



Magnitude and Factors Associated with *Khat* Chewing among Undergraduate Students of Adama University, Oromia National Regional State, January 2012

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Abstract

Background: In some countries the use of *Khat* is widespread. The use or misuse of *Khat* is increasingly prevalent in Ethiopia. College and university students consume *Khat* to get mental alertness and to work hard in their academic endeavours. Most of the studies concerning *Khat* chewing were done on community-based studies and high school-based as well as psychiatric effects of *Khat*: less was done among university students. **Objective:** The study was aimed to assess the prevalence and associated factors of *Khat* chewing among undergraduate Adama University students. **Methodology:** A cross-sectional study using self-administered questionnaire was conducted on population sample size determined by using single population proportion formula in January 2012. By using multi-stage sampling technique followed by simple random sampling, one department was selected from each school. Then, by simple random sampling, the sampled students were selected proportionally to their year of study and class size. Questions regarding demographic variables, academic and environmental factors were included in the survey. Data quality was controlled by pre-test, supervision, translation and training data collectors. Completed data were coded and entering into EPI info version 3.5.1 and analyzed by SPSS version 16. Odds ratio with 95% CI and multiple logistic regression analysis were used. **Results:** A total of 728 students participated giving a response rate of 95.3%. The lifetime and current prevalence of *Khat* chewing were found to be 27.7% and 20.7% respectively. Being male (AOR = 1.95; 95% CI 1.10 - 3.47), monthly pocket money (AOR = 1.52; 95% CI = 1.01 - 2.28), family history of *Khat* chewing (AOR = 1.72; 95% CI = 1.14 - 2.59) and friend chewing *Khat* (AOR = 1.70; 95% CI = 1.12 - 2.58) were associated factors for *Khat* chewing ($p < 0.05$). **Conclusion and Recommendation:** The prevalence of *Khat* chewing among Adama University students was high compared to other studies done in similar settings. Therefore, there is a need for early intervention that targets university students to reduce impact of peer pressure, family history of *Khat* chewing and proper management of money. To realize this involvement and participation of policy makers, ministry of education, universities and parents are mandatory.

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Keywords

Khat Chewing, Magnitude, Students, Adama University

Subject Areas: Epidemiology, Public Health

1. Background

In some countries where the use of *Khat* (*Catha edulis* Forsk) is widespread, the habit has a deep-rooted social and cultural tradition. This is particularly true for Ethiopia [1]. Several million people may be chewing *Khat* worldwide, with an estimated 10 million people chewing *Khat* leaf daily [2]. It is an evergreen plant that grows mainly in Ethiopia, Yemen and other African countries along the coast of the Indian Ocean favouring altitudes of between 5000 and 6500 feet above sea level, a good altitude for coffee and tea production [3]. Fresh leaves and buds of the *Khat* plant contain cathinone, an amphetamine like alkaloid responsible for its pharmacological action [4].

College and university students consume *Khat* to get mental alertness and to work hard in their academic endeavours [5]. Traditionally, it is commonly used for prayer and during Moslem fasting seasons [6] [7]. However, nowadays, many Christians especially the young also use it [5]. Alcohol and *Khat* were the two “drugs” commonly ever tried by high school students both in government and private schools [8].

Insomnia is a common problem associated with the use of *Khat* which prompts the chewer to use/misuse sedatives and to indulge in alcohol as a means of overcoming the side effect [8] [9].

In Ethiopia, the use or misuse of addictive substances, such as cigarettes, alcohol, and *Khat* (*Catha edulis* Forsk) is increasingly prevalent in Ethiopia [10] [11]. However, most of the studies were done at community and high school level. Therefore, this study was intended to study the prevalence and associated factors of *Khat* chewing among undergraduate students of Adama University.

Khat (*Catha edulis* Forsk) is a natural stimulant from the *Catha edulis* plant, found in the flowering evergreen tree or large shrub of Celastraceae family, which grows mainly in Ethiopia, Kenya, and Yemen and at high altitude areas in South Africa and Madagascar. The plant is known by different names in different countries: *Khat* in Ethiopia, *Qat* in Yemen, *Mirra* in Kenya and *Qaad* or *Jaad* in Somalia, but in most of the literature it is known as *Khat* [12]. The leaves of the *Khat* plant contain alkaloids structurally related to amphetamine [13]. In Africa chewing of *Khat* among children is not encouraged, and fathers will often continue to discourage their sons well into adult life [14].

The youth constitutes the population aged 15 - 24 years. Worldwide, there are more than one billion people within the ages of 15 - 24 years, most of who live in developing countries. Young people constitutes one-third of the total population in Ethiopia [15]. Hard drugs like heroin and cocaine are very rarely available in Ethiopia. However, *Khat*, a locally produced psycho-stimulant is commonly and widely used in the country [11]. Only 0.7% of in-school youth reported use of substances other than *Khat*, compared to 5.1% for out-of-school youth [11].

According to Ethiopian Demographic and Health Survey, eleven percent of women and twenty eight percent of men reported that they had ever chewed *Khat*. Among both women and men, this proportion increases with age. Among women, chat consumption is higher in rural areas than that in urban areas (12 percent versus 7 percent); while among men there is no marked difference by place of residence. The percentage who ever chewed chat is highest among women with no education (14 percent) and among men with more than secondary education (32 percent) [16]. **Figure 1** and **Figure 2** show tip of *Khat* which will be chewed and bundle respectively.

The reported reasons for chewing *Khat* include religious prayer, to pass time, to accompany or socialize with family members, and to get more concentration at work [4]. “To keep alert while reading” and “for relaxation with friends” were the main reasons for starting chewing, 40.5% and 33%, respectively [17].

According to study conducted among the staff of Jimma University, the reasons for chewing *Khat* were to increase performance (58.5%) followed by relaxation (39.8%) and socialization (18.7%) [18]. The study done by Gofu M showed that the college students are using *Khat* to overcome academic stressful work (40%); the next 31.4% and 23.8% reported that mostly they are using *Khat* to enjoy with their friends and to be free from anxiety,



Figure 1. Tip of *Khat* prepared to be chewed (source: www.blackgoldfoundation.org, accessed on September 10, 2014).



