

**PSYCHOACTIVE SUBSTANCE USE AMONG ADOLESCENTS IN NIGERIA: A SYSTEMATIC REVIEW**<sup>1,\*</sup>Okogbenin O. Esther and <sup>2</sup>Kucharska Justyna<sup>1</sup>Department of Mental Health, Irrua Specialist Teaching Hospital, Edo State, Nigeria<sup>2</sup>The Faculty of Economics and Management, Lazarski University, Warsaw, PolandReceived 19<sup>th</sup> April 2021; Accepted 14<sup>th</sup> May 2021; Published online 17<sup>th</sup> June 2021

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**Abstract**

Adolescents' vulnerability to experiment with psychoactive substances has implications not just for the adolescent period but also for the future adult. While there are isolated studies on adolescents' psychoactive substance use in Nigeria, systematic reviews are lacking. This review examined findings from the literature to estimate the prevalence and determine the pattern and correlates of psychoactive substance use among adolescents in Nigeria as well as gaps in the literature. A systematic review was conducted using searches from PubMed, PsychoINFO, Embase and Scopus. Studies conducted between 1998 and 2018 were generated and screened using pre-determined criteria. Relevant data extracted from included studies were subjected to narrative synthesis. The lifetime prevalence of any psychoactive substance use among adolescents in the multiple substance studies ranged from 40.1% to 87.3% while current prevalence ranged from 32.9% - 69.2%. This high prevalence was mainly accounted for by caffeine use followed by alcohol, hypnotosedatives and tobacco. Being male and peer pressure were the most consistent correlates of psychoactive substance use. There was dearth of epidemiological surveys on adolescent psychoactive substance use in the Northern and South-Southern regions of Nigeria. National annual epidemiological surveys on the use of psychoactive substances among adolescents in Nigeria are imperative to fill the gaps in epidemiological surveys and to explore the determinants of use which will help tailor efforts towards specific policies and programmes to address psychoactive substance use in adolescents including out of school adolescents. Stakeholders in psychoactive substance use/abuse related matters should consider the factors identified when planning prevention and intervention strategies. Efforts to control psychoactive substance use among adolescents in Nigeria need to move beyond policy to implementation.

**Keywords:** Adolescents, Nigeria, Prevalence, Psychoactive, Substance.**INTRODUCTION**

There is a growing consensus among public health researchers that psychoactive substance use by adolescents is on the increase [1-3]. Besides the fear of addiction, psychoactive substance use in adolescence can cause significant mental/psychological deficits that can interfere with their future potentials [4]. Psychoactive substance addiction in adulthood has been described as a preventable chronic illness with onset in the adolescent period [5]. The extent of psychoactive substance use among adolescents varies from country to country. A review of available literature shows that there has been a gradual rise in psychoactive substances use among adolescents in Nigeria in the last few decades [2, 3, 6]. In a 2014 report by World Health Organization, Nigeria ranked second for young people's heavy episodic drinking [7]. The first large-scale, nation-wide survey conducted in Nigeria in 2017 to examine the extent and patterns of drug use (other than caffeine, alcohol and tobacco) estimated a past year prevalence of any drug use at 14.4% for people aged between 15 and 64 years [8]. This prevalence was comparatively high when compared with the 2016 global annual prevalence of any drug use of 5.6 percent among the adult population [9]. Adolescents view psychoactive substance use as a socially desirable behaviour and peer group pressure has been identified as a strong factor [10, 11]. Similarly, adolescents whose parents and siblings use psychoactive substance have been found to be more likely to use psychoactive substance [12, 13]. Male gender is reported to correlate with psychoactive substance use among adolescents and this cuts across various psychoactive substances [3,14].

Studies on adolescent psychoactive substance use in Nigeria have been majorly skewed towards secondary school adolescents in urban areas, often neglecting out of school adolescents [13,15-16]. To the best of the authors' knowledge, there is only one systematic review on substance use among adolescents in Nigeria, the largest nation in Africa with adolescents making up about 25% of its population [17]. This study examined only alcohol among in-school adolescents [18]. To address the problem of psychoactive substance use in adolescents, a broad understanding of the prevalence, pattern and psychosocial correlates of use is fundamental. We therefore aimed to conduct a systematic review of the literature to estimate the prevalence and determine the pattern and factors associated with psychoactive substance use in adolescents in Nigeria. Findings from this review will help to provide useful information for planning prevention and intervention strategies for psychoactive substance use among adolescent in Nigeria and identify gaps in epidemiological surveys.

**METHODS****Search and review strategy**

The literature search was performed in June and July 2018 and last searched on 20<sup>th</sup> July, 2018 using the following Databases; PsychoINFO (via EBSCO), PubMed, Embase and Scopus. Table 1 shows key terms generated which were 1) Substance use (e.g. psychoactive substance use), 2) Substance, Adolescents (teenagers), Nigeria). The method of reporting and conduct of this review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines as shown in Appendix A. A pilot study was

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conducted to pretest the protocol for this review submitted and approved by the Wolfson Institute of Preventive Medicine – Barts and The London, Queen Mary University Of London.

