

# Characteristics and Prevalence of Tobacco Use Among Somali Youth in Minnesota

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**Background:** Somalis compose the largest African refugee group in the U.S., with more than 55,000 primary arrivals since 2000. Minnesota has the largest Somali population in the U.S. Despite its size, little research has been conducted to determine the extent of tobacco use among Somali youth.

**Purpose:** This paper reports the results from a knowledge, attitudes, and practices (KAP) survey designed to explore factors related to tobacco-use prevention, initiation, and cessation, and to reliably estimate tobacco-use prevalence among Somali youth in grades 9 through 12 in Minnesota.

**Methods:** A KAP survey, modeled after validated state and national youth tobacco-use surveys, was adapted for Somali youth and administered to ethnically Somali youth (N=302) from seven high schools in Minnesota in 2008. Participants were chosen through probability-proportional-to-size and multi-stage random sampling methods, and the results were analyzed in 2009.

**Results:** Somali high school students' estimated prevalence for "ever-users" of cigarettes was 12.8%, and current use was 4.7%. This is one quarter of the reported statewide smoking prevalence for Minnesota high school students (19.1%) and half of the nationwide prevalence for blacks/African Americans (11.6%). Ever-users were more likely to have close friends or live with someone who smoked cigarettes ( $p<0.01$ ). Belief in the Islamic prohibition of tobacco affected future intention to use tobacco ( $p<0.01$ ), as did the belief that using hookah/sheisha is less risky than smoking cigarettes ( $p<0.01$ ).

**Conclusions:** Estimated cigarette use prevalence (4.7%) for Somali youth was substantially lower than among Minnesota high school students and also lower than perceived prevalence among Somalis. Positive peer pressure and religion appear to be protective factors in tobacco use and should be integrated into future Somali tobacco prevention and cessation programs, along with education on the risks of hookah/sheisha use.

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## Introduction

In 2008, the Minnesota Department of Health reported that the statewide smoking prevalence has been consistently decreasing since 2000. However, 19.1% of high school students still reported being current smokers, indicating that tobacco use continues to be a problem among teenagers.<sup>1</sup>

Despite the plethora of information available on trends, prevalence, and characteristics of youth tobacco use and users, specific information on minority subsets,

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such as the Somali population, is virtually non-existent. While youth surveys often collect racial and ethnic data to better target prevention and cessation measures, African immigrant and refugee groups are universally grouped together in the broad category of black or African-American and, consequently, cannot be separated out for analysis. This racial category encompasses not only individuals born in the U.S., but also those from all over Africa, the Middle East, South and Central America, and the Caribbean. Foreign-born individuals exhibit differences in physical and mental health statuses from their U.S.-born counterparts<sup>2,3</sup> and, given the substantial differences among foreign-born groups in geographic origin, collective history, language, religion, cultural practices, and societal norms, it is reasonable to question the homogeneity of tobacco-use prevalence and tobacco-related beliefs and, consequently, the effectiveness of targeted interventions.

Somalis compose the largest African refugee group in the U.S., with more than 55,000 primary arrivals since 2000.<sup>4</sup> Minnesota has the largest Somali population in the U.S., with the 2004 official estimate at 25,000 individuals.<sup>5</sup> Despite its size, little research has examined the extent of tobacco use among Somali youth. No youth-specific tobacco-use prevalence estimate was found for the Somali population. To address the need for tobacco data in this immigrant group, WellShare International, Hennepin County Medical Center (HCMC), and the Confederation of Somali Community in Minnesota (CSCM) initiated the Somali Tobacco Research Project in 2006, a 3-year, multi-faceted research project.

Earlier research activities from the Somali Tobacco Research Project were reported in a prior publication and included results from focus groups of Somali youth, both smokers and nonsmokers. The publication also discussed perceived prevalence and beliefs, and practices surrounding tobacco initiation, use, and cessation among Somali youth in Minnesota.<sup>6</sup> The study concluded that perceived prevalence of smoking among Somali youth in Minnesota was high at 64%. Since high perceived prevalence estimates are known to increase tobacco-use intentions and initiation among youth,<sup>7–11</sup> and since standard prevention and cessation messages were generally considered ineffective by the Somali population,<sup>6</sup> the project team determined that more information on Somali youth and tobacco use was necessary. This paper reports the results from a knowledge, attitudes, and practices (KAP) survey designed to explore factors related to tobacco-use prevention, initiation, and cessation, and to reli-

ably estimate the prevalence of tobacco use among Somali youth in grades 9–12 in Minnesota.

