

**PREVALENCE OF SUBSTANCE USE AMONG SENIOR HIGH SCHOOL STUDENTS
AT THE PAYNESVILLE COMMUNITY SCHOOL IN PAYNESVILLE CITY,
MONTERRADO COUNTY, LIBERIA.**

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Medicine Degree in Psychiatry in the School of Medicine, University of Nairobi**

2022

DECLARATION

I, **Wilma Albertine Tubman**, do hereby declare that this thesis is my original work carried out in partial fulfillment of the requirements for the award of the degree of Masters of Medicine in Psychiatry by the University of Nairobi. This work has not been submitted in any other institution of higher learning for an award of a degree or for any other purpose(s) except where due references have been made in the text.

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DEDICATION

This thesis is dedicated to The Government and People of Liberia, who awarded me a fully-funded scholarship. Furthermore, I would love to dedicate this work to my beloved and supportive parents, Mr. and Mrs. Tubman together with my four siblings. I would also like to extend my sincere gratitude to Dr. Cynthia C. Blapoo, Princess L. Monmia, Christy S. Boygeh, Aunty Charlesetta, Uncle Methodius, Regina Jugbeh and my biostatistician; Dr. Kola Mark. Lastly, to everyone who supported me financially and morally during the enduring moment. I will forever cherish the encouragement and motivation behind this study. Thank you, and I love you all.

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List of Abbreviation

ASSIST:	Alcohol Smoking and Substance Involvement Screening Tools
CDC:	Center for Disease Control
CHS:	College of Health Sciences
ERC:	Ethics and Research Committee
GSHS:	Global School-based Student Health Survey
KNH:	Kenyatta National Hospital
MTF:	Monitoring the Future
PCS:	Paynesville Community School
SPSS:	Statistical Package for Social Sciences
UL-PIRE IRB:	University of Liberia - Pacific Institute for Research and Evaluation Institutional Review Board
UON:	University of Nairobi
WHO:	World Health Organization
YRBS:	Youth Risk Behavior Surveillance
KNH-UON ERC:	Kenyatta National Hospital – University of Nairobi Ethics Research Committee

Operational Definitions

- Adolescent:** WHO defines an adolescent as any person between ages 10 and 19 years.
- Drug abuse:** Use of medications for purposes other than a medical reason.
- Drug/substance:** Any chemical substance that brings about human physical, mental and emotional changes
- Substance Use:** Refers to drugs or alcohol and includes tobacco, cannabis, opioids, inhalants, prescription drugs, solvents and illegal drugs.
- Youth:** In Liberia, youths refer to young people between 15 and 34year (Inter-Agency Social Protection Assessment (SPA) Initiative, 2014)

Abstract

Introduction: Globally, substance use causes a serious public health hazard and is extremely common during adolescence and early adulthood. Among the youthful population, the prevalence rate of substance use is disturbing. The issue is not solely detrimental for individuals but also harms society and families. Nevertheless, only little is known about the prevalence of substance use among high school students in Liberia.

Aim: This study aims to determine the prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia.

Methodology: This was a cross-sectional school-based study involving 278 senior high school students from grade 10, 11 and 12 in Paynesville Community School within Paynesville City, Montserrado County, Liberia. Stratified systematic sampling was used to proportionally select 278 students in grades 10, 11 and 12 into the study. Sociodemographic data was collected using a researcher – designed questionnaire while substance use was done using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) tool. Fisher’s exact test, chi square test and bivariate logistic regression were used to check association between substance use and grades of the students. Multivariate analysis was used to estimate the same association while controlling for socio- demographic factors. Data analysis was done in RStudio Version 2021.09.2 Build 382.

Results: Alcoholic beverages were the most used substance. There was a significant association between substance use and the grade of the students in both bivariate and multivariate analysis. Out of the 278 students, alcoholic beverages had the highest prevalence of 81.2% (n = 226). This was followed by cannabis, tobacco products and sedative at 22.6% (n = 63), 10.9% (n = 30) and 5.7% (n = 16) respectively. The lifetime prevalence for opioids was 3.9% (n = 11) while that of

amphetamine type substances was 3.2% (n = 9). Hallucinogens and cocaine had a lifetime prevalence of 1.8% each. Inhalants had the lowest lifetime prevalence of 1.4% (n = 4). The number of students who had used at least one form of substance within the last three months prior to the commencement of the study reduced to 187. This translated to an overall 90-day prevalence rate of 67.2%.

Conclusion: Students in Paynesville are more exposed to alcohol and cannabis, in their lifetime, than most parts of the world but the habit subsides with age. Bigger research and surveillance should be carried out in order to establish a more generalized prevalence rate for Liberia.

1. Chapter One

1.1. Introduction

Substance use is a crucial public health concern in secondary schools, especially amongst adolescents and young adults (Birhanu et al., 2014a). Despite worldwide awareness, substance use still remains one of the most significant risk-taking behaviors among adolescents; and many of them are unaware of the adverse effects it carries. Peer influence and social pressure are reportedly the primary reasons for substance use (Oshodi et al., 2010). Frequently experimentation with the supposed "gateway drugs," for instance, alcohol, marijuana, and tobacco, results in use mainly by adolescents and young adults (Oshodi et al., 2010).

Separate studies worldwide have shown that substance use is rife amongst students in high school. In the United States of America (USA), a 2014 report on World Drug found the prevalence of heroin use among 10th graders to be high at 1.3% (United Nations Office on Drugs and Crime, 2014). A different survey in the same region among 44, 482 students found a lower prevalence of heroin use among 12th graders at 0.4%. A Monitoring the Future (MTF) survey, however, found high prevalence rates of marijuana 35.9%, cocaine 2.3%, inhalants 1.6%, and heroin 0.4% among the same 12th graders (Johnston et al., 2019).

In Africa, the prevalence of substance use is also on the increase. A study done in rural South Africa by Onya & Flisher (2009) showed the lifetime prevalence of cigarette use among boys in both grades 9 and 11 to be 18.2% and girls 1.9% (n = 1570). In the same population, boys also registered a higher prevalence than girls in alcohol use (n = 1570, boys 36.2%, girls 10.2%), spirits (n = 1570, boys 2.2%, girls 1.5%), and cannabis (n = 1570, boys 6.1%, girls 0.9%). Tshitangano & Tosin (2016) also conducted another study within the same setting but among 8th to 12th graders

in ten schools. They recorded a prevalence rate of substance abuse to be lower at 6% male and 2% female.

In Kenya, the prevalence rates are somehow higher than those in South Africa. One study found the prevalence of licensed alcohol use by secondary students to be 100% (n = 203), followed by tobacco at 76.5% (n = 230), miraa at 45.7% (n = 230), and marijuana at 30.4% (n = 230) (Abur, 2014). Lower prevalence findings have however been found in Liberia. A pilot cross-sectional survey of (n = 802) secondary students from sixteen schools in Monrovia showed alcohol to be the most prevalent at 51% (n = 802) followed by marijuana at 9% (n = 802), cigarette 6.8%, cocaine 0.6% and heroin 1% (Harris et al., 2012) . In contrast, higher prevalence findings were found in a mixed-methods study done by Ghebrehiwet et al., (2020) where locally validated tools were used across eight selected secondary schools in Monrovia. This study found the lifetime prevalence of alcohol to be 70.2%. However, the subset of former child soldiers who were students had a considerably higher lifetime tobacco use rate than the overall study sample, (23.5% vs. 15.6%).

As depicted by studies done among secondary high school students in the urban setting, Monrovia, Liberia, and other studies globally, there is a significant disparity regarding the prevalence of substance use. This could be attributed to the tools used in collecting data or the population characteristics, including the grade and residence.

As at the time of this study, there were no recently published national studies among school-going adolescents on the prevalence of substance use among students in public high schools in the suburb areas of the capital city, Monrovia. The researcher therefore sought to determine the prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia.

1.2. Problem Statement

As adolescents' transition from childhood to adulthood, risk-taking is part of the intense changes that happen. This includes, but is not limited to, behaviors such as having their first experience with alcohol, tobacco, and illicit drugs. Such risky behavior can sometimes harm adolescents' health and well-being hence leading to lifelong negative consequences and poor mental health.

There is a global burden of the use of substances among high school students with different regions showing differing prevalence rates for different substances. Having such mixed findings makes it cumbersome to know the severity of the problem and the type of intervention to integrate with the drug of choice.

In recent times, Liberia has become a haven for drug traffickers due to the country's porous borders, weak immigration monitoring systems, and ineffective law enforcement efforts. This has caused widespread substance use in the society at large, mainly in secondary and tertiary institutions.

The first pilot study of substance use prevalence among Liberia's secondary school students was done in 2008 and published in 2012. Twelve years later no study has been done to denote whether prevalence has changed. Moreover, this study was mainly done among secondary schools in the nation's capital, Monrovia, yet according to studies discussed, one can expect the prevalence rates to change depending on the setting. In this study, the researcher sought to realign these discrepancies by determining the prevalence of substance use among senior high school students at the Paynesville Community School in the suburb east of Monrovia, Paynesville City.

2. Chapter Two

2.1. Literature Review Introduction

This chapter includes literature reviewed from various authors on the research done around the world about the prevalence of substance use among high school students.

2.2. Background on Liberia

The West African nation of Liberia spans 43,000 square miles. Its population estimates at 4.9 million (Photo & Park, 2019). Liberia is a nation that emerged from fourteen years of civil conflict, which effectively ended in August 2003. Over 250,000 people were murdered, all infrastructures damaged, and many children were forced into becoming child soldiers and exposed to drugs during that period. Since then, substance use has become a significant obstacle to post-conflict recovery (Johnson et al., 2008).

Like many post-conflict countries, impacts from the civil war are still being felt in Liberia to this date. The educational system, for example, is significantly behind most countries both in terms of quality and access. In Liberia, overage enrollment in schools remains a civil war legacy. A reflection of Liberia's students' population indicates that many students are older than the appropriate age requirement for their grades and are, to a greater extent, more likely to drop out of school. Also, delayed entry into the first grade and the non-enforcement of age-appropriate enrollment policy are contributing factors (World Bank, 2016).

2.2.1 Adolescents and Young Adults as an At-Risk population

The well-being of adolescents and young adults is of particular concern in all societies because they are the future generation. There is, however, a severe risk of the onset of substance abuse and related issues during the developmental phase of adolescence. Some students are likely to use substances for the first time during this phase in their life. This predisposing behavior could lead to misuse of substances later in their adult life. Globally, there are constant efforts to reduce all types of dangerous behaviors, including substance use, which has the propensity of causing disability and premature loss of life. Nevertheless, some people find it challenging to stop substance use (Oshodi et al., 2010). Further, substance use has significant consequences on one's cognitive abilities and psychological well-being, and being a student, it is even worse. One of the reasons why students get involved in substance use is the fidelity to their peers so as to fit in. Determining the severity of the situation at high school level and associated risk factors are therefore paramount (Chege, 2019).

Table 1: Grading system of high schools from various countries in the world

Countries	Name of the Grading Systems	Grades
USA	High School	Grade 9 – Grade 12
Kenya	Secondary School	Form 1 – Form 4
Botswana	Senior Secondary	Form 4 – Form 5
Nigeria	Senior Secondary School	SS1 – SS3
Ghana	Senior High School	Grade 10 – Grade 12
Liberia	Senior High School/ Secondary School	Grade 10 – Grade 12

2.3 Prevalence of Substance Use among Students in High School

2.3.1 Global Prevalence

Globally, a report published in the United Nations Office on Drugs and Crime (2014) showed that, in 2012, approximated 162 million and 324 million individuals aged 15 - 64 had used illicit drugs; which corresponded 3.5% and 7.0% of the world's population. Globally, studies on prevalence rates of substance use among students in high school indicated that students engaged in maladaptive behavior. The leadership of World Health Organization/ Tobacco - Free Initiative and the US Center for Disease Control (CDC) and Prevention/ Office on Smoking and Health carried out a worldwide collaborative surveillance which illustrated it in 43 countries and the Gaza Strip/ West bank region. In this surveillance, self-administered questionnaires were completed by a sample of 230, 000 students between ages 13 and 15. Even with one or two puffs, the overall prevalence rates of students who had smoked cigarettes ever was 33%, while any tobacco products current use ranged from 62.8% to 3.3% (Warren, 2002). Nearly 25% (n = 230,000) of the students smoked cigarettes for the first time before the age of 10 years (Warren, 2002).

