

Commonly used and determinants of drug use among Students of Tertiary Institutions in Idah Local Government Area, Kogi State, Nigeria

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Abstract

Illicit drug use among students of tertiary institutions remains a significant public health and social concern, particularly among young adults who are exposed to peer pressure, academic stress and easy access to psychoactive substances. Thus, this descriptive study sought to identify the illicit drugs commonly used among students of tertiary institutions in Idah Local Government Area, Kogi State, Nigeria. Two hundred and fifty-four students were selected from the Federal Polytechnic, Idah and College of Health Sciences and Technology, Idah, as respondents using a well-structured questionnaire. A total of 246 copies of the questionnaire were retrieved, representing a 96.85% retrieval rate. Data were analysed using descriptive statistics involving frequencies and percentages, while Analysis of Variance (ANOVA) was used to test the hypothesis at 0.05 level of significance. The study found that 91.9% of the respondents had heard of illicit drug use among students. Marijuana (80.5%) was the most commonly misused drug, followed by tramadol (75.2%) and codeine-based cough syrup (66.7%), while methamphetamine (39.4%), cocaine (30.1%), ecstasy (27.6%) and heroin (24.0%) were also reported. The study further revealed a statistically significant difference in the types of illicit drugs misused among students ($p = 0.000$), leading to the rejection of the null hypothesis. The study concludes that illicit drug use remains a significant concern among students of tertiary institutions in Idah LGA, with marijuana, tramadol and codeine-based cough syrup constituting the major substances of concern. The study recommends, among others, that tertiary institutions should strengthen health education and drug-abuse prevention programmes, provide effective counselling and support services for students, and collaborate with relevant government agencies to control access to illicit and commonly misused pharmaceutical drugs.

INTRODUCTION

It is a truism that drug correctly prescribed and administered is a blessing to mankind while illicit drug use remains a critical public health challenge, leading to significant health, social, and economic consequences. Illicit drug use among students in tertiary institutions remains a significant public health and social concern, especially in developing countries like Nigeria. Tertiary institution students, often young adults navigating freedom, peer pressure, and academic stress, are vulnerable in experimenting with or becoming addicted to illicit use such as cannabis, codeine, tramadol, cocaine, and methamphetamine. The National Drug Law Enforcement Agency (NDLEA) in Nigeria reported a surge in drug abuse among young adults between 2020 and 2024, with a significant portion traced to students in higher institutions (NDLEA, 2023).

Health education programmes have been globally

recognized as a fundamental preventive tool against substance abuse. These programmes encompass awareness campaigns, peer education, counseling services, and curriculum-based interventions that aim to improve knowledge, attitudes, and behaviors related to drug use. According to Omole and Ajayi (2021), structured health education significantly reduces susceptibility to peer pressure and helps students develop life skills that foster drug-resistant behaviors. Similarly, Chukwu et al. (2022) found that continuous school-based education and sensitization campaigns led to a 17% reduction in drug experimentation among undergraduates in Nigerian universities.

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Health education programmes have emerged as pivotal tools in preventing the initiation and escalation of illicit drug misuse.

These programmes aim to inform individuals about the risks associated with drug use, enhance decision-making skills, and foster environments that support healthy behaviours. National Institute on Drug Abuse (NIDA, 2022). Illicit drug use is a significant public health issue with widespread social, economic, and health consequences. One of the most effective strategies for addressing this problem is the implementation of health education programmes. These programmes aim to increase awareness, change attitudes, and promote healthy behaviors that prevent illicit drug use before it starts.

Statement of the Problem

Illicit drug use among students of tertiary institutions in Nigeria has become a major public health and educational challenge. The past decade has witnessed a noticeable increase in the use of psychoactive substances such as cannabis, tramadol, codeine syrup, cocaine, and other non-prescribed medications among students. Recent national and institutional studies (Olanrewaju & Yusuf, 2022; Ugwu, 2024) have shown that substance use among undergraduates in Nigeria is rising, with many students initiating drug use before or during their tertiary education. This situation poses serious threats to students' physical and mental health, academic performance, and moral development, while also undermining the nation's educational objectives.

Empirical evidence indicates that substance use among students contributes to a wide range of negative consequences, including impaired cognitive function, poor academic performance, absenteeism, violence, risky sexual behavior, and psychiatric disorders such as anxiety and depression (Akinpelu et al., 2024; Ogbodu, 2024). These outcomes not only hinder students' personal development but also lead to increased dropout rates and decreased productivity. The National Drug Law Enforcement Agency (NDLEA, 2023) has also reported an alarming increase in drug-related arrests among young people aged 15–29 years the typical age bracket for tertiary students signaling an urgent need for effective preventive interventions.

Health education programmes have long been promoted as a vital strategy for preventing illicit drug use among youths. They aim to increase students' knowledge of drug-related harms, shape positive attitudes, and strengthen decision-making skills that enable young people to resist peer pressure (Onuorah, 2024; Egga et al., 2024). However, recent research shows that while many health education programmes enhance knowledge and attitudes, their

actual influence on behavior change remains inconsistent and often limited (Vigna-Taglianti et al., 2021). Several school- and campus-based interventions in Nigeria have been found to be poorly implemented, inadequately evaluated, or not tailored to the local socio-cultural context (Akpan, 2024).

RESEARCH QUESTIONS

This study was guided by the research question below:

- i. What are the illicit drugs commonly used among students of tertiary institutions in Idah LGA, Kogi State?

AIM AND OBJECTIVE OF THE STUDY

The objective of the study is to:

- i. Identify the illicit drugs commonly used by students of tertiary institutions in Idah L.G.A, Kogi State, Nigeria.

Research Hypothesis

The following null (H_0) hypothesis and alternative (H_1) tested at 0.05 level of significance guided this research:

H_0 : There is no significant difference in the types of illicit drugs use among students of tertiary institutions in Idah LGA, Kogi State.

H_1 : There is a significant difference in the types of illicit drugs misused among students of tertiary institutions in Idah, Kogi State.

LITERATURE REVIEW

Conceptual Review

Health Education

Health education can be defined as the principle by which individuals and groups of people learn to behave in a manner conducive to the promotion, maintenance, or restoration of health.

