

Nearly One-Fourth of Eastern Ethiopian Adolescents are Current Psychoactive Substance Users: A School-Based Cross-Sectional Study

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Introduction: Psychoactive substance use is a growing health problem in both developing and developed countries. Despite adolescents being at high risk of practicing risky behaviors including substance use, there is no adequate information on the problem in the Harari Region, in the Eastern part of Ethiopia. Hence, the present study aimed to identify the burden of current substance use in high school adolescent students of Harari Region, Ethiopia, from 10th April to 10th May 2022.

Methods: A school-based cross-sectional study was employed on a total of 1498 randomly selected adolescent students. Poisson regression was used for the assessment of substance use over the last three months among adolescent students. The substance use burden was reported by IRR (incidence rate ratio) at a 95% Confidence interval. The final model fitness was checked using Akaike information criterion (AIC) and Bayesian information criterion (BIC) reports. The variables that had less than 0.05 P-value were declared to be statistically significant.

Results: The overall psychoactive substance use was 373 (24.9%, 95% Confidence Interval (CI); 22.8–27.1%). The substances included *khat* (21.6%, 95% CI; 18.6–23.6%), alcohol drinking (1.8%; 95% CI; 1.3–2.6%), and smoking (1.2%, 95% CI; 0.75–1.9%). Being male (IRR (Incidence Rate ratio) = 1.21, 95% CI; 1.11–1.38), availability of the substance (IRR (Incidence Rate ratio) = 2.02, 95%; 1.53–2.66), having substance user friends (IRR=1.60; 95% CI: 1.30–2.01), and being at a younger age (IRR = 1.21; 95% CI: 1.02–1.44) increased the psychoactive substance use rate in the adolescents.

Conclusion and Recommendation: One out of four adolescents was a current psychoactive substance user. Being male, substance availability, having substance-user friends, and being at younger age increased the psychoactive substance use rate in school adolescents in Eastern Ethiopia. The intervention that involves the schools' community, students' families, and executive bodies should be strengthened to overcome the substance use-related burdens among high school adolescent students.

Keywords: psychoactive substance use, adolescents, students, Ethiopia

Introduction

Psychoactive substances are the compounds/chemicals that cause health and social problems, including addiction.¹ These substances affect brain functions and cause disturbance in thought, feeling, mood, awareness, or any other behavior. For instance, drinking alcohol, and taking marijuana, nicotine, caffeine, and some pain medicines can change an individual's behaviors.² These substances can be grouped into legal (eg, tobacco and alcohol), illegal (eg, cocaine and heroin), and controlled for use by authorized bodies for treatment purposes that could be organized into 7 categories based on their behavioral and pharmacological effects such as Nicotine containing substances (chewing tobacco and smoking cigarettes), drinking alcohol, taking Cannabinoids (marijuana, hashish), Opioids (Heroin), Depressants (Benzodiazepines and Barbiturates), Stimulants (Cocaine and amphetamine), and Hallucinogens.^{1,2}

Substance use is a growing problem in both developed and developing nations.³ Drug prescription abuse and psychoactive substances like heroin, cannabis, smack, and crack have increased considerably in the youth people, along with the already high burden of alcohol and tobacco consumption.⁴ Again, an increasing number of novel psychoactive substances are emerging worldwide.⁵ Among many children and adolescents, tobacco use, alcohol consumption, and using other substances are growing tremendously throughout the world.⁶ In addition, licit and illicit substances consumption is also growing more than ever globally, and surprisingly, these groups of the population are starting the consumption at their early life stage.⁷ In 2016, 10.3 million cancer-related disability-adjusted life years lost were attributable to substance use.⁸ In 2015, the attributable disability-adjusted life-years were the peak for tobacco consumption (170.9 million DALYs), followed by the consumption of alcohol. The overall substance-attributable death rates were primarily contributed by tobacco consumption (110.7 deaths per 100,000 population), followed by alcohol drinking (33.0 deaths per 100,000 population), respectively.⁹ Particularly, of these substances, smoking shares about five million deaths per year and is responsible for the largest burden of global diseases.¹⁰ Moreover, studies demonstrated that chronic *khat* chewing causes severe neurological disorders, cardiovascular problems, dental carries gastrointestinal disturbance, psychiatric conditions, and reproductive dysfunctions.^{11–14}

