

Factors associated with quit attempt and successful quitting among adults who smoke tobacco in Ethiopia: Global Adult Tobacco Survey (GATS) 2016

Henok S. Demissie¹, Tenecia Smith², Isabel G. de Quevedo^{2,3}, Alissa C. Kress², Evelyn Twentyman²

ABSTRACT

INTRODUCTION Tobacco is the leading cause of preventable death in the world. Identification of factors associated with quit attempts and successful quitting can help strengthen tobacco cessation programs. In Ethiopia, no prior study of such factors exists. Our aim was to identify factors associated with quit attempts and successful quitting among adults who smoke tobacco in Ethiopia.

METHODS We used the Ethiopian 2016 Global Adult Tobacco Survey (GATS) data (n=10150). GATS is a nationally representative household survey that collects data on sociodemographic and tobacco-related characteristics. We calculated prevalence of reported past 12 months quit attempts and successful quitting and performed logistic regression to obtain prevalence ratios with 95% confidence intervals. A p<0.05 was considered statistically significant.

RESULTS Overall 42.0% of people who smoked tobacco made a quit attempt. Men were more likely (APR=3.9; 95% CI: 1.4–10.7) to make a quit attempt compared to women but were less likely to successfully quit (APR=0.6; 95% CI: 0.3–0.9). Those aware of the health harms of tobacco were 2.5 (95% CI: 1.1–5.5) and 3.9 (95% CI: 1.8–8.5) times as likely to make a quit attempt and successfully quit, respectively, than those unaware. Receiving healthcare provider advice to quit was not associated with quit attempts.

CONCLUSIONS More than 4 in 10 people smoking tobacco in Ethiopia are making attempts to quit. Receipt of healthcare provider advice to quit is not yet associated with quit attempts in Ethiopia; however, awareness of the health harms of tobacco is a powerful predictor of quit attempt and success in quitting. Improved access to cessation support and expanded awareness of the health harms of tobacco are urgently needed to enhance both quit attempts and success across Ethiopia.

AFFILIATION

1 Ethiopian Public Health Institute, Addis Ababa, Ethiopia
2 Global Tobacco Control Branch, Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, United States
3 CDC Foundation, Atlanta, United States

CORRESPONDENCE TO

Henok S. Demissie. Ethiopian Public Health Institute, Addis Ababa, Ethiopia. E-mail: hensol4@gmail.com

KEYWORDS

GATS, Ethiopia, quit attempt, tobacco smoking, successful quit

Received: 22 December 2021

Revised: 26 January 2022

Accepted: 2 February 2022

INTRODUCTION

Tobacco use is the leading cause of preventable death globally, killing more than 8 million people a year. More than 7 million of those deaths are due to direct tobacco use, while around 1.2 million are the result of secondhand smoke exposure^{1,2}. Over 80% of people who use tobacco live in low- and middle-income countries (LMICs) where the burden of tobacco-related illness and death is heaviest^{1,2}. In Ethiopia, an LMIC in eastern Africa, the most recent

nationally representative data from 2016 show that 3.7% of individuals aged ≥15 years (6.2% men and 1.2% women) currently smoked tobacco products, and 29.3% and 12.6% of adults were exposed to SHS at the workplace and home, respectively³. This indicates that about two and a half million Ethiopian adults are at risk of tobacco-related morbidity and mortality from tobacco use³, and that numerous others may be at risk of morbidity and mortality from secondhand exposure.

In Ethiopia, 42% of people who smoke tobacco reported attempts to quit in the past year, and over three-fourths (76%) of these attempted to quit without any assistance³. People attempting to quit tobacco use face challenges due to nicotine dependence, and there is a high incidence (up to 50%) of relapse after attempting to quit^{4,5}; therefore, it is crucial to establish cessation support for successful quitting⁶.

Evidence shows that availability of tobacco cessation services and cessation support, healthcare provider involvement, and access to pharmacotherapy play critical roles in quit attempts and successful attempts to quit^{4,6-8}. Specific recommendations for strengthening tobacco cessation services are provided in the World Health Organization Framework Convention on Tobacco Control (WHO FCTC), an international treaty which Ethiopia has signed^{6,9}. Recommendations, cessation services and smoking cessation pharmacotherapies remain severely limited in Ethiopia¹⁰. Only around a quarter of people who made a quit attempt in Ethiopia used cessation methods: 3.1% used pharmacotherapy, 14.7% used counseling or advice, 5.6% used traditional medicine, and 13.7% used other quit methods³.

