Prevalence of Khat chewing and associated factors in Ethiopia: Findings from the 2015 national Non-communicable diseases STEPS survey

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Abstract

Background: Chewing of the leaves of the plant khat (*Catha edulis* Forsk) is a common habit in some countries of East Africa and the Arabian Peninsula. Khat is chewed by an estimated 20 million population every day in the Arabian Peninsula and in Eastern Africa region including Ethiopia. Ethiopia is believed to be the country of origin of khat where millions chew khat on a daily bases. Khat is also one of Ethiopia's biggest export commodities. This particular study assessed the prevalence of khat chewing and its predictors in Ethiopia.

Method: We used a community based cross-sectional data collected in 2015 as part of the National STEPs survey on NCD risk factors. .. The target population for this survey was all men and women aged 15-69 years who had been living at their place of residence for at least six months prior to the survey. A mix of stratified, three-stage cluster and simple random sampling were used to the study setting or clusters and households. The sampling frame was based on the population and housing census conducted in Ethiopia in 2007. A total of 10,260 households were selected from the 513 enumeration areas. Data were collected using WHO STEPS questionnaire and a locally constructed structured questionnaire to collect data on life time and current khat chewing and associated factors. Data were analyzed using SPSS Version 20, descriptive statistics as well as association tests were carried out.

Result: Nineteen percent of the respondents had ever chewed khat where among these, the majority (83%) were current khat chewers giving an overall prevalence of current khat chewing rate of 15.8% (21.1% of males and 9.4% of females). Khat was significantly higher in Afar [AOR and (95% CI)] [7.23 (2.01-26.01)], Dire Dawa [AOR and (95% CI)] [5.945 (2.116-16.706)], Harari [AOR and (95% CI)] [5.83 (1.49-22.87)] and Somali [AOR and (95% CI)] [4.315 (1.36-13.71)] among others. Similarly, the odds of khat chewing in urban areas [AOR and (95% CI)] [1.726 (1.18-2.53)] and current users of tobacco [AOR and (95% CI)] [2.882 (1.744 to 4.764)] were higher than their counterparts. Those who were in the third and fourth quartile income ranges [AOR and (95% CI)] 0.612 (0.384-0.974)], [AOR and (95% CI)] [0.508(0.309-0.84)] and those in high school education [AOR and (95% CI)] [0.386 (0.213-0.70)] were less likely to use Khat respectively.

Conclusion: Almost 1 out of 5 respondents had ever chewed khat and among these, the vast majority, more than 80%, reported to have been current khat chewers. Being educated and in a better economic status were the protective factors for current khat chewing. Current tobacco use was associated with khat chewing increasing the risk to NCDs. Hence, policy measures aiming at prevention of khat chewing are recommended. Further studies aiming at problematic khat chewing and associated psychosocial and physical health problems is recommended. [*Ethiop. J. Health Dev.* 2017;31(Special Issue):320-230]

Key words: Ethiopia, Risk Factors, Khat, NCD, Protective Factors, Tobacco

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Introduction

Chewing of the leaves of the plant called khat (Catha edulis Forsk) is a common habit in some countries of East Africa and the Arabian Peninsula. In recent times its use has expanded to North America and Europe, particularly among emigrants and refugees from countries such as Somalia, Ethiopia and Yemen (1). Khat is cultivated in countries bordering the Red Sea and along the east coast of Africa. The people of these countries have chewed khat for centuries. There are several names for the plant, depending on its origin: chat, qat, qaad, jaad, miraa, mairungi, cat and catha. It is an evergreen shrub which is mainly grown in Ethiopia, Kenya, Yemen, Somalia, Sudan, South Africa and Madagascar; it has also been found in Afghanistan and Turkestan (2).

Khat chewing is rising, from being restricted to certain geographical areas and segments of society; it travels far and wide geographically and socially. This rise in chewing has met with great concern locally and globally (3). The plant is chewed by an estimated 20 million people every day on the Arabian Peninsula and in Eastern Africa region (4). Chewing of khat has a stimulating effect on the central nervous system, the reason for the widespread use (5). Ethiopia is believed to be the country of origin of khat; the chewing of khat leaves probably pre-dates the use of coffee (2). Given the accessibility of market, khat remains a marketable commodity (6). Khat cultivation is expanding at an alarming rate as farmers realize its earning potential; it is exported to Djibouti, Somalia, and Yemen and became one of Ethiopia's biggest export commodity like coffee (7).