According to the UNESCO (2026) health education programmes is a life-long educational processes aimed at preparing learners for healthier and sustainable futures. UNESCO (2026) also defined health education programmes as educational pathways that strengthen learners' competencies for healthy citizenship and sustainable development. Open Access Pub (2026) described health education programmes as structured learning initiatives that equip individuals with the knowledge, attitudes, and practical skills required to make informed health decisions, adopt healthy lifestyles, and prevent disease.

Gonzalez-Edo et al. (2025) described Health education as a planned and systematic teaching–learning process aimed at improving health and well-being, typically designed

around life-course needs (e.g., early childhood settings). Aflatoonian et al. (2022) viewed Health education within primary care, is a core, organized activity intended to influence clients' behaviors through formal and informal educational efforts delivered in health settings.

According to Aghaei et al. (2025), Health education is a process that includes planned educational and communication opportunities designed to enhance health-related knowledge and life skills for individuals and communities. Ramos-Pla and Fornons-Casol (2025), health education is a planned, systematic teaching -learning process aimed at improving the health of individuals and communities by helping people acquire, choose, and keep healthy practices and modify unhealthy ones. Health education is a process that equips people with knowledge and skills so they can take greater control of their health and its determinants and act to improve it (Levine & Stillman-Lowe, 2024). Levine and Stillman-Lowe (2024) defined health education programmes as organized educational interventions that provide individuals and communities with the knowledge, skills, and motivation needed to gain greater control over their health and improve health outcomes through informed behavioural change.

Health education is a standards-based instruction that builds health literacy -knowledge, attitudes, and skills - so students can make informed, health-enhancing decisions throughout life (Kolbe, 2024). Olaoye et al. (2024) viewed health education programmes as planned educational activities implemented to improve health knowledge, encourage preventive practices, and promote positive behavioural changes among specific populations.

From the above definitions, health education is defined as principles and methodologies in the maintenance and restoration of normal health in the face of physical, social, emotional, and psychological barriers that may impaired health. Health education encourages positive attitudes toward healthy choices and changes.

ILLICIT DRUG USAGE

According to the United Nations Office on Drugs and Crime (UNODC, 2026), Illicit drug use refers to the use of substances that are prohibited under international drug control conventions or the non-medical use of controlled medicines in ways that pose significant health, social, economic, and legal risks to individuals and society. Australian Institute of Health and Welfare (2026), defined illicit drug use includes the use of illegal drugs, the non-medical use of pharmaceutical drugs, and the illicit use of other psychoactive substances such as inhalants, all of which may result in harmful physical, psychological, and social consequences. The European Union Drugs Agency

(2026) describes high-risk illicit drug use as recurrent use of illicit psychoactive substances that causes actual health, psychological, or social harm, or places an individual at a high risk of experiencing such harms.

Illicit drug use is the consumption, possession, or use of psychoactive substances that are prohibited by law or are used without legal authorization, resulting in significant health, psychological, and social consequences for individuals and communities (Oladapo & Oladapo, 2025). Illicit drug use refers to the non-medical use of controlled substances such as cannabis, cocaine, heroin, methamphetamine, and other prohibited drugs for recreational or other unauthorized purposes, contrary to national drug control laws (Nelson & Klantschnig, 2025). Illicit drug use is the unlawful consumption of psychoactive substances that are not legally prescribed or permitted, often associated with increased risks of addiction, mental disorders, poor academic performance, criminal behaviour, and adverse public health outcomes (Emmanuel & Akinsolu, 2024).

According to Ananyamanda (2024), illicit drug use is the use of certain chemical substances for the purpose of creating pleasurable effects on the brain. To her, substance abuse are usually psychoactive drugs that are used by people for various different reasons which may include; curiosity and peer pressure among school children and youth adults, the use of prescription drugs that were originally intended to target pain relief may have turned into recreational use and become addictive, chemicals which may be used as part of religious practices and drugs used as a means of obtaining creative inspiration. In the same vein, Ahmed and Harshi (2024) defined illicit drug use as the continuous, excessive, or maladaptive use of legal and illegal drugs, notwithstanding with the adverse physical, psychological, or social consequences of such use. To them, the causes of illicit drug use include accessibility, social factors, environmental factors, mental health conditions, genetic predisposition, lack of social support, and curiosity or experimentation. They further opined that the most commonly misused drugs are benzodiazepines, alcohol, marijuana, cocaine, heroin, methamphetamine, tobacco, codeine, inhalants, prescription opioids, and synthetic cannabinoids. Therefore, can be seen as Illicit drug use is the use of substances that are illegal or the misuse of prescription or over-the-counter drugs for purposes other than those intended.

Commonly Used Illicit Drugs Among Students of Tertiary Institutions in Nigeria

Drugs that are commonly misuse includes stimulants, narcotics, phencyclidine, cannabis sativa (Marijuana or

Indian hemp), cocaine, heroin, morphine, opium, tobacco, alcohol among others (Ajibola and Oluwatusin, 2024). Infact Adepuju and Osunwoye 2022 emphasized that the following drugs such as cannabis (Marijuana), cocaine, morpheme, amphetamines, Vicodin, inhalants, pemoline, sedatives, hallucinogen, crystal methamphetamine, Xanax and oxytotinare commonly misuse by youths in Nigeria.

The five most commonly drugs misuse in college include; alcohol, marijuana, opioids, stimulants, and sedatives (American Addictive Centers, 2019). The most commonly abused drugs can cause a wide array of dangers that range from addiction to death. These drugs can be highly addictive because they affect the brain's reward system. Dopamine is released in large quantities when someone uses drugs, especially those with psychedelic effects. Dopamine is a neurotransmitter involved with pleasure, motivation, and rewarding behavior reinforcement. Regular drug use can change the brain's reward system, creating a cycle of behaviour focused on obtaining rewards (Ahmed and Harshi, 2024). According to Ahmed and Harshi, the most commonly drug used include; Benzodiazepines, alcohol, marijuana, cocaine, heroin, methamphetamine, tobacco, inhalants, opioids, synthetic cannabinoids.