2.3.1.1 United States of America Prevalence

In the USA, a 2009 report from the CDC highlighted the National Youth Risk Behavior Surveillance (YRBS) data collected from 42 states. Six categories of priority health-risk behaviors, including alcohol, tobacco products and other use of drugs among students, were monitored. The study focused on students in grades 9 - 12 from private and public schools; with a sample size of 16,410 students. Nationwide, 72.5% of the students had used alcohol in their lifetime whereas 41.8% reported past-30-day use before the survey. The prevalence of cigarette use was lower than that of alcohol with the lifetime prevalence found to be 46.3%; and past 30-day use of 19.5%. This was followed by 36.8% marijuana use, 6.4% for cocaine and 2.5% for heroin (Stephens et al.,

2009). Furthermore, results from a study done on data taken from the YRBS 2013, which featured responses from 13, 446 high school students who were at least 14 years of age, in grade 9th through 12th; and from 148 private and public schools in all 50 states together with the District of Columbia showed that 2.1% had experienced heroin use in their lifetime while 10.8% had misused prescription drugs (Yantsides et al., 2017).

Another cross-sectional study that utilized a self-reported 47- item “ High School Questionnaire” model was conducted, after MTF study mentioned earlier, by Anand et al., (2015) in North Carolina, the United States. It examined the prevalence among high school students with an average of 16.4 years; 7.4% had used an electronic cigarette in the past month, and lifetime use was found to be 15.2 %. However, the usage rates were variable and high in Connecticut. The electronic cigarettes lifetime prevalence use among students in high school was 25.2% (n = 3614) and 12% in the past month use (Krishnan-Sarin et al., 2015).

In Florida, another cross-sectional study (Florida Youth Tobacco Survey) by Porter et al., (2015) examined electronic cigarette (e-cigarette) and traditional cigarette use among middle and high school students from 2011-2014. Results showed a four-fold increase from 6.0% in 2011 to 20.5% in 2014 among high school students who ever used electronic cigarettes. Electronic cigarette-use also increased from 3.1% to 10.8% among current users, respectively. In comparison, traditional current cigarette users in 2014 were 8.7% among students in high school.

Moreover, in 2017, the National Youth Tobacco Survey estimated the prevalence rates of tobacco use among students in high school in USA as follows; e-cigarettes 11.7%, cigars 7.7%, cigarettes 7.6%, smokeless tobacco 5.5%, and hookah 3.3% among others (Wang et al., 2011). In 2011, another MTF study assessing alcohol use prevalence and binge drinking by adolescents in the U.S found that the past-twelve-months alcohol use for both 10th and 12th graders was 49.8% and 63.5%

respectively. The rates for the corresponding use of alcohol in the past thirty days were 27.2% and 40% respectively. Additionally, binge drinking was reported by 15% of 10th graders and 22% of 12th graders two weeks before the survey (Patrick & Schulenberg, 2013).

Conway et al.,(2013) did a study exclusively among 10th graders across nine U.S Census divisions. The prevalence rate of past-year marijuana use was 26.3% (n = 2485) and 8.3% (n = 2483) for other illicit drugs. In line with parents' education, the prevalence of cigarette smoking, binge drinking, and marijuana use were lower among children whose parents had a graduate degree than those with a high school diploma or graduate equivalence diploma. In addition, children who stayed with their biological parents had a low prevalence of substance use than that of children whose family structure fell into other categories, including step parents and single parents (Conway et al., 2013).

2.3.1.2 Canadian Prevalence

Five national school-based surveys were done between 1990 and 2006 as part of the survey on Canadian Health Behavior in School-aged adolescents. It reported that 44% of students in grade 10 drank beer at least once per month in 1990 but declined to 28% in 2006; consumption of wine also declined from 17% to 12%. The report on cannabis use increased from 25% in 1990 to 45% in 2002 but dropped to 30% in 2006. Lifetime use of the substance was consistently below 10%. The questionnaire tool used in the survey measured various health behaviors and had a set core of items about drugs and alcohol (Elgar et al., 2011).

Another study in Canada, assessing the prevalence of alcohol and drug use, found that 50.8% of 12th graders used alcohol, while 29.1% used marijuana. Under the substance use section of the Canadian 2008- 2009 Youth Smoking Survey questionnaire, data were collected and used from students who responded to this section (Leatherdale & Burkhalter, 2012).

2.3.1.3 European Prevalence

In 1995- 2015, the European School Survey Project on Alcohol and other Drugs conducted six surveys in forty-eight European countries among 15 to 16 years old students. Less than one-quarter (21%) had in the last thirty days smoked cigarettes. Alcohol use in the previous thirty days decreased from 56% in 1995 to 47% in 2015. The most prevalent lifetime illicit drug use was cannabis at 16%, whereas 4% used other substances. The majority of data collected were taken from self-administered questionnaires save for three countries where web-based questionnaires were used (Group et al., 2015).

In six cities of Northern Greece, a study was conducted among 9, 276 students aged 15 – 18 years in high school. The prevalence rate of current smokers was 29.2%; and that of students who started smoking before the age of 14 were 43.3%. It was also observed that 25.4% of students smoked between 6 to 10 cigarettes per day (Sichletidis et al., 2009).

2.3.1.4 Middle East Prevalence

In Middle Eastern countries, substance use and abuse are becoming a significant concern. In the Erbil City of Iraq, a descriptive cross-sectional study aimed to determine the prevalence and potential contributing factors to the use of substances involving high school students aged 14-19 years was carried out with a 2,743 sample size. Over their lifetime, smoking of cigarettes among the students and last 30-day prevalence rates were 27.6 % and 13 % respectively. Moreover, the lifetime prevalence rates of water-pipe smoking, alcohol consumption, and marijuana were 23.8 %, 3.7 % and 0.7 % in that order. The self-administered questionnaire used in the study on Drugs and Crime was developed and validated by the United Nations Office (Mahmood et al., 2019).

Another similar study in Iraq found 19.7 % of tobacco use among secondary students (Hussain & Abdul Satar, 2013). Studies conducted among 1020 male students in Iran by Vakili et al., (2016)

showed the following prevalence of drug use: opium 12.9 %, amphetamine 12.5 %, heroin 12.2 %, ecstasy 10.8 %, cannabis 9.5 %, and crack 9.6 %. Most of the students were 14 -15 years old when they first used the drugs.

Another study was done in Iran on dokha, a novel form of smoking, among 560 male secondary school students (grades 10 to 12). Ever smokers observed in the study were about 39%; 28% were smokers of cigarettes, 8% users of dokha, and the remainder of 3% shisha users. Data were collected using a modified twenty-nine-item self-administered questionnaire based on the Global Youth Tobacco Survey (Al Shemmari et al., 2015).

In Oman, the prevalence of substance-use among students from grade 9 to grade 12 was conducted from 2015 to 2016. There were 614 respondents of whom nearly one-fifth (20.7%) had reported abuse of one or more substances at least once in their lifetime. The majority affirmed 25% use of a stimulant, 18% sedative, and 17% tobacco; other illicit drugs alcohol 5%, glue 6% and paint 13% (Shaikh et al., 2018).

2.3.2 Africa Prevalence

The geographical location of Africa has made it an appealing drug transit point due to inadequate surveillance and inexperienced law enforcement agencies. Eventually, these drugs make their way to the local markets through the point of transit (Affinnih, 2009). In Africa, several study findings on the substance use prevalence among high school students and global study findings do not vary much. A study involving secondary analysis of existing data from six countries in Africa (Namibia, Kenya, Swaziland, Zambia, Uganda, and Zimbabwe) was carried out among students aged 13 -15 years using the Global School - Based Health Survey. The sample size of 20, 765 students. The prevalence rate of tobacco use for 10th graders was 12%, alcohol use (two bottles per day in the past month) 8%, and illicit drug use 7.7% (Peltzer, 2009).

A cross-sectional study, with a total sample size of 1, 236 students, evaluated the prevalence of alcohol use among students of middle and high schools in Khemisset, Morocco between March and April 2013. The prevalence of alcohol consumption results from various grades (10th, 11th and 12th) was 16.1%, 8.5%, and 12.2% respectively. Questionnaires used in the study were composed of two parts: Alcohol Use Disorders Identification Test and a socio-demographic questionnaire (Ben El Jilali et al., 2020).

Like most countries in Africa, Ethiopia is faced with increasing substance use challenges. A systemic review and meta-analysis estimated some commonly used substances prevalence among students in Ethiopia. The review identified 676 studies; only 28 articles were finally analyzed. Overall, lifetime prevalence rates of substance use among high school students were khat at 22.5%, alcohol at 41.4%, and cigarette smoking at 21.5%, respectively (Roba et al., 2019).

A school-based cross-sectional study was done among 684 students from grades 9 to 12 in Woreta, Northwest Ethiopia. The average participants' age was 17.25 years. The study found a prevalence of 47.9% for current substance use and 65.4% lifetime use. Overall lifetime use of alcohol was 59% (Birhanu et al., 2014b).

A study was also done in Uganda among 2, 902 participants from selected secondary schools; the mean age of participants was 16.5 years. The most common substance use was alcohol at 19.3%, kuber at 4.4%, cigarettes at 3.9%, marijuana at 2.9% and khat at 1%. Some tools used in the study included a socio-demographic questionnaire (Abbo et al., 2016).

In Kenya, one study where 1038 students from public secondary schools were enrolled found the prevalence of overall lifetime substance use to be 57.4 %. The previous month-use was 48.7%. In this study, a self-administered socio-demographic questionnaire was developed by the researcher

and questions selected from the developed WHO (2001) Global School-based Student Health Survey (GSHS) (Waithima, 2017).

In Botswana, a cross-sectional survey was administered in seventeen public secondary schools in the capital city. Those who opted to participate on the day of the study were 1936 students. Results showed that 24.2% of Form Three students admitted to hazardous drinking, while in Form 4, 23.1% admitted to similar abuse. Illicit drugs use by both Form three and Form Four was 17.8% and 18.9% in that order. The survey utilized the Alcohol Use and Dependency Inventory Tool (AUDIT) and Botswana version of WHO's Global Student Health Survey (GSHS) (Riva et al., 2018). See Table 1 for the different forms of education grading systems and how they compare across countries.

In another study in Zimbabwe, high school students who admitted to using cannabis thirty days previously were (n = 311, 8%) and ever used cannabis (n = 311, 15.6%). Most of the reasons cited for cannabis use were: boosting self-confidence (60%) and wanting to fit in with peers (16%) (Chivandire & January, 2016).

Nigeria has had several regional studies conducted on the prevalence of substance use among students in high school. In Oyo-state Idowu et al.,(2018) did a cross-sectional survey among 249 Senior Secondary 1 (SS1) and Senior Secondary 2 (SS2) students. The prevalence of those that ever had an alcohol-containing drink was 21.7%, where palm wine was the most consumed alcoholic drink. On the other hand, 39% widely abused tramadol; with enhancement of intellectual capacity being their major drive.

Another study done among 896 SS1-SS3 students from six selected secondary boarding schools in Enugu revealed different findings from that of Oyo's state. The lifetime prevalence of various

substance use was kolanut (63.5%), followed by alcohol (59.3%), tobacco (10.3%) and cannabis (0.8%). The study adopted the WHO Student Drug Use Questionnaire (Manyike et al., 2016) for the study.

In Lagos, the reported prevalence rates of lifetime use of substance by secondary students was 87.3% (n = 402), with 57.4% engaged in multiple substances. The commonly used substance in the study was caffeine (coffee and kolanut), with 85.7% and 56.5% for lifetime users and current users respectively. Cannabis, heroin, and cocaine were low (Oshodi et al., 2010).