Khat is part and parcel of the social fabric of the societies where it is traditionally chewed. Consequently, it is banning its use is not a pragmatic option (6, 8). Hence, it is said to enhance social interaction, playing a role in ceremonies such as weddings (2). Several studies have shown the adverse effects of khat chewing; for instance, a study revealed that excessive use of khat may create considerable problems of social, health and economic nature (5, 9). The chewing of khat leaves was reported to be one of the most important risk factors for health problems in Yemen (10). Other studies have shown that in communities where khat is used regularly, it leads to family and marital problems as well as decreased productivity and economic growth (2, 11). Khat chewing appears to predispose individuals to psychological and physical health problems such as disturbance of mood, aggressive behavior, and elevation of blood pressure and pulse rate with subsequent increased cardiovascular risk (12).

In the past, several studies were conducted to determine the prevalence and factors associated with khat chewing in Ethiopia and elsewhere. In Ethiopia, studies conducted among students of Jimma University showed that the current prevalence of khat chewing was 30.8% (13) and 21 % among instructors of Ethiopia (14). The prevalence was high among males 33 %, Tigre ethnic group 42.9%, and 34.4% age group of 18-24 (13). Moreover, in Ethiopia, 42% of university instructors were lifetime khat chewers (14). Besides, other studies have also presented that the use of khat was significantly associated with age, gender and place of residence (15). Similarly, a study in Gondar town revealed that the prevalence of khat chewing was high with statistically significant associations with sex, religion, and monthly income (16).

A 2011 report from the Ethiopian Demographic and Health (EDHS) survey showed khat chewing was more common in the Eastern, Central and Northeastern parts of the country; the highest wealth index quintile, older age group, unskilled workforce, rural residents, exposure to mass media and administrative regions were factors statistically associated with khat chewing practice (17). The habit of khat chewing leads to the development of other habits like cigarette smoking and alcohol intake (13). Furthermore, peer influence and residing off-campus in rented houses are independently associated with the practice (18). The use of khat is also significantly associated with risky sexual behavior (19) and high blood pressure (20).

Although the literature on khat is fairly extensive, and several authors have stated the prevalence, potential adverse effects and factors associated with chat chewing; however, very few large scale population based studies exist to substantiate those statements in Ethiopia as its growing public health concern. The main aim of this study was to provide national data on the prevalence of khat chewing and associated factors that will serve as evidence for policy and planning, and as baseline data for further studies.

Methods

Study design, setting, and target population: A national community-based cross sectional study was conducted by Ethiopian Public Health Institute (EPHI) from April 14-June 26, 2015 using the WHO STEPwise survey on NCD risk factors (21). In Ethiopia, there are 11 regions including the two city administrations (Addis Ababa and Dire Dawa). Kebeles are the smallest administrative units with a clear geographic jurisdiction in Ethiopia. Within Kebeles, there are Enumeration Areas (EAs) which are delineated by the Central Statistical Agency (CSA) of Ethiopia. Therefore, Enumeration Areas (EAs) were considered as the primary sampling units for this survey.. According to the 2007 population and housing census, there were a total of 16,328 Kebeles in Ethiopia i.e. 14,850 in rural and 1,478 in urban kebeles (22). Taking into account the cost of the study and the level of precision, 20 households per EA and one eligible individual from each household with a total of 513 EAs were covered nationwide. Stratifying the sampling design by place of residence, 404 EAs for rural and the remaining 109 to urban areas were allocated. Since, the Primary Sampling Units (PSUs) were the EAs both in rural and urban settings, at the first stage, 513 PSUs (404 rural and 109 urban) were selected with probability proportionate to size (PPS). This was followed by a random selection of secondary sampling

units (SSUs), households, per selected PSU in the second stage. The total number of EAs in the 2007 census were 86,805 and one EA essentially comprised on average 150 households both in urban and rural settings. Twenty households were selected from each EA using systematic sampling. The fresh listing of all households in that EA in consultation with local health workers and any other active member who have a good understanding of the local context was done. In the third stage, eligible individuals were selected from household using Kish method (23). Kish method is a commonly used method for selecting a participant to a survey from a household using a table of random numbers (grid). The survey used Personal Digital Assistant (PDAs) to collect the data and this machine was also programmed to select one eligible individual from the already listed member of the household using Kish method. So that, only one eligible participant (an adult age 15-69 years) in the selected household was enrolled in the survey.