## Methods

### Study Design

The youth KAP survey portion of the Somali Tobacco Research Project used a mixed-method, cross-sectional design to describe factors related to tobacco use and cessation among Somali youth. The sequential exploratory design began with qualitative research methods (key informant interviews and focus groups; methods described elsewhere<sup>6</sup>). Qualitative data from key informant interviews and focus-group discussions of Somali youth, both smokers and nonsmokers, were then used to inform KAP survey creation.

### Participants

Data were collected on 302 ethnic Somali youth, grades 9–12, with 86% participation (302/350). Probability-proportional-to-size sampling methods were applied to all 24 schools in Minnesota with more than 50 Somali students in grades 9–12. Schools were identified through the Minnesota Department of Education data on the primary language spoken at home. Seven different area high schools in Minnesota participated, including schools in St. Cloud and the Minneapolis–St. Paul metro area, including both cities, and surrounding suburbs. These areas were included to assure a representative sample of Somalis living in Minnesota. The seven schools included three public schools with primarily mainstream students and some English Language Learners (ELL); four charter schools; and one alternative school. The alternative and charter schools had more ELL students. Five schools declined participation in the survey. A pilot was conducted with 50 students (from a randomly selected school) in order to test the cultural appropriateness and design of the survey.

Fifty students per school were chosen to participate through a school-based, multi-stage random sampling method. Students were sampled equally from all grade levels. This combination of sampling methods assured the most representative sample of Somali youth. Informed consent was obtained from all participants, and passive parental consent forms, which included an option to decline, were distributed to all parents of participating students. IRB approval was obtained for all study activities by the Minneapolis Medical Research Foundation, Minneapolis, Minnesota.

### Data Collection

The KAP survey for youth (defined as students in grades 9–12) was designed to collect comprehensive, quantitative data on tobacco use, prevention and cessation among youth in the Somali community. The creation of the KAP survey instrument began with a literature search on to-

**Table 1.** Demographic characteristics of Somali youth, % unless otherwise indicated

Characteristic	Overall (N=302)	Never-users (n=235)	Ever-users (n=67)	p-value
<b>Female</b>	48.3	54.0 (43.8, 64.2)	32.4 (22.8, 42.0)	<b>&lt; 0.01</b>
<b>Grade</b>				
9	15.0	14.2 (6.2, 22.2)	15.2 (5.8, 24.6)	0.63
10	28.0	28.6 (21.8, 35.4)	27.9 (20.1, 35.7)	0.85
11	29.0	29.5 (19.5, 39.5)	29.2 (15.4, 43.0)	0.96
12	28.0	27.9 (14.9, 40.9)	26.7 (11.1, 42.3)	0.82
<b>Age (years)</b>				
13–15	11.3	10.7 (4.3, 17.1)	14.1 (0.2, 28.2)	0.53
16–18	49.3	50.9 (40.3, 61.5)	50.9 (34.1, 67.7)	0.99
19–22	35.8	39.0 (23.2, 54.8)	34.2 (17.8, 50.6)	0.47
<b>Born in Somalia</b>	80.0	83.8 (76.0, 91.6)	80.3 (71.5, 89.1)	0.32

Note: Boldface indicates significance.

bacon use among various immigrant and refugee groups in the U.S., with an additional focus on acculturation. Pre-established research questions and preliminary results from the key informant interviews and focus group sessions guided the development of the survey topics.<sup>6</sup> The format of the survey draft mirrored other validated, school-based youth tobacco surveys in length, structure and content.<sup>12–16</sup> The basic flow and majority of questions were structured after the Youth Tobacco Survey 2006–2007<sup>12</sup> and the National Youth Tobacco Survey 2004.<sup>13</sup> Select questions were also taken from the Diverse Racial Ethnic Groups and Nations Survey,<sup>14</sup> the Global Youth Tobacco Survey,<sup>15</sup> and a previously conducted WellShare International survey.<sup>16</sup> When appropriate questions were unavailable, they were created. Every effort was made to retain questions in their original format to ensure comparability with the general Minnesota and U.S. populations.