Figure 2. Bundle of *Khat* (source: www.blackgoldfoundation.org, accessed on September 10, 2014).

respectively [1]. “To keep alert while reading” and “for relaxation with friends” were the main reasons for starting *Khat* chewing [19]. The main reasons reported for chewing *Khat* included for effective reading and studying (68%), for enjoyment (63%) and to get rid of sleeplessness (43%) according to study among undergraduate students of Addis Ababa University [20]. The subjective reasons given for *Khat* chewing were “to get concentration”, “peer pressure” and “for enjoyment” among others as shown by study in Dire Dawa [21]. Relief from academic stress 41 (51.8%), for relaxation 27 (34.1%) and socialization 17 (21.5%) were among the reasons for *Khat* chewing [22].

Khat typically is ingested while chewing the leaves. After ingesting *Khat*, the chewer experiences an immediate increase in blood pressure and heart rate [2]. Substance abuse is generally believed to be one of the associated factors for sexual risk behaviour in HIV transmission [11]. Grandiose fantasy 138 (65.7%), depression 92 (43.8%), anxiety 107 (50.9%) and impotency 70 (33.3%) were reported due to *Khat* use [1]. Local interviewers found that rates of severe disability due to mental disorders were 8.4% among males (above the age of 12); of these, 83% had severe psychotic symptoms [23].

About 40% of those out-of-school youths who chewed *Khat* reported that it increased their sexual desire [24]. Furthermore, a significant association was observed between frequencies of *Khat* chewing and intake of alcohol [24]. Study done on *Khat* chewing and mental distress showed that over a quarter of the study participants (25.8%) were found to have mental distress due to *Khat* chewing [25].

Among *Khat* chewers, 34 (27.6%) were chewing 2 - 3 times per week [18]. Over 23% of out-of-school youth used *Khat* every day or once weekly while only 7.5% of in-school youth did so [11]. Of the chewers, 89 (20.9%) chewed *Khat* daily [21]. Approximately 16% of the men chewed *Khat* 1 or more days every week; 5% chewed *Khat* daily [26]. More than four hours were spent by 26 (32.9%) of the respondents per ceremony for *Khat* chewing [22].

The median duration (years) of chewing was 20 years [4]. The peak age of *Khat* chewing was found to be between 18 and 44 years [18]. The habit of *Khat* chewing was more frequent in the age group between 16 and 45 years and less common above the age of 55 [27]. Median age at start of chewing was 22 years (range, 12 - 42 years) among current chewers [26]. The mean (SD) age of chewing debut was 15.1 (2.33) years [21].

Seventy-four (40.2%) have started *Khat* chewing before four years [18]. Among *Khat* chewers, 57.8% were

regular daily *Khat* chewers [27]. One hundred and thirty four (45.6%) of the lifetime chewers started chewing when they were senior secondary school students and 52 (17.7%) of the lifetime chewers started chewing during their first year at college [17]. Forty percent of the chewers started chewing while they were in college or university, 20.7% as government employees, 17.4% at senior secondary school, 14.2% at elementary school, 3.9% at junior high school and 3.9% of them started during childhood [18]. Twenty-four (40.0%) of the instructors started *Khat* chewing while they were in senior high school or first year college [19].

The amount of *Khat* consumed at a time was estimated per cost in birr, and 76.2% of the chewers consumed *Khat* that costs 1 - 5 birr [27]. The average amount of *Khat* chewed each day by one individual was 52.4 gm and the average money spent per day by one chewer was 2.9 birr [17]. The amount of *Khat* consumed at a time was estimated per cost in birr, and fifty one (41.5%) of the chewers consumed *Khat* that costs 3 - 5 birr per ceremony [18]. The average amount of money spent each day by one *Khat* chewer was 3.0 birr [19]. Out of those who chewed *Khat*, 144 (33.6%) spent more than 26 birr (mean = 26.4 birr) per week [21]. Twenty three (29.1%) of the chewers consume *Khat* that costs 15 - 20 birr [22].

Most (72.1%) of the chewers chew *Khat* with friends, 13.6% chew alone, 13.6% chew with spouse and 0.7% chew with their parents [18]. Seventy-eight percent got the money from their family and 22% from their friends [21]. Two hundred sixty four of the students had family members who chew *Khat* [17]. Forty seven (59.5%) were from *Khat* chewing families [22]. Only 9.0% chewers reported that they might be addicted to *Khat*, while another 45% claimed that they might have some habit of chewing, but no addiction [4].

Out of the total studied subjects, 63.7% said yes for coffee consumption, of which 24.2% were found to be *Khat* chewers or drink coffee during *Khat* chewing and 14.7% of the *Khat* chewers ingested alcohol after chewing [27]. Thirty eight (30.9%) of the chewers smoked cigarettes while chewing *Khat* and the habits of *Khat* chewing and cigarette smoking were found to have a statistically significant association. Fifty two (42.3%) of the chewers drank coffee while chewing but no statistically significant association was found between *Khat* chewing and drinking coffee and 73 (59.4%) took alcohol after *Khat* chewing [18]. The students reported that alcohol consumption (75%) and cigarette smoking (63%) were the main additional substances used after *Khat* chewing [20]. In addition to *Khat* chewing, 186 (43.5%), 142 (33.3%) and 128 (29.9%) students drank alcohol, smoked cigarettes and used shisha respectively [21]. The life time and current shisha smoking prevalence in the schools was 12.8% and 7.6%, respectively [28]. Thirty eight (48.1%) of the chewers smoked cigarette, 70 (88.6%) drank coffee and 7 (8.9%) took other substances like hashish, diazepam and shisha during chewing. Twenty (25.3%) reported to drink alcohol after *Khat* chewing. Twenty three (76.7%) of the respondents who were getting >500 birr per month were *Khat* chewers [22].

Addiction and Gastro-Intestinal Tract (GIT) problems like constipation were mentioned as the main health problems of chewing *Khat*, 47.3% (n = 423) and 33.4% (n = 299), respectively [17]. Many instructors believed that *Khat* chewing had health risks, 79.05 (n = 143). Mental problems and GIT problems were mentioned as the main health problems of chewing *Khat*, 60.1% and 44.8%, respectively. One hundred and forty seven (81.2%) instructors believed that chewing *Khat* causes socio-economic problems [19]. All of the respondents said that *Khat* chewing has health risk. Sleep disturbance 177 (74.0%) and psychosis 167 (70%) were few among other health problems reported by respondents, considered to be the result of *Khat* chewing [22].