The target population for this survey was all men and women aged 15-69 years who had been living at their place of residence for at least six months prior to the survey. This target population included all people who considered Ethiopia to be their primary place of residence regardless of their citizenship status. Critically ill, severely mentally disabled and those with some type of physical disability that was not suitable for physical measurement were excluded from this study.

A single population-proportion formula was used to determine the sample size. To adjust for the design effect, a complex sampling design effect coefficient of 1.5 was used to compute the sample size. In order to have an adequate level of precision for each age-sex estimate and place of residence, the sample was multiplied by the number of age-sex and place of residence groups for which the estimates were reported. In this study, a mix of sampling approach namely stratified, three-stage cluster sampling, simple random sampling and Kish method were employed to select the study settings and the study participants. The sampling frame was based on the population and housing census conducted for Ethiopia in 2007 by Central Statistics Agency (CSA). A total of 10,260 study participants were included in the study.

Survey instrument: The survey was conducted using the WHO NCD STEPS survey instrument version 3.1. The questionnaire consisted of three STEPS for measuring the NCD risk factors. For this report, we used step-1 which includes information on demographics and behavioral risk factors including tobacco use, alcohol consumption, dietary behaviors such as fruit and vegetable intake and salt and sodium intake, and physical inactivity. History of NCDs and related conditions such as raised blood pressure, diabetes, raised cholesterol, cardiovascular diseases, cervical cancer screening coverage in women, and provision of general lifestyle advice to tackle NCDs was collected through self-report. The questionnaire was modified with expanded and optional questions to suit local needs. Each step consisted of a number of core, expanded and optional questions. Additional optional questions such as khat chewing, were added to the instrument because they were deemed locally relevant. Khat chewing was measured using two questions. The first measurement was employed by asking the respondents whether they had ever chewed khat in their lifetime, and to determine current chewing, those who had positive response for lifetime chewing were asked whether they were currently chewing khat or not. The current khat chewers were defined as those who chewed khat in the past 30 days prior to the survey.

Data Analysis and Management: The survey data were collected entirely using Personal Digital Assistant (PDAs), eSTEPs software was used to design and program the data collection tools in the PDAs. The use of the software and PDAs to collect the data helped to generate the final dataset quickly following the completion of data collection. Outcome measures (prevalence and mean variance) and differences between groups (age, sex and urban/rural groups) were calculated with a 95% CI. Results of the study on the prevalence of khat chewing are representative for the target population, since they were adjusted using population, non-response and sample weights. A further statistical analysis was done by using logistic regression model to identify factors associated with khat chewing. All factors with a p-value <0.05 in the bivariate analysis were further entered into the multivariate model to control for confounding effects. Odds ratios (OR) with 95% confidence intervals (CI) were calculated. Statistical significance was determined at $p<0.05$. The descriptive statistics included prevalence of khat chewing by stratifying variables like, demographic, socio-economic and history of morbidity. The statistical analysis was done using SPSS version 20.

Ethical considerations: Principles of Ethics were considered. Data were collected unlinked anonymously, without any personal identifiers. For the purpose of data collection, informed consent was obtained from the study participants before administering the questions/collecting blood sample and objectives of the study was explained to the participants by the data collectors. For under eighteen children (age <18 years) survey participants, assent and consent was obtained from their parents or guardians. Ethical clearance was obtained first from the EPHI Institutional Review Board (IRB) then from National Research and Ethics Review Committee (Ministry of Science and Technology). Furthermore, an official letter was produced and delivered to the respective regional health bureaus by EPHI staff during fieldwork.

Results

A total of 10,260 participants were planned to be included in this study, and the overall response rate was 95.5% (9,800), more than half (59.4%) were males. Majority, 40.4%, were aged between (15-29 years) and only 7% of were aged between, 60-69 years

with a mean age of 34.5 years (SD=13.1). Out of the total, about 73% of the respondents were from the rural parts of the country. Most respondents were married, 49% of them were without formal education, and slightly more than half (52%) of the participants were self-employed (Table 1).