The 115-question survey was designed in a written, multiple-choice, bubble-style, English-language format, most often utilizing a 4-point Likert scale for answers. Questions focused on level of acculturation (22 items), tobacco-use behaviors (36 items), cessation behaviors (17 items), attitudes toward tobacco use (28 items), and exposure to tobacco use (12 items). All students selected as participants from a particular school completed surveys in the same classroom. Surveys were administered by WellShare staff and were read aloud in Somali if requested by students.

## Data Analysis

Estimates of tobacco-use prevalence (i.e., cigarettes, chewing tobacco, cigars, bidis, kreteks, hookah) were generated using unconditional logistic regression models in 2009. Differences in key psychosocial risk factors for tobacco use were examined by tobacco-use status variables (e.g., lifetime tobacco use, intentions to use tobacco) using logistic regression models unadjusted for covariates. The level of significance was set to  $\leq 0.05$ . Mixed-effects regression models were employed in all analyses. This type of regression model is appropriate in such studies, since students are sampled within schools. Schools were specified as a nested random effect.<sup>17</sup> Analyses were conducted using SAS PROC MIXED version 9.1.

## Results

### Demographics

Table 1 presents demographic results from the 302 students included in the sample. There was 86% participation with 146 girls/women and 153 boys/men (three missing gender values) participating. The average age of students was 17.8 years, with an age range of 13–22 years. There were fewer 9th-grade students, but other grades were equally represented. Eighty (80) percent of the students (241) were born in Somalia. Girls/women were significantly more likely to be never-users ( $p < 0.01$ ); however, there were no significant differences between ever-users and never-users of tobacco in other demographic categories.

### Prevalence

Table 2 reports prevalence estimates for ever-users (defined as people who report using any form of to-

**Table 2.** Prevalence of tobacco use among Somali high school students

Type of tobacco use	All students (N=302)
	% (95% CI)
<b>Cigarette smoking</b>	
Ever smoked cigarettes <sup>a</sup>	12.8 (6.6, 19)
Current cigarette smoking <sup>b</sup>	4.7 (1.7, 7.7)
<b>Chewing tobacco</b>	
Ever used chewing tobacco <sup>a</sup>	2.0 (0.8, 3.2)
Current use of chewing tobacco <sup>b</sup>	1.7 (0.5, 2.9)
<b>Cigar smoking</b>	
Ever smoked a cigar <sup>a</sup>	5.0 (3.6, 6.4)
Current cigar smoking <sup>b</sup>	2.3 (0.9, 3.7)
<b>Bidi and kretek smoking</b>	
Ever smoked a bidi or kretek <sup>a</sup>	9.3 (6.3, 12.3)
Current bidi smoking <sup>b</sup>	1.3 (0.5, 2.1)
Current kretek smoking <sup>b</sup>	1.0 (0.0, 2.0)
<b>Hookah smoking</b>	
Ever smoked a hookah/waterpipe <sup>a</sup>	3.8 (0.8, 6.8)
Current hookah/waterpipe smoking <sup>b</sup>	2.3 (0.5, 4.1)
<b>Any tobacco use</b>	
Ever use	22.2 (16.2, 28.2)
Current use	6.3 (2.7, 9.9)

<sup>a</sup>“Ever-user” defined as people who report ever having tried referenced form of tobacco in their lifetime.

<sup>b</sup>“Current user” defined as people who report having used referenced form of tobacco in the past 30 days.

bacon in their lifetime) and current users (defined as people who report using any form of tobacco in the last 30 days). Overall, 22.2% of students reported being ever-users of any form of tobacco. The percentage of Somali youth who stated that they currently use tobacco was relatively small (6.3%). Cigarette smoking had the highest prevalence (4.7%) of current tobacco users. Other tobacco forms, including hookah tobacco (2.3%) had a much smaller prevalence of current users. The numbers of current and ever-users were too small to do an analysis by gender.