The problem of illicit drug use among students of tertiary institutions in Nigeria has become a critical public health and educational issue. Illicit drugs are substances that are prohibited by law, or when used without medical supervision, cause harm to users' physical, mental, and social wellbeing. Among students, drug experimentation often begins as a result of curiosity, peer pressure, stress, or the desire to enhance academic performance and social confidence (Akinpelu et al., 2024; Olanrewaju & Yusuf, 2022). However, this experimentation frequently escalates into habitual use, dependence, and addiction, which in turn leads to several health and behavioral problems. Below are some of the explanations of the most commonly drugs misuse among students of tertiary institutions in Nigeria;

1. Cannabis: Cannabis, locally known as Igbo, Weed, or Ganja, is the most widely used illicit drug among Nigerian youths and students. According to the National Drug Law Enforcement Agency (NDLEA, 2023), cannabis remains the most commonly seized drug, accounting for over 70% of all drug-related arrests in the country. Many students believe cannabis enhances creativity, improves concentration, and reduces stress, particularly during examinations (Egga et al., 2024). However, long-term use is associated with impaired cognitive performance, hallucinations, and mental disorders such as psychosis and schizophrenia (Adebayo et al., 2022). Cannabis popularly known as marijuana or weed among other names, is a non-chemically uniform drug from the cannabis plant. Native

to Central or South Asia, the cannabis plant has been used as a drug for both recreational and entheogenic purposes and in various traditional medicines for centuries. Tetrahydrocannabinol (THC) is the main psychoactive component of cannabis, which is one of the 483 known compounds in the plant, including at least 65 other cannabinoids, such as cannabidiol (CBD).

Cannabis can be used for smoking, vaporizing, within food, or as an extract. Cannabis is illegal in Nigeria, yet the country is a major source of West African-grown cannabis, and ranked the world's third highest consumer of cannabis. Cannabis is widely grown across the States of Nigeria, including Lagos State, Edo State, Delta State, Osun State, Oyo State and Ogun State (National Drug Law Enforcement Agency, 2021). In Nigeria cannabis is known by various names including "pot", "igbo", "wee wee", "marijuana", "ganja" and "Morocco". The active ingredient in all of these is tetrahydrocannabinol (THC). The mode of consumption in Nigeria is by smoking the prepared leaves and flowering seeds. There has been no reported use of other preparations. There are no known medical uses of the drug in Nigeria. The effects, which appear to depend on the potency of the preparation and the amount consumed, are both physiological and behavioural. Although some authors have associated smoking of cannabis with the genesis of mental illness, we shall not enter into the controversy over the degree of harmfulness, since relevant data on this issue are scanty in Nigeria.

Cannabis affects almost every body system, via cannabinoid receptors in the brain, which regulate a range of cognitive and motor functions (NIDA, 2005b). Within minutes of smoking cannabis, the heart rate increases and the bronchial passages relax. Often the individual experiences intoxication, mild euphoria and increased sociability. However, anxiety or paranoia may sometimes occur, particularly among first-time or psychologically vulnerable users (Johns, 2021). Distorted perceptions are common, for example colours may appear more intense and time may seem to slow down. The euphoria reaches a plateau lasting 2 hours or more, depending on the dose, after which the individual may feel sleepy or depressed.

Cannabis use also impairs memory, attention and motor coordination, with especially dangerous consequences on driving performance. Such effects may last for many hours after administration of the drug; the numerous metabolites of a single moderate dose of cannabis may require up to 4 weeks to be completely eliminated from the body (Maykut, 1985). The smoke from cannabis contains the same constituents as tobacco smoke; hence chronic cannabis smoking is associated with a range of respiratory tract disorders, including bronchitis,

emphysema and cancers (Hashibe et al., 2005; Tashkin, 1990). A study by Cambridge University Press (2018) shows that cannabis affects almost every body system. It combines many of the properties of alcohol, tranquillizers, opiates and hallucinogens; it is anxiolytic, sedative, analgesic, psychedelic; it stimulates appetite and has many systemic effects. The study identified the following effects of cannabis; pain, nausea, reduced appetite, insomnia, paranoia, increases schizophrenia etcetera. About 147 million people, 2.5% of the world population, consume cannabis (annual prevalence) compared with 0.2% consuming cocaine and 0.2% consuming opiates. In the present decade, cannabis abuse has grown more rapidly than cocaine and opiate abuse (WHO, 2018). Cannabis remains by far the most commonly consumed illicit drug in Europe. National surveys of cannabis use would suggest that overall, around 8 % of European adults (22.6 million aged 15 to 64) are estimated to have used cannabis in the last year (European Drug Report, 2023). Cannabis is illegal in Nigeria, yet the country is a major source of West African-grown cannabis, and ranked the world's third highest consumer of cannabis. Cannabis is widely grown across the States of Nigeria, including Lagos State, Edo State, Delta State, Osun State, Oyo State and Ogun State (NDLEA Report, 2021).

Cannabis is the most commonly used drug in Nigeria with 10.8 per cent (or 10.6 million people) of the adult population reporting use in the past year. Nigeria is among the main countries globally that reported high quantities of cannabis herb seized in 2018. The extent of cannabis use in Nigeria is comparable to the 2018 UNODC prevalence estimates of cannabis use in West and Central Africa (13.2 Per cent). Cannabis use is reported 7 times higher among men than women with past year prevalence estimated at 18.8 per cent among men as compared to 2.6 per cent among women. The current mean age of men using cannabis was 34 years while women cannabis users were slightly younger with a mean age of 31 years. The average age of initiation of cannabis use was 19 years regardless of gender.

2. Crack: Crack is a smokable form of cocaine that is made by processing powder cocaine with ammonia or sodium bicarbonate (baking soda) and water to form small rock crystals that crackle when heated and the vapors smoked. Smoking and inhaling the vapor or smoke into the lungs produces a faster and more intense high than snorting powder cocaine because the drug is more quickly absorbed into the bloodstream. Crack cocaine is a drug derived from the mixture of cocaine crystals or powder with water and sodium bicarbonate (NaHCO_3) (Fernandes et al., 2021). When smoked, crack cocaine produces small particles that are rapidly absorbed by the lungs, reaching a peak level

shortly after use. Crack cocaine is a potent form of cocaine that leads to quick and impressive stimulant effects when smoked, and it became popular in the late 1980s.