Table 1: **Socio-demographic characteristics of the study participants of NCD STEPS Survey in Ethiopia, 2015**

Background Characteristics	Number	Percentage (%)
Sex		
Male	3977	40.6
Female	5823	59.4
Age Group (in years)		
15 – 29	3959	40.4
30 – 44	3499	35.7
45 – 59	1690	17.2
60 – 69	652	6.7
Mean Age +SD	34.5 (13.1)	
Locality of the respondents		
Urban	2687	27.4
Rural	7113	72.6
Ethnicity of the respondent		
Oromo	2773	28.3
Amhara	2666	27.2
Tigray	1059	10.8
Somali	597	6.1
Wolayita	222	2.3
Sidama	339	3.5
Guraghe	316	3.2
Others	1824	18.6
Marital Status		
Single	1705	17.4
Married	6634	67.7
Separated/Divorced	788	8.0
Widowed	669	6.8
Educational status		
No Formal Education	4843	49.4
Primary Education	3793	38.7
Secondary Education	653	6.7
Higher Education	511	5.2
Occupation Status of the respondent		
Employed	956	9.8
Self Employed	5087	51.9
Unpaid	3323	33.9
Unemployed	300	3.1
Others	134	1.4
Quintile of annual household Income		
1st Quintile	4597	53.6
2nd Quintile	1364	15.9
3rd Quintile	1220	14.2
4h Quintile	1373	16.0
5th Quintile	18	0.2

Based on the result, 19% of the respondents reported chewing khat at least once in their life time, and among the lifetime chewers, 83% of them were current khat chewers. A large proportion (49%) of the participants who ever chewed khat were from Harari region followed by Dire Dawa (35.3%), Somali (35.2%) and Oromia (34.5%) regions respectively. In Afar region, out of the ever chewers, 96.1% of chewers continued chewing. Similarly, 95.6% in Harari, 90.6% in Gambela (87.5% in Dire Dawa, 75 % in Oromia and 88% in Somali) regions reported a very high proportion of current chewing. Less than half, 46%, of ever chewers continued to be current chewers in Addis Ababa city administration (Table 2).

Table 2: **Distribution of current Khat consumption nationally and by regions among participants of NCD STEPS Survey in Ethiopia, 2015**

Region	Ever chewed Khat				Currently chewing Khat among the ever chewers			
	Yes		No		Yes		No	
	n	%	n	%	n	%	n	%
Tigray	24	3.1	930	96.9	15	61.9	9	38.1
Afar	100	27.9	284	72.1	95	96.1	5	3.9
Amhara	206	7.5	1659	92.5	145	71.5	61	28.5
Oromiya	700	34.5	1608	65.5	609	87.8	91	12.2
Somali	202	35.2	411	64.8	171	87.7	31	12.3
Benishangul Gumuz	19	4.6	364	95.4	14	75.5	5	24.5
SNNPR	215	13.8	1490	86.2	161	76.4	53	23.6
Gambela	45	13.6	248	86.4	41	90.6	4	9.4
Harari	136	49.0	78	51.0	130	95.6	6	4.4
Dire Dawa	120	35.3	137	64.7	109	87.5	11	12.5
Addis Ababa	114	15.9	700	84.1	56	45.9	58	54.1
Total	1881	19.0	7909	81.0	1546	83.1	334	16.9

In general, the proportion of ever khat chewers varied among different age groups ranging from 39.1% in age group of 15-19 years to 7% in age group of 60-69 years. Men were more likely to try khat than women (ranging from 80.7% in age group 60-69 years to 71.5% in age group 45-59%), than women (ranging from 28.5%in age group 40-59 years to 19.3% in age group 60-69 years). The proportion of current khat chewers was the highest among the age group of 30-44 years (39.1%) and lowest among the age group of 60-69 years (7.0%), the proportion of current khat chewers ranged from 81.9% to 69.7% in the age group of 60-69 years and 30-44 years respectively among males, and from 30.3% to 18.1% in the age group of 45-59 years and 60-69 years among females respectively.

Overall, during the past 12 months, 39.9% to 6.8% of age group 15-29 years and 60-69 years tried to stop chewing khat; among them the highest proportion, 42.5%, was among males in the age group of 15-29 years, and 41.5% among females in the age group of 30-44 years.

The proportions of participants who currently smoke tobacco while chewing khat varied among different age groups and sex. Accordingly, smoking tobacco currently while chewing khat ranged from 39.9 % to 7.9% in the age group of 30-44 years and 60-69 years respectively, among them the highest proportion was found in the age group of 30-44 years (42.5%) in males and 15-29 years (40.0%) in females.