### Differences Between Never-Users and Ever-Users of Tobacco

Table 3 describes differences observed between individuals who reported using some form of tobacco at least once in their life and those who had never used any form of tobacco. Most notable of these results was the influence of friends and

**Table 3.** Differences in selected psychosocial measures of Somali youth, by lifetime tobacco use<sup>a</sup>

Psychosocial measure	Never-users (n=235)	Ever-users (n=67)	p-value
	% (95% CI)	% (95% CI)	
<b>Experienced exposure to others' tobacco use</b>			
Do any of your close friends smoke cigarettes?	8.0 (4.0, 12.0)	22.2 (14.2, 30.2)	<b>&lt;0.01</b>
Do any of your close friends use chewing tobacco?	3.0 (0.4, 5.6)	13.5 (5.5, 21.5)	<b>0.02</b>
Do any of your close friends use hookah/sheisha?	4.3 (1.7, 6.9)	16.6 (3.0, 30.2)	0.07
Does anyone who lives with you now smoke cigarettes?	7.5 (5.3, 9.7)	15.2 (10.2, 20.2)	<b>&lt;0.01</b>
Does anyone who lives with you now use chewing tobacco?	1.3 (0.0, 3.1)	9.3 (2.1, 16.5)	<b>0.03</b>
Does anyone who lives with you now use hookah/sheisha?	1.3 (0.0, 2.9)	9.2 (3.4, 15.0)	<b>0.02</b>
<b>Exposure to pro-tobacco influences</b>			
When you watch TV/movies, how often do you see actors use tobacco? <sup>b</sup>	71.8 (63.0, 80.6)	64.3 (53.5, 75.1)	0.05
When you watch TV, how often do you see athletes using tobacco? <sup>b</sup>	40.3 (32.7, 47.9)	30.5 (22.1, 38.9)	0.06
When you are using the Internet, how often do you see ads for tobacco? <sup>b</sup>	42.0 (37.6, 46.4)	29.6 (18.8, 40.4)	<b>0.03</b>
Would you ever use or wear something with a tobacco company name on it? <sup>c</sup>	5.7 (3.5, 7.9)	19.7 (8.7, 30.7)	<b>0.02</b>
Have you seen any advertisements for tobacco targeted at the Somali community? <sup>c</sup>	3.6 (1.6, 5.6)	17.9 (6.1, 29.7)	<b>0.01</b>
<b>Beliefs about the consequences of tobacco use</b>			
Do you think tobacco use should be forbidden in Islamic law?	55.5 (49.7, 61.3)	53.6 (33.8, 73.4)	0.85
Do you think young people who use tobacco have more friends? <sup>c</sup>	33.4 (26.8, 40.0)	48.7 (35.1, 62.3)	<b>0.01</b>
Do you think using tobacco makes young people look cool or fit in? <sup>c</sup>	9.6 (6.4, 12.8)	22.7 (14.1, 31.3)	<b>0.02</b>
Do you think youth harm themselves if they smoke 1–5 cigarettes per day? <sup>c</sup>	66.3 (58.9, 73.7)	66.6 (59.0, 74.2)	0.93
Do you think it is safe to smoke for only a year or two, then quit after that? <sup>c</sup>	23.2 (13.4, 33.0)	22.7 (17.1, 28.3)	0.94
Do you believe that light cigarettes are less risky than regular cigarettes? <sup>c</sup>	27.3 (23.3, 31.3)	37.5 (26.1, 48.9)	0.06
Do you believe using hookah/sheisha is less risky than smoking cigarettes? <sup>c</sup>	24.1 (19.7, 28.5)	33.9 (26.9, 40.9)	<b>&lt;0.01</b>
<b>Cultural values and beliefs</b>			
How important do you feel it is to keep in touch with Somali culture? <sup>d</sup>	96.1 (94.3, 97.9)	90.8 (83.6, 98.0)	0.17
How important do you feel it is to learn about American culture? <sup>d</sup>	71.7 (65.5, 77.9)	61.8 (44.8, 78.8)	0.30

Note: Boldface indicates significance.

<sup>a</sup>Defined as people who report using any form of tobacco (e.g., cigarettes, chewing tobacco, cigars, bidis/kreteks, and/or hookah/sheisha) in their lifetime.