In Ethiopia, the most frequently used substances by adolescents are cigarettes, *khat*, and alcohol.¹⁵ A study conducted in the central part of Ethiopia revealed that about 16.3% of individuals were substance users. Of these, 8.3%, 6.4%, and 5.9% of them were alcohol drinkers, cigarette smokers, and *khat* chewers, respectively.¹⁵ The burden of smoking in high school students was 11% of which 9.4% were current smokers.¹⁶ A substantial number of the students were exposed to common substances and those who used the *khat*, alcohol, and cigarette smoking as a lifetime in Ethiopia was 22.5%, 41.4%, and 21.5%, respectively.¹⁷ The current use was 47.9%, while the lifetime was found to be 65.4% in *northern Ethiopia*.¹⁸ Ethiopia was one of the countries that has signed the World Health Organization FRAMEWORK convention on substance use particularly, on the tobacco controls that ban the consumption of any type of tobacco products including cigarettes across the country in both indoor and outdoor spaces. However, the problems continue to rise at an alarming rate.¹⁹

Factors that drive substance use include age, having substance-user friends,¹⁶ community norms, substance-using family history, offspring's substance use,¹⁸ close to smoking people (parents, teachers, and friends), substance availability, socio-economic status, academic performance, level of self-esteem, perceived risk of using the substance,¹⁶ gender, having alcohol drinking family member, having *khat* chewing family member, poor school substance use controlling rule, substance retailing shops in the living areas, strong relationship with parents, and being a member of school mini-media.¹⁵ Even though pieces of evidence are indicating that the age of substance users is falling by,⁷ the number of substance-using adolescents is increasing by.¹⁸ In Ethiopia, existing kinds of reports focused mainly the substance use in higher institutions like universities and college students.^{20–24} Moreover, to the level of our knowledge, no studies done to determine the current substance use in the high school attending students in the study area where the availability and accessibility of such substances specifically cigarette smoking, *khat* chewing, and alcohol consumption are usually practiced.^{25,26} Therefore, this investigation is intended to determine the burden of the current substance use among high school adolescent students in the eastern part of Ethiopia.

Methods and Material

Study Area, Design, and Period

An institution-based cross-sectional study design was conducted in the Harari region state of Ethiopia, between 10th April and 10th May 2022. The region is situated 525 km away from the capital city of the eastern part of Ethiopia. The region is encircled by the Oromia region. There are two public and four private secondary schools in the region. More than 4000 students are attending class currently of which 50.1% are females.

Population and Eligibility Criteria

High school students who were attending their education from 9th to 12th grade in Harari Region were the target group of this study. Students who were in the randomly selected schools were considered the study population. The students were on the roster and actively attending their education during the semester in which this study was conducted. Students who were severely ill during the data collection time and were unable to respond to the questions due to their ill health condition were excluded from the study.

Sample Size Calculation and Sampling Technique

The sample size was calculated using a single population proportion formula as follows:

$n = (Z\alpha/2)^2 p(1 - p)/d^2$; whereas n: the required sample size for this study, $Z\alpha/2(1.96)$: is significance level at $\alpha = 0.05$ with 95% confidence interval, p: is the prevalence of substance use in school students in *Kolfe Keranyo* sub-city of Addis Ababa, Ethiopia (26.3%)¹⁵ and d: is the margin of error (3%). By considering the design effect of 1.5, the sample was determined to be 1323 with a non-response rate of 10%. Finally, a total of 1498 adolescents were randomly selected. Ninth to twelfth grade students were proportionally identified and randomly included using their registration numbers from the registrar's office.

Quality Control and Tools for Collecting Data

A designed self-administered tool was utilized for collecting all relevant information. The tool was developed from different literature using the English Language. Once prepared in English, the tool is retranslated into two local languages (Afaan Oromo and Amharic) to which the participants can read, write, listen, and speak. The substance use status was measured using Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). This checklist was prepared by the World Health Organization international group of substance use investigators.²⁷ The tool is primarily used to evaluate the substance use of both the lifetime and current use.²⁷⁻²⁹ A pretest was conducted on 5% of the sample before the actual data collection on non-selected high schools. The two-day training was provided for the data collectors and supervisors on the principles, procedures, and purpose of the study. Once the data were collected, the filled forms were manually assessed for consistency, accuracy, and validity checks. In the case of error, the data collectors were ordered to refill the incomplete information a day after the collection.

Operational Definition

Current psychoactive substance use was defined as when the student utilized a specific substance (for non-medical purposes) over the past three months.^{30,31}

Every substance user was defined as a student who consumed a certain substance for non-medical purposes even only one time throughout their life.³⁰

Statistical Analysis

The data were entered into Epi-data 3.1 and transferred to Stata 14.2 versions for analysis. The descriptive statistics including frequency, percent, and arithmetic mean with SD were computed. A Poisson regression extension of the binomial was run to determine the rate of using a psychoactive substance. A dichotomized outcome variable (current psychoactive substance user vs non-users) and independent variables association was assessed to identify the factors that affect substance use. The incidence rate ratio was used to assess the current psychoactive substance use in the last three months. Information criteria (AIC and BIC) were used for the model fitness test, and the model with the lowest score was used as the model fitted. The model with the lower value of AIC was selected to be the final analysis. Finally, the IRR with 95% CI was reported. Finally, the variables that had a P-value of <0.05 were declared as having a statistically significant association with the outcome variable of the study.