The proportion of tobacco smokers while they were chewing khat together with their friends ranged from 40.4% to 5.6%, from which the highest (41.3 %) was among males and 37.1% among females in the age group of 30-44. While, the current alcohol drinkers after chewing khat ranged from 44.0% to 3.4%, among them the highest was found among the males in the age group of 15-29 years (41.2%) and 15-29 years (64.3%) among females.

During the past 12 months prior to the survey, the proportion of participants who had family problems or problems with partner due to consumption of khat ranged from 35.7% to 7.1% in the age group of 30-44 and 60-69 years respectively, while, the highest proportion was in the age group 30-44 years (40.7%) among males and 15-29 years (44.2%) among females (Table 3).

Figure 1 depicted that among the study participants who faced problems due to their or someone else's khat chewing practice, 67% of males and 57% of females were rural residents respectively. Around 63% of the respondents who faced problems due to khat chewing behavior were from rural parts of the country (Figure 1)

Table 3: **Distribution of khat chewing among the participants of NCD STEPS Survey in Ethiopia, 2015**

Variables	Age Group (in years)	Sex					
		Male		Female		Both Sexes	
		Unweighted N	%	Unweighted N	%	Unweighted N	%
Ever khat chewers	15-29	388	73.4	247	26.6	635	33.8
	30 - 44	482	72.5	254	27.5	736	39.1
	45 - 59	241	71.5	131	28.5	372	19.8
	60 - 69	91	80.7	47	19.3	138	7.3
Current khat chewers	15 - 29	334	73.8	201	26.2	535	34.6
	30 - 44	393	71.7	212	28.3	605	39.1
	45 - 59	193	69.7	105	30.3	298	19.3
	60 - 69	76	81.9	32	18.1	108	7.0
Past chewer	15 - 29	54	71.4	46	28.6	100	29.9
	30 - 44	88	76.0	42	24.0	130	38.9
	45 - 59	48	78.6	26	21.4	74	22.2
	60 - 69	15	74.2	15	25.8	30	9.0
Tried to stop chewing khat, past 12months	15 - 29	97	42.5	43	35.0	140	39.9
	30 - 44	84	36.8	51	41.5	135	38.5
	45 - 59	32	14.0	20	16.3	52	14.8
	60 - 69	15	6.6	9	7.3	24	6.8
Advised to quit chewing khat, past 12 months	15 - 29	13	18.6	10	25.0	23	20.9
	30 - 44	36	51.4	21	52.5	57	51.8
	45 - 59	16	22.9	6	15.0	22	20.0
	60 - 69	5	7.1	3	7.5	8	7.3
Currently smoke tobacco while chewing khat	15 - 29	77	28.7	14	40.0	91	30.0
	30 - 44	114	42.5	7	20.0	121	39.9
	45 - 59	56	20.9	11	31.4	67	22.1
	60 - 69	21	7.8	3	8.6	24	7.9
Ever smoke tobacco products while chewing khat	15 - 29	26	26.0	4	28.6	30	26.3
	30 - 44	39	39.0	6	42.9	45	39.5
	45 - 59	28	28.0	3	21.4	31	27.2
	60 - 69	7	7.0	1	7.1	8	7.0
Friends tobacco smoking status while chew ing khat	15 - 29	151	34.5	36	37.1	187	35.0
	30 - 44	181	41.3	35	36.1	216	40.4
	45 - 59	83	18.9	19	19.6	102	19.1
	60 - 69	23	5.3	7	7.2	30	5.6
Currently alcohol drinking behaviour after khat chewing	15 - 29	42	41.2	9	64.3	51	44.0
	30 - 44	39	38.2	4	28.6	43	37.1
	45 - 59	17	16.7	1	7.1	18	15.5
	60 - 69	4	3.9	0	0.0	4	3.4
Ever alcohol drink ing while chewing khat	15 - 29	21	29.6	6	40.0	27	31.4
	30 - 44	28	39.4	6	40.0	34	39.5
	45 - 59	16	22.5	2	13.3	18	20.9
	60 - 69	6	8.5	1	6.7	7	8.1
Faced family or partner problems due to khat use by self ot else	15 - 29	25	27.5	34	44.2	59	35.1
	30 - 44	37	40.7	23	29.9	60	35.7
	45 - 59	20	22.0	17	22.1	37	22.0
	60 - 69	9	9.9	3	3.9	12	7.1

