tobacco, smoking, cigarette

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Introduction

Notwithstanding regional successes in the public health battle against tobacco use, cigarettes remain the leading preventable cause of death in the world today. Unless significant changes in smoking behaviors occur, tobacco use will claim over a billion lives in this century.[1,2] More than 80% of these unnecessary deaths will occur in low- and middle-income countries.[1,2] The World Health Organization (WHO), in its Framework Convention on Tobacco Control (FCTC), established in 2003 with 180 nation-signatories, took concerted action against these trends.[3] Despite these efforts, smoking prevalence in Africa is projected to rise from 15.8% in 2010 to 21.9% in 2030.[2,4]

In 2018, 37.9 million people were living with HIV in the world, and 25.6 million of these (67.5%) were living in

sub-Saharan Africa.[5] Low- and middle-income countries in South America, Asia, and Africa consistently report elevated smoking rates in persons living with HIV (PLWH).[6] This has emerged as a critical public health challenge since in the era of effective antiretroviral therapy (ART), tobacco use has overtaken all other causes as the leading driver of mortality in PLWH.[7,8]

Kenya is a nation of over 53 million people in East Africa. Similar to many non-Western countries, cigarette smoking is a largely male practice in Kenya, with very low rates among females. The most recent available national statistics estimate current smoking prevalences of 17.3-22.0% among Kenyan men and .18-2.0% among Kenyan women.[2,9,10] The most recent Global Youth Tobacco Survey (2013) demonstrated a troubling rise in the female:male ratio (4.0% of girls:9.6% of boys) among Kenyan adolescents smoking tobacco.[11] In addition to the male predominance, smoking is concentrated among the poorer and less-educated strata and among those who drink alcohol.[10] Tobacco use in Kenya is also entangled with illicit substance use.[12,13] The government of Kenya has been extremely proactive in its battle against tobacco use, and it has led all other African nations in its implementation of the FCTC.[4,14]

Kenya is also home to 1.6 million PLWH, 68% of whom are receiving ART.[15] Smoking rates are higher in Kenyan PLWH than in the general population, and the PLWH in Kenya smoke at higher rates than the PLWH of any other East African country.[6] Over 26% of male Kenyan PLWH and over 1% of female Kenyan PLWH smoke cigarettes.[6] Certain subgroups of Kenyan PLWH smoke at much higher rates, for example, those in methadone maintenance programs, where tobacco use prevalences can approach 100% (unpublished data, Mathare and Ngara methadone clinics in Nairobi, Kenya). Although sub-Saharan Africa is home to more PLWH smokers than any other area in the world, aside from limited research conducted in South Africa,[16,17] there is little in-depth information about tobacco use beliefs and behaviors in PLWH smokers from this region.

In 2018, we initiated a project aimed at gathering information about cigarette smoking behaviors in Kenyan PLWH with the goal of using these data to develop a culturally appropriate tobacco treatment intervention. We present herein the results of a structured interview that was conducted in a cohort of PLWH smokers in Nairobi.

Methods

Between September and November 2019 trained staff completed a cross-sectional interview study of a sample of PLWH smokers in Kenya. They administered structured interviews about tobacco use to PLWH smokers recruited from 4 HIV care clinics and 2 methadone maintenance facilities in Nairobi. A prescreening form was given to clinicians in these clinics to identify HIV-infected smokers who were willing to quit and to participate in the formative study. Those meeting the criteria were referred to the study clinic for further evaluation by the research assistants (RAs) and to complete the informed consent process. Of the 58 individuals who were referred, 50 agreed to participate and completed the study.

The RA read the questions for the participant in Swahili or English and noted his/her responses on the questionnaire. Each interview took between 1-2 hours. Participants were paid 500 Kenyan shillings (approximately USD $5) upon completion.

The battery of tobacco use, behavior, and belief questions that we used was based on those recommended in The Tobacco Dependence Treatment Handbook,[18] with several additions. A summary of the scales that we employed may be found in Table 1.[19-30]

Interview responses were keyed into a REDCap database. Categorical variables are presented as proportions, and continuous variables are presented as means and standard deviations. All statistical analyses were completed using SPSS V26.0.

The study was approved by the Institutional Review Board of the University of Maryland and the Ethics and Research Committee of the Kenyatta National Hospital/University of Nairobi (Approval #901/12/2018).

