

Cigarettes and the Somali Diaspora

Tobacco Use Among Somali Adults in Minnesota

Kristin K.W. Giuliani, MHS, Osman Mire, MPH, Andrea Leinberger-Jabari, MPH, Laura C. Ehrlich, MPH, Melissa H. Stigler, PhD, MPH, Douglas J. Pryce, MD, Diana K. DuBois, MPH, MIA

Background: Since the onset of the Somali civil war in 1991, more than 1 million Somalis have been displaced from Somalia. Minnesota has the largest Somali population in the U.S. Informal tobacco prevalence estimates among Somali populations in the U.S. and the United Kingdom range from 13% to 37%, respectively. Little research has been conducted to determine the extent of Somali tobacco use.

Purpose: This paper reports the results from a knowledge, attitudes, and practices (KAP) survey conducted and analyzed in 2009 that explores tobacco use and estimates prevalence among Somali adults aged ≥ 18 years in Minnesota.

Methods: Modeled after validated state and national tobacco use surveys, the survey was adapted for Somalis and administered to ethnically Somali adults ($N=392$) from 25 neighborhood clusters in Minnesota. Participants were chosen through probability proportional to size and multistage random sampling methods.

Results: Estimated prevalence for cigarette use among Somalis was 24% (44% among men, 4% among women). Ever users were significantly more likely to be men, have attended college, and have friends who used cigarettes ($p<0.0001$). Belief in Islamic prohibition of tobacco was protective and affected current use and future intention to use tobacco ($p<0.0001$). The majority of Somali smokers were unwilling to use current cessation programs.

Conclusions: Estimated cigarette use prevalence was lower than perceived prevalence (37%). Contrary to typical results, greater smoking prevalence was found among Somalis with higher education levels. Positive peer pressure and religion are protective factors from tobacco use and should be integrated into prevention and cessation programs.

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Introduction

In 2010, the CDC¹ reported that statewide smoking prevalence for Minnesota adults had decreased by more than 27% since 1999. Adult smoking prevalence in Minnesota is estimated to be around 16%, consistently lower than the U.S. population (19.3%).^{1–4} However, minority populations face substantial health disparities, including higher smoking prevalence and

lower tobacco cessation success (www.health.state.mn.us/omh, www.americashealthrankings.org).^{5–8}

The Somali diaspora includes more than 1 million Somalis who have resettled in countries across Africa, the Middle East, Europe, Australia, and North America since the onset of civil war in 1991.⁹ Somalis have settled in nearly every state and compose the largest African refugee group in America, with the majority residing in Minnesota.^{10,11} Minnesota's 2010 official estimate was more than 32,000 Somalis, and community estimates are as high as 70,000 (factfinder2.census.gov).¹⁰

Somalis have sizeable communities in major cities worldwide, including Nairobi, London, Toronto, Helsinki, Cairo, Sydney, and San Diego.¹⁰ Yet specific health information for the Somali population is virtually non-existent. Health data for Somalia, including tobacco use, are not available.¹² Gathering representative data on most immigrant/refugee populations is challenging. Somalis in the U.S. live in shifting

From WellShare International (Giuliani, Mire, Ehrlich, DuBois), the Office of Community Engagement for Health (Leinberger-Jabari), Clinical and Translational Science Institute, University of Minnesota, the Hennepin County Medical Center (Pryce), Minneapolis, Minnesota; and Michael and Susan Dell Center for Advancement of Healthy Living (Stigler), School of Public Health, UTHealth, Austin Regional Campus, Austin, Texas

Address correspondence to: Diana K. DuBois, MPH, MIA, Executive Director, WellShare International, 122 West Franklin Avenue, Suite 510. Minneapolis MN 55404. E-mail: ddubois@wellshareinternational.org.