In Ghana, Adu-Mireku, (2003), reported that among 894 senior secondary school students, the prevalence rate for lifetime use of alcohol was at 25.1%, cigarettes 7.5% and marijuana. 2.6%.

2.3.3 – Local trends or prevalence

Only one pilot study about the prevalence rate of substance use among students in Monrovia secondary schools was published. The study had a total sample size of 802 and revealed that 51% of the respondents use alcohol, making it the most commonly used substance, and marijuana at 9%. Majority of participants (78.8%) reported that their maiden alcohol consumption occurred at 18 years of age or younger. The mean age of students in grades 11 and 12 was 21 years, with a deviation of 3 years. Their age ranged from 14 and 36 years (Harris et al., 2012).

2.4 Factors influencing substance use among high school students

A cross-sectional descriptive study using a self-administered questionnaire, designed by adopting a suggested global assessment program on drug abuse, was carried out on 300 students in high schools in Karnataka, India. Their age ranged between 14 and 16 years. The study found gender being the influencing factor for substance abuse; a total of 26 males and 4 females admitted to

having abused drugs. Moreover, 25 students who abuse these substances belonged to nuclear families. Age advancement was also a factor (Smriti, 2018).

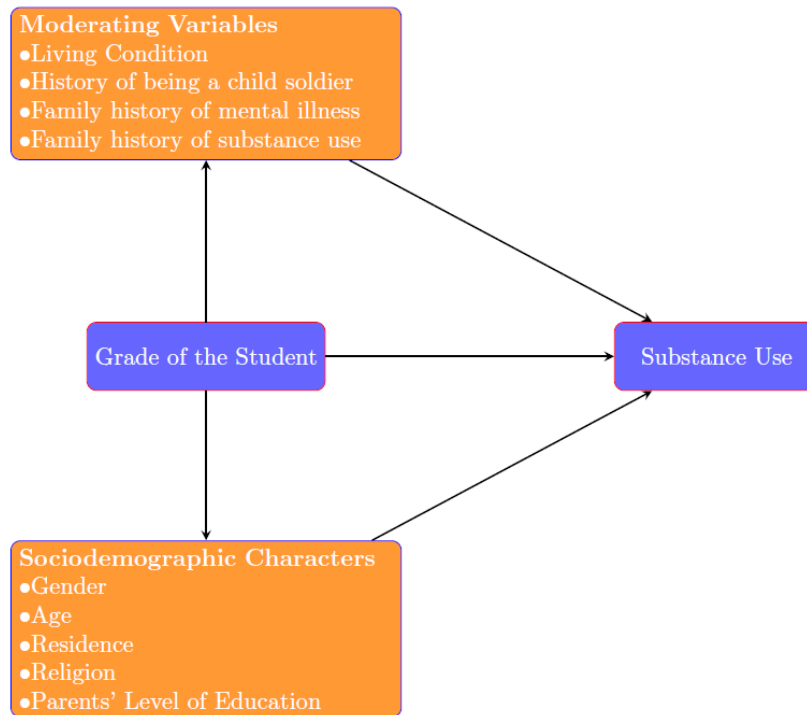
In Ibadan, Nigeria, 538 (SS1-SS2) students were sampled from two public schools within one of the eleven districts. Questionnaires were given to participants; it was reported that in the last twelve months, 56.5 % of males (n=538) and 43.5 % of females (n=538) use alcohol and other substances (Atilola et al., 2013).

A study done among 1927 secondary school students in Botswana found male students to be 1.3 times more likely to consume alcoholic beverages than female students; furthermore, males were also 2.2 times more likely to use drugs. Moreover, students who attended school in an urban setting were 1.2 times at risk for drinking alcohol than students from the peri-urbans (Riva et al., 2018).

In Woreta town, Ethiopia, a study on 651 high school students reported an increase in substance use by almost threefold in students whose siblings used substances. Furthermore, there was a 2.24 increased risk of using substances among students with a family history of drug and alcohol use than those with no drug and alcohol use history. Also, students who were performing poorly in academics were 1.67 times more probable to use substances than their peers with good academic performance. Lastly, students whose friends used substances had a 2.14-times risk of using substances than those who did not have friends who used substances (Birhanu et al., 2014b).

2.5 Conceptual Framework

Figure 1: Conceptual Framework Showing the Variables



Key:

Independent variable: Senior High School grades

Dependent variable: Substance use

Moderating variable: A variable that can, positively or negatively, alter the strength of the association between independent and dependent variables

2.6 Rationale

It is vital to raise awareness on the prevalence of substance use and factors associated with it among high school students. This information can guide stakeholder on the appropriate actions to take in order to limit substance use.

2.7 Significance of the Study

The problem of drug and substance use in Liberian public high schools had been a significant concern since the end of civil war. In 2008, a mapping exercise sponsored by the World Health Organization showed that Monrovia town, which is a few kilometers away from Paynesville city, was dominated by areas where cocaine and heroin were quickly purchased. A more detailed information on the prevalence of substance use among public high school students in Liberia is therefore needed. This research contributes a wealth of knowledge in this area by adding to the existing data and information. This report also helps in promoting a drug and substance-free school environment hence a better academic performance which will eventually improve the education standards in Liberia. Lastly, it will also enable relevant institutions to take all the necessary measures to combat this phenomenon.

2.8 Research Question

What is the prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia?

2.9 General Objective

This study aimed to assess the prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia.

2.9.1 Specific Objectives

- i. To describe the sociodemographic characteristics of senior high school students who use substances at the Paynesville Community School in Paynesville City, Montserrado County, Liberia.

- ii. To determine the prevalence of substance-use among senior high school students in grade 10 through 12 at PCS in Paynesville City, Montserrado, Liberia.
- iii. To determine the factors that are association with substance use among senior high school students in grade 10 through 12 at PCS in Paynesville City Montserrado, Liberia.

3. Chapter Three: Research Method

3.1. Study Design

The study's design was a cross-sectional study on substance use at the Paynesville Community School.

3.2. Study Site

This study was conducted in the senior high school section of Paynesville Community School (PCS), one of the most populous public high schools in Paynesville City, Montserrado County. The school has 830 students enrolled in the senior high school section and who learn exclusively in English. Paynesville City is a 9km suburb which sits on the east of Monrovia, Liberia's capital city. It is geographically larger than Monrovia and houses an estimated population of 400, 000 persons. It is sometimes referred to as greater Monrovia. It has six political districts with more than 55 established communities, including ghettos. Furthermore, Paynesville hosts the largest market in Liberia, the national sports stadium, and many entertainment centers. There have also been increased drug peddlers and users in recent times thus contributing to high crime rate in Paynesville.

3.3. Study population

The study involved students enrolled in the senior high school section of PCS in grades 10, 11 and 12. Their admission age ranged between 14 and 24 years. It targeted both male and female students who enrolled for the academic year.

3.3.1. Inclusion criteria

- Students between 14 and 17 years at the onset of the study and had a duly signed assent from their parents or guardians

- Students who were 18 years old and had signed an informed consent.
- Students who were free of self-reported symptoms and were physically well

3.3.2. Exclusion criteria

- Students who were not in grade 10, 11 or 12 at the time of the study
- Students above 24 years of age

3.4. Sample Size Determination

Taro Yamane's formula was used to compute the sample size for the study as follows:

$$n = \frac{N}{(1 + Ne^2)}$$

Where: n = Estimated sample size

N = Population under studies

e = Margin of error, 5% (0.05)

$$\text{Sample Size} = \frac{803}{1 + (803 * 0.05^2)} = 266.99 = 267 \text{ students}$$

3.5. Sampling Method

A total of 278 students were enrolled into the study through a stratified systematic sampling technique. Each of the three grades (10, 11 and 12) in senior high school formed a stratum upon which study participants were systematically sampled in representative proportions. The researcher used the school's registrar to sum the total number of students in each grade. These figures were then used to compute the respective number of participants to be sampled from each

of the three strata out of the total 830 students available (Table 2). Students were systemically sampled, starting with the 2nd student on the list and then every other second student. This was repeated until the requisite sample size for the study was attained in all the three strata.

Table 2: Requisite number of students sampled from 10th, 11th and 12th grade

Grade	No. of students per grade	Sample size per grade	Total Sampled
10	273	$\frac{273}{830} * 258 = 87.8$	89
11	260	$\frac{260}{830} * 258 = 83.6$	89
12	297	$\frac{297}{830} * 258 = 95.5$	100

3.6. Recruitment and Consenting procedure

In Liberia, the senior high school consists of three years of study, used as the strata for this study. Study participants were recruited from the senior high school sections of Paynesville Community School after getting approval from the University of Liberia - Pacific Institute for Research and Evaluation Institutional Review Board (UL-PIRE IRB), the administration of Paynesville Community School (PCS), and the Kenyatta National Hospital - the University of Nairobi Ethics and Research Committee (KNH/ UON - ERC). Recruitment of participants was done over lunch breaks during the weekdays (Monday - Friday). Students aged 18years and older provided duly filled written consent to participate in the study. For students under the age of 18 years, a duly filled informed assent was sought from their parents or guardians through each participant. These students were required to give assent then take a consent explanation and statement form to the

parents for their authorization. Only students who met the threshold outlined in the aforementioned inclusion and exclusion criteria were allowed into the study.

3.7. Study instruments

The ASSIST is a standardized screening tool that the World Health Organization created to aid in assessment of levels of multiple substance use. The tool was self-administered to the students. The ASSIST (V3.0) consisted of eight questions covering alcohol, tobacco, cannabis, cocaine, amphetamine-type stimulants (including ecstasy), sedatives, inhalants, hallucinogens, opioids, and other drugs. Provided for each substance was a risk score. The scores were further grouped into 'low risk', 'moderate risk', and 'high risk'. After completion of an assessment, four recommended interventions could be made based on the levels of risk scores ('brief intervention', 'treatment as usual' or 'brief intervention plus referral to specialist treatment').

A socio-demographic questionnaire was designed by the researcher to be used in the study to collect information on relevant demographics such as gender, age, religion, grade level, history of being a child soldier during the civil conflict, living arrangements, ethnicity and area of residence.

3.8. Quality Assurance Procedure

The proposed study approval was obtained from the KNH/ UoN-ERC and UL-PIRE IRB. The study was done under the supervision of two lecturers at the UoN's Department of Psychiatry. Questionnaires that were used in the study were self-administered to participants after obtaining permission from each of them. Before administering the questionnaires, the researcher explained in detail to participants the purpose of the research and gave clear instructions on how to complete the questionnaires to avoid confusion. This aimed at reducing the chances of yielding misinterpreted data.

3.9. Data Collection Procedures

On obtaining authorization to collect data for the study by the researcher, a request was made to the class representative to allow a few minutes during lunch break to do data collection. The role of the class representative was to help coordinate and identify the students sampled for the study. Once the respondents met the inclusion criteria, they were selected, and the researcher explained the content of the consent form, which would be signed. Respondents were then issued with a questionnaire. Anonymization of respondents was done by coding the questionnaires. The researcher collected and stored the completed questionnaires in a lockable drawer for data analysis. The data collection was carried out for six weeks, from February 14, 2022, to March 25, 2022.

3.10. Pretest

The pretesting of the questionnaires using an identical sample was collected two weeks preceding the actual onset of data collection. The pretesting sought to identify problems such as unclear wordings and lack of clarity of instructions.

3.11. Ethical Consideration

The researcher sought approval from PCS administration, KNH-UON ERC and UL-PIRE IRB. Written and signed consent were sought from study participants once the following had been clarified to the study participants.

- The study instructions, study objectives, risks and their rights.
- Participation was voluntary, and that they could withdraw from the study whenever they wanted without being subjected to penalties or victimization.
- Respondents were assured of their anonymity as no names were included on the tools

- There would be no possibility of being harmed either physically or psychologically from the study
- Participation would commence once a respondent signed the consent form
- Both Ministries of Health and Education would use the study's findings to guide policy-making on substance use among students in high school in Liberia.