Results

We completed interviews on 50 Kenyan PLWH smokers between September 2019 and November 2019. Seventy-two percent of participants completed the interview in Swahili, 14% in English, and 14% in a combination of the 2 languages. The sociodemographic and clinical profile of the sample is summarized in Table 2.

Table 3 summarizes tobacco use behaviors in the study sample, and the scores of all the standardized scales that we administered. They smoked a mean of 14.9 cigarettes per day, and 82% smoked every day. All reported purchasing individual cigarette "sticks" and not full packs as their most common route of acquisition. Forty percent lived with another smoker. Both dual tobacco use, that is, use of tobacco products other than cigarettes, and quit attempts were uncommon. Nicotine dependence and motivation to quit were both high. Only 8% had ever tried nicotine replacement therapy and none had ever tried bupropion or varenicline.

Perceived risks and benefits of smoking

The investigators revised a previously validated scale[28] to produce a 22-item measure exploring participants' beliefs about the risks and benefits of smoking to their health. Responses are summarized in Table 4. Whereas the majority of individuals expressed some concern about the harms of smoking to their own health, the highest perceived risk ratings were assigned to the monetary expense of smoking, setting a bad example for children, and exposing others to secondary smoke. Most of the higher perceived benefits of smoking scores related to social acceptance and control of negative emotions. Of note, 74.0% endorsed the "benefit" of enhancing the effects of narcotics and/or other drugs.

Comparative risk

The investigators developed a 10-item questionnaire asking participants to estimate their own risk compared to other people

Table 1. Tobacco behaviors and beliefs measures.

DESCRIPTION	MEASURE/SCALE	REF.
Nicotine dependence	Fagerström Test for Nicotine Dependence	19
Motivation to quit	Abrams-Biener Readiness to Quit Ladder	20
Locus of control	Modified Drinking Related Internal-External Locus of Control Scale	30
Intrinsic/extrinsic motivation to quit	Reasons for Quitting Questionnaire	21
Self-concept	Smoker Self-Concept Questionnaire	22
Self-efficacy	Self-Efficacy/Temptation Scale	23
Anxiety	General Anxiety Disorder Scale	25
Depression	Center for Epidemiologic Studies Short Depression Scale	24
Pain	Minnesota Cancer Pain Project Questionnaire	26
Social support	Partner Interaction Questionnaire	27
Perceived risks/benefits of smoking	Modified Perceived Risks and Benefits Questionnaire	28
Comparative risk	Comparative Risk Questionnaire	NA
Knowledge about smoking risks and second-hand smoking	Risks of Smoking and Second-hand Smoke Scale	NA
Importance of quitting and interest in cessation interventions	Importance of Smoking Cessation and Interest in Cessation Interventions Scale	NA
Health care provider practices	Health Care Provider Practices Scale	NA
Current life stressors	Current Life Stress Scale	NA
Spiritual well-being	Functional Assessment of Chronic Illness Therapy – Spiritual Well-Being	29

Note: Ref. = reference, NA = not applicable (measure was developed by the investigators).

attending their clinics of dying from a range of medical (eg, HIV and cancer) and non-medical (eg, random violence and motor vehicle accident) causes. The majority (67-77%) rated themselves at higher risk for deaths from HIV infection, cancer, and heart disease, and at lower risk for deaths from violent or traumatic causes. Only 6.0% thought themselves more likely to die of old age than the other patients in their clinics.

Knowledge about the direct risks of smoking and of second-hand smoke

The investigators developed a 13-item True/False questionnaire asking participants whether cigarette smoking (via direct inhalation or second-hand exposure) caused or increased the risk of a variety of medical conditions, all of them known to be tobacco-related. The great majority answered, correctly, that cigarette smoking increased the risk for a variety of cancers and cardiovascular and pulmonary diseases. Of note, 98% believed that smoking increased the risk of tuberculosis, whereas only 40% believed that it increased the risk of bacterial pneumonia. The great majority also endorsed the belief that second-hand smoke increases the risk of neoplastic, cardiac, and pulmonary diseases.

Importance of quitting and interest in specific smoking cessation interventions

The investigators developed a 1-item scale to assess the importance of quitting: 1 = not important to 10 = extremely important. Quitting smoking was rated as extremely important by 94% of participants.

Asked which cessation strategies they would be interested in using (Yes/No), participants reported interest in the following non-mutually exclusive categories: individual counseling 100.0%, nicotine replacement therapy 92.0%, oral medications 82.0%, buddy support 74.0%, and group counseling 72.0%.