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communities with nebulous borders where an individual may fall under any number of residency categories (i.e., asylee, refugee, or national).¹⁰

Smoking prevalence for Somalis in Minnesota is estimated from 6% to 16% and as high as 31% among Somali adults in the United Kingdom, and individuals cite peer pressure and stress as primary reasons for smoking.^{13–15} It is unknown if Somalis face similar disparities as other minority populations; surveys usually do not disaggregate the racial category of “black/African-American” into subcategories. Given the diversity of sociocultural norms, it is reasonable to question the homogeneity of tobacco prevalence, tobacco-related beliefs, and efficacy of cessation programs across subgroups.^{16,17} There is a perception of very high tobacco use among Somalis and with smokers dying, on average, 14 years earlier than nonsmokers, there is a need to determine tobacco use prevalence and appropriately target prevention and cessation programs.^{14,18,19}

In 2006, in response to this need and to establish a reliable model for collecting population data in the absence of an official sampling frame, WellShare International, Hennepin County Medical Center (HCMC), and the Confederation of Somali Community in Minnesota (CSCM) initiated the Somali Tobacco Research Project, a 3-year, multifaceted research project designed to answer 12 pre-established research questions (Table 1). Data collected from focus groups of Somali youth and adults in 2006 and a school-based youth knowledge, attitudes, and practices (KAP) survey in 2008 revealed that perceived prevalence of smoking among Somali adults in Minnesota was 37%.^{15,20} Additionally, Somalis mentioned that prevention and cessation messages should incorporate religious and cultural content and, consequently, current efforts were less effective.^{15,20} In 2009, the project team conducted and analyzed a KAP survey designed to better inform Somali tobacco programming for adults through exploration of factors related to tobacco use and to reliably estimate tobacco use prevalence among Somali adults in Minnesota.

Methods

Study Design

The adult survey portion of the Somali Tobacco Research Project used a mixed-method, cross-sectional design to describe factors related to tobacco use among Somali adults. The overall study's sequential exploratory design began with qualitative research methods, which were used to inform survey creation (key informant interviews and focus groups; methods described elsewhere).¹⁵ A school-based Somali youth KAP survey was administered in 2008.²⁰ Preliminary statistical results from the youth survey were used to modify specific questions in the adult version. This paper presents quantitative results obtained from the Somali adult KAP survey conducted in 2009.

Table 1. Somali Tobacco Research Project guiding research questions, 2006–2009

1. Where and in what socio-environmental contexts is tobacco used? ^a
2. Which factors lead to and sustain tobacco use? ^a
3. Which factors lead to and sustain cessation? ^a
4. What is the dominant Somali perception of existing cessation programs and the success of these programs in the Somali community? ^a
5. Which intervention components/messages are effective in increasing tobacco use cessation? ^a
6. Which tobacco marketing messages resonate with Somalis? ^a
7. Where and under what conditions do Somali adults and youth purchase or obtain tobacco? ^a
8. Among Somali adults and youth, who uses tobacco? ^a
9. What types of tobacco are used? ^a
10. How much tobacco is used? ^a
11. How often is tobacco used? ^a
12. Are self-reported estimates of cigarette use among adults reliable?

^aDenotes questions addressed by Somali Adult Tobacco Survey

Participants

Data were collected on 392 adults (defined as individuals aged ≥18 years not attending high school) from 25 clusters corresponding to 25 officially designated neighborhoods where Somalis were known to reside based on information gathered from neighborhood associations, community leaders, WellShare Somali community health workers, and Somali neighborhood residents. Adults were selected based on the Probability Proportional to Size (PPS) sampling method. As no official census of the Somali population in Minnesota existed, an overall population estimate was calculated at 36,591 by triangulating data from the Minnesota State Demographer's estimate from 2004, data from the Minnesota Department of Health on primary Somali refugee arrivals to Minnesota for 2005–2007 and births to Somali-born women in Minnesota for 2004–2006. As an estimated 37% of the Somali population in Minnesota is under 18 years (based on Minnesota Department of Education number of enrolled Somali students and children 0–5 years), areas with nine births or fewer (for a proportional population of 80 people maximum) were excluded from the sampling frame because of an insufficient anticipated number of adults available for sampling. Using an estimated prevalence of tobacco use for men (20%–30%) and women (5%–10%), a sample size of 400 individuals was chosen to allow for a 95% confidence level and 10% precision with subsamples of men versus women and smokers versus nonsmokers.