3.12. Data Analysis, Results Presentation, & Dissemination

The prevalence of the study was determined through computation of simple proportions. Owing to the binary scale of the response variable, bivariate association between substance use and sociodemographic factors among senior high school students was assessed using Fisher's exact test, chi square tests and bivariate logistic regression. Multivariate logistic regression was fitted to assess the association between substance use and the grade of the students while controlling for the effects of other sociodemographic factors. The multivariate logistic regression model was fitted by specifying a full model. Model selection was then done through stepwise selection method. The final parsimonious model featured grade of the students, gender, living condition and student who has family history of mental illness as the main independent variables. The final multivariate model had an AIC value of 233.6. The results were presented in percentage frequency tables, pie-chart, means and standard deviations.

All the documentation was responsibly handled by the researcher; with both the hard and soft copies of the thesis being submitted to the UON, Department of Psychiatry, for marking and assessment. Dissemination of the study results was done through defense at the department of psychiatry. The study manuscript will be done and later submitted for publication in a reputable peer-review journal and presented at a recognized conference to disseminate findings. The researcher also intends to share results and recommendations for education policies in the Liberia.

4. Chapter Four: Results

4.1. Socio-demographic characteristics of senior high school students who used substances in Paynesville City, Montserrado County, Liberia

In the study, a total of 278 senior high school students participated. One hundred students were in grade 12 while grades 10 and 11 shared 89 students a piece. This accounted for 35.9%, 32.0% and 32.0% of the study population respectively.

Out of the 278 participants in the study, 132 (47.7%) were females while 156 (52.5%) were male. The overall mean age of the study population was 19.9 years; with a standard deviation of 2.0 years. The youngest student in the study was 15 years while the oldest was 24 years. The students were predominantly Christians (268, 96.7%). Majority of the students were either living with both parents (96, 34.7) or with a single parent (88, 31.8%). Students who were living alone and those who were living with either relatives or guardians accounted for 16.6% apiece.

A total of 29 (10.5%) students had a mental illness history in their family while another 82 (29.8%) students had a substance use history in the family. Only 7 students had been used as child soldiers in the past. They accounted for 2.5% of the study population.

The education system in Liberia ranges from elementary school to college. Forty-two (15.2%) parents to students who participated in the study had not received the basic form of formal education. Out of 278 students, 5 (1.8%) and 68 (24.7%) of them had parents who had either dropped out of elementary or high school. A total of 69 (25.0%) parents to students who

participated in the study had attained high school diploma. Moreover, 3 (1.0%) parents had a certificate while 87 (31.6%) had a college degree.

Entertainment joints, friends and shops were the most mentioned points where students accessed drugs. Most of the students accessed drugs through entertainment spots (111, 65.2%). This was followed by friends and shops which were cited by 35 (20.5%) and 13 (7.6%) students respectively. Other avenues included ghetto, home and community in descending order. Friends also played a big part in influencing the students into substance use compared to the family unit. It accounted for 80.5%, which was much lower, as compared to the family unit which accounted for the remaining 19.4%.

Kpelle, Bassa, Gio, Mano, Lorma, Grebo and Kru were the most common ethnic communities among the sampled students. They accounted for 66 (24.4%), 61 (22.5%), 36 (13.3%), 19 (7.0%), 17 (6.3%), 16 (5.9%) and 12 (4.4%) students in that order. Most students (n = 68) lived in 68 (24.7%) Duport Road-Paynesville. This was followed by GSA Road Paynesville (43, 15.6%), ELWA Community Paynesville (31, 11.2%), AB Tolbert Road Paynesville (18, 16.5%), Red-light Paynesville (17, 6.1%), Police Academy Paynesville (16, 5.8%), SD Cooper Road Paynesville (13, 4.7%), Vokar Mission Paynesville (13, 4.7%), Oldest Congo Town/Monrovia (12, 4.4%) and Joe Bay Paynesville (11, 4.0%). A summary of this information has been tabulated in Table 3 below.

Table3: Sociodemographic Characteristics of Study Population

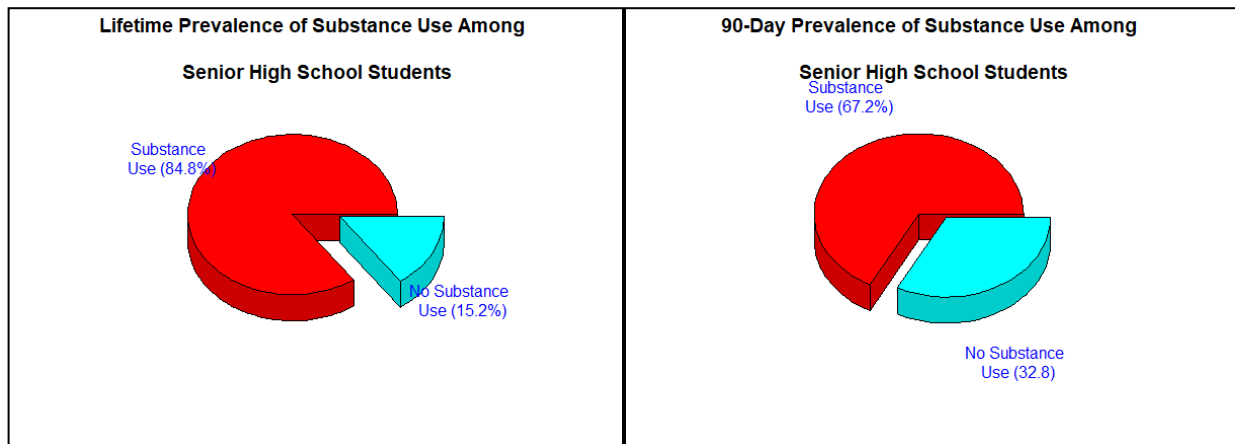
Sociodemographic Characteristic	n (%)
Grade	
10 th	89 (32.0)
11 th	89 (32.0)
12 th	100 (35.9)
Gender	
Female	132 (47.4)
Male	146 (52.5)
Age (mean, std dev)	19.9 (2.0)
Religion	
Christian	268 (96.7)
Muslim	9 (3.2)
Living Condition	
Living alone	46 (16.6)
Living with a relative (guardian)	46 (16.6)
Living with a single parent	88 (31.8)
Living with both parents	96 (34.7)
History of mental illness in the family	
No	248 (89.5)
Yes	29 (10.4)
Family history of substance use	
No	193 (70.1)
Yes	82 (29.8)
Were you a child soldier	
No	265 (97.4)
Yes	7 (2.5)
Parent's level of education	
Illiterate, Elementary dropout	47 (17.0)
High school dropout	68 (24.7)
High school diploma	69 (25.0)
Certificate, College degree, College drop-out	91 (32.9)
Main influence into substance use	
Family	37 (19.4)
Friends	153 (80.5)
Access to drugs	
Entertainment spots	111 (65.2)
Friends	35 (20.5)
Shop	13 (7.6)
Others	11 (6.2)
Ethnicity	
Kpelle	66 (24.4)
Bassa	61 (22.5)
Gio	36 (13.3)
Mano	19 (7.0)
Lorma	17 (6.3)
Grebo	16 (5.9)
Kru	12 (4.4)
Others`	44 (16.2)
Residence	
Duport road/ Paynesville	68 (24.7)
GSA Road Paynesville	43 (15.6)
ELWA Community Paynesville	31 (11.2)
AB Tolbert Road Paynesville	18 (6.5)
Redlight Paynesville	17 (6.1)

Police Academy Paynesville	16 (5.8)
SD Cooper Road Paynesville	13 (4.7)
Vokar Mission Paynesville	13 (4.7)
Oldest Congo Town/Monrovia	12 (4.4)
Joe Bay Paynesville	11 (4.0)
Others	33 (9.2)

4.2. Prevalence of substance-use among senior high school students in Paynesville City, Montserrado County, Liberia

Out of 278 students, a total of 236 had used at least one form of substance in their lifetime. This translated to an overall lifetime prevalence rate of 84.8% as illustrated in the pie chart below. The number of students who had used at least one form of substance within the last three months prior to the commencement of the study reduced to 187. This translated to an overall 90-day prevalence rate of 67.2%. This information is illustrated in the pie charts below (Figure 2).

Figure 2: Pie of lifetime and ninety-day prevalence of substance use by high school students



More specifically, assessment of the lifetime prevalence of using specific substances by senior high school students revealed that- out of the 278 students- alcoholic beverages had the highest prevalence of 81.2% (n = 226). This was followed by cannabis, tobacco products and sedative at 22.6% (n = 63), 10.9% (n = 30) and 5.7% (n = 16) respectively. The lifetime prevalence for opioids

was 3.9% (n = 11) while that of amphetamine type substances was 3.2% (n = 9). Hallucinogens and cocaine had a lifetime prevalence of 1.8% each. Inhalants had the lowest lifetime prevalence of 1.4% (n = 4). (Table 4)

Table 4: Percentage Frequency of the Risk Level to Specific Substance Among Senior High School Students

Specific Substance	Lifetime Prevalence	90- Day Prevalence
	n (%)	n (%)
Alcoholic beverages (wine, beer, spirits, etc.)	226 (81.2)	170 (71.5)
Cannabis (marijuana, pot, grass, hash, etc.)	63 (22.6)	30 (12.8)
Tobacco products (cigar, cigarettes, chewing tobacco, etc.)	30 (10.9)	23 (9.8)
Sedatives or Sleeping Pills (Serapax, Valium, Rohypnol, etc.)	16 (5.7)	22 (9.4)
Opioids (morphine, heroin, methadone, codeine, etc.)	11 (3.9)	5 (2.2)
Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	9 (3.2)	11 (4.7)
Hallucinogens (mushroom, LSD, acid, PCP, Special K, etc.)	5 (1.8)	5 (2.2)
Cocaine (coke, crack, etc.)	5 (1.8)	4 (1.7)
Inhalants (glue, nitrous, petrol, paint thinner, etc.)	4 (1.4)	5 (2.6)
Other substances	49 (21.6)	44 (21.3)

The 90-day prevalence of using specific substances by senior high school students also revealed a high prevalence of 71.5% (n = 170) for alcohol use. This was followed by cannabis products, tobacco and sedative at 12.8% (n = 30), 9.8% (n = 23) and 9.4% (n = 22) respectively. The 90-day prevalence for amphetamine type substances was 11.0% while that of inhalants was 2.6% (n= 5). Hallucinogens and opioids had a 90-day prevalence of 2.2% each. Cocaine had the lowest 90-day prevalence of 1.7% (n = 4). (Table 4)

4.2.1. Risk of injection drugs

Only 5 out of 236 students had used injectable substances in the past hence a lifetime prevalence of 2.2%. Two among them had used it in the previous 3 months hence a 90-day prevalence of 0.4% past 90-day prevalence. The remaining three had used it long before 3 months from the time the interview was conducted.

4.2.2. Ninety-Day Overall Substance Use Risk Level

The drug use levels were assessed in three categories low, moderate, and high, and were stratified by sex. More than half of the participants had moderate to high-risk levels of alcohol use. The majority of the study participants had low-risk levels (> 90%) on Cannabis, Inhalants, Cocaine, Amphetamine, Sedatives, Opioids, Hallucinogen, and other drugs. The majority of the females had low and moderate alcoholic risk levels compared to the males ($p = 0.027$). No significant difference in risk levels was observed between all the substances assessed, excluding alcohol, by sex ($p > 0.05$). More of the results are shown in Table 5.