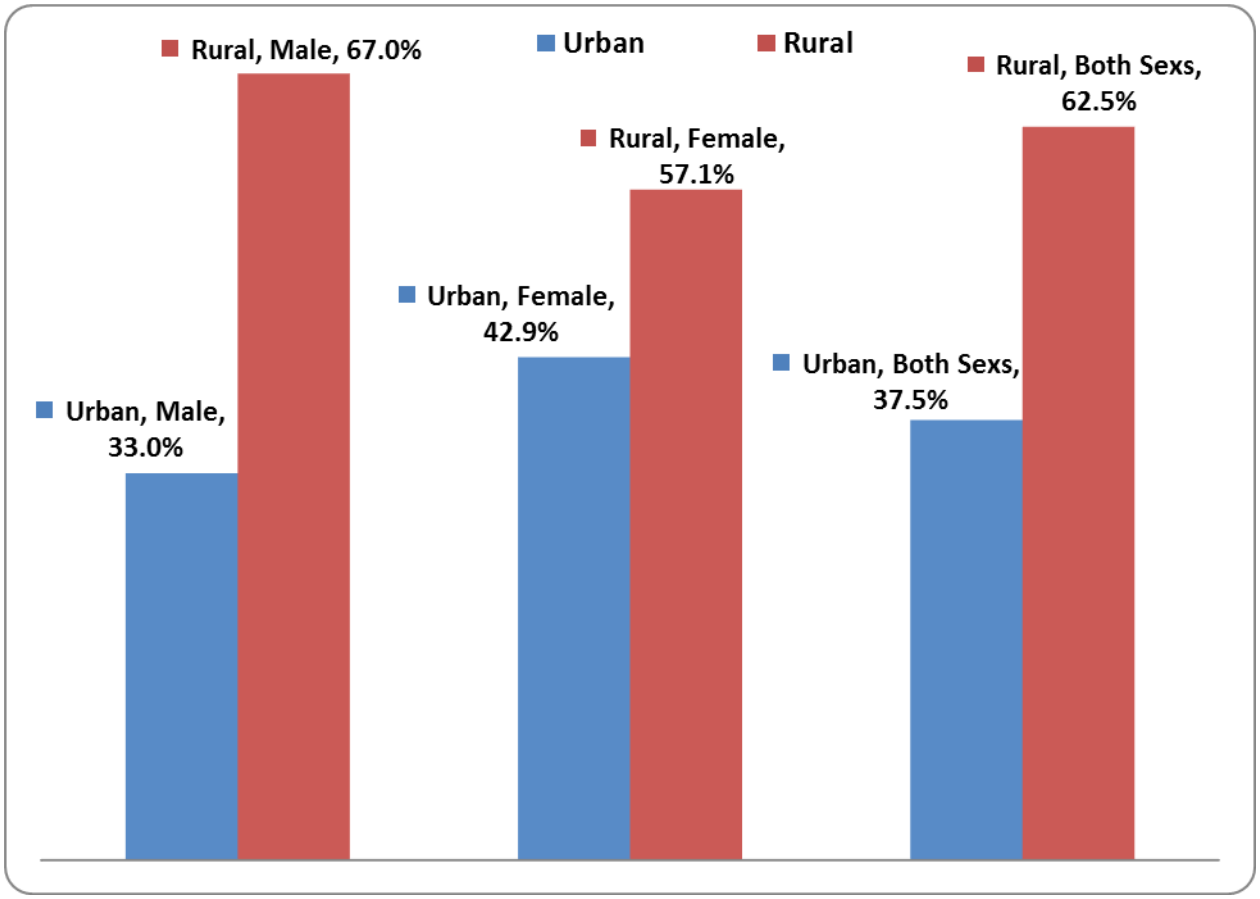

Figure 1: **Proportion of study participants who faced problems due to their or someone else's khat chewing practices, by sex and place of residence in Ethiopia, 2015**

In the multivariate logistic regression model (Table 4), factors independently associated with khat chewing in Ethiopia after controlling for other predictors were region, place of residence, educational status, current tobacco use and income level.

Khat was significantly higher in Afar [AOR and (95% CI)] [7.23 (2.01-26.01)], Dire Dawa [5.945 (2.116-16.706)], Harari, [5.83 (1.49-22.87)] and Somali [4.315 (1.36-13.71)] than Tigray region.. The odds of khat chewing in urban areas was higher than rural areas [AOR and (95% CI)] [1.726(1.177-2.531)].The other factors which had a significant association with khat chewing were being in the no education level (which is a positive factor), people who currently use any tobacco[AOR and (95% CI)] [2.882(1.744 to 4.764)], people who were in the third quartile income range [AOR and (95% CI)] [0.612(0.384 to 0.974)] and fourth quartile income range[AOR and (95% CI)] [0.508(0.309 to 0.836)] (Table 4).