Identification of factors that could facilitate cessation is important to make best use of available resources, particularly to inform the design of evidence-based smoking cessation interventions¹¹. Several studies performed outside Ethiopia have identified factors that are associated with quit attempts and successful quitting including age, educational level, wealth index, receiving advice to quit from a healthcare provider, and awareness of smoking-related health consequences¹²⁻¹⁵. No published studies have examined sociodemographic factors and other characteristics that are associated with quit attempts and successful quitting among people who smoke tobacco in Ethiopia. The aim of this study is to assess whether sociodemographic and other factors among people who smoke tobacco are associated with quit attempts and successful quitting, in order to provide the evidence base for development of well-tailored, effective tobacco control strategies and to strengthen cessation programs in Ethiopia.

METHODS

Data source and study population

Secondary analyses of data from the 2016 Ethiopia

Global Adult Tobacco Survey (GATS)¹⁶ were performed. GATS, a component of the Global Tobacco Surveillance System (GTSS), is the global surveillance system for systematically monitoring adult tobacco use and tracking key tobacco control indicators. It is a nationally representative household survey of all non-institutionalized adults aged ≥ 15 years and provides weighted national estimates of tobacco use and tobacco control indicators¹⁷. GATS uses a multi-stage, geographically clustered sampling design and simple random sampling to identify households for participation¹⁸. A household questionnaire is administered to one adult in the household to determine the number of eligible household members. One household member is then randomly chosen to complete the individual questionnaire, which collects in-depth information on background characteristics, tobacco smoking, smokeless tobacco use, cessation, secondhand smoke, economics, media, and knowledge, attitudes and perceptions of tobacco. The 2016 GATS Ethiopia was conducted by the Ethiopian Public Health Institute (EPHI) in collaboration with the Ethiopian Federal Ministry of Health, Ethiopian Food and Drug Authority (EFDA), and Central Statistical Agency (CSA) with technical support from World Health Organization, the Centers for Disease Control and Prevention (CDC), CDC Foundation, and RTI International. A total of 10875 households were sampled, from which 10649 eligible respondents aged ≥ 15 years were obtained and 10150 completed the survey (person-level response rate of 95.4% and overall response rate of 93.4%)³.

Measures and variables

Definitions and denominators

'Quit attempt' was defined as an attempt to quit within the past 12 months among adults who currently smoked tobacco, or as smoking cessation within the past 12 months among adults who formerly smoked. 'Successful quitting' was defined as smoking cessation 12 months ago or more, among adults who reported ever smoking tobacco. 'People who currently smoked tobacco' were defined as respondents who reported smoking tobacco (cigarettes, cigars, pipes, gaya, and shisha/waterpipe tobacco smoking) daily or less than daily. 'People who formerly smoked' were defined as respondents who reported having formerly smoked tobacco (daily or less than daily) and who were not

smoking at the time of interview. 'People who ever smoked tobacco' were defined as including both respondents who formerly and currently smoked tobacco.

Covariates

The independent variables which were used were: age group in years (15–30, 31–45, 46–60, or >60 years), place of residence (urban or rural), gender (male or female), educational level (no formal education; primary school [first and second cycle]; secondary school [first and second cycle]; and above secondary school [college or university and post-graduate]), wealth index (defined by quintiles: lowest, lower, middle, higher, and highest), work status (worked in the last twelve months or not; students, homemaker, and retired were categorized as not working), advised by a healthcare provider to quit smoking (yes or no, among those who had visited a healthcare provider), time to first smoke after waking up (≤ 5 , 6–30, 31–60, or >60 minutes), awareness of health harms of tobacco smoking (yes or no), and ever used smokeless tobacco (yes or no).

Statistical analysis

Analyses were completed using SAS-callable SUDAAN 11.0.1 (RTI International, Research Triangle Park, North Carolina). Descriptive analyses including weighted percentages and 95% confidence intervals were calculated for quit attempt and successful quitting against each independent variable. We examined associations between dependent variables (quit attempt and successful quitting) and each independent variable using univariable logistic regression. We then conducted multivariable logistic regression to evaluate predictors of quit attempts and successful quitting. Both adjusted regression models controlled for gender, age group, place of residence, working status, education level, wealth index, awareness of health harms of tobacco, and ever used smokeless tobacco; the model for quit attempts also controlled for time to first smoke after waking and healthcare provider advice to quit smoking. Adjusted prevalence ratios (APRs) and corresponding 95% confidence intervals are reported. Statistical inferences are based on a significance level of $p < 0.05$. According to the GATS Analysis Package, missing responses are excluded from calculations and indicators with sample

size less than 25 have been suppressed¹⁹. We limited our analyses to the 929 respondents with information on either quit attempts or successful quitting.