Few reports could be found in the literature on the prevalence of *Khat* among the university students. Milaat *et al.* (2005) reported that current *Khat* prevalence among the general population in Jazan area (Saudi Arabia) was 48.7 percent [29]. The overall prevalence of *Khat* chewing in all the studied population of students was 21.4%. *Khat* prevalence was high in secondary schools (21.5%) compared to the colleges (15.2%). The life time prevalence rate of *Khat* chewing in the colleges was: 41.90% in Boys Health College, 38.20% in Engineering and Computer College, 21.40% in Boys College of Medicine, 7.20% in Samtah Girls Education, 4.80% in Sabiya Girls Education, 3.50% in Jazan Girls Education and 1.40% in Farsan Girls Education [30].

In a study conducted in Jimma Town in 2000, the current prevalence of *Khat* chewing was found to be 30.6% [27]. The prevalence of cigarette smokers in the study was 17.2%, of which 32.4% of the smokers were found to be *Khat* chewers [27]. The prevalence rates of *Khat* chewing in Butajira and Adamtitulu were 50% and 31.7% respectively [5]. Eighteen percent of men and 2% of women reported current *Khat* chewing [26]. Four hundred fifty three of the twelve hundred participants were chewing *Khat* giving the current prevalence rate 37.8% [25].

One study revealed that the prevalence of *Khat* chewing among secondary school students in south-western Ethiopia was 64.9% [31]. Among in-school youth, over 90% did not use *Khat* or alcohol, while among the out-of-school youth close to 73% did not use *Khat* or alcohol [11]. A total of 427 (24.2%) students ever chewed

Khat [21]. The life time *Khat* chewing prevalence in the schools was 18.4% and the current prevalence was 10.9% [28]. The percentages of ever use of *Khat* were 9.2%, 35.6% and 31%, in urban governmental high school, private high school, and Butajira rural governmental high school, respectively [8].

The life time prevalence of *Khat* chewing was found to be 32.6% and the current prevalence was 21.0% [19]. In a study conducted in 2003 among staffs of Jimma University in northwest Ethiopia, the lifetime prevalence of *Khat* chewing was found to be 46% while the current prevalence of *Khat* chewing was 30.8% [18].

The lifetime prevalence of *Khat* chewing was 26.7%. One hundred twenty students (10.9%) were both life time smokers and chewers. The life time prevalence rate of *Khat* chewing in GCMS (Gonder College of Medical Sciences), GCTE (Gonder College of Teacher Education), BUENGF (Bahr Dar University Engineering Faculty, and BUEDUCF (Bahr Dar University Education Faculty) was 27.4%, 23.2%, 27.5% and 27.2%, respectively. There were 18 life time chewers. The current prevalence rate of *Khat* chewing was 17.5% among college students of North West Ethiopian 2001 [17]. The prevalence rate of current use of *Khat* among medical and paramedical students in north-western Ethiopia [32] was 22.3%. About 14% of the participants reported lifetime use of *Khat*. Only 7% of the participants reported the use of *Khat* within the last 12 months; about 4% did it in the past week and 2% reported the current use of *Khat* [20]. A study conducted in Jimma University showed that the current prevalence of *Khat* chewing was 33.1% [22].

Khat chewing habit emerged as a significant risk predictor for HIV (Human Immune Virus) infection along with other influencing factors, viz. age, sex, religion, educational and marital status, and multiple sexual practices. The risk of being HIV positive increases 1.97 times by *Khat* chewing; as much as 4.68 times through multiple sexual practice; 2.05 times among the age group at or above 31 years; and 2.71, 2.67, 2.09, and 1.62 times among the females, the less educated, among the married, and the Christians, respectively [33]. Being male sex, being single and having sex with commercial sex workers were positively associated with *Khat* chewing [34].

The presence of family members who chew *Khat* was a risk factor for chewing *Khat* [17]. Instructors from the GCTE, those with high income, Muslim and instructors who had family members who chew *Khat* were found to be at higher risk of chewing *Khat* [19]. It was noted that the use of *Khat* was reported to be higher among male than that among female students [20].

Compared to Christians and Muslims other religious groups were at higher risk of chewing. There was no statistically significant difference in chewing habit between the different faculties and regions [17]. The risk of chewing increases with increasing year of study and age and males were at higher risk compared to female students [17]. Male sex and being Muslim were significantly associated with *Khat* chewing [18].

No association was found between *Khat* chewing and membership of specific ethnic group, age group, marital status and educational level [18]. There was a significant association of *Khat* chewing habit among Muslims compared with Christians and *Khat* chewing was found to be commoner among males than females [27]. The presence of a strong association between *Khat* chewing and alcohol consumption was observed. The combined use of both drugs seemed to have a more amplifying effect on the incidence of rate of HIV infections than either drug has individually [33]. The use of one or more substances was markedly higher among men than women [26]. There were 151 (3.8%) female *Khat* chewers and 1783 (37.70%) male *Khat* chewers. Significant difference was found between male and female *Khat* chewers [30].

Being Muslim was strongly and positively associated with *Khat* use in the past year, but students who reported business as their parent's main source of income were less likely to consume *Khat* than students who reported other source of income for their parents. Students who reported having a friend who currently chewed *Khat* were about eight times more likely to chew *Khat* than those students who reported no such friend (adjusted OR (Odds Ratio) = 8.08, 95% CI (Confidence Interval) = 2.84 - 22.98) [20]. The prevalence of *Khat* chewing occurs across all years of study, although it is higher among clinical students than pre-clinical ones [20]. It was found that those students who reported friend's use of alcohol, *Khat* and cigarette smoking were more likely to be users of either one or all of the above substances than those students whose friends were non-users [20]. Sex was related with alcohol use and cigarette smoking, yet it was not related with *Khat* use [20].

Khat chewing was significantly associated with male gender, peer influence and similar habit among family members, and being a Muslim [21]. Current substance use was statistically associated with gender, grade in school, religion, ethnicity, presence of income, peer and social pressures, substance use by significant others, knowledge and attitudes about substance use, and parental factors [28]. The habit of *Khat* chewing was higher in males than females [22]. *Khat* chewing had a significant association with high income, smoking habit, Oromo ethnicity, Muslim religion and coffee drinking habit [22].

The objective of this study was to assess the prevalence of *Khat* chewing and associated factors among undergraduate Adama University students, Ethiopia.