Table 5: Substance use risk levels

Variable and measurements	Female, N = 132 ¹	Male, N = 146 ¹	P-Value ²
Alcoholic Products			0.027
Low/No Intervention	65 (49%)	49 (34%)	
Moderate/Receive brief intervention	62 (47%)	88 (60%)	
High/More intensive treatment	5 (3.8%)	9 (6.2%)	
Cannabis			0.300
Low/No Intervention	117 (89%)	122 (84%)	
Moderate/Receive brief intervention	15 (11%)	23 (16%)	
High/More intensive treatment	0 (0%)	1 (0.7%)	
Cocaine			0.800
Low/No Intervention	123 (93%)	138 (95%)	
Moderate/Receive brief intervention	9 (6.8%)	8 (5.5%)	
High/More intensive treatment	0 (0%)	0 (0%)	
Amphetamine Stimulants			0.200
Low/No Intervention	120 (91%)	139 (95%)	
Moderate/Receive brief intervention	12 (9.1%)	7 (4.8%)	
High/More intensive treatment	0 (0%)	0 (0%)	
Inhalants			0.600
Low/No Intervention	125 (95%)	136 (93%)	
Moderate/Receive brief intervention	7 (5.3%)	10 (6.8%)	
High/More intensive treatment	0 (0%)	0 (0%)	
Sedatives or Sleeping Pills			>0.900
Low/No Intervention	117 (89%)	131 (90%)	
Moderate/Receive brief intervention	14 (11%)	14 (9.6%)	
High/More intensive treatment	1 (0.8%)	1 (0.7%)	
Hallucinogens			0.800
Low/No Intervention	123 (93%)	138 (95%)	
Moderate/Receive brief intervention	9 (6.8%)	8 (5.5%)	
High/More intensive treatment	0 (0%)	0 (0%)	
Opioids			>0.900

Table 5: Substance use risk levels

Variable and measurements	Female, N = 132¹	Male, N = 146¹	P-Value²
Low/No Intervention	125 (95%)	139 (95%)	
Moderate/Receive brief intervention	7 (5.3%)	7 (4.8%)	
High/More intensive treatment	0 (0%)	0 (0%)	
Other Drugs			0.600
Low/No Intervention	111 (84%)	116 (79%)	
Moderate/Receive brief intervention	19 (14%)	28 (19%)	
High/More intensive treatment	2 (1.5%)	2 (1.4%)	
Tobacco Products			0.700
Low/No Intervention	117 (89%)	127 (87%)	
Moderate/Receive brief intervention	15 (11%)	19 (13%)	
High/More intensive treatment	0 (0%)	0 (0%)	

4.3. Association between socio-demographic factors and substance use among senior high school students in Paynesville City, Montserrado County, Liberia

4.3.1. Association between socio-demographic factors and lifetime substance use among senior high school students in Paynesville City, Liberia

There was a significant association between substance use by the student and their grade. The odds of a student in 11th grade having used at least one substance in their lifetime was 0.31 times that of a student in 10th grade (OR = 0.31, $p = 0.014$). Students in 11th grade were therefore less likely to have used at least one substance compared to those in 10th grade. The odds of students in 12th grade was 0.44 times that of those in 10th grade. The association was however non-significant (OR = 0.44, $p = 0.093$).

Gender, age, religion, living condition, family history of substance use, child soldier and parents' level of education were all non-significantly associated with substance use. It is worth noting that the association between history of mental illness in the family and substance use was marginally non-significant. The odds of a student from a family with a mental illness history using substance was 0.41 times that of a student from a family without no known history of mental illness (OR = 0.41, $p = 0.057$). A student from a family with known history mental illness was therefore less likely to engage in substance use. This relationship was however marginally non-significant.

Multivariate analysis was used to adjust for other socio-demographic factors. The final parsimonious model featured grade of the student, gender, living condition and family history of mental illness as predictors; with a model AIC value of 233.6. There was a significant association between substance use and grade of the students. The odds of students in 11th grade having engaged in substance use in their lifetime was 0.21 folds that of students in 10th grade (OR = 0.21, $p =$

0.002). The odds of students in 12th grade engaging in substance use was 0.36 folds that of students in 10th grade (OR = 0.36, p = 0.047). Having adjusted for the effects of gender, living condition and history of mental illness in the family, students in 11th and 12th grade were both less likely to have engaged in substance use in their lifetime compared to the ones in 10th grade.

The odds of a student from a family with a history of mental illness having engaged in substance use in their lifetime was adjusted downwards to 0.26 times that of a student from a family without a history of mental illness (OR = 0.26, p = 0.008). The association between gender and substance use was non-significant (p = 0.058). Likewise, living condition was non-significantly associated with substance use after controlling for other factors. This information is summarized in Table 6 below.

Table 6: Association between Lifetime Substance Use and Sociodemographic Characteristics of Senior High School Students in Paynesville City, Liberia

Sociodemographic Characteristic	Substance Use		Crude OR (0.95 CI)	P-Val	Adjusted OR (0.95 CI)	P-Val
	No n=42(%)	Yes n=236(%)				
Grade						
10 th	7 (16.6)	82 (34.7)	Ref	Ref	Ref	Ref
11 th	19 (45.2)	70 (29.6)	0.31 (0.11,0.76)	0.014	0.21 (0.07,0.55)	0.002
12 th	16 (38.0)	84 (35.5)	0.44 (0.16,1.10)	0.093	0.36 (0.12,0.95)	0.047
Gender						
Female	25 (59.5)	107 (45.3)	Ref	Ref	Ref	Ref
Male	15 (35.7)	129 (54.6)	1.76 (0.86,3.69)	0.096	1.95 (0.98,3.96)	0.058
Age (mean, standard dev.)	20.1 (2.53)	20.0(1.92)	0.96 (0.81,1.13)	0.617		
Religion						
Christian	39 (92.8)	229 (97.0)	Ref	Ref		
Muslim	2 (4.7)	7 (2.9)	0.59 (0.10,6.10)	0.625		
Living Condition						
Alone	6 (14.2)	40 (16.9)	Ref	Ref	Ref	Ref
With a relative (guardian)	7 (16.6)	39 (16.5)	0.83 (0.24,2.73)	0.765	0.78 (0.22,2.68)	0.696
With a single parent	15 (35.7)	73 (30.9)	0.73 (0.24,1.95)	0.546	0.66 (0.21,1.85)	0.451
With both parents	14 (33.3)	82 (34.7)	0.87 (0.29,2.36)	0.805	0.75 (0.23,2.14)	0.610
Family hist. of mental illness						
No	34 (80.9)	214 (90.6)	Ref	Ref	Ref	Ref
Yes	8 (19.0)	21 (8.9)	0.41 (0.16,1.18)	0.057	0.26 (0.10,0.74)	0.008
Family hist. of substance use						
No	32 (76.1)	161 (68.2)	Ref	Ref		
Yes	9 (21.4)	73 (30.9)	1.61 (0.75,3.74)	0.236		
Were you a child soldier						
No	42 (100.0)	223 (94.4)	Ref	Ref		
Yes	0 (0.0)	7 (2.9)	Inf (0.26,inf)	0.600		
Parent's level of education						
Elementary, Illiterate	9 (21.4)	38 (16.1)	Ref	Ref		
High School	21 (50.0)	116 (49.1)	1.30 (0.53,3.02)	0.054		
Certificate, College	12 (28.5)	79 (33.4)	1.55 (0.59,4.00)	0.357		

AIC Value for Final Multivariate Model = 233.6

4.3.2. Association between socio-demographic factors and 90-days substance use among senior high school students in Paynesville City, Liberia

Bivariate analysis of turned a non-significant association between 90-day substance use by the student and their grade. The odds of a student in 11th grade having used at least one substance in the last 90 days prior to the study was 0.60 times that of a student in 10th grade (OR = 0.60, $p = 0.114$). The odds of students in 12th grade was 0.86 times that of those in 11th grade. The association was also non-significant (OR = 0.86, $p = 0.662$). Students in both 11th and 12th grade were therefore as likely to have used at least one substance within the 90 days leading to the study as their counterparts in the 10th grade.

Bivariate analysis also returned a non-significant association between the 90-day substance use and gender, age, religion, living condition, family history of mental illness, child soldier and parents' level of education (Table 6). It is worth noting that the association between history of substance use in the family and the 90-day substance use was significant (OR = 1.88, $p = 0.035$). The odds of a student from a family with history of substance use having used a substance within the 90 days prior to this study was 1.88 times that of a student from a family that is free from history of substance use. Within 90 days preceding the study, a student from a family with a history of substance was more likely to have engaged in substance use.

Like in the analysis of lifetime substance use, multivariate analysis was also used to adjust for the effects of other socio-demographic factors in the analysis of 90-day substance use. The final multivariate logistic regression model featured grade of the student, age, living condition, history of family mental illness, history of family substance use and the parents' level of education as predictors; with a model AIC value of 340.15.

There was a significant association between the 90-day substance use and grade of the students, family history of substance use and parents' level of education.

The odds of students in 11th grade having engaged in substance use within 90 days prior to the study was 0.48 folds that of students in 10th grade (OR = 0.48, $p = 0.043$). Having adjusted for the effects of age, living condition, history of mental illness in the family, history of substance use in the family and parents' level of education; students in 11th grade were less likely to have engaged in substance use within 90-days to the start of the study as compared to the ones in 10th grade. The odds of students in 12th grade engaging in substance use was 0.71 folds that of students in 10th grade (OR = 0.71, $p = 0.358$). The association was non-significant hence, despite adjusting for the effects of effects of age, living condition, history of mental illness in the family, history of substance use in the family and parents' level of education, students in 12th grade were as likely to have engaged in substance use within 90-days prior to the study as compared to their counterparts in 10th grade.

The odds of a student from a family with a history of substance use having engaged in substance use within the 90 days leading to the onset of the study was adjusted upwards to 2.02 times that of a student from a family without a history of substance use (OR = 2.02, $p = 0.029$). The probability of a student from a family with history of substance use engaging in substance use within 90 days to the study was much higher after controlling for the effects of the above-mentioned characteristics.

The odds of a student, whose parents had studied to high school level, having engaged in substance use within the 90 days to the onset of the study was 2.64 of students whose parents had not attained elementary education. The odds of a student, whose parents had studied to certificate or college level was 2.47 that of students whose parents had not attained elementary education. Students

whose parents had gained higher levels of education were therefore more probable to have used substance within 90-days lead to this study.

The association between the students' age, living condition and history of mental illness in their families was non-significantly associated with the 90-day substance use. Table 7 below summarizes this information.

Table 7: Association between 90-Days Substance Use and Sociodemographic Characteristics of Senior High School Students in Paynesville City, Liberia

Sociodemographic Characteristic	Substance Use		Crude OR (0.95 CI)	P-Val	Adjusted OR (0.95 CI)	P-Val
	No n=91(%)	Yes n=187(%)				
Grade						
10 th	25 (27.4)	64 (34.2)	Ref	Ref	Ref	Ref
11 th	35 (38.4)	54 (28.9)	0.60 (0.31,1.12)	0.114	0.48 (0.23,0.97)	0.043
12 th	31 (34.0)	69 (36.8)	0.86 (0.46,1.62)	0.662	0.71 (0.34,1.46)	0.358
Gender						
Female	49 (53.8)	83 (44.3)	Ref	Ref		
Male	42 (46.1)	104 (55.6)	1.76 (0.85,2.49)	0.159		
Age (mean, standard dev.)	19.7 (2.17)	20.1(1.93)	1.09 (0.96,1.24)	0.159	1.08 (0.93,1.26)	0.268
Religion						
Christian	84 (92.3)	184 (98.3)	Ref	Ref		
Muslim	6 (6.5)	3 (1.6)	0.22 (0.03,1.10)	0.062		
Living Condition						
Alone	11 (12.0)	35 (18.7)	Ref	Ref	Ref	Ref
With a relative (guardian)	15 (16.4)	31 (16.5)	0.64 (0.25,1.61)	0.355	0.57 (0.19,1.58)	0.288
With a single parent	31 (34.0)	57 (30.4)	0.57 (0.24,1.26)	0.182	0.59 (0.23,1.48)	0.276
With both parents	33 (36.2)	63 (33.6)	0.60 (0.26,1.30)	0.209	0.60 (0.23,1.47)	0.277
Family hist. of mental illness						
No	80 (87.9)	168 (89.8)	Ref	Ref	Ref	Ref
Yes	11 (12.0)	18 (9.6)	0.77 (0.33,1.91)	0.536	0.51 (0.20,1.31)	0.157
Family hist. of substance use						
No	70 ()	123 (65.7)	Ref	Ref	Ref	Ref
Yes	19 ()	63 (33.6)	1.88 (1.06,3.47)	0.035	2.02 (1.08,3.89)	0.029
Were you a child soldier						
No	89 (97.8)	176 (94.1)	Ref	Ref		
Yes	0 (0.0)	7 (3.7)	Inf (0.71,inf)	0.099		
Parent's level of education						
Elementary, Illiterate	21 (23.1)	26 (13.9)	Ref	Ref	Ref	Ref
High School	41 (45.1)	96 (51.3)	1.89 (0.95,3.74)	0.066	2.64 (1.25,5.65)	0.010
Certificate, College	29 (31.8)	62 (33.1)	1.72 (0.83,3.57)	0.139	2.47 (1.11,5.54)	0.026

AIC Value for Final Multivariate Model = 340.45

5. Chapter Five: Discussion

Under the leadership of the WHO, the Global Youth Tobacco Survey (GYTS) conducted surveillance that focused on students aged 13-15 years; the overall prevalence rate of students who smoked cigarettes in their lifetime was 33%, even with one or two puffs. The prevalence of those who were using any form of tobacco products at the time of the surveillance ranged from 3.3% to 62.8% in 41 countries (Warren, 2002).