RESULTS

Quit attempt and successful quitting by sociodemographic variables

Table 1 shows the distribution of sociodemographic and other characteristics among people who made a quit attempt and people who successfully quit. Among people who made a quit attempt in the past 12 months, 94.6% (95% CI: 89.6–97.3) were male, more than three-fourths were aged 15–45 years [47.2% (95% CI: 32.3–62.6) 15–30 years and 31.6% (95% CI: 22.0–43.0) 31–45 years], approximately two-thirds were rural residents (66.1%; 95% CI: 52.0–77.9), and most were working (92.0%; 95% CI: 85.3–95.8). Over 80% of those who made a quit attempt had completed primary school or above [44.1% (95% CI: 27.3–62.5) primary, 30.8% (95% CI: 16.5–50.1) secondary, and 5.2% (95% CI: 2.6–10.4) above secondary], while 19.9% (95% CI: 11.1–33.0) had no formal education. Nearly 60% who made a quit attempt had low and lowest wealth index [37.7% (95% CI: 21.2–57.8) and 20.7% (95% CI: 12.5–32.8), respectively]. More than half who made a quit attempt first smoked tobacco more than 60 minutes after waking (53.5%; 95% CI: 32.6–73.3), around 60% (59.2%; 95% CI: 39.9–75.9) received healthcare provider advice to quit smoking, and 90.8% (95% CI: 77.4–96.6) had awareness of health harms of tobacco use. Among people who made a quit attempt, 5.6% (95% CI: 1.9–15.8) had ever used smokeless tobacco.

Among those who successfully quit, 80% were male (95% CI: 69.3–87.6) and nearly two-thirds were aged 15–45 years [31.5% (95% CI: 20.8–44.7) 15–30 years and 33.5% (95% CI: 22.4–46.7) 31–45 years] (Table 1). More than half who successfully quit were from rural areas (64.9%; 95% CI: 49.7–77.6) and three-fourths (76.0%; 95% CI: 59.9–87) were working. One-fourth (24.7%; 95% CI: 14.3–39.3) of those who successfully quit had no formal education. Around 50% of people who successfully quit had the low or lowest wealth index [30.0% (95% CI: 18.0–45.6) and 20.5% (95% CI: 9.1–39.8), respectively]. The majority of those who successfully quit (92.9%; 95% CI: 79.3–97.8) had awareness about harms of tobacco use. Around 8% (8.2%; 95%

Table 1. Distribution of selected characteristics among adults aged >15 years, Global Adult Tobacco Survey, Ethiopia, 2016

	Overall			Quit attempt ^a			Successful quitters >1 year ^b		
	n	%	95% CI	Yes			Yes		
				n	%	95% CI	n	%	95% CI
Overall	10150	100	N/A	249	100	N/A	198	100	N/A
Gender									
Male	4627	49.9	48.1–51.8	216	94.6	89.6–97.3	155	80.0	69.3–87.6
Female	5523	50.1	48.2–51.9	33	5.4	2.7–10.4	43	20.0	12.4–30.7
Age (years)									
15–30	5342	62.3	60.1–64.4	110	47.2	32.3–62.6	51	31.5	20.8–44.7
31–45	3023	21.6	20.2–23.1	96	31.6	22.0–43.0	76	33.5	22.4–46.7
46–60	1241	11.3	10.1–12.6	32	19.4	7.2–42.9	41	24.1	14.9–36.4
>60	544	4.9	4.1–5.8	11	1.9	0.6–6.0	30	10.9	5.2–21.6
Place of residence									
Urban	5064	24.1	22.1–26.3	119	33.9	22.1–48.0	118	35.1	22.4–50.3
Rural	5086	75.9	73.7–77.9	130	66.1	52.0–77.9	80	64.9	49.7–77.6
Working status									
Working	5852	50.4	48.2–52.6	207	92.0	85.3–95.8	151	76.0	59.9–87.0
Not working	4288	49.6	47.4–51.8	42	8.0	4.2–14.7	47	24.0	13.0–40.1
Education level									
No formal education	3768	35.7	32.8–38.7	67	19.9	11.1–33.0	49	24.7	14.3–39.3
Primary school	3195	37.0	34.9–39.1	89	44.1	27.3–62.5	78	44.1	31.5–57.5
Secondary school	2098	21.3	19.4–23.4	64	30.8	16.5–50.1	39	20.4	11.8–32.9
Above secondary	1070	6.0	5.0–7.1	27	5.2	2.6–10.4	32	10.9	6.1–18.7
Wealth index									
Lowest	2324	38.0	33.7–42.5	53	20.7	12.5–32.3	26	20.5	9.1–39.8
Low	2016	26.2	23.0–29.7	58	37.7	21.1–57.8	37	30.0	18.0–45.6
Medium	1900	13.9	11.5–16.7	47	10.7	5.1–21.1	34	18.0	10.4–29.4
High	1924	11.2	9.4–13.3	40	12.4	6.1–23.6	54	16.5	9.4–27.2
Highest	1986	10.7	9.1–12.4	51	18.6	11.3–28.9	47	15.0	8.5–25.1
Awareness of health harms of tobacco									
Yes	8883	88.0	85.4–90.1	230	90.8	77.4–96.6	193	92.9	79.3–97.8
No	1266	12.0	9.9–14.6	18	9.2	3.4–22.6	5	7.1	2.2–20.7
Time to first smoke after waking^c (minutes)									
≤5	166	26.6	17.0–38.9	40	28.0	11.2–54.4	0	0.0	N/A
6–30	148	20.3	13.9–28.7	31	6.7	3.4–12.8	0	0.0	N/A
31–60	114	20.3	13.8–28.8	31	11.8	5.7–22.8	0	0.0	N/A
>60	172	32.8	22.4–45.1	80	53.5	32.6–73.3	0	0.0	N/A
Healthcare provider advice to quit smoking^d									
Yes	97	53.0	39.7–65.9	45	59.2	39.9–75.9	0	0.0	N/A
No	83	47.0	34.1–60.3	32	40.8	24.1–60.1	0	0.0	N/A
Ever used smokeless tobacco									
Yes	293	1.9	1.1–3.3	21	5.6	1.9–15.8	30	8.2	4.2–15.7
No	9441	98.1	96.7–98.9	208	94.4	84.2–98.1	164	91.8	84.3–95.8