Using official city maps, certain blocks within each cluster were pre-identified as locations with large numbers of Somalis. Each block was assigned a random number and addresses on each block were physically collected, listed sequentially, and numbered to generate an address list. The starting point was determined by generating a random number to correspond to a particular address

within the first numbered block in each of the clusters. Sixteen individuals (eight male, eight female) were interviewed from each cluster. Two Somali interviewers, one male and one female, were assigned to each cluster and were instructed to interview eight individuals of the same gender, beginning with the selected address and continuing down the list. One adult from each home was randomly selected to participate. Each subsequent address was identified by the previous interviewee as the next geographically nearest Somali household of nonrelatives. If the interviewer ran out of addresses for the selected block, they moved to the first address in the next listed block. Participants signed informed consent forms and were given a financial incentive of \$20 for survey completion. A pilot was first conducted with three selected clusters of 16 individuals ($n=48$) in order to test the cultural appropriateness and survey design (Table 1). IRB approval was obtained for all study activities by the Minneapolis Medical Research Foundation, Minneapolis, MN.

Data Collection

The KAP survey was designed to collect comprehensive, quantitative data on Somali adult tobacco use. Instrument creation began with a literature search on tobacco use among various immigrant and refugee groups in the U.S. Pre-established research questions (Table 1) and preliminary results from qualitative research guided survey topics.¹⁵ As no single validated adult tobacco use survey contained all elements necessary to sufficiently address research questions, numerous validated surveys were reviewed and used to construct a basic survey draft, which was approved by an expert survey team at the University of Wisconsin before being piloted.^{21–28} The Somali survey format and most questions were taken unmodified from the National Health and Nutrition Examination Survey Questionnaire, but also utilized questions from the National Health Interview Survey Questionnaire, and the Behavioral Risk Factor Surveillance System.^{21–24}

Select questions were used from the Diverse Racial Ethnic Groups and Nations (DREGAN) Survey, Fagerstrom Nicotine Tolerance Questionnaire, Stages of Change Questionnaire, and a previously conducted WellShare International survey.^{25–28} Smoking behavior was measured in a variety of ways, including lifetime number of cigarettes smoked, number of cigarettes per day, number of days smoked in the past 30 days, and time between cigarettes. Adult surveys were created in English, translated into Somali, and then reviewed by three Somali WellShare staff for accuracy, consistency of messages, and general comprehensibility. The 89-question, multiple-choice, and Likert-type survey was administered orally by WellShare staff in either Somali or English, depending on respondent preference. Questions focused on demographics (nine items); level of acculturation (two items); tobacco use behaviors (28 items); cessation behaviors (15 items); attitudes toward tobacco use (23 items); and exposure to tobacco use (12 items).

Data Analysis

Estimates of tobacco use prevalence and certain characteristics specific to tobacco cessation were generated using unconditional logistic regression models. Demographic factors and key psychosocial risk factors for tobacco were used as predictors of tobacco use status variables (never versus ever users and never versus current users) using logistic regression models unadjusted for covariates to explore the associations between these variables and tobacco use status. The level of significance was set to 0.05. Mixed-effects re-

gression models were used in all analyses, which were conducted using SAS PROC MIXED 9.1. Sandwich-type estimators were used to generate robust standard errors in these models, providing analogous results to a design-based approach to analysis (e.g., SAS PROC SURVEYMEANS).²⁹ Sandwich estimators for variance, based on Huber's formula for individual-level data, are preferred because they produce consistent standard errors that are independent of model specification, and are robust to heteroscedasticity, or weighted data.^{29–31}

Results

Demographics

Table 2 presents demographic information on the 392 adults sampled. There was a 98% participation rate, with 188 (48.3%) women and 201 (51.7%) men (three missing gender values). The average age was 41.9 years, with ages ranging from 18 to 87 years. Nearly all participants (98.0%) were born in Somalia.

Prevalence

More than one third of Somali adults reported having ever used any form of tobacco product ($35.2\% \pm 6.2\%$), with 25.7% ($\pm 5\%$) current users (defined as people who report using tobacco in the past 30 days) and 9.5% former users. Cigarette smoking was by far the most prevalent tobacco product; 33.9% (60.7% of men; 4.8% of women) of the adults reported ever smoking cigarettes, with 24.5% (44.1% of men, 3.7% of women) current smokers and 9.4% (16.6% of men, 1.1% of women) former smokers. On average, Somalis smoked 6–10 cigarettes per day (Table 2). Hookah smoking was the next most prevalent tobacco product, with 8.1% ever users and 2.5% current users. Other tobacco products were rarely or never used.