Contrary to our study, which used a different age range and smaller sample size, students' lifetime prevalence of tobacco use in Paynesville Community School was 10.9% (n = 30). This was approximately one-third of the one presented by WHO in their report. Senior High School students in Paynesville Community School, Liberia, interacted less with drugs in their lifetime compared to the 41 countries reported by WHO. Nevertheless, the 90-day prevalence of tobacco products among senior students in Paynesville Community School (9.8%, n = 23) fell within the WHO range of 3.3% to 62.8%, 30-day use preceding the survey estimated from the 41 countries. The lifetime and 90-day prevalence patterns observed in the Paynesville study closely replicated the ones obtained from the Surveillance of the National Youth Risk Behavior (YRBS) conducted by the CDC in 42 states within the USA and reported in their 2009 report. Alcohol, tobacco products, and cannabis were the most common substances that the students had been exposed to in their lifetime. The lifetime prevalence of alcohol use was highest in both studies (81.2%, n = 226 for Paynesville and 72.5% in the USA).

In PCS, the lifetime prevalence for cannabis use (22.6%) was higher than that of tobacco products (10.9%). The same trend was observed for the 90-day prevalence rate, where alcohol, cannabis, and tobacco products had a prevalence of 71.5%, 12.8%, and 9.8% in that order.

Apart from alcohol, the lifetime prevalence of tobacco products (9.8% versus 46.3%), cannabis (22.6% versus 36.8%), and cocaine (1.8% versus 6.4%) were relatively lower for students in PCS compared to the ones in the USA. The 90-day prevalence for alcohol use (71.5%) was higher for Paynesville students compared to the 30-day prevalence for USA student (41.8%). The 90-day prevalence for tobacco product use was lower for Paynesville students (9.8% versus 19.5%).(Stephens et al., 2009).

This study estimated a lifetime prevalence of opioid use of 3.9% (n = 11). This was a little higher than the 2.1% lifetime prevalence of heroin use that was estimated by Yantsides et al., (2017) in a study using data taken from the YRBS 2013. It is worth noting that the data obtained from PCS targeted all forms of opioids; and not necessarily heroin. The figure however closely approximated the 90-day prevalence of opioid use by senior students in PCS (2.2%, n = 5). The lifetime prevalence of alcohol-use by 10th, 11th and 12th grade Paynesville students was 92.2%, 78.6% and 84.0% respectively. This was higher than the twelve-month alcohol use prevalence for 10th and 12th grade that was reported from an MTF study which aimed at assessing the prevalence of alcohol use and binge drinking by adolescents in the U.S in 2011. The study estimated the prevalence for 10th and 12th grades at 49.8% and 63.5% respectively (Patrick & Schulenberg, 2013).

Conway et al.,(2013) reported a 26.3% (n = 2485) past 12-month prevalence rate of marijuana use and 8.3% (n = 2483) for other illicit drugs from a study they did exclusively among 10th graders across nine U.S Census divisions. The prevalence of 26.3% was higher than the 22.6% lifetime prevalence of cannabis use in Paynesville School. However, the figure almost doubled that of 90-day prevalence of cannabis use (12.8%). More difference between the two studies was seen in line with parents' education. The prevalence of cigarette smoking, binge drinking, and marijuana use were lower among children whose parents had a graduate degree compared to those whose parents

had a high school diploma or graduate equivalence diploma. A reversal of the trend, where students to more educated parents, tended to have indulged more in substance use within 90 days prior to the study compared to the students whose parents were less educated was observed in Paynesville (Table 6). In Africa, education usually has a strong correlation with financial capability hence this reverse trend may be attributed to the fact that students whose parents were more educated were more likely to meet the cost of purchasing substance. The prevalence of substance use among children who lived with their biological parents was also lower than that of children whose family structure fell into other categories (Conway et al., 2013). On the contrary, the Paynesville students' living condition was non-significantly associated with substance use in this study.

Five national school-based surveys that were done on the Canadian Health Behavior in School-aged adolescents, between 1990 and 2006, reported that 44% of students in grade 10 drank beer at least once per month in 1990 but declined to 28% in 2006 (Elgar et al., 2011). The 44% twelve-month alcohol use prevalence was much lower than the 90-day alcohol use prevalence rate for students in 10th grade in Paynesville school (76.8%, n = 63). Lifetime prevalence of substance use was consistently below 10% in Canada as opposed to that of Paynesville which was higher at 84.8%. A total of 73.8% (n = 62) of the senior students in grade 12 at Paynesville school had taken alcohol within the 90 days to the onset of the study. This was much higher than that of another study in Canada, assessing the prevalence of alcohol and drug use. It reported that 50.8% of 12th graders used alcohol, while 29.1% used marijuana (Leatherdale & Burkhalter, 2012).

In 1995- 2015, the European School Survey Project on Alcohol and other Drugs reported that 21% of the students had smoked cigarettes in the last thirty days (Group et al., 2015). This was higher than both the lifetime and 90-day prevalence for tobacco products use by students in Paynesville

(10.9 and 9.8% respectively). Alcohol use in the previous thirty days decreased from 56% in 1995 to 47% in 2015. The thirty-day prevalence estimated in both 1995 and 2015 was still lower than the 90-day alcohol use prevalence among students in PCS (71.5%). The lifetime prevalence of cannabis use was however higher in Paynesville (22.6%) than the 16% estimated in the European School Survey (Group et al., 2015).

Conway et al. (2013) estimated a prevalence rate of 29.2% for current smokers in a study done in six cities of Northern Greece. This was approximately three-fold the 90-day prevalence of tobacco product users in Paynesville (9.8%). It was also much higher than the lifetime prevalence of tobacco product use (10.9%). The study reported a prevalence of 43.3% among students who started smoking before 14 years. This was much higher than the lifetime prevalence of tobacco product use (10.9%) in PCS.

The lifetime prevalence of 10.9% for tobacco product use among senior high school students in Paynesville was also much lower than 27.6%, which was reported as the lifetime prevalence of smoking cigarettes among students in a descriptive cross-sectional study to determine the prevalence and potential contributing factors to substance use. The study was carried out by Mahmood et al. in Erbil City, Iraq. (Mahmood et al., 2019). Likewise, the last 90-day prevalence rate for tobacco products use by Paynesville students (9.8%) was lower than the last 30-day prevalence rates for students in Iraq (13 %). The prevalence rate of lifetime alcohol consumption by high school students in Erbil City, Iraq (3.7%) was much lower compared to that of students in Paynesville (81.2%). This could be attributed to cultural or religious background. The same trend was also reported for the lifetime prevalence of marijuana smoking with Erbil having a prevalence of 0.7% compared to 22.6% for Paynesville (Mahmood et al., 2019). Students in Paynesville were

more exposed to alcohol and cannabis; and less exposed to tobacco products than those in Erbil, Iraq.

Comparison with another study done in Iran by Vakili et al., (2016) showed the same trend. Paynesville recorded relatively low prevalence rates of specific substance use compared to Iran. This included 2.2% 90-day prevalence rate of opium use compared to 12.9% for Iran, 4.7% for amphetamine use compared to 12.5% in Iran and lastly 1.7% for cocaine use compared to 9.6% for Iran. The lifetime prevalence of 3.9%, 3.2% and 1.8% for opium, amphetamine and cocaine use in that order products was also lower than the ones estimated in that study. PCS, however, recorded a higher prevalence for cannabis use (12.8%) than the 9.5% that was recorded by Iran.

Another similar study in Iraq found 19.7 % of tobacco use among secondary students. The result of the study which was conducted among 1020 male students was higher than the 90-day prevalence of tobacco product use in Paynesville (9.8%) (Hussain & Abdul Satar, 2013). The lifetime prevalence of tobacco use in Paynesville was also much lower than 39% which was reported by Al Shemmari et al., (2015) in a study on dokha, a new form of smoking, that they conducted in Iran.

In Oman, 20.7% had used at least one form of substance as reported in a study that was conducted among students from grade 9 to grade 12 between 2015 to 2016 (Shaikh et al., 2018). This was much lower than the lifetime and 90-day overall prevalence rates of substance use in Paynesville (84.8% and 67.2% respectively). The trend was however reversed for both sedatives (Paynesville, 5.7%; Oman, 25%) and tobacco use (Paynesville, 10.9%; Oman, 17%).

Paynesville also reported higher prevalence rates for alcohol, but a lower rate for other substances, than those of a study involving secondary analysis of existing data that was collected from 20,765 students in six African countries namely Namibia, Kenya, Swaziland, Zambia, Uganda, and Zimbabwe. The study estimated a higher prevalence rate of tobacco use for 10th graders at 12% against 9.8% in Paynesville. On the contrary, it estimated a lower prevalence rate of alcohol use at 8% against 71.5% in Paynesville school (Peltzer, 2009). Ben El Jilali et al. (2020) reported a prevalence of 16.1% for 10th grade, 8.5% for 11th grade and 12.2% for 12th grade students in middle and high schools in Khemisset, Morocco in 2013. This was generally lower than 60.6% and 69.0% for 11th and 12th grades in Paynesville.

The lifetime alcohol use prevalence rate for students in Paynesville was higher while that of tobacco product use was lower than that of Ethiopia as reported in a systemic review and meta-analysis of 28 articles picked from 676 studies. The study estimated the lifetime prevalence of 41.1% for alcohol use and 21.5% for cigarette smoking among students in Ethiopia (Roba et al., 2019). The overall lifetime prevalence of 81.2% for alcohol use in Paynesville was higher than the 59% which was estimated in a school-based cross-sectional study in Woreta, Ethiopia (Birhanu et al., 2014b). The study reported a prevalence of 47.9% for current and 65.4% for lifetime use of substance. The reported current prevalence was much lower than the one for Paynesville. The 90-day prevalence of tobacco use in Paynesville (9.8%) was much lower than the current prevalence rate for tobacco use (65.4%) for Woreta.

The rates obtained in this study were generally higher than the ones previously registered in studies within East Africa. Paynesville's 90-day prevalence rate for alcohol (71.5%) and cannabis (12.8%) was more than three folds that of Uganda (19.3% and 2.9% respectively). In both studies, alcohol was the most used substance among high school students (Abbo et al., 2016). Waithima, 2017

estimated an overall lifetime prevalence of substance use of 57.4% in Kenya. The study involved 1038 students from public secondary schools. Like in Uganda, this was much lower than the overall lifetime prevalence of 84.7% for substance use in Paynesville School, Liberia. Moreover, the 90-day overall substance use prevalence of 67.2% in Paynesville was higher than the thirty-day prevalence of 48.7% estimated in the study (Waithima, 2017). The high prevalence of substance use in Paynesville than in Kenya and Uganda is mostly attributed to higher exposure to alcohol.

The results obtained in this study also points to a higher prevalence than those of studies done in Southern Africa countries. A cross sectional study in seventeen public schools in Botswana's capital city reported a 24.2% alcohol-use prevalence among Form 3 students and 23.1% among Form 4 students (Riva et al., 2018). This is equivalent to grade 11 and 12 in this study (Table 1). The figure was much lower than the ninety-day prevalence rate of 62.5% and 73.9% observed among Paynesville students. In Zimbabwe, 311 high school students admitted to have used cannabis within 30 days to the onset of the study (n = 311, 8%). The 8% thirty-day prevalence of cannabis use was low compared to the ninety-day prevalence of 12.8% that was obtained in Paynesville. Moreover, the study reported a 15.6% lifetime prevalence of cannabis use while in Paynesville it was 22.6% (Chivandire & January, 2016).