Advice from general practitioner/primary care providers about smoking cessation

Fifty-six percent of participants stated that their general practitioners (GP) had discussed smoking cessation with them, 2.0% reported that their GPs recommended or prescribed pharmacotherapy to assist them to quit, 18.0% reported having received brochures about quitting from their GPs, and 12.0% reported having been referred to a smoking cessation program. None of the participants expressed the belief that their providers smoked cigarettes. Sixty-four

Table 2. Sociodemographic and clinical characteristics of study participants.

CHARACTERISTIC	N = 50
Age in years (mean ± SD; range)	38.5 ± 9.7; 20-57
Gender	
Male	34 (68.0%)
Female	16 (32.0%)
Race	
African	48 (96.0%)
Somali	1 (2.0%)
Asian	1 (2.0%)
Marital status	
Single	9 (18.0%)
Married/living with partner	24 (48.0%)
Separated	14 (28.0%)
Divorced	1 (2.0%)
Widowed	2 (4.0%)
Religion	
Protestant (eg, Baptist, Pentecostal, and Anglican)	17 (34.0%)
Catholic	24 (48.0%)
Muslim	9 (18.0%)
Educational attainment	
No formal education	2 (4.0%)
Some primary school	14 (28.0%)
Completed primary school	10 (20.0%)
Some secondary school	11 (22.0%)
Completed secondary school	9 (18.0%)
Some college	1 (2.0%)
Completed college	3 (6.0%)
Housing status	
Stable	47 (94.0%)
Transitional	3 (6.0%)
Homeless	0 (.0%)
Route of HIV acquisition (by self-report)	
Injection drug use[a]	20 (40.0%)
Heterosexual contact with infected individual[a]	16 (32.0%)
Same sex contact	0 (.0%)
Other or unknown	15 (30.0%)
Currently taking antiretroviral medication	50 (100.0%)
History of selected medical conditions	
Bacterial pneumonia	15 (30.0%)
Tuberculosis	18 (36.0%)
PCP[b]	12 (24.0%)
Cryptococcal meningitis	1 (2.0%)
Depression	10 (20.0%)
Anxiety	9 (18.0%)
Diabetes	0 (.0%)
Heart disease	0 (.0%)
Hyperlipidemia	0 (.0%)

(Continued)

Table 2. Continued.

CHARACTERISTIC	N = 50
Hypertension	3 (6.0%)
Asthma	2 (4.0%)
Other lung disease (eg, emphysema and COPD)	2 (4.0%)
Cancer	0 (.0%)
Substance use[c]	
Alcohol	
Ever	40 (80.0%)
Current	17 (34.0%)
Marijuana	
Ever	36 (72.0%)
Current	22 (44.0%)
Cocaine	
Ever	17 (34.0%)
Current	0 (.0%)
Heroin	
Ever	37 (74.0%)
Current	4 (8.0%)
Miraa (khat)	
Ever	32 (64.0%)
Current	15 (30.0%)
Jet fuel	
Ever	13 (26.0%)
Current	0 (.0%)
Currently in methadone maintenance	36 (72.0%)

[a] One individual reported both injection drug use and heterosexual contact with an infected individual.
[b] *Pneumocystis carinii* pneumonia, also known as *Pneumocystis jirovecii* pneumonia.
[c] Current substance use was defined as admitted use of the substance within the past 30 days.

percent indicated their belief that their cigarette smoking was a very important health issue to their GP, and 14% indicated their belief that it was unimportant.

Current life stressors

The investigators developed a 6-item questionnaire asking participants to rate the severity of a range of life stressors on a 4-point Likert scale: 0 = "None" to 3 = "Major." The percentages of participants who rated the severity of stress as either moderate or major for the various stress domains follow: financial 88.0%, safety 26.0%, relationships 26.0%, sexual abuse 6.0%, and job-related 68%.