a Among current smokers and former smokers who have been abstinent for <12 months. b Among ever smokers. c Among daily tobacco smokers. d Among current and former smokers who have been abstinent for <12 months who visited a healthcare provider (n=97). N/A: the estimate is '0.0' or '100.0'.

CI: 4.2–15.7) of those who successfully quit had ever used smokeless tobacco.

Association of selected demographic characteristics and quit attempts

The overall prevalence of a quit attempt in the past 12 months was 42.0% (95% CI: 31.2–53.6); 47.4% (95% CI: 37.8–57.2) in men and 14.0% (95% CI: 4.8–34.5) in women (Table 2). Over 40% of adults aged 15–60 years made a quit attempt [aged 15–30 years (48.7%; 95% CI: 31.8–65.9), 31–44 years (40.5%; 95% CI: 31.3–50.4), and 45–60 years (45.2%; 95% CI: 20.4–72.6)]. Quit attempts were reported by 60.3% (95% CI: 50.0–69.8) of urban residents, 45.2% (95% CI: 33.3–57.6) of those who were working in the last 12 months, 65.7% (95% CI: 50.8–78.0) of those in the highest wealth index, and 73.2% (95% CI: 55.5–85.7) of those who had completed secondary school. When categorized by time to first smoke after waking, 61.3% (95% CI: 43.8–76.3) of those who smoked >60 minutes after waking had a quit attempt while 12.4% (95% CI: 5.4–26.1) of those who smoked 6–30 minutes after waking did so. The prevalence of a quit attempt among those who received healthcare provider advice to quit smoking (53.4%; 95% CI: 39.9–75.9) was not significantly different from the prevalence among those who did not receive healthcare provider advice (41.6%; 95% CI: 24.1–60.1). Among those who were aware of the health harms of tobacco, 51.6% (95% CI: 42.6–60.6) made a quit attempt while only 14.3% (95% CI: 6.0–30.3) of those who were not aware of the harms made a quit attempt. Among people who ever used smokeless tobacco, 15.8% (95% CI: 4.7–41.5) made a quit attempt while close to half (46.5%, 95% CI: 36.1–56.9) who never used smokeless tobacco made a quit attempt.

In the unadjusted model, all sociodemographic variables, except for primary education and low through high wealth index, were significantly associated with quit attempts (Table 2). Those with the lowest wealth index were less likely (PR=0.3; 95% CI: 0.2–0.6) to attempt to quit smoking compared to those with the highest wealth index. Those who were aware of health harms of tobacco were more likely to attempt to quit than those who were unaware (PR=3.6; 95% CI: 1.6–8.2). Those who smoked 6–30 minutes (PR=0.2; 95% CI: 0.1–

0.4) and 31–60 minutes after waking (PR=0.4; 95% CI: 0.2–0.7) were less likely to attempt to quit smoking compared to those who smoked >60 minutes after waking. Healthcare provider advice to quit smoking and having ever used smokeless tobacco were not significantly associated with quit attempts.