Demographics and Smoking Status

Cigarette smoking varied significantly by gender; 44.1% ($\pm 9.8\%$) of men and only 3.7% ($\pm 2.8\%$) of women are current smokers. The highest prevalence of cigarette smoking was among individuals aged 20–29 years (29.0%) and 40–49 years (29.2%; Table 2). Table 3 presents associations between demographic characteristics and lifetime tobacco use status (never smokers versus ever smokers [which collapsed both current smokers and ex-smokers because the small numbers of the latter prevented its separate analysis]). Somali men were significantly more likely to have used tobacco than to have never used. Among all survey respondents, 91.3% of those who reported having ever used tobacco were men, whereas only 29.9% of never users were men ($p < 0.01$). Education had an atypical impact on lifetime tobacco use status; never users were more likely to have never attended school while ever users were more likely to have some college education.

Table 2. Participant demographics, Somali Adult Survey, 2009, % unless otherwise noted

	All adults (N=392)
Gender	
Male	51.7
Female	48.3
Average age (years; M)	41.9
Education	
Never attended school	17.8
<High school	29.0
High school graduate	30.0
Vocational/business school	2.9
Some college	13.1
College degree	5.5
Advanced degree	1.3
Other (i.e., ELL)	0.5
Country of birth	
Somalia	98.0
U.S.	0.3
Other (i.e., Kenya, Ethiopia, Zambia)	1.7
Average years in U.S. (M)	8.6
Employment status	
Working, at least one job	33.8
Student	7.9
Retired	20.0
Disabled	3.3
Not currently working	32.7
Marital status	
Married	46.8
Separated/divorced	26.1
Widowed	7.2
Never been married	20.0
Residence	
Twin Cities Metro	53.1
Suburban	26.8
Rural	20.2
Cigarette smoking prevalence	
Ever users	33.9
Current users	24.5
Never users	66.1

(continued)

Table 2. (continued)

	All adults (N=392)
CIGARETTE SMOKING BY GENDER	
Male	
Ever users	60.7
Current users	44.1
Never users	39.3
Female	
Ever users	4.8
Current users	3.7
Never users	95.2
Cigarette smoking by age (years; n=101 current users)	
18–19	0.0
20–29	29.0
30–39	24.2
40–49	29.2
50–59	17.0
≥60	20.5
Number of cigarettes smoked per day (n=101 current users; 4 missing values)	
≤1	4.0
2–5	19.8
6–10	28.7
11–20	19.8
>20	22.8

ELL, English-language learner

Differences Between Never and Current Tobacco Users

Table 4 illustrates associations between selected psychosocial measures and current (excluding ex-smokers) and never tobacco use. Current users were significantly more likely to have close friends that smoked cigarettes, chewed tobacco or used hookah/sheisha. However, few individuals reported living with anyone who used tobacco. Nearly one fifth of current users were willing to wear clothing with tobacco labels versus only 4% of never users ($p<0.01$). Current users were more likely to underestimate how quickly tobacco use causes negative health impacts (e.g., smoking 1–5 cigarettes per day may not cause harm); however, the actual percentage of participants holding inaccurate beliefs was relatively small. Never users had a much stronger belief that tobacco should be prohibited in Islam ($p<0.0001$). Nearly 100%

Table 3. Differences between ever and never users of tobacco by demographic characteristics, Somali Adult Survey, 2009 (N=392)