Discussion

Similar to the experience in Western countries 10 years ago, with the advent of effective and accessible ART in Kenya,[7] cigarette smoking in Kenyan PLWH is poised to emerge as a leading killer in this group. Developing effective smoking cessation interventions for PLWH has been a challenge,[31] and it is reasonable to expect that getting established PLWH smokers to quit in Kenya will be difficult as well. In order to create a culturally appropriate cessation strategy in a new target population, one must begin by understanding the social and behavioral milieus of their tobacco use and how they may differ from those of other smoking populations. Accomplishing this task often relies upon the examination of aggregate statistics, for example, national reports, and the performance of thoughtfully constructed structured interviews and focus groups in subsets of the target population. In the process of developing a cessation intervention for PLWH smokers in Kenya, we have done both. Herein we report the results of a structured interview on cigarette smoking behaviors and beliefs conducted in a group of 50 PLWH smokers in Kenya.

Our participant sample had a mean age of 38.5 and was predominantly male, similar to the gender pattern of smoking in the nation as a whole.[2,9,10] The mean daily cigarette consumption of 14.9 is higher than the national average of 8

Table 3. Tobacco use behaviors of study participants.

BEHAVIOR	N = 50
Cigarettes smoked per day (mean ± SD; [range])	14.9 ± 12.4; [1-60]
Smoking frequency	
Daily	41 (82.0%)
Non-daily	9 (18.0%)
Type of cigarette most frequently smoked	
Regular	47 (94.0%)
Menthol	3 (6.0%)
Usual unit of cigarette purchase	
Pack	0 (.0%)
Singles (“sticks”)	50 (100.0%)
Current use of other tobacco products	
Chewing tobacco (including paan, gutka, mishri, zarda, and kuber)	2 (4.0%)
Nasal snuff	2 (4.0%)
Cigars, pipe, hookah, or bidis	0 (.0%)
Age at cigarette smoking initiation (mean ± SD; [range])	17.5 ± 4.8 [9-30]
Lives with another smoker	20 (40.0%)
Number of lifetime quit attempts (mean ± SD; [range])	1.2 ± 1.1 [0-3]
Quitting strategies or aids used in the past	
Unassisted (“cold-turkey”)	31 (62.0%)
Behavioral counseling	1 (2.0%)
Nicotine replacement therapy	4 (8.0%)
Varenicline or bupropion	0 (.0%)
Nicotine dependence	
Low	8 (16.0%)
Low-moderate	5 (10.0%)
Moderate	30 (60.0%)
High	7 (14.0%)
Motivation to quit (stage of change)	
Pre-contemplation	5 (10.0%)
Contemplation	19 (38.0%)
Preparation	22 (44.0%)
Action	4 (8.0%)
Locus of control	
Intrapersonal	4.2 ± 1.1
Interpersonal	4.2 ± 1.2
Fate	4.2 ± 1.2
Intrinsic/extrinsic motivation to quit	
Intrinsic	4.4 ± 0.5
Extrinsic	2.6 ± 1.1
Self-concept	
Smoker	4.4 ± 2.5
Abstainer	4.4 ± 2.5

(Continued)

Table 3. Continued.

BEHAVIOR	N = 50
Self-efficacy	
Positive affect/social situation	3.8 ± 0.9
Negative affect	3.9 ± 1.2
Habit/craving	3.3 ± 1.0
Anxiety	
Minimal	27 (54.0%)
Mild	8 (16.0%)
Moderate	12 (24.0%)
Severe	6 (12.0%)
Depression	
Scored at risk for clinical depression	20 (40.0%)
Pain	3.7 ± 4.0
Social support	
Positive behavior	30.5 ± 6.8
Negative behavior	24.4 ± 7.4
Spiritual well-being	
Meaning	13.0 ± 3.2
Peace	10.2 ± 2.1
Faith	12.7 ± 4.4

cigarettes per day.[2] It is notable that all of our participants purchased their cigarettes as single sticks and not as packs. This may be a strategy to lessen the financial burden of smoking (a pack of cigarettes costs approximately 140 KES/1.20 USD, and the cost of a single stick ranges from 5-25 KES/0.05-.23 USD), and it may reduce the impact of package-based tobacco warnings. It is likely that the heavy representation of persons in methadone maintenance contributed to the relatively high cigarette consumption rate and the cigarette purchasing behaviors of our sample. Both nicotine dependence levels and motivation to quit were high in our sample. Similar to the national surveys, dual tobacco use was uncommon, and there was little use of medications to assist quit attempts.[2,9,10] Our participants had relatively low educational attainment and high levels of past or present alcohol and drug use. They reported low levels of smoking-related comorbidities, although 36% of them had had tuberculosis.