2. Methodology

The study was conducted at Adama University, which is located at 100 kilometres to the east of Addis Ababa, the capital city of Ethiopia. Adama town has a growing trend of infrastructure, utilities and large labour force. It falls within the low land zone with an average annual temperature of 21 degree Celsius. Based on the 2007 census, in 2010 the population of the city was estimated to be 280,000. The major sources for *Khat* to the town are from Wondogenet and Harar. There are two *Khat* distributing centers in the town: Arada and Gimbi Gabaya. From these sources it will be again redistributed to *Khat* selling shops and neighbour towns (Asella, Gofa, Doni, Wonji, and Wolenchit) [35].

Adama University is one of the universities which is found in Ethiopia. The university gives teaching learning process in different programmes: regular, extension and summer. The total number of regular undergraduate students in the academic year of 2011/12 was 13930. The University has six schools namely school of engineering and information technology, school of business, school of humanity and natural sciences, school of pedagogy, school of agriculture and school of health. The study was conducted in January, 2012 G.C (Gregorian Calendar).

Quantitative higher teaching institution based cross-sectional study design was conducted. The source population were all Adama University regular undergraduate students who were registered as second year and above during the academic year of 2011/2012.

Adama University students randomly selected from the six departments and who completely filled the self-administered questionnaire were the study population. Critically ill students during data collection time were excluded from study. In addition, first year, extension, summer, distance education and post graduate students were excluded.

Sample size (n) required for this study was calculated by using single population proportion (p) formula to be 764 by taking margin of error to be 4% and, 95% confidence interval and the prevalence of *Khat* chewing among college students of North West Ethiopia in 2001 which was 17.5%. Finally, the sample size was 764 by considering non-response rate 10% and design effect 2.

Multi stage sampling technique was used to select the respondents of the study. First, among the six schools in Adama University, one department was selected by using simple random sampling (SRS) method from each school. Sample size was proportionally allocated for the selected departments based on their class size and academic years of the study. Secondly, from the selected departments, by using the students' name list from the registrar as a sampling frame, the respondents were selected by a simple random sampling method for the self-administered questionnaire.

The dependent variable was *Khat* chewing while the independent variables were age, sex, ethnicity, religion, marital status, department/school, academic year, income of family and the students, peer pressure, family history of *Khat* chewing and availability of *Khat*.

The final English version of the questionnaire was developed after extensive revision of relevant literature on the subject and WHO (World Health Organization) student drug-use questionnaire to ensure reliability. Data was collected from sample students using structured self administered questionnaire having two parts. The first part contains general information including socio demographic characteristics of the students and their family where as the second part contains the questionnaire which assesses *Khat* chewing condition of the students and their family's history of *Khat* chewing. Two versions of the questionnaire were used: an English version and an Amharic language version. Amharic version was made available to students.

The data collection was facilitated by four grade twelve completed students and supervised by two Bachelor of Science (BSc) holders in health sciences. The sample size for each randomly selected department was predetermined proportionally. Therefore the number of students in the study sample was known for each class. The time elapsed (used) for filling questionnaire in one class by average was 15 - 25 minutes. The ID (Identification) number of the students in the sample was posted in the class. Then the data collectors inform the students about the objective of the study and administered the questionnaire by cross checking their ID number. Finally, the data collectors collected the questionnaire and the supervisors took the questionnaire by checking the completeness.

To assure the data quality high emphasis was given in designing data collection instrument. Pre-test was done in Ambo University, prior to five days of the actual data collection day on 30 students, followed by modification.

Proper instruction was given before the survey as to the importance of the study for the students. During data collection, the supervisors received questionnaires from data collectors and reviewed for completeness, accuracy, and consistency.

The collected data was reviewed and checked for completeness before data entry; the incomplete data was discarded. Complete data was coded and entered into EPI info version 3.5.1 and transported to SPSS version 16. The analyses was composed of two parts, descriptive and analytical statistics. Descriptive analysis of frequency, percentage, mean, median and standard deviation were applied for general characteristics, prevalence of *Khat* chewing. Logistic regression was applied to find the relationship between outcome (dependent) variable and independent variable. Crude logistic regression was used to see relationship between one independent variable with outcome at time and adjust logistic regression was used to see relationship between many independent variables with outcome variable after controlling confounding factors. Significance level and association of variables were tested by using 95% Confidence Interval (CI) and odds ratio. Level of significant was set at 5%.

Ethical clearance letter was obtained from Research and Ethics Committee (REC) of School of Public Health, Addis Ababa University. A written consent was obtained from Adama University. Additionally verbal consent information was explained to the students before delivering questionnaire. The students had right to refuse join this study without any effects on their study's result and no need to explain the reason. Students were informed that data will be used for research's purpose only. To keep confidentiality, no need to write their name and personal identification.

The result of this study will be disseminated or communicated to Addis Ababa University School of Public Health, Federal Ministry of Education, Ministry of Health, Adama Town Administrative Bureau, Adama University, local institutions and other concerned bodies through reports and publication on an appropriate journal.

3. Result

Of the total 764 questionnaires administered, 728 were completed and returned making a response rate of 95.3%. The study population included more males (87.5%) than females. The students age range from 18 to 35 years, with the mean of 21.84 years (SD (Standard Deviation) = ± 1.67) and the majority 633 (87%) were within the age of 20 - 24 years old as shown in [Table 1](#).

With regard to the department of the students, most students 304 (41.8%) were from electrical engineering department and followed by business administration department students 105 (14.4%). From total of students involved in the study second year students account 286 (39.3%) and followed by third year students that account 276 (37.9%) as shown in [Table 1](#).

The main ethnicity group was Oromo which account for 315 (43.27%) and followed by Amhara which was 242 (33.24%). About 55.9% and 25.1% of the sample were Orthodox Christian and Muslim, respectively, followed by Protestant Christian (15.7%). Most of the students involved in the study were unmarried which account 673 (92.4%) as shown in [Table 1](#).