	Never users (n=254) % (95% CI)	Ever users ^a (n=138) % (95% CI)	Ratio*	p**
Gender				
Male	29.9 (24.5, 35.3)	91.3 (85.9, 96.7)	0.3:1	<0.01
Female	70.1 (64.7, 75.5)	8.7 (3.3, 14.1)	8.1:1	<0.01
Education				
Never attended	21.8 (12.8, 30.8)	9.5 (0.7, 18.3)	2.3:1	0.02
<High school	32.0 (24.2, 39.8)	24.4 (16.4, 32.4)	1.3:1	0.08
High school graduate	29.8 (22.4, 37.2)	30.8 (20.8, 40.8)	1.0:1	0.83
Vocational/business school	2.5 (0.1, 4.9)	3.4 (0.2, 6.6)	0.7:1	0.52
Some college	7.7 (4.7, 12.3)	22.8 (14.8, 30.8)	0.3:1	<0.01
College degree	4.8 (1.4, 8.2)	6.8 (2.4, 11.2)	0.7:1	0.42
Advanced degree	1.2 (0.2, 2.6)	1.5 (0.0, 3.5)	0.8:1	0.84
Other (i.e., ELL)	0.1 (0.0, 1.3)	1.0 (0.0, 3.6)	0.1:1	0.30
Country of birth				
Somalia	99.3 (98.1, 100.0)	95.6 (91.6, 99.6)	1.0:1	0.09
U.S.	Not estimable	Not estimable		
Other (i.e., Kenya, Ethiopia)	0.8 (0.0, 2.0)	4.5 (0.5, 8.5)	0.2:1	0.09
Employment status				
Working, at least one job	33.3 (25.3, 41.3)	34.9 (25.7, 44.1)	1.0:1	0.76
Student	7.2 (3.8, 10.6)	9.6 (4.4, 14.8)	0.8:1	0.32
Retired	22.2 (13.8, 30.6)	14.9 (6.3, 23.5)	1.5:1	0.13
Disabled	2.4 (0.8, 4.0)	5.1 (1.3, 8.9)	0.5:1	0.11
Not currently working	33.7 (26.7, 40.7)	31.0 (23.6, 38.4)	1.1:1	0.58
Marital status				
Married	47.9 (37.5, 58.3)	45.6 (35.2, 56.0)	1.1:1	0.65
Separated/divorced	23.7 (16.3, 31.1)	29.6 (21.0, 38.2)	0.8:1	0.11
Widowed	10.1 (5.5, 14.7)	1.6 (0.0, 3.4)	6.3:1	<0.01
Never been married	18.1 (10.7, 25.5)	23.7 (14.5, 32.9)	0.8:1	0.23
Residence				
Twin Cities Metro	49.2 (43.0, 55.4)	60.1 (51.7, 68.5)	0.8:1	0.04
Suburban	28.4 (22.8, 34.0)	23.9 (16.3, 31.5)	1.2:1	0.35
Rural	22.4 (17.4, 27.4)	15.9 (9.1, 22.7)	1.4:1	0.13
	M (95% SE)	M (95% SE)	Ratio*	p**
Average age (years)	41.7 (1.81)	41.9 (1.87)	1.0:1	0.91
Average years in U.S.	8.2 (0.36)	9.4 (0.60)	0.9:1	0.08

^aDefined as people who report smoking cigarettes in the last 30 days

*Compares percentages/means of never users in a given demographic category with those of ever users in the same demographic category

**Significant at $p < 0.05$

ELL, English-language learner

Table 4. Differences in selected psychosocial measures, by current tobacco use, Somali Adult Tobacco Survey, 2009 (N=392)