The almost instant effects of smoking crack cocaine last for only 5 to 10 minutes before wearing off. Powder cocaine has a slower onset, and the less intense effects may last twice as long. This can lead individuals into a cycle of binge use to maintain the high (Stancy and Ryan, 2024). According to Ryan, (2024), Crack or any cocaine use can result in numerous immediate effects, which can vary from person to person.⁷ These effects can depend on how fast the drug is absorbed, how much was used, other substances in the system, and 20 individual physical and mental health differences but may include; Constricted blood vessels, dilated pupils, increased body temperature, heart rate, and blood pressure, bizarre, erratic, and violent behaviour, tremors, vertigo, muscle twitches, headache, increased energy, abdominal pain, nausea, restlessness, irritability, and anxiousness, psychosis, seizures, heart rhythm problems, stroke, coma, loss of appetite, erratic, anxiety and paranoia, hyper stimulation, depression, hallucinations, hyper excitability, and irritability, intense euphoria and intense drug craving.

An estimated 12% of American adults have used powder cocaine and 4% have used crack cocaine (Chris Carberg, 2021). Already in early 2000s, concerns have been growing in the EU about increasing use of cocaine and it is estimated that below 1 % of the population administer the drug by smoking crack cocaine. New available data suggests an increase in the use of crack cocaine and an increase in the number of crack cocaine users entering treatment has been reported in several European countries. Robust estimations of crack cocaine use are however not available yet. The use of crack cocaine has long been associated with severe adverse socio-economic conditions as well as mental health problems, such as suicide ideation and depression (Steenbeek, et al, 2022).

3. Tramadol: Tramadol, though a prescription analgesic, is widely abused among students for its perceived euphoric and energy-boosting effects. It is often used to stay awake for long hours, improve sexual performance, or relieve emotional distress (Ugwu et al., 2024). Studies have shown that tramadol misuse among tertiary students in Nigeria has increased significantly due to easy access through unregulated pharmacies and street vendors (Oluwatosin & Hassan, 2023). Excessive use of tramadol can cause severe dependence, respiratory depression, convulsions, and in some cases, death.

Tramadol is one of the most commonly prescribed central nervous system (CNS) analgesics used globally. It is widely prescribed for the treatment of moderate to severe pain.

It is one of the most widely prescribed opioids in many countries. Because of an increased incidence of tramadol-related overdoses and deaths in the last decade, it has been classified as a controlled substance in several countries. It was thought that tramadol had a lower risk for overdose, constipation, and addiction than other opioids, but some studies propose that phenotypic differences can contribute to its analgesic and side effect profile (Samaneh, Christopher and Omid, 2023).

The International Narcotics Control Board review of 2013 revealed that tramadol abuse was problematic for several countries (32 out of 77 countries responding). However, recent studies have increasingly reported tramadol as a drug of misuse with intentional overdoses or intoxications. While much is known about tramadol's efficacy for pain, there is increasing evidence from post-marketing surveillance indicating significant side effects. In 2004, the Australian Adverse Drug Reactions Advisory Committee received several adverse events due solely to tramadol use. These reactions suggest that the decision to prescribe tramadol should be carefully considered. Tramadol is responsible for severe intoxications leading to consciousness disorder (30%), seizures (15%), agitation (10%), and respiratory depression (5%). Easy availability of prescription opioids in some countries may be contributing to increased drug-related health problems, hospitalizations, and mortality. This review focuses on a variety of aspects of tramadol intoxication in humans and its effects on different systems.

Tramadol is mainly used in the treatment of muscle pain, joint pain and wound pain. Its use is not recommended for children below 16 years. Patients with medical history of drug addiction, alcoholism, seizure, epilepsy, head injury and metabolic disorders have more possibility of seizures when treated with tramadol. Its use is not practiced in patients with kidney disease, liver disease, stomach disorder, mental illness, depression and suicidal ideation as it can worsen the patient's condition. Its usage is restricted in pregnant women as well as breast feeding mothers as it may cause birth defects and harm the foetus and to the nursing (Muna, S et al, 2019).

According to them, Tramadol has the following effects; fast heart, gaseous abdominal pain, loss of memory, recurrent fever, difficult urination, convulsions, chest pain, darkened urine, increased blood pressure, blurred vision blisters under the skin, change in walking and balancing, among others. Tramadol poisoning can affect multiple organ systems: gastrointestinal, central nervous system (seizure, CNS depression, low-grade coma, anxiety, and over time anoxic brain damage), cardiovascular system (palpitation, mild hypertension to life-threatening complications

such as cardiopulmonary arrest), respiratory system, renal system (renal failure with higher doses of tramadol intoxication), musculoskeletal system (intoxication than with other opioids. Fatal tramadol intoxications are uncommon, except in ingestion cases concurrent with other medications, particularly CNS depressants, most commonly benzodiazepines, and ethanol. Abdomyolysis), endocrine system (hypoglycemia), as well as, cause serotonin syndrome. Seizure, a serious nervous disturbance, is more common in tramadol (Samaneh, Christopher and Omid, 2023).

Tramadol oral table is a prescription drug that is available as the brand- name drugs ultra (immediate -release tablet) and Ultram ER (extended-release tablet). Tramadol is a controlled substance in some countries. T means it can only be used with doctor's close supervision. Tramadol is not a controlled prescribed drug in Nigeria. Tramadol is a narcotic-like pain reliever used in treating mild to severe pain. Tramadol can stop or slow breathing and can also cause seizures. Tramadol is also used as a treatment for premature ejaculation during copulation or sexual intercourse but may have other negative effects like erectile dysfunction.

In conclusion, with the increasing popularity of tramadol, physicians must be aware of its adverse effects, substantial abuse potential, and drug interactions, to weigh its risk-benefit ratio for pain management. Alternative therapies might be considered in patients with a previous overdose history to reduce risks for adverse outcomes.

4. Codeine: Codeine is an opioid pain reliever which is used to treat mild to moderately severe pain and to help reduce coughing. Codeine-based cough syrups are another commonly abused substance among tertiary students. They are often mixed with soft drinks or alcohol to produce a "high." Despite government restrictions, students continue to access codeine through illegal markets (Akpan, 2024).