In the fully adjusted model, the prevalence ratio of quit attempts among men was significantly higher (APR=3.9; 95% CI: 1.4–10.7) than among women (Table 2). Those who were aged 15–30 years (APR=5.2; 95% CI: 1.1–24.9) and who were aware of health harms of tobacco (APR=2.5; 95% CI: 1.1–5.5) were more likely to attempt to quit than those aged ≥60 years and unaware of health harms of tobacco, respectively. All other demographic variables as well as time to first cigarette after waking, healthcare provider advice to quit smoking, and ever use of smokeless tobacco, were not statistically associated with a quit attempt in the fully adjusted model.

Association of selected demographic characteristics and successful quitting

The overall prevalence of successful quitting among adults who ever smoked was 27.8% (95% CI: 19.8–37.5); 26.8% (95% CI: 20.2–34.7) in men and 32.4% (95% CI: 12.8–60.9) in women (Table 3). The prevalence of successful quitting was 34.0% (95% CI: 18.1–54.5) for those aged 45–60 years and 33.2% (95% CI: 14.8–58.8) for those aged >60 years, 36.4% (95% CI: 26.5–47.7) for urban residents, 40.7% (95% CI: 27.8–55.1) for those of high wealth index, and 39.1% (95% CI: 21.3–60.3) among those who were not working. Nearly half (46.6%; 95% CI: 27.9–66.3) of those with educational level above secondary had successfully quit; the prevalence of successful quitting among those with lower education level ranged from 19.8% (95% CI: 8.6–39.4) in those with no formal education to 30.8% (95% CI: 17.7–47.9) in those with secondary education. The prevalence of successful quitting was 32.9% (95% CI: 24.5–42.7) among those aware of health harms of smoking and 9.3% (95% CI: 2.4–30.4) among those who were not aware. The prevalence of successful quitting among people who ever used smokeless tobacco was 17.2% (95% CI: 6.5–38.4) and 28.9% (95% CI: 20.6–38.9) among those who never used smokeless tobacco.

In the unadjusted model, adults who had ever

Table 2. Crude and adjusted prevalence ratios (APR) for sociodemographic and other factors associated with quit attempts in the past 12 months among adults aged >15 years, Global Adult Tobacco Survey, Ethiopia, 2016

Variable	Quit attempt ^a					
	%	95% CI	PR	95% CI	APR ^b	95% CI
Overall	42.0	31.2–53.6	N/A	N/A	N/A	N/A
Gender						
Male	47.4	37.8–57.2	3.4	1.3–8.9*	3.9	1.4–10.7*
Female (Ref.)	14.0	4.8–34.5	1		1	
Age (years)						
15–30	48.7	31.8–65.9	5.3	1.4–20.4*	5.2	1.1–24.9*
31–44	40.5	31.3–50.4	4.3	1.2–15.6*	3.6	0.9–15.2
45–60	45.2	20.4–72.6	4.1	1.1–15.6*	2.3	0.5–9.7
>60 (Ref.)	9.2	2.4–29.6	1		1	
Place of residence						
Urban	60.3	50.0–69.8	1.7	1.1–2.5*	1.0	0.6–1.6
Rural (Ref.)	36.4	24.0–50.9	1		1	
Working status						
Working	45.2	33.3–57.6	1.9	1.2–3.2*	3.4	0.9–13.7
Not working (Ref.)	23.3	13.5–37.2	1		1	
Education level						
No formal education	21.8	12.6–35.0	0.5	0.3–0.9*	1.0	0.5–1.9
Primary school	47.3	33.4–61.7	1.0	0.7–1.6	0.7	0.4–1.4
Secondary school	73.2	55.5–85.7	1.6	1.1–2.4*	1.7	1.0–2.8
Above secondary (Ref.)	45.8	30.9–61.4	1		1	
Wealth index						
Lowest	22.6	13.7–35.1	0.3	0.2–0.6*	1.1	0.7–1.9
Low	56.5	36.0–75.0	0.9	0.6–1.3	0.9	0.4–1.6
Medium	35.9	16.8–60.7	0.6	0.3–1.1	0.8	0.5–1.5
High	56.4	36.8–74.2	0.9	0.6–1.3	0.5	0.2–1.3
Highest (Ref.)	65.7	50.8–78.0	1		1	
Awareness of health harms of tobacco						
Yes	51.6	42.6–60.6	3.6	1.6–8.2*	2.5	1.1–5.5*
No (Ref.)	14.3	6.0–30.3	1		1	
Time to first smoke after waking^c (minutes)						
≤5	39.6	17.5–66.9	0.7	0.3–1.3	0.8	0.6–1.3
6–30	12.4	5.4–26.1	0.2	0.1–0.4*	0.7	0.4–1.2
31–60	21.8	10.4–40.2	0.4	0.2–0.7*	0.8	0.5–1.3
>60 (Ref.)	61.3	43.8–76.3	1		1	
Healthcare provider advice to quit smoking^d						
Yes	53.4	32.6–73.1	1.3	0.8–2.1	0.8	0.5–1.1
No (Ref.)	41.6	23.7–62.0	1		1	
Ever used smokeless tobacco						
Yes	15.8	4.7–41.5	0.3	0.1–1.0	0.8	0.5–1.3
No (Ref.)	46.3	36.1–56.9	1		1	