When the students were asked about their source of monthly income, they revealed that 676 (92.9%) of the students got money from the family, 71 (9.8%) from friends, 182 (25%) from relatives and 107 (14.7%) from their own (the percent does not add up hundreds because one student can answer more than one alternatives). Similarly, concerning their monthly pocket money, 5.6% of the students did not report their estimated money. From those who revealed it, 39.6% reported birr 100.00 - 299.00 and 54.8% indicated birr 300.00 or more. The average monthly income reported was 351.90 (SD = ± 210.15) birr. The minimum and maximum amounts of monthly pocket money were 100 and 1200 birr respectively. Government employment (27.9%), business (27.3%), and agriculture-based (38.0%) were the main reported source of parents' income as depicted in [Table 1](#).

The lifetime prevalence of *Khat* chewing was found to be 27.7% while the current prevalence of chewing was 20.7% and briefly presented in [Table 2](#). The life time prevalence of *Khat* chewing among males (21.5%) was higher than that of females (6.2%). Similarly the current prevalence of *Khat* chewing was higher for male students (16.9%) when compared to female students (3.8%).

The life time prevalence rate of *Khat* chewing in the departments was: 36.5% in natural resource management, 33.3% in electrical electronics, 32.7% in law, 25.7 in business administration, 25.3% in electrical engineering and 24.3 in medicine. The current prevalence of *Khat* chewing according to the year of study was: 21.3% in second year, 22.9% in third year, 16.3% in fourth year and 16.1% in fifth year students. The current prevalence rate of *Khat* chewing in natural resource management, in electrical electronics, law, in business administration, in electrical engineering and in medicine was 32.7%, 26.7%, 24%, 21%, 19.7% and 10.7%, respectively.

Table 1. Socio-demographic characteristics of undergraduate Adama University students, Adama, Ethiopia, January 2012.

Variables	Frequency N = 728	%
Age (years)		
15 - 19	64	8.7
20 - 24	633	87.0
25 or more	31	4.3
Sex		
Male	637	87.5
Female	91	12.5
Department of the student		
Natural resource management	52	7.2
Medicine	103	14.1
Law	104	14.3
Electrical engineering	304	41.8
Business administration	105	14.4
Electrical electronics	60	8.2
Year of the study		
Second year	286	39.3
Third year	276	37.9
Fourth year	104	14.3
Fifth year	62	8.5
Marital status		
Never married	673	92.4
Ever married/cohabiting	55	7.6
Religion		
Orthodox Christian	407	55.9
Protestant Christian	114	15.7
Muslim	183	25.1
Others	24	3.3
Ethnicity		
Amhara	242	33.3
Oromo	315	43.3
Gurage	70	9.6
Tigre	78	10.7
Others	23	3.2
Monthly pocket money	N = 686	
100 - 299 birr	398	59.1
300 or more birr	288	40.9
Family's main source of income		
Daily labourer	26	4.0
Government employee	204	27.9
Business	199	27.3
Agriculture-based	279	38.0
Others	20	2.7

Table 2. Prevalence of *Khat* chewing among undergraduate students of Adama University, Adama, Ethiopia, January 2012.

Prevalence of <i>Khat</i> chewing	<i>Khat</i> chewers				Non- <i>Khat</i> chewers				Total	
	Male		Female		Male		Female			
	No	%	No	%	No	%	No	%	No	%
Lifetime prevalence	157	21.6	45	6.2	480	65.9	46	6.3	202	27.7
One year prevalence	150	20.6	41	5.6	487	66.9	50	6.9	191	26.2
Current prevalence	123	16.9	28	3.8	514	70.6	63	8.7	151	20.7

Table 3 shows, among current *Khat* chewers, 67 (44.4%) were chewing *Khat* on occasional base. Most (53%) of the chewers chew *Khat* with friends in the university, 23.8% chew with friends out of the university, 21.8% chew alone and 1.4% chew with their parents. Concerning the accessibility of *Khat* almost above half of the current chewers 77 (51%) bought it from in front of the university. Sixty four of the students (42.4%) got it in the town while ten of the students obtain it from their friends.

Table 3 shows, Eighty one (53.6%) of the *Khat* chewers smoke cigarette while chewing and seven (4.6%) took hypnotics after *Khat* chewing. Ninety (59.7%) of the chewers drink hot drinks like coffee while chewing and 64 (42.4%) took alcohol after *Khat* chewing. Other substance use was also observed in 66 (43.8%) of the students. Many of the students 137 (90.8%) used water by the time of *Khat* chewing. During *Khat* chewing 76 (50.3%) of current chewers used sugar and 74 (49%) used soft drinks. Majority of the current chewers (43.7%) chew *Khat* in their dormitory. Only males (6.6%) were found to be chewers in the video house.

On average 19.78 birr (SD = ± 7.245) is spent by a *Khat* chewer per ceremony. The minimum and the maximum amount of money spent in a ceremony of *Khat* were 7 and 40 birr, respectively. Four hundred and eighty two (66.2%) of the students had a family who chew *Khat* and 493 (67.75%) also had friends who chew *Khat*.

Table 4 shows the time when the students started *Khat* chewing. Accordingly, majority of the students (67.2%) started *Khat* chewing when they were in grade eleven or twelve or first year in the university. Almost 10% of the students started *Khat* chewing by the time they were second year university students. Five percent of the students started *Khat* chewing below high school level. Only three percent of the students started *Khat* chewing above second year or other time.

Life time chewers gave various reasons for chewing *Khat*. The main reason mentioned was to increase performance and concentration on study (68.3%) followed by peer pressure (56.4%) and enjoyment (relaxation) (45%). Only 6 (3%) of students chew *Khat* for the purpose of enhancing sex.

Table 5 shows the risk of *Khat* chewing. Accordingly, many students from that of life time chewers stated that *Khat* chewing have problems, 115 (57%). From the problems mentioned by the students, health risks (94.8%) were the major one. Economic problem was stated by 70 students (60.9%) followed by social problems (34.8). Twenty of the students mentioned that chewing *Khat* has educational problems. Teeth problem and decrement in sexual feeling were mentioned as the main health problems of chewing *Khat*, 56.9% and 54.1%, respectively. The other health problems mentioned by the students were weight loss (49.5%), gastrointestinal problems (34.9%) like constipation, addiction (28.4%) and increment in sexual feeling (9.2%). Disagreement with the family members, rejection by the society and criminal activity were the mentioned social problems.

Table 6 shows the association between dependent and independent variables. According to binary logistic regression, being male, being less than 20 years, being medicine department and having more than or equal to 300 birr for pocket monthly money showed association. However, the rest did not show any association before and after adjustment.