Cocaine and Crack Cocaine although less common than cannabis and tramadol, the use of cocaine and its derivative, crack, has been reported among some elite students in private universities and urban tertiary institutions. Cocaine is a strong stimulant that produces a feeling of energy, euphoria, and alertness (Boun et al., 2024). However, dependence develops rapidly, and chronic use may cause heart attacks, paranoia, anxiety disorders, and social decline (NDLEA, 2023). Codeine misuse is associated with drowsiness, impaired coordination, mood swings, and in the long term, liver and kidney damage. Repeated use can lead to addiction and severe withdrawal symptoms. Codeine is available as a single ingredient tablet and also available in multi-ingredients products combined with other pain-relieving medicines or cold and flu medicines

(Melissa Puckey, 2023). Codeine (3- methyl morphine) is an alkaloid prepared from the methylation of morphine derived from poppy seeds (*Papaver somniferum*). It is used to manage mild to moderate pain, including chronic cancer pain, and has antitussive, anti-stress, and anti-diarrheal properties. In the body, a small amount of codeine is metabolized to form morphine (its active metabolite). Until now, the precise mechanism of action of codeine is not known; however, similar to morphine, codeine can bind to opioid receptors in the brain and induce signaling processes throughout the brain and in the rest of the body. Codeine also has a sedative effect which helps reduce the pain sensation. The drug has also been used in combination with acetaminophen or aspirin for more effective (Rimadani,P et al (2021).

Melissa Puckey (2023), Identified the following side effects of codeine; noisy breathing, sighing, shallow breathing, breathing that stops during sleep; a slow heart rate or weak pulse; a light-headed feeling, like you might pass out; confusion, agitation, hallucinations, unusual thoughts or behaviour; feelings of extreme happiness or sadness; seizure (convulsions);problems with urination; or low cortisol levels--nausea, vomiting, loss of appetite, dizziness, worsening tiredness or weakness, itching, dry mouth, vomiting, euphoria etcetera.

Some over-the-counter (OTC) and prescription cough and cold medicines contains active ingredients that are psychoactive (mind- altering) at higher-than-recommended dosages and are frequently misused for this purpose. Any quick visit to the pharmacy will confirm that the craze for cough syrups is high. This is not because there is a cough outbreak, but the stimulating effect of codeine in these cough syrups. Codeine -which is derived from the opium Poppy and also related to morphine and heroin being misused by most tertiary institutions students at alarming rate in Nigeria?

5. Skunk (SK): This refers as the elder brother of Indian hemp. This is because it is much stronger than hemp and is a bit more expensive though it is easy to get because it is sold by the same peddlers. Skunk is made from unpalliated cannabis plants which naturally contain higher levels of THC - the substance that gives recreational users the 'stoned' feelings they seek from the drug, but can also cause nasty side effects, including paranoia and hallucinations (Michelle, 2018). Most of the cannabis sold illegally in the UK is super-strength skunk that is linked to a higher risk of psychotic mental health episodes, says a new report. Skunk has high potency cannabis. Any cannabis with high levels of THC can lead to people developing psychiatric issues (Amir, 2018).

Skunk is a mixture of weed and some element of cocaine

and dried leaves and is sold for 100 a pinch on the street years back. SK is a drug for the strong, and more youths, including ladies who want to demonstrate their ruggedness as it were. According to Jonathan (2022), Skunk has the following physical and psychological effects on abusers; Increased heart rate by 20–50 beats per minute, slowed breathing, bloodshot eyes, fainting, falling, orthostatic hypotension (dizziness when standing up quickly), heightened senses, drowsiness, slowed reaction, imbalance and poor coordination, increased appetite, euphoria, relaxation, mood swings, altered sense of time, hallucinations, paranoia, anxiety, panic attacks, psychosis, impaired judgment and memory and learning problems

6. Aphrodisiac: This is popularly known as manpower. An aphrodisiac is any substance or food that increases sexual desire, arousal, behavior, performance, or pleasure. Aphrodisiac is a food or drug that increases both sexual desire and performance (da Silva et al., 2012). Throughout all ages, the continuous search for means to increase, preserve, and recapture sexual capacity or stimulate sexual desire has been described elsewhere, from holy texts to contemporary literature (Zanolari, 2003). There are a number of reasons why people may want to take an aphrodisiac to improve their sex lives. Such reasons may include low libido or to improve sexual performance, but sometimes people may want to simply try to enjoy sex more (Kendra, 2022).

Aphrodisiac can be found on the streets or qurantanshi by people from the Northern part of the country, or aleko in the South West is also prominent among students of tertiary institutions as well as sexually active men to boost their sexual performance while the uneducated are most associated with local gin mixed with herbs for solutions such as Afa-too,sepe, paraga, opaeyiecetera, the educated ones and students are big on drinks like Alomo Bitters and the other ever increasing list of bitter solutions. Kendra Cherry (2022), identified the following side effects of aphrodisiacs; anxiety, blurred vision, overstimulation, hallucinations, paralysis, suicidal tendencies, tremors, weakness, upset stomach, mental disorders, facial flushing etcetera.

7. Rohypnol (Roofies): Rohypnol (flunitrazepam) is a potent drug that can have serious short and long-term effects when abused. People who abuse or become addicted to Rohypnol may require treatment (Isaac, 2019). Rohypnol (flunitrazepam) is a powerful sedative that belongs to the benzodiazepine drug class. Unlike many similar sedatives, Rohypnol is illegal for medical or recreational use in the United States. According to the National Institute on Drug Abuse, most long-term effects of roofies are unknown. Although it is sometimes used as a drug of abuse in the

United States, this lack of information is likely due to it no longer being prescribed for medical purposes. Rohypnol is a central nervous system (CNS) depressant, meaning it slows down activity in the brain. This can result in effects of relaxation, drowsiness, reduced blood pressure, and more. In countries other than the United States, Rohypnol is typically prescribed as a sleeping pill. Rohypnol is considered a short-acting drug, meaning its effects can set in quickly. After taking Rohypnol, effects are likely to be felt within 15 to 20 minutes, and may last for up to 12 hours.

Rohypnol is estimated to be ten times more potent than Valium, producing more powerful effects in small doses. Also known as a "roofie," Rohypnol has a history of being used to commit sexual assault. People may also mix Rohypnol with other drugs such as marijuana and ecstasy to create a more intense high. It is used for the short-term treatment of insomnia, as a pre-medication in surgical procedures and for inducing anesthesia. Rohypnol (Rohypnol) is another common misused drug among students of tertiary institutions and youths in Nigeria. Rohypnol is also called Ref, Roche, Roffies, forget-me pill, Mexican Valium, R2, Roofinol, Rope and Rope' on the street.