PR: prevalence ratio. APR: adjusted prevalence ratio. a Among current smokers and former smokers who have been abstinent for <12 months. b Adjusted regression model controlled for gender, age group, place of residence, working status, education level, wealth index, awareness of health harms of tobacco, time to first smoke after waking, healthcare provider advice to quit smoking, and ever used smokeless tobacco. c Among daily tobacco smokers. d Among current and former smokers who have been abstinent for <12 months who visited a healthcare provider (HCP, n=97). *Statistically significant (p<0.05).

Table 3. Crude and adjusted prevalence ratios (APR) for sociodemographic and other factors associated with successful quitting among ever tobacco smokers aged >15 years, Global Adult Tobacco Survey, Ethiopia, 2016

Variable	Successful quitters >1 year ^a					
	%	95% CI	PR	95% CI	APR ^b	95% CI
Overall	27.8	19.8–37.5	N/A	N/A	N/A	N/A
Gender						
Male	26.8	20.2–34.7	0.8	0.4–1.7	0.6	0.3–0.9*
Female (Ref.)	32.4	12.8–60.9	1		1	
Age (years)						
15–30	22.9	12.6–38.0	0.6	0.2–1.4	0.5	0.2–1.2
31–44	28.3	18.3–41.0	0.4	0.2–0.9*	0.4	0.2–0.8*
45–60	34.0	18.1–54.5	0.7	0.4–1.3	0.7	0.4–1.4
>60 (Ref.)	33.2	14.8–58.8	1		1	
Place of residence						
Urban	36.4	26.5–47.7	1.5	0.9–2.6	0.9	0.5–1.7
Rural (Ref.)	24.6	15.1–37.5	1		1	
Working status						
Working	25.5	17.5–35.6	0.7	0.4–1.2	0.8	0.4–1.6
Not working (Ref.)	39.1	21.3–60.3	1		1	
Education level						
No formal education	19.8	8.6–39.4	0.4	0.2–1.1	0.6	0.2–1.6
Primary school	30.2	19.1–44.4	0.7	0.3–1.2	0.8	0.4–1.6
Secondary school	30.8	17.7–47.9	0.7	0.4–1.2	0.8	0.4–1.5
Above secondary (Ref.)	46.6	27.9–66.3	1		1	
Wealth index						
Lowest	17.0	6.6–37.2	0.5	0.2–1.4	0.8	0.3–2.5
Low	29.2	15.3–48.6	0.9	0.4–1.8	1.0	0.4–2.4
Medium	35.8	24.0–49.6	1.1	0.7–1.8	1.4	0.7–2.8
High	40.7	27.8–55.1	1.3	0.8–2.0	1.4	0.8–2.5
Highest (Ref.)	32.7	21.5–46.2	1		1	
Awareness of health harms of tobacco						
Yes	32.9	24.5–42.7	3.5	1.0–12.1*	3.9	1.8–8.5*
No (Ref.)	9.3	2.4–30.4	1		1	
Time to first smoke after waking^c (minutes)						
≤5	0	N/A	N/A	N/A	N/A	N/A
6–30	0	N/A	N/A	N/A	N/A	N/A
31–60	0	N/A	N/A	N/A	N/A	N/A
>60	0	N/A	N/A	N/A	N/A	N/A
Healthcare provider advice to quit smoking^d						
Yes	0	N/A	N/A	N/A	N/A	N/A
No	0	N/A	N/A	N/A	N/A	N/A
Ever used smokeless tobacco						
Yes	17.2	6.5–38.4	0.6	0.3–1.4	0.9	0.5–1.9
No (Ref.)	28.9	20.6–38.9	1		1	