The locus of control measure assessed our participants' perception of factors contributing to their involvement with smoking. The scale permits the separate evaluation of intrapersonal (control resides within the participant), interpersonal (control resides with other individuals), and fate (smoking and quitting are outside of human control). Higher intrapersonal locus of control beliefs predicts better health-related behavior outcomes.[32] Our observation that locus of control scores were equivalent across the intrapersonal, interpersonal, and fate domains suggests that a counseling intervention should try to strengthen the belief that a smoker is the ultimate decisor of his/her tobacco use, and not others or fate. Intrinsic and extrinsic motivations to quit are important predictors of successful cessation, and higher levels of intrinsic vs extrinsic motivation are predictive of better cessation outcomes.[21] Our participants' significant tilt toward intrinsic motivation suggests that they may be more amenable to cessation interventions. Their significant self-conceptual identification with the abstainer persona over the smoker persona is also a favorable predictor of successful quitting.[22]

Anxiety and depression both play important roles in cigarette smoking.[33] The rates of anxiety and depression that we observed were much lower than the 61.7% and 73.3% rates reported in a US sample of PLWH smokers.[34] The interactions of psychiatric illness with HIV, tobacco use, other substance use, and poverty are complex and multilayered, and assumptions about anxiety and depression derived from data in the US are not necessarily applicable to sub-Saharan Africa[35] or other areas of the world. The relationship of anxiety and depression to tobacco use in Kenya is beyond the scope of this project, but it is a worthy topic for future research. Although coping with chronic pain is an important driver of tobacco use in certain populations,[36] only about a quarter of our sample reported severe pain in the past 7 days.

In accordance with the national sample surveyed by the International Tobacco Control (ITC) Project,[2] we observed

Table 4. Perceived risks and benefits of smoking.

	N = 50		
	NOT AT ALL, %	SOMEWHAT, %	A LOT, %
Perceived risks ("For you, how much do these things bother you about smoking?")			
Worrying about getting seriously ill	24.0	22.0	54.0
Smelling like smoke	34.0	16.0	50.0
Exposing others to secondary smoke	16.0	18.0	66.0
Expense of smoking	10.0	16.0	74.0
Stigma (ie, rejection from others)	40.0	12.0	48.0
Inconvenience (eg, smoke-free laws)	34.0	16.0	50.0
Looking older	40.0	4.0	56.0
Feeling tired and/or out of breath	20.0	20.0	60.0
Setting a bad example for children	20.0	8.0	72.0
Perceived benefits ("How much do you think smoking helps you with..?")			
Weight control	74.0	14.0	12.0
Moving your bowels	54.0	18.0	28.0
Enhanced narcotic response (ie, increases the "high" from other drugs)	26.0	18.0	56.0
Fighting HIV infection	96.0	4.0	0.0
Fighting other infections	96.0	4.0	0.0
Increasing your T-cell count	94.0	4.0	2.0
Decreasing your pain	86.0	12.0	2.0
Controlling anxiety	46.0	26.0	28.0
Controlling anger	36.0	24.0	40.0
Controlling depression	40.0	34.0	26.0
Increasing relaxation	24.0	36.0	40.0
Being accepted by other smokers	42.0	16.0	42.0
Increasing social contact	44.0	20.0	36.0

near universal recognition of the health harms of cigarette smoking and significant concern over the damage that smoking could do to themselves and to those around them. In contrast to the ITC report, a large majority of our participants were concerned with the financial costs of their smoking. The leading causes of stress identified by our participants were financial and job-related. In comparison to other groups that we have studied in the United States,[37] our participants did not minimize their risk of suffering serious health consequences of smoking, including death, when they compared themselves to other patients in their clinics.

Slightly more than half of participants reported that their primary health care providers had discussed smoking cessation with them, but few offered them any sort of cessation assistance. The government of Kenya has been a leader in promoting tobacco control throughout the nation. Further measures may be indicated to better recruit health care professionals into this effort and to put more cessation resources at their disposal.

Finally, we found high levels of spiritual well-being in our participants. Despite the enormous socioeconomic and health challenges that they faced, they scored high on self-assessments of meaning, peace, and faith. For those who are counseling such individuals to quit, this may provide a source of strength and resolve to smokers trying to overcome their addiction to cigarettes.