Rohypnol is a rape drug and also associated with criminally include young men. Isaac (2019) Identified the following effects of Rohypnol; dizziness, drowsiness, sleeping and amnesia, nightmares, headaches, confusion, and tremors, muscle relaxation, blackouts, aggressive behaviour, decreased blood pressure, blurred vision, poor coordination among others.

8. Methamphetamine ("Mkpuru Mmiri"):

Methamphetamine use has risen sharply among young Nigerians since 2021, particularly in southeastern and central parts of the country (Onuorah, 2024). Popularly known as Mkpuru Mmiri, methamphetamine is a synthetic stimulant that increases energy and alertness but also causes aggressive behavior, insomnia, and hallucinations.

Methamphetamine is an illicit psychoactive substance that increases the release of dopamine in the brain, producing intense feelings of euphoria, alertness, and energy. Methamphetamine can be taken into the body through smoking, injecting, snorting, and swallowing. Methamphetamine possesses the following effects; increased energy and confidence, reduced appetite, rapid heartbeat, high blood pressure, addiction and dependence, mental disorders (anxiety, paranoia, psychosis), brain damage and memory loss, severe dental problems ("meth mouth"), increased risk of heart failure and stroke. Among students, its use is often linked to the desire to remain awake during

examinations or to enhance mood in social gatherings. Continuous use, however, leads to rapid addiction and severe neurological damage (Nwosu et al., 2023).

9. Alcohol and Tobacco: Although alcohol and tobacco are legal substances, their misuse is a major contributor to illicit behavior and serves as a gateway to the use of stronger drugs (Akinpelu et al., 2024). Students frequently consume alcohol excessively during parties, social events, or to cope with academic and emotional stress. Cigarette smoking is also prevalent and is often associated with group identity and peer influence. Both substances significantly increase the risk of mental health problems and contribute to poor academic performance.

10. Inhalants and Solvents: Some students, particularly those from low-income backgrounds, resort to the abuse of inhalants such as glue, petrol, paint thinners, or correction fluids (Tippex). These substances are cheap and easy to access, making them attractive to young users (Egga et al., 2024). Inhalant abuse causes dizziness, hallucinations, brain damage, and, in severe cases, sudden death due to heart failure or suffocation.

RESEARCH DESIGN

The design adopted for this study is the descriptive survey research design. Survey method according to Osuala (2005) studies both large and small chosen groups from the population to discover relative incidence, distribution and inter-relative variables. Survey research draws and studies a sample from a population or universe.

Sample Size

The sample size was 254 using Krejcie and Morgan (1970) Table for determining sample size for finite population. The sample size was drawn from 7,767 students across the Federal Polytechnic and College of Health, Sciences and Technology, Idah, Kogi State.

I n s t r u m e n t

Data for the study were collected using a well-structured questionnaire; this was modified and employed as the primary data collection instrument.

Data Analysis

Descriptive statistical tools were used to analyse the data. Descriptive statistics were presented in frequency tables, and percentages. The simple statistical tool was chosen to ensure better understanding of the data collected and also to enable quick and statistical inference drawn from the data. This makes the analysis of data easy to understand. The Statistical Package for Social Sciences (SPSS) version twenty was used for the analysis of copies of the questionnaire.

Presentation of Results

This section covers the presentation, analysis, interpretation of data and discussion of findings. The results were based on the 246 copies of the questionnaire retrieved from the 254 copies administered to the respondents, representing 96.85% retrieval rate. The remaining 3.15% copies could not be retrieved.

The chapter is organized into five sections. First is this introduction. The next section is the socio-demographic characteristics of the respondents. This is followed by an analysis of data on the research objectives. The third section presents the test of hypotheses formulated to guide the study. The final section discusses the research findings.

Table1: *Percentage Distribution of Socio-demographic Characteristics of Respondents*

Variable	Category	Frequency (N=246)	Percentage (%)
Sex	Male	142	57.7
	Female	104	42.3
Age in years	Less than 18	15	6.1
	18–25	134	54.5
	26–33	59	24.0
	34–41	22	8.9
	42–49	9	3.7
	50 and above	7	2.8
Institution/School	School of Engineering	56	22.8
	School of Technology	40	16.3
	School of Business Studies	52	21.1
	School of General Studies	42	17.1
	School of Environmental Studies	56	22.8
Department	Community Health	45	18.3
	Environmental Health	50	20.3
	Pharmacy Technician	47	19.1
	Health Information/Medical Records	54	22.0
	Medical Laboratory Technician	50	20.3
Level of study	ND1	58	23.6
	ND2	62	25.2
	HND1	65	26.4
	HND2	61	24.8
Residence	Campus	104	42.3
	Off-campus	142	57.7

Source: *Field Survey, 2025.*

Table1 showed the socio-demographic characteristics of respondents.

The socio-demographic characteristics of the respondents in the study are revealed below. The data provides insights into the composition of the sample, which can help in understanding the context of illicit drugs commonly used among students of tertiary institutions. The data was derived from a field survey, involving a sample size of 246 students, representing a retrieval rate of 96.85% from the 254 questionnaires administered.

On the sex distribution of respondents, there was a slight male dominance, with 142 respondents (57.7%) being male, while 104 respondents (42.3%) were female. This

indicates that both sexes were well represented, though the male respondents had a marginally higher participation rate.

The age distribution revealed that the majority of respondents (134; 54.5%) fell within the age range of 18–25 years, followed by those aged 26–33 years (59; 24.0%). Respondents aged less than 18 years accounted for 15 (6.1%), while those aged 34–41 years were 22 (8.9%). The age group of 42–49 years comprised 9 respondents (3.7%), and those aged 50 years and above were the least represented with 7 respondents (2.8%). This pattern

shows that the study population was largely youthful, which is consistent with the age profile expected in tertiary institutions.