Ethical Statement

The Haramaya University College of Health and Medical Sciences (CHMS) Institutional Health Research Ethics Review Committee (IHRERC) reviewed and provided an ethical approval letter for this study. Then, data were collected after getting permission from the study schools based on the letter of cooperation sent from the college. The interview was held after taking informed, voluntary written and signed consent from all schools' heads and students who aged 18 and above. In addition, the parental/legal guardian consent was obtained for the participants under 18 years of age. Taking part in the study was voluntary, and any information collected from the study participants was kept confidential. Participants were informed about the purpose of the study. Reports and other documents did not include the names of participants. The Helsinki Declaration was followed in each step of data obtaining and processing in this study.

Results

Sociodemographic Features of the Study Participants

The data of 1498 high school students are included in this study. More than half ($n = 815$, 54.41%) of the students were females, while the rest 45.59% were males. The average age of the students was 15 years with ± 3 Standard Deviation (SD). More than three-fourths, 1142 (76.23%) of the participants were single, while the rest were in a relationship ($n = 299$, 19.96%) and married ($n = 57$, 3.81%). Nearly three-fourths of the study respondents lived in an urban area with their parents. More than three-fourths of both fathers and mothers attended at least primary education. The majority of the high school students got money in their pockets whereas only 513 (34.25%) could not get it (Table 1).

Clinical History-Related Characteristics and Substance Use

Among a total of 1498 students, only 102 (6.8%) had a familial history of mental illness, while about 46 (3.1%) had a history of committing suicide in the family. About 83 (5.6%) of them had a history of suicidal attempts in their family. Many of the

Table 1 Sociodemographic and Behavioral Characteristics of Students Attending Their High School Education in Harari Regional State, Eastern Ethiopia, 2022

Variable	Category	Frequency	Percent
Sex	Females	815	54.41
	Males	683	45.59
Age	Mean=15 \pm 3Standard Deviation (SD)		
Religion	Muslim	1012	67.56
	Orthodox	382	25.5
	Others	104	6.94
Marital status	Married	57	3.81
	In relationship	299	19.96
	Single	1142	76.23
Student's grade	9th	562	37.52
	10th	554	36.98
	11th	217	14.49
	12th	165	11
Residence	Urban	1049	70
	Rural	449	30
Living with	Alone	52	3.47
	Friends	69	4.61
	Spouse	159	10.61
	With both parents	792	52.87
	With one parent	426	28.44
Father's level of education	Had no formal education	298	19.89
	Elementary	413	27.57
	Secondary	434	28.97
	Diploma and above	353	23.56
Mother's level of education	Had no formal education	511	34.1
	Elementary	587	39.2
	Secondary	223	14.89
	Diploma and above	177	11.82
Getting money in Pocket	No	513	34.25
	Yes	985	65.75

students (70.2%) slept for a maximum of 7 hours per day. About one-fourth of the students were users of any form of psychoactive products throughout their life. These ever-used substances were *Khat* (24.1%), smoking (1.8%), alcohol (3.3%), and others (1.4%). The reason why the students were using substances included availability (14.85%), peer influence (9.75%), academic purpose (8.2%), and his/her friends used (19.43%), and family used (39.49%). About 1043 (69.63%) of the students had a strong family control over using substances. Nearly one out of two students were challenged with poor social support. Depression and anxiety were identified in 668 (44.62%) and 589 (39.32%) of the students, respectively (Table 2).

Table 2 Clinical Characteristics and Types of Substance Use Among High School Students in Harari Regional State, Eastern Ethiopia, 2022

Variable	Category	Frequency	Percent
Familial history of mental illness	No	1396	93.2
	Yes	102	6.8
Familial history of committing suicidal	No	1452	96.9
	Yes	46	3.1
Familial history of suicidal attempt	No	1415	94.4
	Yes	83	5.6
Sleep greater than 7 hours/per day	No	1052	70.23
	Yes	446	29.77
Ever using substance	No	1117	74.57
	Yes	381	25.43
Ever used khat	No	1138	75.9
	Yes	360	24.1
Ever consumed cigarette	No	1471	98.2
	Yes	27	1.8
Ever consumed alcohol	No	1449	96.7
	Yes	49	3.3
Ever using any other substances	No	1478	98.6
	Yes	20	1.4
Substance easily available	No	1277	85.25
	Yes	221	14.85
Friends influence to use the substance	No	1352	90.25
	Yes	146	9.75
Believe that the substance used for academic purposes	No	1375	91.79
	Yes	123	8.21
Friends used the substance	No	1207	80.57
	Yes	291	19.43
The family used the substance	No	908	60.61
	Yes	590	39.49
There is family control of the substance	No	455	30.37
	Yes	1043	69.63

(Continued)

Table 2 (Continued).