<sup>b</sup>Defined 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

<sup>c</sup>Defined as “definitely yes” and “probably yes” (1) versus “probably not” and “definitely not” (0)

<sup>d</sup>Defined as “very important” and “somewhat important” (1) versus “not very important” and “not at all important” (0)

family on lifetime tobacco use. Ever-users were significantly more likely to have close friends or live with someone who smokes cigarettes ( $p < 0.01$ ) or who use other various forms of tobacco ( $p < 0.05$ ). Ever-users were also more likely to believe that using hookah/sheisha is less risky than smoking cigarettes (33.9% vs 24.1%;  $p < 0.01$ ). Most pro-tobacco influences appeared to have little effect on lifetime tobacco use, although nearly 18% of ever-users felt they were exposed to tobacco advertising specifically targeted at the Somali communities, compared to only 3.6% of never-users ( $p = 0.01$ ).

While only a small percentage of Somali youth had positive views of tobacco, ever-users were significantly more likely than never-users to think that using tobacco makes young people look “cool” ( $p = 0.02$ ). Additionally, nearly half of ever-users of tobacco felt tobacco users had more friends compared to only one third of never-users ( $p = 0.01$ ). Cultural and religious beliefs, however, had little impact on tobacco use. Percentages of those who believed Islam should prohibit tobacco use were high and nearly identical based on usage. Nearly all students felt it

**Table 4.** Differences in psychosocial measures of Somali youth, by intentions to use tobacco in coming year<sup>a</sup>

Psychosocial measure	Do not intend to use tobacco (n=242)	Intend to use tobacco (n=53)	p-value
	% (95% CI)	% (95% CI)	
<b>Exposure to others' tobacco use</b>			
Do any of your close friends smoke cigarettes?	8.7 (4.7, 12.7)	22.9 (15.9, 29.9)	<b>&lt;0.01</b>
Do any of your close friends use chewing tobacco?	3.3 (1.1, 5.5)	15.3 (8.1, 22.5)	<b>&lt;0.01</b>
Do any of your close friends use hookah/sheisha?	5.9 (2.3, 9.5)	12.2 (1.4, 23.0)	0.20
Does anyone who lives with you now smoke cigarettes?	9.2 (7.2, 11.2)	9.4 (0.0, 19.6)	0.96
Does anyone who lives with you now use chewing tobacco?	2.5 (0.7, 4.3)	6.0 (0.4, 11.6)	0.12
Does anyone who lives with you now use hookah/sheisha?	3.3 (1.9, 4.7)	1.9 (0.0, 5.9)	0.52
<b>Exposure to pro-tobacco influences</b>			
When you watch TV/movies, how often do you see actors use tobacco? <sup>b</sup>	71.7 (63.7, 79.7)	60.1 (40.9, 79.2)	0.20
When you watch TV, how often do you see athletes using tobacco? <sup>b</sup>	37.7 (29.1, 46.3)	38.7 (26.3, 51.1)	0.92
When you are using the Internet, how often do you see ads for tobacco? <sup>b</sup>	39.9 (34.7, 45.1)	36.6 (24.5, 48.7)	0.66
Would you ever use or wear something with a tobacco company name on it? <sup>c</sup>	6.6 (4.2, 9.0)	19.2 (12.2, 26.2)	<b>&lt;0.01</b>
Have you seen any advertisements for tobacco targeted at the Somali community? <sup>c</sup>	5.5 (2.5, 8.5)	10.3 (3.9, 16.7)	0.06
<b>Beliefs about the consequences of tobacco use</b>			
Do you think tobacco use should be forbidden in Islamic law?	59.7 (52.9, 66.5)	33.0 (22.0, 44.0)	<b>&lt;0.01</b>
Do you think young people who use tobacco have more friends? <sup>c</sup>	35.7 (26.9, 44.5)	41.7 (30.5, 52.9)	0.37
Do you think using tobacco makes young people look cool or fit in? <sup>c</sup>	10.7 (9.1, 12.3)	21.2 (14.0, 28.4)	<b>0.01</b>
Do you think youth harm themselves if they smoke 1–5 cigarettes per day? <sup>c</sup>	69.3 (61.3, 77.3)	52.8 (45.2, 60.4)	<b>0.01</b>
Do you think it is safe to smoke for only a year or two, then quit after that? <sup>c</sup>	20.5 (10.9, 30.1)	35.1 (24.7, 45.5)	0.06
Do you believe that light cigarettes are less risky than regular cigarettes? <sup>c</sup>	28.9 (21.5, 36.3)	32.7 (24.3, 41.1)	0.60
Do you believe using hookah/sheisha is less risky than smoking cigarettes? <sup>c</sup>	22.6 (17.0, 28.2)	43.2 (32.0, 54.4)	<b>&lt;0.01</b>
<b>Cultural values and beliefs</b>			
How important do you feel it is to keep in touch with Somali culture? <sup>d</sup>	96.0 (94.0, 98.0)	90.0 (84.4, 95.6)	<b>0.04</b>
How important do you feel it is to learn about American culture? <sup>d</sup>	69.7 (62.5, 76.9)	68.3 (57.7, 78.9)	0.84

Note: Boldface indicates significance.