Table 4: **Bivariate and Multivariate analysis of factors associated with khat consumption among the NCD STEPS participants in Ethiopia, 2015**

Predictors	Categories	Bivariate		Multivariate	
		P-value	COR [95% C.I]	P-value	AOR[95% C.I]
Region	Tigray		1		1
	Afar	0.001	11.400[3.361- 38.665]	0.002	7.225[2.007-26.006]
	Amhara	0.428	1.426[0.592-3.435]	0.714	1.203[0.447-3.239]
	Oromia	0.001	4.015[1.707-9.444	0.018	3.065[1.214-7.738]
	Somali	0.010	3.310 [1.331-8.228	0.013	4.315[1.358-13.713]
	B-Gumuz	0.439	1.680[.452-6.249]	0.483	1.900[0.317-11.406]
	SNNP	0.183	1.823[.754-4.406]	0.795	1.135[0.437-2.948]
	Gambella	0.007	6.150[1.646-22.975	0.218	2.509[0.580-10.845]
	Hareri	0.001	13.000[4.063-41.596]	0.011	5.834[1.488-22.871]
	Dire Dawa	0.001	5.945[2.116-16.706]	0.016	4.132[1.297-13.162]
	Addis Ababa	0.237	0.579[0.235-1.431]	0.614	0.771[0.280-2.122]
Place of residence	Urban	0.001	0.330[0.257-0.423]	0.005	1.726[1.177-2.531]
	Rural		1		1
Sex	Male		1		
	Female	0.293	0.878[0.688-1.120]		
Age	15-29		1		
	30-44	0.339	0.870[0.654-1.157]		
	45-59	0.094	0.753[0.540-1.049]		
	60-69	0.090	0.673 [0.426-1.063]		
Marital Status	Single		1		
	Married	0.119	1.299[0.935-1.804]		
	Divorced/Separated	0.455	1.242[0.704-2.189]		
	Widowed	0.640	1.141[0.657-1.980]		
Education	No Formal Schooling		1		1
	Primary Education	0.001	0.593[0.454-0.774]	0.006	0.604[0.421-0.868]
	Secondary Education	0.001	0.305[0.197-0.473]	0.002	0.386[0.213-0.700]
	Higher Education	0.001	0.266[0.171-0.416]	0.005	0.427[0.235-0.773]
Occupation	Employed		1		
	Self Employed	0.001	2.584[1.862-3.587]		
	Unpaid	0.001	2.365[1.609-3.478]		
	Unemployed	0.815	0.934[0.526-1.658]		
	Others	0.017	4.417[1.301-14.997]		
Tobacco Use	Yes	0.001	3.242[2.149-4.891]	0.001	2.882[1.744-4.764]
	No		1		1
Quartiles of income	Q1		1		1
	Q2	0.313	0.799[0.516-1.237]	0.549	0.868[0.547-1.379]
	Q3	0.001	0.478[0.310-0.738]	0.038	0.612[0.384-0.974]
	Q4	0.001	0.250[0.165-0.377]	0.008	0.508[0.309-0.836]

Discussion

This STEP wise survey on the risk factors for NCDs is the first national survey which included participants from a wide age range (15-69 years) and had a nationwide coverage. The current report aimed at elucidating the distribution of khat chewing and associated factors among the study participants. High prevalence of both lifetime and current khat chewing was found in this study; having no education, being in the lowest income range, and current tobacco use were factors associated with kaht chewing.

Several studies were conducted to investigate the distribution, prevalence and associated factors of khat chewing in Ethiopia and other parts of the world where countries that khat chewing was a common practice. The overall prevalence of current khat chewing at 15.8% is comparable with the report by the EDHS which is found a national prevalence of current khat chewing of 15.3% (33).

Unlike other reports, the prevalence of khat chewing was not statistically significantly higher in males compared with females, although the difference in percentages were wide, 21.1 % vs. 9.1%; pooled results from studies East Africa estimated much higher prevalence of khat chewing in both males and females at 80-90% in males and 10-60% females (24). It is even lower than the prevalence reported by the 2012 EDHS survey of 28% for men and 17% for women (33).