The same trend whereby Paynesville recorded higher prevalence was also observed against studies done in West African countries. In Nigeria, the prevalence of those who had ever taken an alcohol-containing drink in a cross-sectional survey among 249 Senior Secondary 1 (SS1) and Senior Secondary 2 (SS2) students was 21.7% compared to 63.3% in Paynesville (Idowu et al., 2018). Still in Nigeria, Manyike et al. (2016) reported a higher prevalence for alcohol use (59.3%) than that of tobacco use (10.3%). A similar trend was observed in Paynesville where the lifetime and

90-day prevalence rates for alcohol was higher than that of tobacco products. The overall lifetime prevalence rate of substance use for Paynesville students (84.8%) closely approximated that of Lagos (85.7%) in a study by Oshodi et al. (2010).

Paynesville also recorded higher prevalence of substance use than Ghana. Adu-Mireku, (2003) reported a lifetime prevalence rate of 25.1% for alcohol use; which was much lower than 63.3% in Paynesville. The lifetime exposure of students to tobacco products was also higher in Paynesville (62.9%) compared to 7.5% in Ghana. Lastly, cannabis use was also higher at 63.6% against 2.6% in Ghana.

As at the time of this study, only one pilot study on the prevalence rate of substance use among students in secondary schools in Monrovia had been published in Liberia. Like in this study, Paynesville study revealed that alcohol had the highest 90-days prevalence compared to other substances. The 90-day prevalence for Paynesville was however higher at 67.2% compared to 51% in Monrovia. The ninety-days prevalence of marijuana use in Paynesville was also high at 12.8% compared to 9% in Monrovia (Harris et al., 2012).

Paynesville study revealed a non-significant association between gender and lifetime substance use. Female senior high school students were equally exposed to substance use as the male students (OR = 1.95, $p = 0.058$). This finding differed with that from a cross-sectional descriptive study that was carried out on 300 students in high schools in Karnataka, India. The study reported a significant association between gender and substance use. The study also differed with the results obtained from a study involving 1927 secondary school students in Botswana; in which male students were reported to be 1.3 times more likely to consume alcoholic beverages than female students. Furthermore, males were also 2.2 times more likely to use drugs (Riva et al., 2018).

5.1. Factors Influencing Use Among High School Students

The study in India also reported a significant association between the living condition and substance abuse. Moreover, 25 students who abuse these substances belonged to nuclear families. In Paynesville, there was a non-significant association between living conditions of the students with substance use. Senior students were equally exposed to substance use regardless of who they were living with. Age advancement was also a factor (Smriti, 2018) in the Indian study but it was non-significant in Paynesville study.

The Paynesville study recorded a significant relation between the grade of the students and lifetime substance use. Students in grade 12 were less likely to have indulged in substance abuse in their lifetime compared to those in 10th grade (OR = 0.36, p = 0.047). Students in grade 11 were also less likely to have indulged in substance use compared to those in grade 10 (OR = 0.21, p = 0.002). Family with known history of mental illness was also a significant predictor for substance use. Senior students from families with history of mental illness were less likely to have indulged in substance use (OR = 0.26, p = 0.008).

Birhanu et al. (2014b), in a study done in Woreta town in Ethiopia, reported an increase in substance use by almost threefold in students whose siblings used substances. He also reported a 2.24 increased risk of using substances among students with a family history of drug and alcohol use than those with no drug and alcohol use history. These results closely resembled the results obtained in the Paynesville study where a significant association between 90-day substance use and family history of substance use was reported (OR = 2.02, p = 0.029). Paynesville students from families with history of substance use were more likely to have used at least one form of substance within 90 days prior to this study compared to their counterparts who hailed from families that were free from substance use.

Moreover, the odds of a student whose parents had studied to high school level, having engaged in substance use within 90 days to the onset of this study was 2.64 times that of students whose parents had not attained elementary education. The odds of a student, whose parents had studied to certificate or college level was 2.47 that of students whose parents had not attained elementary education. Students whose parents had gained higher levels of education were therefore more probable to have used substance within 90-days lead to this study.

6. Chapter Six: Summary, Conclusion and Recommendations

6.1. Summary

Indeed, many studies have shown that substance use among teenagers in school is a worldwide problem. Senior students in Paynesville had a high lifetime prevalence of substance use compared to the other parts of the world. This was mostly contributed by high lifetime and 90-day exposure to alcohol. Cannabis was the second most prevalent substance use after alcohol.

Senior students in Paynesville Community School were less exposed to tobacco product use in the course of their life than in most parts of the world. The 90-day prevalence rate compared to lifetime prevalence in Paynesville shows that the tendency to use substance among students reduced with age. Senior students in grades 11 and 12 were less likely to engage in substance use compared to those in grade 10. Students who hail from families with history of mental illness were less likely to indulge in substance use in their lifetime. On the other hand, students from families with history of substance use were more likely to use substance.

6.2. Conclusion

In conclusion, while students in Paynesville School are less exposed to the other forms of substance use, they more exposed to alcohol and cannabis in their lifetime than most parts of the world; a habit which habit subsides with age.

6.3. Recommendation

The school should initiate innovative ways of detecting drug use among the students and remedial measures.

The school should also initiate an awareness program on the use of the substance and its effects, including counseling.

The government should also establish regulations to control easy access to drugs by such stringent surveillance systems for illicit drug peddling in the country, particularly the entertainment spots.

Additionally, the government should provide national guidelines on the age limit of those who can access entertainment spots to control access to illicit substances for those under 18 years old population.

Moreover, there should be a proper control of drug supply chains and more stringent regulation of professional practice to limit the abuse of prescription drugs.

Lastly, the government should consider investing in more extensive research and surveillance programs that cover a large part of the population, including public and private schools, to yield more representative estimates of Liberia's overall student population.

6.4. Study Limitation

The study was conducted in one public school in Paynesville, Liberia. The findings from this study may not be representative of the actual population of senior students in high school in Paynesville and Liberia at large. Moreover, this study targeted the prevalence of substances as a group. The estimates may change when individual substances within the bigger groups are estimated. For instance, the estimated prevalence for cigarette smoking may differ from that of tobacco products.

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1.1. Proposed Time Frame for the Study

Event/ Activity	Time
Research proposal development and department defense	March-July 2021
Proposal submission, ethical approval, and clearance	August 2021
Data collection	October- November 2021
Data cleaning, entry, analysis, report writing	January 2022
Results defense, and thesis preparation and submission	February- March 2022

1.2. Self-sponsored proposed budget

Table 8: Budgetary allocation for the study

Category/ Item	Total Cost (Ksh)
Charges for the KNH/UON-ERC Proposal Review	2, 000.00
Stationery expenses	3, 000.00
Operating expenses including fueling of car for transportation, report writing.	25, 000.00
Statistician (1) person	30, 000.00
Hard copies of the Data Collection Tools for participants	8, 000.00
Photocopying and Printing hard copies of the Consent Forms for the participant	2, 000.00
Document printing and copying, Proposal copies (3), Copying and binding of the final thesis (5 copies)	15, 000.00
The University of Liberia-Pacific Institute for Research and Evaluation Institutional Review Board (UL-PIRE IRB)	25, 000.00
Round trip air-ticket from Nairobi, Kenya to Monrovia Liberia	150, 000.00
Miscellaneous	10, 000.00
Grand total	270, 000.00

2. Appendices

Appendix A: INFORMED CONSENT

Title of the study:	Prevalence of Substance Use among Senior High School Students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia
Investigator and institutional affiliation:	Dr. Wilma Albertine Tubman, MMED Psychiatry Student University of Nairobi, Kenya

INTRODUCTION:

My name is Dr. Wilma A. Tubman, a postgraduate student at the University of Nairobi. I wish to conduct a study on the prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia. This consent form gives you the information you will need to help you decide whether to participate in the study or not. Please feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, rights as a volunteer, and anything else about the study that is not clear. If we answer all your questions to your satisfaction, you may decide to enroll into the study or not. This process is called "Informed Consent". Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the following general principles which apply to all participants in medical research:

- The decision to participate in the study is entirely voluntary
- One may withdraw from the study at any time without giving a reason for the withdrawal

May I continue? YES/ NO

What is this study about?

The researcher listed above will be interviewing adolescents and young adult students. Participants in this study will be asked questions about Substance use, among other questions that will focus on the socio-demographic factors. This study targets approximately 300 participants. The researcher will request for your consent to consider participating in this study. You will need to sign a form that you have clearly understood what the study is all about.

What will happen if you decide to be in this study?

If you agree to participate in the study, you will need to sign a consent form confirming your willingness to participate in the study. You will also need to complete a questionnaire which should take approximately 15 – 20 minutes.

Is there any harm, risk or discomfort associated with this study?

Sometimes medical research has the potential to cause emotional, psychological, social and physical risk. Therefore, effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. The researcher will ensure that everything mentioned will be kept as confidential as possible. The researcher will use a code number to identify participants in a password-protected computer database and keep all the paper records in a locked file cabinet. In the case of any injury, illness, or complications related to this study, contact the researcher right away at the number provided at the end of this document. Referrals for counseling will be available to emotionally distressed participants at their request.

Are there benefits being in this study?

There will be no direct benefits for participating in this study. However, the participants' information will contribute to science and knowledge in understanding substance use among high school students in public high schools.

Will participation in the study have some cost implication to the participants?

There will be no financial burden to the participants in the study as data collection will be carried out during lunch break.

Will there be any form of refund for any money spent as part of the study?

As indicated above, participants will not spend any money to participate in the study hence there will be no arising need for compensation to the participants.

Voluntary Participation

To take part in the study is entirely voluntary and if the participant decides to terminate their participation, they can willingly withdraw from the study at any time. Participants may also choose not to answer specific questions. Participants' choice not to participate or withdraw will not affect them academically.

Confidentiality

Participants' identities will be kept confidential. In addition, participants' names or any other personal identifiers will not be used in any publications or reports arising from the study. Moreover, participants will be assigned numbers to protect their identities. The questionnaires completed by participants will be stored safely, and only the investigator and supervisors will have access to them. Data collected for the study will be entered into a computer and kept away from public access.

What if you have additional question(s) in the future?

If you have further concerns about participating in the study or questions that are not answered in the consent information, please ask, call or send a text message to the researcher through the number provided at the bottom of this page. For more information about rights as a research participant, you may contact the following persons.

Investigator (Researcher)

Dr. Wilma Albertine Tubman

University of Nairobi

Tel No: + (254)746418083/ + (231)886481052

Email: wilmatubman@yahoo.com

Prof. Anne Obondo (Supervisor)

Chairman, Department of Psychiatry

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Ext: 44355, Telegrams: varsity

Appendix B: CONSENT FORM FOR STUDENTS

I (Name of participant)

have read/ heard and understood the explanations given to me about this study entitled **“Prevalence of Substance Use Among Senior High School Students at the Paynesville Community School in Paynesville City, Montserrado County, Liberia”**.

I have had the chance to discuss the study with the researcher and the queries I had have been clarified to my satisfaction. The benefits and risks have also been explained in detail to me. I fully understand that my participation in this study is entirely voluntary and that I can withdraw my participation at any time without giving an explanation for doing so. I understand that if I withdraw my participation, it will not affect me academically. I fully understand that all efforts will be made to keep information regarding my identity confidential. I accept giving information that will help in this study and that whatever information is received will be reported and published confidentially.

By signing this consent form, I have not given up any of the legal rights that I have as a participants in a research study.

I agree to participate in the study: Yes No

I agree to have the questionnaire preserved for later study: Yes No

I agree to provide contact information for follow up: Yes No

Participant printed names _____

Participant signature _____ **Date** _____

Signature of witness _____ **Date** _____

You will receive a copy of the signed consent form to take away with you.