<sup>a</sup>Defined as people who responded “definitely yes,” “probably yes,” or “probably not” to the question, “Do you think you will use tobacco at anytime during the next year?” Tobacco includes cigarettes, chewing tobacco, cigars, bidis/kreteks, and/or hookah/sheisha.

<sup>b</sup>Defined 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

<sup>c</sup>Defined as “definitely yes” and “probably yes” (1) versus “probably not” and “definitely not” (0)

<sup>d</sup>Defined as “very important” and “somewhat important” (1) versus “not very important” and “not at all important” (0)

very important to stay in touch with Somali culture, regardless of lifetime tobacco use.

**Future intentions.** Table 4 describes the differences in selected psychosocial measures of the 295 (5 never-users, 2 ever-users missing) students who answered questions about intentions to use or not use some form of tobacco

in the next year, including cigarettes, chewing tobacco, cigars, bidis/kreteks, or hookah/sheisha. Of these, 53 (17.5%) reported an intention to use some form of tobacco in the next year, including 41 (77%) never-users and 12 ever-users. Eighty-two (82) percent of ever-users had no intentions to use tobacco in the next year. The average age,

gender, and place of birth did not vary significantly based on intention to use tobacco in the next year.

Similar factors appeared to have as much of an effect on intent to use as they did on actual use, including current use of tobacco products by friends, specifically cigarettes and chewing tobacco, and willingness to wear something with a tobacco name. Beliefs about Islamic prohibition of tobacco, however, were significantly different based on intention to use; 33.0% of those who intend to use tobacco and nearly 60% of those who do not, believe tobacco should be forbidden in Islam ( $p < 0.01$ ). It appears that religion may be a protective factor in intent to use tobacco among Somali youth. In general, correct health beliefs about tobacco were also protective in intent to use tobacco. Nearly 70% of students who did not intend to use tobacco felt that tobacco was harmful, even if youth smoke only 1–5 cigarettes per day, whereas only 50% of those who intended to use tobacco felt it was harmful ( $p = 0.01$ ). Almost twice as many students who intended to use tobacco believed using hookah/sheisha was less risky than smoking cigarettes compared to those who do not intend to use tobacco (43.2% vs 22.6%;  $p < 0.01$ ).

## Discussion

While tobacco use exists among Somali youth, it is notable that the estimated prevalence is much lower than it is among the general youth population in Minnesota. In December 2008, the Minnesota Department of Health reported a statewide smoking prevalence of 19.1% for high school students in 2008, which is four times higher than that for Somali youth.<sup>1</sup> Similarly, over half of all high school students (53.6%) in Minnesota have tried some form of tobacco at least once, compared to less than a quarter of Somali high school students (22.2%). However, Somali youth show nearly identical tobacco-use statistics as Minnesota middle school students; 3.4% of middle school students and 4.7% of Somalis currently smoke, while 22.2% of Somalis and 22.5% of middle school students have tried any form of tobacco. These comparisons provide evidence that future research is needed on tobacco use in the Somali population.

The lifetime cigarette smoking prevalence for Somali youth, at 12.8%, is far lower than that for either Minnesota or U.S. youth, both approximately 50%.<sup>1,18</sup> Black/African-American students in the U.S., which include Somali students, historically have lower smoking/tobacco-use prevalence than white and Hispanic ethnic groups.<sup>18,19</sup> However, the estimated cigarette smoking prevalence for black/African-American high school students (11.6%) is still more than twice the prevalence for Somali high school students (4.7%). Interestingly, the Somali prevalence is nearly identical to black/African-

American middle school students (4.6%).<sup>18,19</sup> These comparisons suggest that national and state school-based tobacco surveys should include subgroups within the broad category of “black/African-American” to allow for further investigation of differences.