	Never users (n=291) % (95% CI)	Current users ^a (n=101) % (95% CI)	Ratio*	p**
Exposure to others' tobacco use				
Do any of your close friends smoke cigarettes?	14.0 (6.2, 21.8)	84.1 (79.5, 88.7)	0.2:1	<0.01
Do any of your close friends use chewing tobacco?	2.3 (0.1, 4.5)	12.7 (4.1, 21.3)	0.2:1	0.02
Do any of your close friends use hookah/sheisha?	8.5 (5.3, 11.7)	37.5 (27.5, 47.5)	0.2:1	<0.01
Does anyone who lives with you now smoke cigarettes?	4.5 (2.1, 6.9)	11.2 (4.0, 18.4)	0.4:1	0.06
Does anyone who lives with you now use chewing tobacco?	Not estimable	Not estimable		
Does anyone who lives with you now use hookah/sheisha?	0.3 (0.0, 0.9)	3.0 (0.0, 6.2)	0.1:1	0.12
Exposure to pro-tobacco influences				
When you watch TV/movies, how often do you see actors use tobacco? ^b	41.9 (32.9, 50.9)	44.2 (32.4, 56.0)	0.9:1	0.75
When you watch TV, how often do you see athletes using tobacco? ^b	4.4 (1.4, 7.4)	2.1 (0.0, 5.5)	2.1:1	0.35
When you are using the internet, how often do you see ads for tobacco? ^b	17.1 (8.5, 25.7)	23.7 (13.1, 34.3)	0.7:1	0.30
Would you ever use or wear something with a tobacco company name on it? ^c	4.0 (1.4, 6.6)	19.1 (9.5, 28.7)	0.2:1	<0.01
Have you seen any advertisements for tobacco targeted at Somali community? ^c	2.1 (0.1, 4.1)	2.1 (0.0, 5.9)	1.0:1	0.94
Have you participated in community activities discouraging tobacco use? ^c	5.1 (2.3, 7.9)	2.1 (0.0, 4.7)	2.4:1	0.07
Beliefs about the consequences of tobacco use				
Do you think tobacco use should be forbidden in Islamic law?	81.4 (76.8, 86.0)	39.6 (25.4, 53.8)	2.1:1	<0.01
Do you think people harm themselves if they smoke 1–5 cigarettes per day? ^c	98.3 (96.9, 99.7)	89.9 (83.5, 96.3)	1.1:1	0.01
Do you think it is safe to smoke for only a year or two, then quit after that? ^c	18.5 (12.9, 24.1)	24.5 (15.9, 33.1)	0.8:1	0.20
Do you believe that light cigarettes are less risky than regular cigarettes? ^c	16.0 (9.6, 22.4)	22.6 (11.4, 33.8)	0.7:1	0.29
Do you believe using hookah/sheisha is less risky than smoking cigarettes? ^c	15.6 (9.8, 21.4)	23.8 (13.6, 34.0)	0.7:1	0.14
Has a doctor, dentist, nurse, or other health professional asked if you use tobacco?	69.5 (59.7, 79.3)	59.9 (49.3, 70.5)	1.2:1	0.03
Cultural values and beliefs				
How important do you feel it is to keep in touch with Somali culture? ^d	100.0 (not estimable)	99.0 (97.2, 100.0)	1.0:1	0.30
How important do you feel it is to learn about American culture? ^d	96.9 (94.9, 98.9)	95.0 (90.6, 99.4)	1.0:1	0.40

^aDefined as people who report smoking cigarettes in the past 30 days

^bDefined as "most of the time" and "some of the time" (1) versus *hardly ever* and *never* (0); *I don't watch TV/use internet* coded as missing

^cDefined as *definitely yes* and *probably yes* (1) versus *probably not* and *definitely not* (0)

^dDefined as *very important* and *somewhat important* (1) versus *not very important* and *not at all important* (0)

*Compares percentages of never users' response with those of current users' response to the same question

**Significant at $p < 0.05$

of both current and never users felt connection to Somali culture was important and only 2% felt tobacco ads were being targeted to Somalis.

Tobacco Cessation

Survey results indicated an extremely high interest in cessation; 92.9% ($\pm 5.0\%$) of current users want to quit using tobacco, which is much higher than the U.S. population (68.8%).⁸ However, fewer than half ever tried to quit (41.5% $\pm 13.6\%$). Few individuals indicated a willingness to use cessation aids; medication (i.e., nicotine replacement) was the most acceptable (36.9% $\pm 9.8\%$). Few current users would be willing to either attend a community-based tobacco cessation program (8.4% $\pm 6.0\%$) or call/visit a quit line or internet site (6.3% $\pm 5.4\%$). The largest number of current users had heard of either internet-based QuitPlan.com (43.9% $\pm 13.6\%$) or the telephone-based QUITPLAN® Helpline (19.7% $\pm 11.6\%$), the largest tobacco-cessation program in Minnesota. Only 11.9% ($\pm 7.6\%$) of current users had ever tried a tobacco cessation program, and only 4% ($\pm 3.2\%$) had ever heard of a Somali-specific tobacco cessation program, *Fayobilow*. As nearly all current users were men, cessation results did not vary significantly by gender.

Discussion

The Somali Tobacco Research Project was among the first of its kind in this population. The research used an innovative model for collecting data in the absence of an established sampling frame and provides an important glimpse into tobacco use within the Somali immigrant and refugee population. Both data and methodology offer useful information for tobacco research and programming in Minnesota as well as the numerous other communities with resettled Somalis.

Somalis are primarily culturally and/or religiously Muslim along with over one fifth of the world's population.^{15,32} Although there is a general consensus among Islamic leaders that tobacco use should be discouraged, Muslims typically reside in or emigrate from areas with high smoking prevalence.³² Somalis demonstrate similarities to other Muslim populations, particularly in tobacco use gender differences, smoking prevalence, and desire for religious-based programming. Belief in Islamic prohibition of tobacco was protective, which suggests that current efforts in other Muslim communities to create mosque-based cessation programs may be effective among Somalis as well.^{15,20,32–34} Similarly, Somali tobacco data may also offer insight and direction to programming for other Muslim communities.