Our study had several weaknesses that require mention. The sample size was small and inferences from a group of this size should be interpreted with caution. Participants were recruited from several care centers, but all within Nairobi. They may not be representative of Kenyan PLWH from other locales or from non-urban areas. The majority of our sample was in methadone maintenance. This likely contributed to the larger proportion of women in the group than would be expected from national cigarette smoking statistics. Although substance use is common in cigarette smokers and vice versa, our findings may not be fully generalizable to a non-substance-using PLWH population. Finally, the data collection methodology, that is, direct questioning by study staff, introduces concern for social desirability bias and likely accounts, in part, for the extremely high interest in quitting reported by our participants.

Conclusions

A significant proportion of Kenyan PLWH, especially the men, are current cigarette smokers. The health implications of their tobacco use are destined to increase as the wide availability of effective antiretroviral therapy puts control of their HIV

infection within reach. Leading concerns among PLWH smokers are the potential effects of second-hand smoke on those around them, setting a bad example for children, and the financial costs associated with cigarette smoking. Along with the direct health effects of cigarettes on their smokers, smoking cessation counseling should emphasize some of these ancillary harms and explain the benefits of quitting in a similarly expansive manner. Studies such as this one will be vital in elucidating the social and behavioral underpinnings of tobacco use in this very vulnerable group so that culturally appropriate smoking cessation strategies may be devised and implemented.

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Authors' Contributions

J.S., S.A.O., E.K., and S.S.H. planned the study, oversaw its conduct, and prepared the manuscript. P.O., M.O., and L.K. performed the research. A.O.A., T.W.M., W.P., M.E.B., and A.H.W. contributed within their areas of expertise (pharmacy, clinical trial management, and behavioral psychology) to data interpretation and to the review of the manuscript.