The distribution by institution and school showed that respondents from the Federal Polytechnic, Idah, were spread across all schools, with the School of Engineering and School of Environmental Studies each accounting for 56 respondents (22.8%). The School of Business Studies had 52 respondents (21.1%), the School of General Studies had 42 respondents (17.1%), and the School of Technology recorded 40 respondents (16.3%). For the College of Health Sciences and Technology, Idah, respondents were drawn from Community Health (45; 18.3%), Environmental Health (50; 20.3%), Pharmacy Technician (47; 19.1%), Health Information/Medical Records (54; 22.0%), and Medical Laboratory Technician (50; 20.3%). This indicates that the study captured a diverse spread of students across the academic programmes of both institutions.

The level of study distribution showed a relatively balanced representation, with HND1 having the highest number of respondents (65; 26.4%), followed by ND2 (62; 25.2%), HND2 (61; 24.8%), and ND1 (58; 23.6%). This

balance across levels helps ensure that the data reflects the experiences of students at different stages of their academic journey.

In terms of residence, the majority of respondents (142; 57.7%) lived off-campus, while 104 respondents (42.3%) resided on campus. This variation in residence could have implications for students' exposure to and participation in health education programmes, as well as their accessibility to campus-based facilities.

Table2 presents the responses to questions aimed at identifying the illicit drugs commonly used by students in tertiary institutions in Idah LGA, Kogi State. An overwhelming majority of respondents (226; 91.9%) reported having heard of illicit drug use among students in their institution, indicating high awareness of the problem.

Marijuana (198; 80.5%) emerged as the most commonly misused substance, followed by tramadol (185; 75.2%) and codeine-based cough syrup (164; 66.7%). Other drugs such as methamphetamine (97; 39.4%), cocaine (74; 30.1%), ecstasy (68; 27.6%), and heroin (59; 24.0%) were less prevalent but still notable in the student population.

Table2: Percentage Distribution of Responses on Illicit Drug Use among Students in Tertiary Institutions in Idah LGA

Variable	Category	Frequency (N=246)	Percentage (%)
Heard of illicit drug use	Yes	226	91.9
	No	20	8.1
Commonly misused drugs	Marijuana	198	80.5
	Cocaine	74	30.1
	Heroin	59	24.0
	Tramadol	185	75.2
	Codeine-based cough syrup	164	66.7
	Methamphetamine	97	39.4
	Ecstasy	68	27.6

Table3: ANOVA Analysis Result Showing Difference in the Types of Illicit Drugs Use Among Students of Tertiary Institutions

		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	397.38	6	66.23	66.23	0.000
	Within Groups	2675.22	693	3.86		
	Total	3072.60	699			

Source: Field Survey, 2025.

Decision-Making and Conclusion

The p-value (Sig.) is 0.000, which is less than the conventional alpha level of 0.05. This means there is a statistically significant difference in the types of illicit drugs misused among students of tertiary institutions in Idah, Kogi State. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted.

This confirms that students significantly differ in their misuse of various illicit drugs.

Post-hoc Interpretation (Tukey HSD)

The post-hoc comparison revealed that marijuana and tramadol misuse were significantly higher compared to cocaine, heroin, and ecstasy. Codeine misuse was

also significantly higher than heroin and cocaine. Methamphetamine misuse fell in the mid-range, being significantly higher than heroin but lower than marijuana and tramadol. This pattern suggests that while multiple drugs are being misused, marijuana and tramadol are the most prevalent, highlighting priority areas for targeted intervention.

DISCUSSION OF FINDINGS

The objective of the study aimed at identifying the most commonly misused illicit drugs among students in Idah. The study revealed that marijuana (80.5%), tramadol (75.2%), and codeine-based cough syrup (66.7%) were the most prevalent, followed by other substances such as methamphetamine, cocaine, and heroin. This finding aligns with Ajayi and Somefun (2020), who reported that cannabis, tramadol, and codeine were among the most misused substances by Nigerian university students. Similarly, a scoping review by Ekpenyong et al. (2022) on drug abuse in Nigeria confirmed that cannabis, pharmaceutical opioids, and cough syrups with codeine were the most abused substances among youths. The prominence of these substances in this study also supports the findings of UNODC (2018), which documented high availability and abuse of tramadol and codeine in Nigeria.

Conversely, studies such as Abasiubong et al. (2017) in Akwa Ibom reported lower prevalence rates for tramadol and codeine use among students, which may reflect regional differences in availability, law enforcement, and cultural perceptions of drug use.

Also, the ANOVA results for the first hypothesis indicated significant differences in the types of illicit drugs misused, with marijuana, tramadol, and codeine showing the highest rates. This aligns with national-level surveys (Ajayi & Somefun, 2020; UNODC, 2018) identifying these drugs as most prevalent among Nigerian youths.

CONCLUSION

Based on the findings of the study, it was concluded that illicit drug use remains a significant concern among students of tertiary institutions in Idah LGA, Kogi State. Although the majority of the respondents were aware of illicit drug use, different types of illicit drugs were being misused among students, with marijuana, tramadol, and codeine-based cough syrup emerging as the most commonly misused substances. The study further established that there was a significant difference in the types of illicit drugs misused among students, leading to the rejection of the null hypothesis. The high prevalence of these substances suggests the need for strengthened preventive measures, particularly through health

education, awareness campaigns, counselling, and other interventions aimed at reducing students' exposure to and misuse of illicit drugs.

RECOMMENDATION

Based on the findings and conclusion of the study, the following recommendations were made

1. Tertiary institutions in Idah LGA should strengthen health education and drug-abuse prevention programmes through regular seminars, workshops, orientation programmes, and awareness campaigns, with particular emphasis on the dangers of marijuana, tramadol, and codeine-based cough syrup, which were identified as the most commonly misused drugs among students.
2. The institutions should establish and strengthen counselling and support services for students to help them deal with peer pressure, academic stress, emotional challenges, and other circumstances that may encourage drug experimentation and misuse. Counselling services should also facilitate early identification and appropriate support for students already involved in drug use.
3. Relevant government agencies and tertiary institution authorities should intensify the control of access to illicit and commonly misused pharmaceutical drugs around tertiary institutions in Idah LGA. There should be stronger collaboration among the institutions, health authorities, and drug-control agencies to monitor drug availability and implement effective measures for preventing and reducing illicit drug misuse among students.