At 24%, smoking prevalence for Somalis appears higher than estimates among adults in Minnesota and the

U.S.^{1,3,13,35} Although smoking prevalence varied by age, the difference was not great enough to affect program targeting. The number of Somali women who reported ever using tobacco (4.8%) was substantially lower than men (60.7%). In general, Muslim women report substantially lower rates than men, potentially because of the social stigma associated with female smokers in Muslim communities.^{15,32,33} This poses a challenge for targeted cessation efforts; one study reported that smokefree legislation in England caused young Somali women to hide smoking habits even more.³⁶ Cessation efforts for Somali women must specifically use discretion.^{15,32}

Education level had an unanticipated relationship with lifetime smoking status among Somalis, which offers important information for targeting tobacco-related programming. Somali individuals with some college education were significantly more likely to have used tobacco compared with individuals who never attended school. In contrast, U.S. adults with education levels at or below high school constitute nearly half of all current smokers, and those with at least a bachelor's degree are the least likely to smoke.^{2,37} Among immigrant populations from countries at earlier stages in the tobacco epidemic (often impoverished countries), however, this trend is reversed.^{38–44} The tobacco epidemic travels through four stages; Somalia still appears to be in the earliest stage, where uptake occurs first among men in higher socioeconomic positions and those most educated.^{40,43,44}

Somali culture is highly relational, placing strong emphasis on family, friends and a sense of community. Therefore, for both men and women, friends appear to be one of the most influential factors in tobacco use among Somalis and affect perceived social norms.^{5,15,20} Perceived norms are powerfully influential factors in smoking status and the results suggest peer education and religious messages may be effective among Somalis, and may decrease perceived acceptability of tobacco.^{5,32,34,45}

Although the majority of respondents indicated that tobacco is harmful, users tend to underestimate tobacco harm. Smokers were more likely to think lighter tobacco use caused fewer or no health impacts. The belief that lighter smoking is safer may help explain why, similarly to other minority populations, Somalis tend to be lighter smokers.⁴⁶ This erroneous belief must be addressed, because light smoking carries similar or nearly equal health impacts to heavy smoking.⁴⁶ Medical professionals are highly regarded among Somalis; utilizing medical professionals more actively would likely address these erroneous beliefs most effectively.¹⁵

Smoking prevalence among Somalis was similar to that among African Americans, and there are striking similarities in psychosocial factors affecting tobacco use.^{2,4,5} Both groups have low utilization of cessation aids and feel

that cessation can be accomplished through willpower alone. In addition, smoking status of close friends was highly predictive of smoking status. Individuals in both populations expressed that smoking status was directly related to tragedies and they desired integration of religious leaders and institutions.^{5,15,20} Similarities should be investigated further as anti-tobacco efforts could potentially be shared across groups.

There were several limitations to the current study. Employing typical randomized sampling methods in an understudied community with nebulous borders is impractical. It was also not possible to weight result estimates based on population parameters as these are unknown. Although it is believed that resulting estimates are well established and reliable, comparability with other populations may be limited. Cultural beliefs and stigma made recruiting participants, namely adult women, challenging. There are inherent limitations to self-reported smoking status, although evidence suggests that self-reported smoking status among Somali adults is generally valid.³⁵ Although every attempt was made to use validated tobacco survey questions, differences in sampling methods could have affected results. Therefore, direct comparisons between these results and other survey data are merely suggestive and indicate the need for future research.

Conclusion

Tobacco use prevalence in the Somali community was higher than earlier estimates and estimates for general Minnesota and U.S. populations. Prevalence was most similar to African Americans and other Muslim communities. Several beliefs that are shared among Somalis, other Muslims, and African Americans could be useful in prevention and cessation programs. Tobacco use among Somalis varied most by gender and education level and was most influenced by friends. Existing cessation programs are rarely utilized by Somalis and would benefit from religious and cultural components. Results suggest that integrating peer groups, religious leaders, and the medical community would provide effective prevention and cessation strategies.

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