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REFERENCES

1. Frieden TR. SHATTUCK LECTURE: the future of public health. *N Engl J Med*. 2015;373(18):1748-1754.
2. ITC Project. *ITC Kenya National Report. Findings from the Wave 1 (2012) Survey*. Waterloo, Ontario Canada: University of Waterloo; Nairobi, Kenya: Ministry of Health [Kenya], Kenya Medical Research Institute, International Institute for Legislative Affairs, and University of Nairobi; December 2015.
3. Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. *Lancet Glob Health*. 2017;5(6):e578-e592.
4. Husain MJ, English LM, Ramanandraibe N. An overview of tobacco control and prevention policy status in Africa. *Prev Med*. 2016;91:S16-S22.
5. UNAIDS. Fact sheet - World AIDS Day 2019. Accessed May 28, 2020. https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf
6. Murphy JD, Liu B, Parascandola M. Smoking and HIV in Sub-Saharan Africa: a 25-country analysis of the demographic health surveys. *Nicotine Tob Res*. 2019;21(8):1093-1102.
7. Helleberg M, Afzal S, Kronborg G, et al. Mortality attributable to smoking among HIV-1-infected individuals: a nationwide, population-based cohort study. *Clin Infect Dis*. 2013;56(5):727-734.
8. Reddy KP, Parker RA, Losina E, et al. Impact of cigarette smoking and smoking cessation on life expectancy among people with HIV: a US-based modeling study. *J Infect Dis*. 2016;214(11):1672-1681.
9. Magati P, Drope J, Mureithi L, Lencucha R. Socio-economic and demographic determinants of tobacco use in Kenya: findings from the Kenya demographic and health survey 2014. *Pan Afr Med J*. 2018;30:166.
10. Ngaruiya C, Abubakar H, Kiptui D, et al. Tobacco use and its determinants in the 2015 Kenya WHO STEPS survey. *BMC Publ Health*. 2018;18(suppl 3):1223.
11. World Health Organization. Global Youth Tobacco Survey. Kenya 2013 Fact Sheet. Accessed September 9, 2020. https://extranet.who.int/ncdsmicrodata/index.php/catalog/142 https://extranet.who.int/ncdsmicrodata/index.php/catalog/142
12. Kinyanjui DW, Atwoli L. Substance use among inmates at the Eldoret prison in Western Kenya. *BMC Psychiatr*. 2013;13:53.
13. Mwenesi HA. Rapid assessment of drug abuse in Kenya. *Bull Narc*. 1996;48(1-2):65-78.
14. Mohamed SF, Juma P, Asiki G, Kyobutungi C. Facilitators and barriers in the formulation and implementation of tobacco control policies in Kenya: a qualitative study. *BMC Publ Health*. 2018;18(suppl 1):960.
15. UNAIDS. Country: Kenya. Accessed May 28, 2020. https://www.unaids.org/en/regionscountries/countries/kenya
16. Elf JL, Variava E, Chon S, et al. Prevalence and correlates of smoking among people living with HIV in South Africa. *Nicotine Tob Res*. 2018;20(9):1124-1131.
17. Krishnan N, Gittelsohn J, Ross A, et al. Qualitative exploration of a smoking cessation trial for people living with HIV in South Africa. *Nicotine Tob Res*. 2018;20(9):1117-1123.
18. Abrams DBNR, Brown RA, Emmons KM, Goldstein MG, Monti PM. *The Tobacco Dependence Treatment Handbook: A Guide to Best Practices*. New York: The Guilford Press; 2003.
19. Fagerstrom K-O, Schneider NG. Measuring nicotine dependence: a review of the Fagerstrom Tolerance Questionnaire. *J Behav Med*. 1989;12(2):159-182.
20. Abrams DB, Biener L. Motivational characteristics of smokers at the workplace: a public health challenge. *Prev Med*. 1992;21(6):679-687.
21. Curry S, Wagner EH, Grothaus LC. Intrinsic and extrinsic motivation for smoking cessation. *J Consult Clin Psychol*. 1990;58(3):310-316.
22. Shadel WG, Mermelstein R. Individual differences in self-concept among smokers attempting to quit: Validation and predictive utility of measures of the smoker self-concept and abstainer self-concept. *Ann Behav Med*. 1996;18(3):151-156.
23. Velicer WF, Diclemente CC, Rossi JS, Prochaska JO. Relapse situations and self-efficacy: an integrative model. *Addict Behav*. 1990;15(3):271-283.
24. Zhang W, O'Brien N, Forrest JI, et al. Validating a shortened depression scale (10 item CES-D) among HIV-positive people in British Columbia, Canada. *PLoS One*. 2012;7(7):e40793.
25. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092-1097.
26. Elliott TE, Murray DM, Oken MM, et al. Improving cancer pain management in communities: main results from a randomized controlled trial. *J Pain Symptom Manage*. 1997;13(4):191-203.
27. Mermelstein R, Cohen S, Lichtenstein E, Baer JS, Kamarck T. Social support and smoking cessation and maintenance. *J Consult Clin Psychol*. 1986;54(4):447-453.
28. McKee SA, O'Malley SS, Salovey P, Krishnan-Sarin S, Mazure CM. Perceived risks and benefits of smoking cessation: gender-specific predictors of motivation and treatment outcome. *Addict Behav*. 2005;30(3):423-435.
29. Peterman AH, Reeve CL, Winford EC, et al. Measuring meaning and peace with the FACIT-spiritual well-being scale: distinction without a difference? *Psychol Assess*. 2014;26(1):127-137.
30. Hartmann DJ. Replication and extension analyzing the factor structure of Locus of Control scales for substance-abusing behaviors. *Psychol Rep*. 1999;84(1):277-287.
31. Pool ER, Dogar O, Lindsay RP, Weatherburn P, Siddiqi K. Interventions for tobacco use cessation in people living with HIV and AIDS. *Cochrane Database Syst Rev*. 2016;2016(6):CD011120.
32. Wallston BD, Wallston KA. Locus of control and health: a review of the literature. *Health Educ Monogr*. 1978;6(2):107-117.
33. Fluharty M, Taylor AE, Grabski M, Munafò MR. The association of cigarette smoking with depression and anxiety: a systematic review. *Nicotine Tob Res*. 2017;19(1):3-13.
34. Shuter J, Bernstein SL, Moadel AB. Cigarette smoking behaviors and beliefs in persons living with HIV/AIDS. *Am J Health Behav*. 2012;36(1):75-85.
35. Mayston R, Frissa S, Tekola B, Hanlon C, Prince M, Fekadu A. Explanatory models of depression in sub-Saharan Africa: Synthesis of qualitative evidence. *Soc Sci Med*. 2020;246:112760.
36. Chapman SLC, Wu L-T. Associations between cigarette smoking and pain among veterans. *Epidemiol Rev*. 2015;37:86-102.
37. Shuter J, Litwin AH, Sulkowski MS, et al. Cigarette smoking behaviors and beliefs in persons living with hepatitis C. *Nicotine Tob Res*. 2017;19(7):836-844.