To minimize the risk of confounder for dependent variables multiple logistic regressions were used. Having families who are chewing *Khat* had association with *Khat* chewing of the students in the university. It had showed significant association at P-value of 0.007 with COR (Crude Odds Ratio) (95% CI) = 1.65 (1.15, 2.39) and P-value of 0.009 with AOR (Adjusted Odds Ratio) (95% CI) = 1.72 (1.14, 2.59). Students whose family has the history of *Khat* chewing were 1.72 times likely to chew *Khat* than the students whose family didn't, according to **Table 6**. The socio-demographic factors of being male and having pocket monthly income of equal to or more than 300 birr showed significant association with *Khat* chewing. It showed significance at P-value 0.013 with COR (95% CI) = 1.86 (1.14, 3.02) and P-value 0.023 with AOR (95% CI) = 1.95 (1.10, 3.47). The students

Table 3. Patterns of *Khat* chewing among undergraduate Adama University students, Adama, Ethiopia, January 2012.

Pattern of <i>Khat</i> chewing	Male		Female		Total	
	No	%	No	%	No	%
Chewing frequency						
Daily	26	17.2	4	2.6	30	19.8
One to three times a week	43	28.5	11	7.3	54	35.8
Occasionally	54	35.8	13	8.6	67	44.4
Where <i>Khat</i> is chewed						
In the dorm	52	34.4	14	9.3	66	43.7
In the video house	10	6.6	0	0	10	6.6
In <i>Khat</i> selling house	46	30.4	9	6.0	55	36.4
In relatives home	14	9.3	4	2.6	18	11.9
Other place	1	0.7	1	0.7	2	1.4
With whom <i>Khat</i> is chewed						
Alone	25	16.5	8	5.3	33	21.8
With friends in the university	67	44.4	13	8.6	80	53
With friends out of the university	29	19.2	7	4.6	36	23.8
With family	2	1.4	0	0	2	1.4
Substance use during/after <i>Khat</i> chewing						
Cigarette smoking	67	44.3	14	9.3	81	53.6
Hot drinks like coffee use	72	47.8	18	11.9	90	59.7
Alcohol intake	58	38.4	6	4.0	64	42.4
Hypnotics use	5	3.3	2	1.3	7	4.6
Other substances use	44	29.2	22	14.6	66	43.8

Table 4. The year in which undergraduate Adama University students started *Khat* chewing, Adama, Ethiopia, January 2012.

Time	Life time <i>Khat</i> chewers; n = 202	
	Number	Percent
Grade 1 - 6	4	2
Grade 7 - 8	6	3
Grade 9 - 10	30	14.9
Grade 11 - 12	60	29.7
First year in the university	76	37.5
Second year in the university	20	9.9
Third year in the university	4	2
Fourth year in the university	1	0.5
Fifth year in the university	0	0
Other time	1	0.5

Table 5. Health risks of *Khat* chewing mentioned by undergraduate students of Adama University, Adama, Ethiopia, January 2012.

Health risks	Number (n = 109)	Percent
Addiction	31	28.4
Loss of weight	54	49.5
Gastrointestinal problems	38	34.9
Affect teeth	62	56.9
Decrease sexual feeling	59	54.1
Increase sexual feeling	10	9.2

Table 6. Relationship between *Khat* chewing and factors like socio-demographic, academic and environmental factors among Adama University undergraduate students, Adama, Ethiopia, January 2012.

variables	<i>Khat</i> chewing		OR (95% CI)		P-value
	Yes	No	Crude	Adjusted	
Sex					
Male	123	514	1.86 (1.14, 3.02)*	1.95 (1.10 - 3.47)*	0.023
Female	28	63	1	1	
Age category					
<20 years	6	58	3.37 (1.05, 10.76)*	2.39 (0.60, 9.51)	0.214
20 - 24 years	137	496	1.26 (0.55, 2.88)	0.82 (0.30, 2.28)	0.713
>24 years	8	23	1	1	
Department					
NRM ♦	17	35	0.75 (0.33, 1.69)	0.55 (0.20, 1.53)	0.245
Medicine	11	92	3.04 (1.30, 7.10)*	1.91 (0.69, 5.27)	0.213
Law	25	76	1.15 (0.56, 2.38)	0.75 (0.29, 1.95)	0.548
EEN ♦♦	60	244	1.48 (0.78, 2.80)	0.94 (0.43, 2.08)	0.874
BA ♦♦♦	22	83	1.37 (0.65, 2.88)	1.15 (0.47, 2.83)	0.768
EE ♦♦♦♦	16	44	1	1	
Year of study					
Second year	61	225	0.71 (0.34, 1.48)	0.48 (0.19, 1.20)	0.118
Third year	63	213	0.65 (0.31, 1.35)	0.48 (0.19, 1.22)	0.120
Fourth year	17	87	0.98 (0.42, 2.31)	0.52 (0.17, 1.54)	0.234
Fifth year	10	52	1	1	
Marital status					
Never married	138	535	1.20 (0.63, 2.30)	0.87 (0.40, 1.91)	0.721
Ever married	13	42	1	1	
Religion					
Orthodox Christian	89	318	0.72 (0.24, 2.15)	0.81 (0.25, 2.60)	0.722
Protestant Christian	9	105	2.33 (0.66, 8.32)	2.60 (0.68, 9.92)	0.162
Muslim	49	134	0.55 (0.18, 1.68)	0.87 (0.26, 2.86)	0.812
Other	4	20	1	1	

who were male chew *Khat* 1.95 times likely than female students. Similarly, the monthly pocket money of students getting equal to or more than 300 birr showed significant association with *Khat* chewing at P-value 0.019 with COR (95% CI) = 1.55 (1.07, 2.23) and P-value 0.045 with AOR (95% CI) = 1.52 (1.01, 2.28). The students who got pocket monthly income of equal to or more than 300 birr were 1.52 times likely to chew *Khat* than students getting less than 300 birr monthly pocket money as shown in **Table 6**.

Having a friend that chews *Khat* showed association at P-value 0.007 with COR (95% CI) = 1.69 (1.17, 2.44) and P-value 0.012 with AOR (95% CI) = 1.70 (1.12, 2.58). The students who report that their friends chew *Khat* were 1.70 times likely to chew *Khat* than students didn't have. Being medicine student showed significant association with *Khat* chewing before adjustment as depicted in **Table 7**.