Variable	Category	Frequency	Percent
Level of social support	Poor	716	47.8
	Medium	568	37.92
	Strong	214	14.29
Having Depression	No	829	55.38
	Yes	668	44.62
Having Anxiety	No	909	60.68
	Yes	589	39.32

Types and Patterns of Currently Used Psychoactive Substances

The overall psychoactive substance use was 373 (24.9%, 95% CI; 22.8–27.1%). The individual contribution of the substance was khat (325, 21.6%, 95% CI; 18.6–23.6%), alcohol consumption (28, 1.8%; 95% CI; 1.3–2.6%), smoking (18, 1.2%, 95% CI; 0.75–1.9%).

Factors Affecting Current Psychoactive Substance Using

The variables that had a p-value of <0.2 were transformed into the final analysis. In the final model, gender, age, substance-using friends, and easy availability of psychoactive substances had a significant relationship with the current psychoactive substance use among adolescent students.

The rate of substance use in male adolescents was 1.2 times more likely to occur than in female students (IRR = 1.2, 95% CI; 1.1–1.4). The psychoactive substance use rate was observed as 2 times more likely among adolescents who could easily get the substance around their living area (IRR = 2.02, 95%; 1.53–2.66). Among the students who had a friend of a psychoactive substance user, the substance use rate occurred 1.6 times than those whose friends were non-user of psychoactive substances (IRR = 1.60; 95% CI; 1.28–2.02). The probability of using the substance in younger adolescents was higher by 1.2-fold than among individuals in the late adolescence period (IRR=1.2; 95% CI: 1.1–1.4) (Table 3).

Table 3 Factors Affecting Psychoactive Substance Use Among High School Adolescent Students in Harari Region, Eastern Ethiopia, 2022

Variable	Category	Psychoactive Substance Use Status		IRR (Bivariable Analysis at 95% CI)	IRR (Multivariable Analysis at 95% CI)	P
		User	Non-User			
Sex	Male	287	396	1.54 (1.36–1.74) 	1.21 (1.1–1.38) 	0.01
	Female	86	729			
Living with whom?	Alone	11	41	1.02 (0.74–1.4)	1.18 (0.86–1.61)	0.30 0.09
	With friends	43	26	0.49 (0.33–0.72)	0.71 (0.47–1.06)	
	With family	319	1058			
Buying the substance out of the pocket	No	87	426	 0.85 (0.75–0.96)	 0.95 (0.84–1.08)	0.46
	Yes	286	699			
The psychoactive substance is easily available	No	215	1062	 2.9 (2.26–3.76)	 2.02 (1.53–2.66)	0.000
	Yes	158	63			

(Continued)

Table 3 (Continued).

Variable	Category	Psychoactive Substance Use Status		IRR (Bivariable Analysis at 95% CI)	IRR (Multivariable Analysis at 95% CI)	P
		User	Non-User			
Having peer influence	No	281	1071	1 0.46 (0.35–0.61)	1 0.87 (0.64–1.19)	0.40
	Yes	92	54			
Had substance using a friend	No	186	1021	1 2.36 (1.93–2.89)	1 1.60 (1.28–2.02)	0.000
	Yes	187	104			
Family control	No	143	311	1 1.13 (0.99–1.29)	1 1.04 (0.91–1.19)	0.49
	Yes	230	814			
Age of the students (years)	At least 15	226	958	1 1.52 (1.29–1.79)	1 1.21 (1.02–1.44)	0.02
	Greater than 15	147	167			
Having stress	No	226	958	1 1.16 (1.01–1.34)	1 1.05 (0.91–1.22)	0.49
	Yes	147	167			

Discussions

The current study is intended to evaluate the burden and features affecting current psychoactive substance use in adolescent students in East Ethiopia. Accordingly, the study publicized that the overall current any kind of substance use in the last three months was 24.9%, 95% CI; 22.8–27.1%. The individual contribution of these substances was *khat* (20.4%, 95% CI; 18.6–22.6%), alcohol consumption (1.8%; 95% CI; 1.3–2.6%), smoking (1.2%, 95% CI; 0.75–1.9%). Factors such as gender, age, having substance-using friends, and living with substance-using families had a significant relationship with substance use in East Ethiopian high school adolescents.