If you have questions or would like to seek further clarification about this study, please contact the following persons.

Investigator (Researcher)

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Tel No: + (254)746418083/ + (231)886481052

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Appendix B: CONSENT FORM FOR PARTICIPANT/ LEGAL GUARDIAN

I _____ the undersigned, do hereby volunteer to participate in this study/ am the legal guardian of this student, and allow him/her to participate in this study. Nature and purpose have been fully explained to me by Dr. Wilma A. Tubman. The role I play by participating in the interviewee is to help the investigator collect information about the prevalence of substance use among senior high school students at the Paynesville Community School. My questions, if any, have been answered to my satisfaction.

Participant's Signature: _____

Date: _____

Serial Number: _____

Researcher's Statement

I, (Dr. Wilma A. Tubman), the undersigned, exhaustively explained the relevant details of this research study to the participant named above. I believe that the participant has understood and has willingly and freely given his/ her consent.

Researcher's Name: Dr. Wilma A. Tubman (Investigator)

Date: _____

Signature: _____

Appendix B: REQUEST FOR PERMISSION FROM PAYNESVILLE SCHOOL

Formal request for permission was made from Paynesville City School's administration after attainment of KNH-UON ERC and UL-PIRE IRB approvals to carry out the study entitled: Prevalence of substance use among senior high school students at the Paynesville Community School in Paynesville City, Monsterrado County, Liberia."

Appendix B: SOCIODEMOGRAPHIC QUESTIONNAIRE

Respondent code/reference number

Date of questionnaire completion

Instruction: Please circle one answer or fill in the blank

1. What is your current class?
 - a. Grade 10th
 - b. Grade 11th
 - c. Grade 12th

2. Gender
 - a. Male
 - b. Female
 - c. Not specify

3. How old were you at your last birthday? _____

4. Religion
 - a. Christianity
 - b. Islam
 - c. Other (specify) _____

5. Living Condition
 - a. Living with both parents
 - b. Living with a single parent
 - c. Living alone
 - d. Living with a guardian (relative)
 - e. Other(s) Specify _____

6. Any history of mental illness in the family?
- a. Yes
 - b. No
7. Any family history of substance use?
- a. Yes
 - b. No
8. Estimated family income
- a. Amount _____
 - b. Other (specify) _____
9. Were you a child soldier?
- a. Yes
 - b. No
10. Where do you live? _____
11. What is your parent(s)/ guardian educational level
- a. Illiterate
 - b. High school dropout
 - c. High school diploma
 - d. College degree
 - e. Other (specify) _____
12. Ethnicity _____

Appendix B: WHO –ASSIST V 3.0 QUESTIONNAIRE

INTERVIEWER ID: _____ **SCHOOL:** _____
RESPONDENT CODE: _____ **DATE:** _____

INTRODUCTION

Thank you for agreeing to take part in this brief interview about alcohol, tobacco products and other drugs. I am going to ask you some questions about your experience of using these substances across your lifetime and in the past three months. These substances can be smoked, swallowed, snorted, inhaled, injected or taken in the form of pills (show drug card).

Some of the substances listed may be prescribed by a doctor (like amphetamines, sedatives, pain medications). For this interview, we will not record medications that are used as prescribed by your doctor. However, if you have taken such medications for reasons other than prescription, or taken them more frequently or at higher doses than prescribed, please let me know. While we are also interested in knowing about your use of various illicit drugs, please be assured that information on such use will be treated as strictly confidential.

Question 1

In your life, which of the following substances have you ever used? (NON-MEDICAL MEDICAL USE ONLY)	NO	YES
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3
d. Cocaine (coke, crack, etc.)	0	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3
j. Other - specify:	0	3

If "No" to all items, stop interview. If "No" to all items, stop interview.

If "Yes" to any of these items, ask Question 2 for each substance ever used.

Question 2

In the past three months In the past three months, how often have you used , how often have you used the substances you mentioned (FIRST DRUG, (FIRST DRUG,SECOND DRUG, ETC)?					
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	2	3	4	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	2	3	4	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	2	3	4	6
d. Cocaine (coke, crack, etc.)	0	2	3	4	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	2	3	4	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	2	3	4	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	2	3	4	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	2	3	4	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	2	3	4	6
j. Other - specify:	0	2	3	4	6

If "Never" to all items in Question 2, skip to Question 6.

If any substances in Question 2 were used in the previous three months, continue with Questions 3, 4 & 5 for each substance used.

Question 3

During the past three months During the past three months, how often have you, how often have you had a strong desire or urge to use (FIRST DRUG, SECOND DRUG, ETC)?					
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3	4	5	6
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3	4	5	6
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3	4	5	6
d. Cocaine (coke, crack, etc.)	0	3	4	5	6
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3	4	5	6
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3	4	5	6
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3	4	5	6
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3	4	5	6
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3	4	5	6
j. Other - specify:	0	3	4	5	6

Question 4

During the past three months During the past three months, how often has your, how often has your use of (FIRST DRUG, SECOND DRUG, ETC) led to health, social, legal or financial problems?					
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	4	5	6	7
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	4	5	6	7
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	4	5	6	7
d. Cocaine (coke, crack, etc.)	0	4	5	6	7
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	4	5	6	7
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	4	5	6	7
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	4	5	6	7
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	4	5	6	7
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	4	5	6	7
j. Other - specify:	0	4	5	6	7

Question 5

During the past three months, how often have you failed, to do what was normally expected of you because of your use of (FIRST DRUG, SECOND DRUG, ETC)?					
a. Tobacco products					
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	5	6	7	8
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	5	6	7	8
d. Cocaine (coke, crack, etc.)	0	5	6	7	8
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	5	6	7	8
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	5	6	7	8
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	5	6	7	8
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	5	6	7	8
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	5	6	7	8
j. Other - specify:	0	5	6	7	8

Ask Questions 6 & 7 for all substances ever used (i.e. those endorsed in Question 1)

Question 6

Has a friend or relative or anyone else ever expressed concern about your use of (FIRST DRUG, SECOND DRUG, ETC.)?			
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	6	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	6	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	6	3
d. Cocaine (coke, crack, etc.)	0	6	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	6	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	6	3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	6	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	6	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	6	3
j. Other – specify:	0	6	3

Question 7

Have you ever tried and failed to control, cut down or stop using (FIRST DRUG, SECOND DRUG, ETC.)			
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	6	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	6	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	6	3
d. Cocaine (coke, crack, etc.)	0	6	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	6	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	6	3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	6	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	6	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	6	3
j. Other – specify:	0	6	3

Question 8

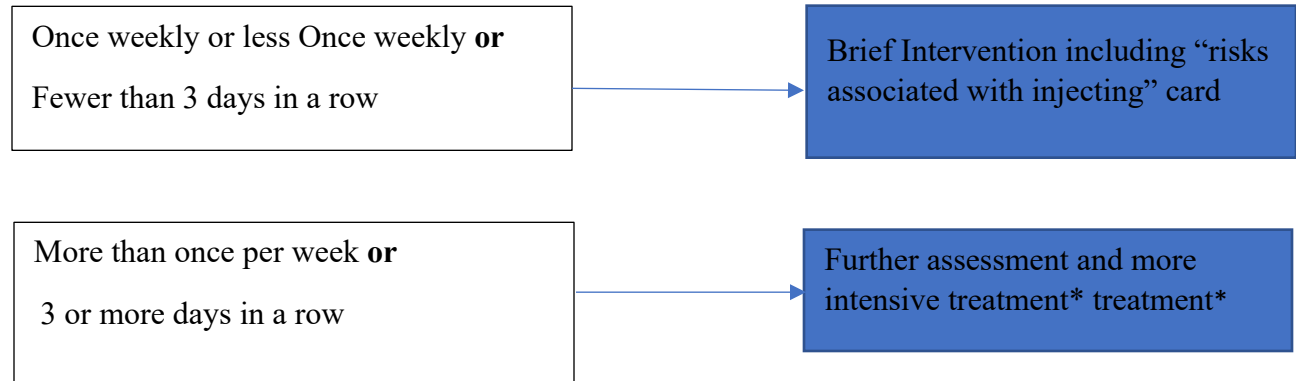
Have you ever used any drug by injection? (NON-MEDICAL USE ONLY)	0	2	1

IMPORTANT NOTE:

Patients who have injected drugs in the last 3 months should be asked about their pattern of injecting

PATTERN OF INJECTING

INTERVENTION GUIDELINE



HOW TO CALCULATE A SPECIFIC SUBSTANCE INVOLVEMENT SCORE

For each substance (labelled a. to j.) add up the scores received for questions 2 through 7 inclusive.

Do not include the results from either Q1 or Q8 in this score. For example, a score for cannabis

would be calculated as: **Q2c + Q3c + Q4c + Q5c + Q6c + Q7c**

Note that Q5 for tobacco is not coded, and is calculated as: **Q2a + Q3a + Q4a + Q6a + Q7a**

THE TYPE OF INTERVENTION IS DETERMINED BY THE PATIENT'S SPECIFIC SUBSTANCE INVOLVEMENT SCORE

	Record Specific Substance Score	No intervention	Receive Brief Intervention	More intensive treatment *
a. tobacco		0 – 3	4 - 26	27+
b. alcohol		0 – 10	11 - 26	27+
c. cannabis		0 – 3	4 - 26	27+
d. cocaine		0 – 3	4 - 26	27+
e. amphetamine		0 – 3	4 - 26	27+
f. inhalants		0 – 3	4 - 26	27+
g. sedative		0 – 3	4 - 26	27+
h. hallucinogens		0 – 3	4 - 26	27+
i. opioids		0 – 3	4 - 26	27+
j. other drugs		0 – 3	4 - 26	27+

NOTE: *FURTHER ASSESSMENT AND MORE INTENSIVE MORE INTENSIVE TREATMENT may be provided by the health professional(s) within your primary care setting, or, by a specialist drug and alcohol treatment service when available.

B. WHO ASSIST V3.0 RESPONSE CARD FOR PATIENTS

Response Card – substances

a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
b. Alcoholic beverages (beer, wine, spirits, etc.)
c. Cannabis (marijuana, pot, grass, hash, etc.)
d. Cocaine (coke, crack, etc.)
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)
i. Opioids (heroin, morphine, methadone, codeine, etc.)
j. Other - specify:

Response Card (ASSIST Questions 2)

Never: not used in the last 3 months

Once or twice: 1 to 2 times in the last 3 months.

Monthly: 1 to 3 times in one month.

Weekly: 1 to 4 times per week.

Daily or almost daily: 5 to 7 days per week.

Response Card (ASSIST Questions 6 to 8)

No, Never

Yes, but not in the past 3 months

Yes, in the past 3 months

**C. ALCOHOL, SMOKING AND SUBSTANCE INVOLVEMENT SCREENING TEST
(WHO ASSIST V3.0) FEEDBACK REPORT CARD FOR PATIENTS**

Name _____ Test Date _____

Specific Substance Involvement Scores Specific Substance Involvement Scores

Substance	Score	Risk Level
a. Tobacco products		0-3 Low 4-26 Moderate 27+ High
b. Alcoholic Beverages		0-10 Low 11-26 Moderate 27+ High
c. Cannabis		0-3 Low 4-26 Moderate 27+ High
d. Cocaine		0-3 Low 4-26 Moderate 27+ High
e. Amphetamine type stimulants		0-3 Low

		4-26 Moderate 27+ High
f. Inhalants		0-3 Low 4-26 Moderate 27+ High
g. Sedatives or Sleeping Pills		0-3 Low 4-26 Moderate 27+ High
h. Hallucinogens		0-3 Low 4-26 Moderate 27+ High
i. Opioids		0-3 Low 4-26 Moderate 27+ High
j. Other - specify		0-3 Low 4-26 Moderate 27+ High

What do your scores mean?

Low: You are at low risk of health and other problems from your current pattern of use.

Moderate: You are at risk of health and other problems from your current pattern of substance use.

High: You are at high risk of experiencing severe problems (health, social, financial, legal, relationship) as a result of your current pattern of use and are likely to be dependent