Table 7. Relationship between *Khat* chewing and factors like socio-demographic, academic and environmental factors among Adama University undergraduate students, Adama, Ethiopia, January 2012.

Variables	Khat chewing		OR (95% CI)		P-value
	Yes	No	Crude	Adjusted	
Ethnicity					
Amhara	41	201	1.03 (1.03, 3.19)	1.50 (0.42, 5.37)	0.535
Oromo	74	241	0.69 (0.23, 2.08)	1.02 (0.29, 3.59)	0.972
Gurage	22	48	0.46 (0.14, 1.51)	1.26 (0.33, 4.86)	0.735
Tigre	10	68	1.43 (0.40, 5.08)	2.42 (0.58, 10.06)	0.227
Other	4	19	1	1	
Monthly pocket money					
300 or more birr	75	331	1.58 (1.10, 2.27)*	1.52 (1.01, 2.28)*	0.045
100 - 299 birr	74	207	1	1	
Source of income					
Family--Yes	136	540	1.61 (0.86, 3.02)	1.28 (0.54, 3.01)	0.564
-----No	15	37	1	1	
Friend---Yes	18	53	0.75 (0.42, 1.32)	1.01 (0.53, 1.99)	0.931
-----No	133	524	1	1	
Relatives-----Yes	52	130	0.55 (0.38, 0.82)◇	0.58 (0.37, 0.91)◇	0.018
-----No	99	447	1	1	
Own-----yes	29	78	0.66 (0.41, 1.05)	0.74 (0.40, 1.38)	0.354
-----No	122	499	1	1	
Family's main source of income					
Daily labourer	5	24	1.20 (0.28, 5.16)	1.16 (0.23, 5.97)	0.869
Civil servant	36	167	1.16 (0.37, 3.68)	1.22 (0.34, 4.35)	0.758
Merchant	64	135	0.53 (0.17, 1.64)	0.58 (0.16, 2.03)	0.392
Farmer	42	235	1.40 (0.45, 4.39)	1.58 (0.44, 5.63)	0.478
Other	4	16	1	1	
Family chew Khat---Yes	86	396	1.65 (1.15, 2.39)*	1.72 (1.14, 2.59)*	0.009
-----No	65	181	1	1	
Friend chew Khat---Yes	88	405	1.69 (1.17, 2.44)*	1.70 (1.12, 2.58)*	0.012
-----No	63	172	1	1	

◆ = Natural Resource Management; * = Association Present; ◇ = Protective P-Value <0.05; ◆◆ = Electrical Engineering; ◆◆◆ = Business Administration; ◆◆◆◆ = Electrical Electronics.

4. Discussion

This study was to determine the prevalence of *Khat* chewing among undergraduate Adama University students. In addition the study also planned to see the association between *Khat* chewing and common socio demographic variables and other key factors which may be associated with *Khat* chewing.

In this study the lifetime, twelve months and current prevalence of *Khat* chewing among undergraduate Adama University students were found to be 27.7%, 26.2% and 20.7% respectively.

The result of the study was lower compared to the study done in Buta Jira which was 55.7% and 50.5% life time and current *Khat* chewers respectively [10]. According to study conducted in Jimma Town, the current prevalence rate of *Khat* chewing was 30.6% [27]. Among 479 staff's of Jimma University, the lifetime prevalence of *Khat* chewing was 46%, while the current prevalence of chewing was 30.8% [18] and in study conducted among university instructors in Ethiopia the life prevalence rate of *Khat* chewing was found to be 32.6% [19]. Other studies conducted on the prevalence of *Khat* chewing among high school students in south-western Ethiopia was 64.9% [31]. In a survey conducted in one private high school in Addis Ababa and one governmental high school in Butajira, 35.6% and 31.0% of the students respectively reported ever chewing of *Khat* [8]. Among students at a college of Medical Sciences in north-west Ethiopia, it was reported that 22.3% of students were current *Khat* chewers [32], which showed high prevalence of *Khat* chewing. The possible reason might be the difference of instruments used to assess *Khat* chewing, the different characteristics of each school, its students and the target groups. Other reason might be due to the use different methodologies. These could be due to the availability of *Khat*, social acceptance to the habit and study time difference.

According to the result of study by Hussein M Ageely on the prevalence of *Khat* chewing in college and secondary school students of Jazan region, Saudi Arabia [30], the overall prevalence of *Khat* chewing in all the studied population of students was 21.4% and the prevalence was high in secondary schools (21.5%) compared to the colleges (15.2%) which was below this finding. The study conducted on drug use among one of urban governmental high school in Addis Ababa revealed 9.2% ever use of *Khat* [8]. Almost a quarter of High School Students in Eastern Ethiopia were ever *Khat* chewers [21]. The lifetime and current prevalence of *Khat* chewing was found to be 26.7% and 17.5% respectively according to study among college students in North West Ethiopia [17] which was again below the prevalence of this study. Another study conducted on Substance use and its predictors among undergraduate medical students of Addis Ababa University in Ethiopia [20] reported the lifetime use of *Khat* and the use of *Khat* within the last 12 months was 14% and 7% respectively. The possible reason might be due to the different characteristics of schools, study time difference, accessibility of *Khat* to the universities, absence of involving all school or faculties even in one college or university and its students.

Khat chewing was also assessed among each departments of Adama University student even though there was scarcity of literature to discuss on each department. The life time prevalence of *Khat* chewing in engineering and computer college of Jazan region [30] was 38.2% and that of Bahir Dar University engineering college was 27.5% [17] of which both were greater than this study (25.3%). Regarding medicine department, the life time prevalence of *Khat* chewing in Saudi Arabia and Gonder College of Medical Sciences of Ethiopia were 21.4% and 27.4% respectively and prevalence in this study was 24.3%. The possible explanation for this difference may be sample size, culture, time and disciplines of the universities. *Khat* chewing in the last twelve months among pre-clinical and clinical medicine students in Addis Ababa University was 4.7% and 12.6% respectively [20]. However, in this study the prevalence was 20.8% and 16.1% among pre-clinical and clinical students respectively. The current prevalence of *Khat* chewing finding in this study was lesser among third year medical students than study conducted in Jimma University [22], which were 20.5% and 27.3% respectively. The reason might be due to different study subject and the different characteristics of schools.