PR: prevalence ratio. APR: adjusted prevalence ratio. a Among ever smokers. b Adjusted regression model controlled for gender, age group, place of residence, working status, education level, wealth index, awareness of health harms of tobacco, and ever used smokeless tobacco. c Among daily tobacco smokers. d Among current and former smokers who have been abstinent for less than 12 months who visited a healthcare provider (HCP, n=97). *Statistically significant (p<0.05).

smoked and were aged 31–44 years were less likely (PR=0.4; 95% CI: 0.2–0.9) to have successfully quit compared to those age ≥ 60 years (Table 3). Those who were aware of health harms of tobacco were more likely (PR=3.5; 95% CI: 1.0–12.1) to have successfully quit than those who were not aware. There was no significant statistical association in the unadjusted model for gender, residence, working status, education level, wealth index, or having ever used smokeless tobacco with successful quitting of tobacco smoking.

After adjusting for all independent variables, men were significantly less likely to have successfully quit than were women (APR=0.6; 95% CI: 0.3–0.9) (Table 3). Those aged 31–44 years were less likely (APR=0.4; 95% CI: 0.2–0.8) to have successfully quit compared to those aged ≥ 60 years. Those who were aware of health harms of tobacco were significantly more likely to have successfully quit (APR=3.9; 95% CI: 1.8–8.5) than those who were not aware. There was no significant statistical association in the fully adjusted model for residence, working status, education level, wealth index, or having ever used smokeless tobacco with successful quitting of tobacco smoking.

DISCUSSION

This study identified factors associated with quit attempts and with successful quitting using Ethiopia's GATS 2016 data. Men were more likely to make a quit attempt, but less likely to successfully quit, than were women. People aged 15–30 years were more likely to have made a quit attempt, and those aged 31–44 years were less likely to have successfully quit than were people aged >60 years. Healthcare provider advice to quit smoking was not associated with quit attempts. Awareness of the health harms of tobacco was significantly associated with both quit attempts and successful quitting. To our knowledge, this is the first study based on the nationally representative data from Ethiopia to assess factors associated with quit attempts and successful quitting. Information from this study can be used to develop well-tailored, effective tobacco control strategies and strengthen cessation programs in Ethiopia.

Gender was associated with both quit attempts and successful quitting in this study; men were more likely to have a quit attempt but less likely

to successfully quit than were women, consistent with prior studies conducted across multiple countries^{13,20–23}. The higher prevalence of quit attempts among men may be due to a higher prevalence among men of exposure to media containing warnings about tobacco use, or a higher prevalence of noticing health warnings on cigarette packages³, both of which may motivate quit attempts. Despite a higher prevalence of quit attempts among men, however, this study demonstrated a lower prevalence of successful quitting among men compared to women. This could be related to a potentially greater severity of nicotine dependence among men; for example, the number of cigarettes smoked by men is greater than among women in Ethiopia³. This is potentially consistent with a recent systematic review of predictors of quit attempts among adults across high- and middle-income countries, which identified that lower severity of nicotine dependence was the single most consistent predictor of successful quitting²⁴. The only other factor related to nicotine dependence examined in this study was time to first smoke after waking, which did not demonstrate a significant association with quit attempts.

Age was also associated with quit attempts and successful quitting in this study, though inconsistently. In unadjusted models, all age groups were more likely to report quit attempts compared with the oldest age group (>60 years), though only those aged 15–30 years were more likely to have made quit attempt in the adjusted model. The higher prevalence of quit attempts among younger age groups might be related to the lower prevalence of daily smoking among younger people compared to older ones³, which is consistent with findings from a four-country survey which showed that younger people are more likely and daily smokers less likely to make quit attempts²⁵. All age groups, compared with the oldest age group (>60 years) had an APR of less than 1 in relation to successful quitting, though the association was only significant for the age group 31–44 years. While the association was not significant across all age groups in our study, the general pattern is consistent with other studies which have found that the chance of successful quitting increases in older age groups^{13,14,21,22,26}. The prevalence of symptoms caused by tobacco related

diseases increases with age, which may motivate people of older ages to quit smoking in order to reduce the negative health effects of tobacco use^{27,28}.