The overall use of any psychoactive substance rate in the last three months was 24.9% in students attending high school students. The report is lower compared to the study conducted in Southern Ethiopia disclosed that the current substance use was 35.5% among university students.³² As the majority of high school students are more attached to their families than University-level students, this lower finding indicates the paramount role of the family in shaping their siblings' behaviors. Moreover, this could be evidence of the role of the family in coughing their children by counseling them not to be exposed to substance use.³³

The studies conducted in Morocco (overall substance use, 6.3%),³⁴ Nigeria (alcohol consumption, 13.6%).³⁵ Another study from Morocco showed that 4.8% of young people were psychoactive substance users. The study clearly showed that cannabis was the most used substance and alcohol was used by 4.3% of students. However, the current study revealed that the most used substance was *khat* (21.6%), and 1.8% of alcohol consumption. This could be due to variations of psychoactive substance distribution across the countries and level of exposure differences due to geographical variation and sociodemographic differences. In addition, because of this study time, the COVID-19 pandemic might cause depression that enforces adolescents to use psychoactive substances.^{36,37}

In the current study, substance use was high among male adolescents in school. The studies from Morocco,³⁴ and South Africa³⁸ supported that males are a high probability of using substances than females. Different findings reported that men are a risky group for having substance use disorder.^{39,40} This could be probably due to that males use substances to get acceptability, for enjoying, be courageous and bold enough, for engaging in sexual activities, and overcome stress in hard situations.^{41,42}

Younger high school students used psychoactive substances higher than older adolescents. This result is consistent with the reports of studies from South Africa and Nepal.^{38,43} Age is one of the most important features responsible for the fast growth of substance use. The report showed that psychoactive substance-related mental and behavioral problems are

rising among younger people.⁴⁴ This could be due to the fact that younger age is the time when people start to practice something that they perceived to be new or told to do so by peers. As the young are encouraged to use the substance by the people around them or the environment, they can be easily immersed in the problem without knowing the health ill effect of using these substances.

This study presented that having a friend who uses psychoactive substances is another important factor that increased the substance use rate among school students. This finding agreed with the reports presented from the Northern part of Ethiopia,⁴⁵ the southern part of Ethiopia,³² and the southwest part of Ethiopia.⁴⁶ Peer pressure could negatively or positively affect adolescents whether for using or not using psychoactive substances.⁴⁷ Therefore, the substance-using student could easily push his/her friend to share what he/she is practicing for getting stimulated and enjoy together.⁴⁸ Moreover, the social learning that can be shared with family, friends, classmates, and any form of interaction can share risky behaviors among adolescents.^{34,49,50} Hence, any enabling factors from family, friends, and other surroundings could lead adolescents to be psychoactive substance users.^{51,52}

The psychoactive substance use rate was 2 times more likely among those adolescents who easily got the substance nearby their living area. This finding is supported by the reports from the USA,⁵³ South Africa,⁵⁴ and Abu Dhabi.⁵⁵ It could be due to the fact that available substance can be used by other population segments in the area. If others use it, the age of adolescence is the time at which adolescents exercise something which is practiced by others. Therefore, the availability and common utilizing psychoactive substances by the community could increase the tendency of practicing what others are utilizing. In general, in this study, identifying the burden and driving factors of psychoactive substance use can contribute to strengthening interventions such as awareness creation through alarming the concerned bodies about the magnitude and negative consequences of using substances among adolescents. Even if this study has much strength, the study would not be free from limitations. The first limitation of the study could be the cross-sectional study nature would not enable the study to know the causal relationships between factors and substance use due to the snap-shooting approach of data capturing. Secondly, even if the study was conducted on the largest number of adolescents than probably some studies previously done; the findings cannot represent all Ethiopian adolescents.

Conclusion and Recommendation

One out of four adolescents was a current user of psychoactive substances in the Harari Region, Ethiopia. Being male, substance availability, having substance user friends, and being at younger age increased the rate of using psychoactive substances in-school adolescents in Eastern Ethiopia. The intervention that involves the schools' community, students' families, and executive bodies should be strengthened to overcome the substance use-related burdens among high school adolescent students. Awareness creation efforts should be made to prevent the health effect of using psychoactive substances among adolescents.

Data Sharing Statement

Data used in the current study are available from AB upon reasonable request.

Disclosure

All authors declared that they have no conflicts of interest in this work.

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