Moreover, this study also revealed that among the ever chewers (19%) the highest proportion of participants (83%) reported continuing to chew khat, and hence this indicates that once they started chewing they are more likely to continue chewing. This is possibly due to the reinforcing and habit forming nature of the psychoactive chemicals in khat (25).

In this analysis different factors of khat chewing were assessed using a multiple logistic regression model. Being living in regions Afar, Oromia, Somali, Hareri and Dire Dawa city administration were significantly associated with current khat chewers. This is due to the fact that khat is predominantly cultivated in these regions and their cultural and religious reasons. This finding is consistent with the report of further analysis of the EDHS report on khat chewing by Haile and Lakew who found that regions in Eastern Ethiopia to have the highest rates of kaht chewing (17). Moreover, this study also revealed that education is a protective factor for current khat chewing. Participants who are in the no education group are more likely to chew khat than those who are educated. Besides, participants who are in the third and fourth quartile are statistically significant factors of current khat chewing practice in the country. The result showed that participants who were in a better economic status, those who were in the third and fourth quartile, have a decreased probability of engagement in current khat chewing practice almost by 40% and 50% respectively. This may be either due to the adverse economic impact of khat on individuals by decreasing their productivity leading to poverty or poor and unemployed people using khat as coping strategy to forget their misery; for instance, according a report from Northeastern Kenya, khat chewers reported spending more than half of their domestic budget to buy khat (26), on the other hand, Kebede et al reported a high proportion of khat chewing among out of school youth compared to in school youth (19). Surprisingly enough, the EDHS further analysis report on khat showed association of khat chewing with the highest wealth quintiles (17).

Using tobacco was significantly associated with current khat chewing practice. Participants who used any tobacco products were more than two times more likely to be current khat chewers than those who didn't use any tobacco products. This finding is also found to be consistent with other studies that showed significant association of tobacco use with khat chewing practice; a study from rural Butajra involving more than 10 thousand adults reported significant association between khat chewing and cigarette smoking than non-smoking, the strength of association increased with the number of cigarettes smoked, being over 3 fold in heavy smokers (27). The concurrent use of khat and tobacco has been found to be associated with higher frequency of oral and gastric cancer (28, 29) and increased risk of stroke and death (30). Khat chewing was also reported to exacerbate existing mental illness and increase frequent hospital admission (31, 32).

The study is not without limitations. First, it is not possible to establish causal relationship between the independent and outcome variables such as tobacco use and khat chewing because the study is cross-sectional. Second, the study didn't explore clinical aspects such as presence of dependence and the detailed psychosocial and physical health problems associated with khat chewing.

Conclusion and Recommendations:

High prevalence rate of khat chewing was found in this nationally representative study. According to the findings of the current study, among the participants who ever chewed khat, the majority reported continuing to chew khat; this might indicate the reinforcing properties of khat. This calls for emphasis on protecting the youth from starting khat chewing. Based on the result found, it seems that education is a protective factor for participants not to be engaged in khat chewing. But, this may be due to the exclusion criteria of the communities in the universities, colleges, schools and other facilities. Therefore, we recommend future studies to include communities from these settings in order to see the real magnitude and whether education is a protective factor or not.

Likewise, participants who were in a better economic status have a decreased probability of engagement in current khat chewing practice. This could be either people in the lower socioeconomic status engage in khat chewing habit, or khat chewing leads to poverty. One way to mitigate this problem is to strengthen the creation of new jobs for the youth, and entrepreneurial skills in order to prevent/minimize the drain of the workforce to the status of being idle due to the habit of khat chewing. Concurrent use of tobacco and khat that was found in this study poses a significant risk for NCDs. Hence, public health efforts at prevention of tobacco use and implementation of national anti-tobacco laws need to be strengthened. Further studies focusing on prevalence problematic khat use including the psychosocial and health problems associated with it are recommended. Development of scales for measuring problematic use of khat is also needed.

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Competing interests

The authors declare that there was no financial or non-financial conflict of interest.

Authors' contributions

HT was involved in the design of the study, acquisition of data, analysis, interpretation, and manuscript writing; GG, TG, AD, AB, AB, TG, KA, TT, GT, MG, FC, KM, MG, YF, FS, YT, DY, MG, YG, TK, ST were involved in the design of the study, acquisition of data, interpretation, and manuscript writing.

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