REFERENCES

1. Adepeju, A. A & Osunwoye, A. A. (2022), Drug Abuse Among Nigeria Youth and its Consequences - A Review of Literature. *Sokoto Journal of Medical Laboratory Science*. 2022;7(2):101-108.
2. Aflatoonia, M. R, Bastami, F, Zamani-Alauijeh, F, Zareban, I, & Araban, M. (2022). Explaining the experiences of health care providers regarding organizational factors affecting health education: A qualitative Study: *BMC Medical Education*, 22(743).
3. Aghaei, A., Mansour, A. M. E., & Ahmed, N. M. E. (2025). The impact of educational intervention on enhancing the health literacy of women at risk of diabetes. *BMC Public Health*.
4. Ajayi, A. I., & Somefun, O. D. (2020). Recreational drug use among Nigerian university students: Prevalence, correlates and frequency of use. *PLOS ONE*, 15(1), e0228490.

5. Akinpelu, K. A., Olaleye, F. A., Oluremi. R. M., Abayomi. E. E. & Olanrewaju, J. A. (2024). Prevalence and Patterns of Drug Abuse Among Tertiary Students in Nigeria. *Journal of Social Health Research*.
6. Akpan, U. U. (2024). Determinants of Drug Abuse Among Nigerian University Students. *International Journal of Social and Behavioral Studies*.
7. Australian Institute of Health and Welfare. (2026). Illicit drug use. Australian Government. <https://www.aihw.gov.au/reports/illicit-use-of-drugs/illicit-drug-use>.
8. Chukwu, E.O., Pius, V.T., Fiase, T.M., Haruna, H. Terkuma, C. & Achukwu, C.E (2022) Effects of substance/drug abuse on the academic achievement of secondary school students in MkarMetropolic, Aboko, Benue State. *International Jkarnal of Psychological and Brain Sciences* 2 (2) 40-45.
9. Egga, D. K., Omobola. O., Victoria. O., & Bright. I. N. (2024). School - Based Substance Abuse Prevention Programmes: A Systematic Review and Contextual Lessons for Nigeria. *Journal of Health Promotion and Education*. DOI. 10.70040/asfirj-szd1-smdr
10. Emmanuel, G. O., & Akinsolu, F. T. (2024). Prevalence and patterns of substance use in West Africa: A systematic review and meta-analysis. *PLOS Global Public Health*, 4(12), e0004019.
11. European Union Drugs Agency. (2026). Statistical Bulletin 2026: Methods and definitions for problem drug use. https://www.euda.europa.eu/data/stats2026/methods/pdu_en.
12. Gonzalez - Edo, M. R., Ben. W. F., Jones, C. (2025). Early Childhood Education and Health Education: A systematic Review. *Societies*, volume (issue), pages.
13. John, B. O (2021), Roles of Health Education in Primary Care Services. *Journal of Environmental and Biological Science*, 12(4):48-59.
14. Kolbe, L. J. 2024). The Future of School Health Education in the United States: An Ontology. *Journal of School Health*. (Author's open-access preprint hosted by SOPHE).
15. Levine, R. S., & Stillman -Lowe, C. (2024). Health Education. *British Dental Journal*, 236(3), 181-185.
16. Melissa, B. (2021). Patient education Programmes, Bilingual Behavioural Health Therapist. AMITA Health. Chicago, Illinois, United States.
17. National Drug Law Enforcement Agency (NDLEA). (2023). Annual Drug Control Report. Abuja. NDLEA Press.
18. National Institute on Drug Abuse (2022, February). Words Matter- Preferred Language for Talking About Addiction. <https://nida.nih.gov/research-topics/addiction-science/words-matter>.
19. Nelson, E.-U., & Klantschnig, G. (2025). Contesting cannabis legalization in Nigeria: Hidden narratives of illicit farmers and traders. *Sociological Inquiry*, 95(2), 235-251.
20. Ogbodu, O. (2024). Medication Misuse Among University Students During Examinations: Risk and Protective Factors. *Futurity Education Journal*.
21. Oladapo, R., & Oladapo, M. (2025). Combating opioid misuse in Nigeria: A comprehensive strategy for public health and social stability. *Addiction*, 120(2), 385-386.
22. Olanrewaju, J. A., & Yusuf, I. (2022). Drug Abuse Among Undergraduates: Prevalence and Implications for Health Education. *Nigerian Journal of Health Promotion*. 120(2), 385-386.
23. Olaoye, T., Osie-Efietie, B., Ogunsanmi, O. O., Mustapha, A. M., Asekun-Olarinmoye, I., & Atulomah, N. O. (2024). Evaluation of a school-based health education program on hepatitis B virus infection prevention practice in rural South-Western, Nigeria. *BMC Public Health*, 24, 591.
24. Omole, J., Ajayi. M. G., Vigna-Taglianti, F. D., Mehanović, E., Alesina, M., Damjanović, L., Ibanga, A., Pwajok, J., Prichard, G., van der Kreeft, P., Virk, H. K., & Unplugged Nigeria Coordination Group. (2021). Structured Health Education and Effects of the "Unplugged" school-based substance use prevention program in Nigeria: A cluster randomized controlled trial. *Drug and Alcohol Dependence*, 228, 108966.
25. Onuorah, S. I. (2024). Effective of School- Based Substance Use Prevention Education Programmes in Nigeria. *Health Education Research*.
26. Onuorah, S. I. (2024). Effective of School- Based Substance Use Prevention Education Programmes in Nigeria. *Health Education Research*.
27. Open Access Pub. (2026). Health Education and Promotion: Research & Overview. *Preventive Medicine and Care*.
28. Ramos-Pla, A., & Fornons-Casol, L. (2025). Health Education in Early Childhood Education: A Systematic Review of the Literature. *Societies*, 15(4), 106.
29. Ugwu, U. T. (2024). Gender and Tramadol Use Among Nigerian University Students. *Journal of Humanities and Applied Social Sciences*. DoI. 10.1108/JHASS-10-2023-0153
30. Ugwu, U. T. (2024). Gender and Tramadol Use Among Nigerian University Students. *Journal of Humanities and Applied Social Sciences*. DoI. 10.1108/JHASS-10-2023-0153

31. United Nations Office on Drugs and Crime. (2026). World Drug Report 2026. United Nations. <https://data.unodc.org/wdr2026>
32. Vigna- Taglianti, F. (2021). Evaluation of the " Unplugged " Prevention Programme in Nigeria: Impacts on Knowledge and Attitudes. *International Journal of Drug Policy*.

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