In this study about 42.4% and 53.6% students drank alcohol and smoked cigarettes respectively in addition to *Khat* chewing. In addition to these substances, the students also used shisha, hashish, hot and soft drinks, sugar and groundnuts during or after *Khat* chewing. This result is in line with other studies [18] [20]-[22] [27] [28]. This act of behaviour may be the reason why the teeth of the students were affected. This might indicates that *Khat* chewing can be the entry point in order to use other substances.

On average one chewer spent 19.78 birr each day for chewing *Khat*. Almost irrespective of the target groups, the money spent for *Khat* is equal to or greater than the previous studies [17] [18] [21] [22] [27]. This indicates that the money spent by the students is high and may not be afforded by them. This might lead to social problems like theft, disagreement with family and in general rejection by the society.

Majority of the students in this study started *Khat* chewing when they were at senior secondary school and first year university students. This result supports other studies [17]-[19]. This might be due to new environment, peer pressure, change in content of subject matter (vast in university), and change in teaching style. Of course, this time is in agreement with the main reason mentioned by the students to start *Khat* chewing: increase performance and concentration on study, peer pressure, enjoyment (relaxation) and relief from stress. The reasons mentioned by the students were almost similar with other studies conducted in schools/colleges [1] [17]-[22].

This study showed that the habit of *Khat* chewing was higher in males than females, which was in line with research findings reported in Jimma University students in 2008 [22], with study reported for college students in north west Ethiopia (OR = 3.69; 95% CI = 2.10 - 6.26) [17], with male high school students in eastern Ethiopia which had higher odds (OR = 2.10; 95% CI = 1.50 - 2.93) of *Khat* chewing than female students [25]. A similar finding has been reported among college students in Saudi Arabia showing significant differences in chewing between males and females (P-value < 0.05) [30]. This might be due to the common tendency of males to chew *Khat* compared to females and there is cultural influence on females not to chew *Khat*. In other hand the study from undergraduate students of Addis Ababa University [20] showed that no association between gender and *Khat* chewing.

The result of the study indicate high prevalence of *Khat* chewing with the factors monthly pocket money, family history of *Khat* chewing and friends history of *Khat* chewing. In this study monthly pocket money was associated with *Khat* chewing. This was consistent with a study conducted in Ethiopia on medical and health officer students which report that the students whose monthly income much birr were found to be chewers compared to those with lower income (P < 0.0001) [22]. This indicates that having money may encourage students to chew *Khat* and to have friends easily. According to the Result from medicine students of Addis Ababa University, students who reported business as their parent's main source of income were less likely to consume *Khat* than students who reported other source of income for their parents [20]. But there was no association between the students' parent main source of income and *Khat* chewing in this study. This study showed that the students who got their monthly income from relatives were less likely to chew *Khat* than students who got from other sources (AOR = 0.58; 95% CI = 0.37 - 0.91). This might be due to the reason that there will be a fear from students not to get additional source of money as they want.

In this study it was revealed that the presence of family members who chew *Khat* predisposes students to chew *Khat*. Likewise with the study in North West Ethiopia [17] and in Jazan region of Saud Arabia [30] that showed association of *Khat* chewing with family history of *Khat* chewing, but the study among medicine students of Addis Ababa in Ethiopia [21] in contrast to this finding had no association. This might be due to the influence of social environment and that students tend to imitate and practice what they observed from their parents.

Having a friend who chews *Khat* was associated with *Khat* chewing. Students those reported having friends who chew *Khat* were 1.70 times more likely chew *Khat* than students didn't report of having chewer friends. Previous studies also identified that friends' chewing of *Khat* was strongly associated with the chewing of *Khat* among university students, indicating the influence of peer pressure [20] [21].

In present study religion had no significant association with *Khat* chewing, but, study conducted among undergraduate students in Addis Ababa University showed being Muslim was strongly and positively associated with *Khat* chewing in the past year [20]. Another studies also showed association of *Khat* chewing with Muslim religion [17] [22].

In this study ethnicity did not showed significant association with *Khat* chewing. In contrast of different studies revealed association of religion with *Khat* chewing such study from Jimma University medical and health officer students [22]. In the present study even though there was no association between *Khat* chewing and year of study as well as age, the association was revealed among college students of North West Ethiopia [17].

The study of all years and departments in the undergraduate Adama University students was strength of the study. The study used double data entry method, collectors and supervisors were trained, pre-test was done and equal chance was given for the sample attendant.

This study was not free of limitations. The limitations included the collection of data was based on self-report of the students and may be subjected to recall bias and under-reporting of *Khat* chewing due to social desirability bias. This is descriptive cross-sectional study that shows only point prevalence of *Khat* chewing and also inability to draw cause-effect associations between the studied variables. Other limitation with self reported questionnaires was inaccurate reporting.

5. Conclusion

According to the findings of this study, the lifetime, twelve months and current prevalence of *Khat* chewing among undergraduate students of Adama University was 27.7%, 26.2% and 20.7% respectively. The magnitude of *Khat* chewing among undergraduate students was considerable compared to most of studies done among college and university students, but lower than the findings of other studies that reported for adolescents and young adults (community based studies). Male sex, having monthly pocket money of ≥ 300.00 ETB, having chewer friend and parent were predictors of *Khat* chewing.

6. Recommendations

Based on the findings of the study and other established facts, the following recommendations were made:

- ◆ There is a need for early intervention that targets university students on *Khat* chewing. Universities should inform their students, about the problems associated with *Khat* chewing. The university should prepare open forums, regular workshops and conferences to create understanding on effects of *Khat* chewing in collaboration with psychiatrists and psychologists. Universities should teach and counsel their students on ways of coping with the problems rather than starting to chew *Khat*. In addition to this, there should be enough recreational areas for students in the university.
- ◆ Parental *Khat* chewing should also be addressed in adolescent *Khat* chewing prevention programs. Parents should be role models to their children by not chewing. They should not expose their children to *Khat* chewing. The students should also be informed about proper management of money.
- ◆ The ministry of education, high schools and university administrators should intervene accordingly by incorporating intervention programs, focusing on reducing *Khat* chewing prevalence. Policy makers should control the production and distribution of *Khat*.
- ◆ Through continuous awareness creation on the impact of *Khat* chewing, the students who were not chewers were not to be enforced by their *Khat* chewing friends, and the chewers should not enforce non-chewer friends to chew *Khat*.

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