Other factors we assessed included healthcare provider advice to quit smoking and awareness of the health harms of tobacco. Unexpectedly, healthcare provider advice to quit smoking was not associated with making a quit attempt in this study. This is inconsistent with studies from other countries which showed a positive relationship between quit attempts and healthcare provider advice^{13,29,30}. Prior studies have shown that simple advice to quit tobacco coupled with the use of cessation aids increases the chances of both quit attempts and successful quitting^{31,32}. Evidence also shows that healthcare provider advice to quit tobacco increased the utilization of different cessation services³³. The lack of association between healthcare provider advice and quit attempts in this study could be due to the small number of study participants who had visited a healthcare provider (n=180), a possible lack of knowledge among healthcare providers on tobacco cessation counseling services, or limited availability of cessation aids and services in Ethiopia. Lack of training of healthcare providers on cessation services and counseling, and time constraints in routine healthcare service, have been identified as barriers affecting the standard counseling services at healthcare facilities^{3,34,35}. In Ethiopia, the majority (three-fourths) of people who attempted to quit smoking did so without any assistance, and few received cessation aid services³. Health system strategies to get assistance to Ethiopians attempting to quit might include: integrating cessation counseling and support into standard healthcare visits; offering cessation support through quitlines, mobile apps, or cessation-specific clinics; and expanding cessation training for all health care providers^{4,31,32,36}.

Awareness of the health harms of tobacco was of significant impact in this study: those who were aware of health harms of tobacco were 2.5 times and 4 times as likely to make quit attempts and successfully quit, respectively, than those who were not aware. This finding is consistent with previous research^{13,14,21,22,26,29}, and underscores the importance of warning populations of the health harms of tobacco⁶. In Ethiopia, cigarette packs are required

to display effective warning labels that contain messages about the harms of tobacco use and large warnings with all appropriate characteristics are displayed on cigarette packs^{34,37}. Notably, however, less than half of those who currently smoked noticed health warning signs on cigarettes³, which indicates an opportunity to increase the visibility of these warnings. The impact of awareness of the health harms of tobacco on successful quitting also suggests potential benefit of broader education, outreach, and public communication to raise awareness of these health harms of tobacco across Ethiopia. Creating a high level of awareness on the health risks of all types of tobacco use across all age groups, sexes, and places of residence is one of the major objectives in Ethiopia's tobacco control strategic plan³⁷. The strategies set forward to achieve this goal include ensuring effective pack warning labels, implementing counter-advertising campaigns through mass media, and regulation and disclosure of the content of tobacco products³⁷. Public health campaigns aimed at improving public awareness on harms of tobacco use have begun in collaboration with civil societies, WHO, Ministry of Health, and regional health bureaus in Ethiopia. In addition, awareness creation activities were completed during WHO's 2021 World No Tobacco Day celebration, which had the theme 'Commit to Quit' tobacco use³⁸.

Limitations

This study has limitations. First, the cross-sectional nature of the data limits our ability to draw conclusions about the directionality of the findings. Second, the study relied on self-reported, close-ended answers to questions on sensitive issues like tobacco smoking status, tobacco smoking quit attempts, and utilization of cessation services; social desirability bias in responses is possible here as a result of perceived stigma. Third, due to the absence of motivation-related questions in the questionnaire, we were unable to assess motivational factors such as confidence in quitting, which could be an important determinant in quit rates and successful quitting²⁴. Fourth, some small sample sizes (people who had recently visited a healthcare provider, for example) may have limited the power of this study to detect some potential associations. Despite these limitations, to our knowledge, this is the first study to assess the

relationship between sociodemographic and other factors with quit attempts and successful quitting.

CONCLUSIONS

This study revealed certain sociodemographic and other factors that predicted quit attempts and successful quitting. Men were more likely to have a quit attempt but less likely to successfully quit, and awareness of health harms of tobacco was associated with quit attempts and successful quitting. Healthcare provider advice to quit smoking was not associated with quit attempts in our study. This study provides evidence to expand access to cessation support for people attempting to quit and for all people who use tobacco in Ethiopia, expanding healthcare provider and healthcare system capacity to encourage cessation, and suggests the potentially powerful impact of expanding public awareness of the health harms of tobacco.

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CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

FUNDING

This research was partly supported by an appointment to the Tobacco Scholars Program Fellowship administered by the CDC Foundation, in partnership with the Centers for Disease Control and Prevention, and funded through a grant from the Bill & Melinda Gates Foundation. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval and informed consent were not required for this study as existing data from the Ethiopian 2016 Global Adult Tobacco Survey (GATS) were used.

DATA AVAILABILITY

The data supporting this research are available from the Centers for Disease Control and Prevention data portal at <https://nccd.cdc.gov/GTSSDataSurveyResources/Ancillary/DataReports.aspx?CAID=2>

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.