Results from the analyses illustrated that estimated prevalence of cigarette smoking among Somali youth (4.7%) was much smaller than the perceived prevalence reported in a prior publication (64%).<sup>6</sup> While it is unknown exactly why Somali youth overestimate actual prevalence, overestimation is not uncommon for youth in general. While overestimation can be affected by any number of factors at home, in school or around the community, the most powerful factor in overestimating prevalence is the tobacco use of close friends and family.<sup>7–11,20</sup> It is well established that students who overestimate tobacco-use prevalence are more susceptible to future use.<sup>7,11,20</sup> So while current estimated prevalence for Somali students is low, the exceedingly high perceived prevalence suggests that targeted prevention measures must be employed to prevent an increase in future use.

Survey results suggest several potential avenues for interventions. Most students felt Somali culture is important, regardless of smoking status. Somali culture strongly discourages tobacco use among youth while simultaneously encouraging parental respect and traditional Islamic values. As the Somali culture is universally regarded as important by youth, it can be applied across the board in prevention and cessation strategies as well as in youth outreach programs as a means to affect social norms.

While never- and ever-users of tobacco felt nearly the same about the legitimacy of tobacco in Islamic law, the results based on intention to use tobacco are more consistent with anticipated results. These results are consistent with other data and suggest that religion and religious leaders are extremely influential in the Somali community, and they would provide an excellent vehicle for prevention strategies in particular.<sup>6</sup> Findings suggest that working with religious leaders would be a powerful approach to use in the fight against tobacco use in Muslim populations. Results also indicate that having correct beliefs about the health effects of smoking are important in a student's intention to use tobacco in the future and, therefore, would make a solid prevention strategy. In particular, students need to internalize the immediacy of the effects of smoking; previous research revealed that youth feel that the health effects of tobacco are applicable to only adults and lifelong smokers.<sup>6</sup> Education on the risks of hookah/sheisha use would also be useful in prevention and cessation programs as would consistent enforcement of youth access restrictions on tobacco.

There were several limitations to the study. First, the sampling method excludes youth not attending school

and those in schools with fewer than 50 Somali students. Additionally, youth were categorized as Somali if Somali was the primary language spoken at home. Although given experience and anecdotal evidence, it was assumed that nearly 100% of Somali families speak primarily Somali at home, the study excluded any ethnic Somali youth who speak another primary language. Next, while overall participation was high at 86%, there is still the possibility of participation bias. However, only six students actually declined participation; the other nonparticipating students had conflicting schedules. Five schools declined participation, and several of these schools were in academically underperforming districts, which could have affected responses. There were also variations within the schools themselves, which included public, charter, and alternative schools. Some of the schools were better organized than others, and the behavior of the students varied by and within schools, which may have affected survey completion.

Additionally, there are inherent limitations to self-reported smoking status. However, self-reported smoking status on school-based written tests are generally regarded as an acceptably valid method of estimating prevalence and, in general, tend toward underestimation of actual prevalence.<sup>21,22</sup> Therefore, it is possible that this study's estimated prevalence may be slightly lower than actual prevalence, although cotinine levels from a previous study suggest that self-reported smoking status among adult Somalis is generally valid.<sup>23</sup> Finally, while every attempt was made to model data-collection instruments and methods after validated state and national, school-based tobacco-use surveys, differences in sampling methods could have affected these results differently. Therefore, direct comparisons between results from the Somali youth tobacco survey and other survey data are merely suggestive and are used to indicate the need for future research on the Somali population.

## Conclusion

Results from the youth tobacco survey in the Somali population demonstrate that the smoking prevalence among Somali youth is lower than prevalence estimates from black/African-American data, and much lower than both perceived prevalence estimates and the general high school student population prevalence in Minnesota. Prevalence levels mirror those in middle school youth in the general population. Results indicate the need for further investigation.

While Somali youth smoking prevalence is more similar to the general African-American population than to all youth, and although many factors influencing tobacco use and cessation are similar across race and ethnicity,

there are several influential factors unique to the Somali population (i.e., religion and Somali cultural norms) that could be effective in programming. The results validate the need for specific prevention and cessation strategies for this population, particularly incorporating Somali cultural and religious beliefs and practices and emphasizing the immediacy of the health impacts of smoking on youth.

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