### Inclusion/exclusion criteria

Only studies on psychoactive substance use among adolescents, conducted in Nigeria which were quantitative studies including but not restricted to cross-sectional studies, reported in English language and carried out between 1998 and 2018 were included. Psychoactive substance use studies outside the adolescent age group, conducted outside Nigeria, not reported in English language, conducted before 1998, qualitative studies, case reports and case series were excluded from this review. All included studies obtained ethical clearance.

**Table 1. Search terms used in databases**

Database	Search terms
Embase	((substance AND use OR psychoactive) AND substance AND use AND ('adolescents'/exp OR adolescents) OR teenagers) AND ('nigeria'/exp OR nigeria)
PsycholINFO	Substance use OR Psychoactive Substance Use AND Adolescents OR Teenagers AND Nigeria
PubMed	((Substance use) OR Psychoactive Substance Use) AND Adolescents) OR Teenagers) AND Nigeria
Scopus	substance AND use OR psychoactive AND substance AND use AND adolescents OR teenagers AND nigeria

### Data extraction and selection

Key search terms were used to systematically search each electronic database. The selection process underwent three steps. In the first step, the studies generated by each search engine were examined by the authors for irrelevant titles which were removed. The two authors independently checked the remaining studies to identify duplicates which were deleted. In the second step, the authors assessed the abstracts of the selected studies to determine the relevant papers. Finally, the authors requested for the full texts of the relevant abstracts. The full texts were screened in details by the authors using the inclusion and exclusion criteria to determine the final studies that were included in the review. Disagreements were resolved by discussions. Information extracted from the included studies were titles, authors, settings of the studies, mean age and sex of participants. The methods, study design, prevalence, pattern and correlates of psychoactive substance (psychoactive substances including but not restricted to caffeine, alcohol, cigarette, cannabis, hypnosedatives/tranquilizers, and other illicit substances) use were also extracted.

### Quality assessment of the methodology of the included papers

The National Institute of Health Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was used to assess for any bias in the methodology of the selected studies [19]. This checklist was used to evaluate possible errors in the objectives, sample size determination, sample selection, study design, data collection, withdrawals and drop outs and data analysis etc. of the selected studies.

### Data synthesis

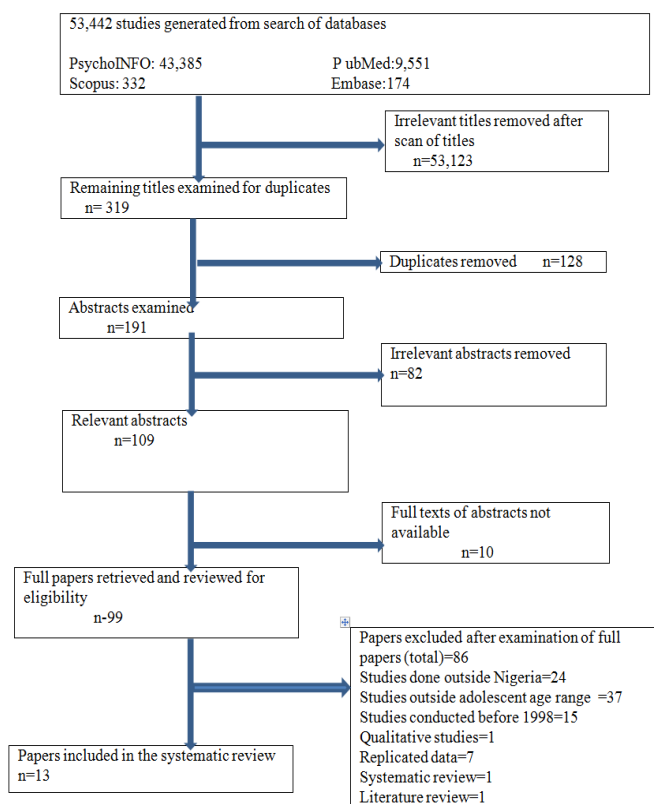
Data generated were summarized in tables, charts and subjected to a narrative synthesis. The mean of individual

substances was determined by dividing the total prevalence of the substance by the number of studies that reported prevalence for the substance. This was done for lifetime use, use in the last one year and current use which is use of the substance in the last 30 days.

## RESULTS

### Study selection process

Fifty-three thousand, four hundred and forty two (53,442) articles were generated from the search of databases. After the papers were examined for irrelevant titles, 53,123 were removed. The remaining 319 were examined for duplicates, 128 duplicates were identified and removed by the authors. The abstracts of the remaining 191 papers were examined for relevance to the aims of the review, 82 irrelevant papers were identified and excluded. Of the 109 relevant abstracts, the full texts of 11 papers were not available and letters requesting for the full texts were sent to the corresponding authors of the papers. Only one author responded and provided the full text. The full texts of the remaining 99 papers were reviewed using the eligibility criteria. Eighty six papers were excluded for the following reasons: Twenty four papers were conducted outside Nigeria, the age range of 37 papers were outside the adolescent age range, 15 studies were older than 20 years (done before 1998), one was a qualitative study, one a systematic review, one a literature review and seven had replicated data. The remaining thirteen papers were included in the final review having met the inclusion criteria [20-32] as shown in Figure 1.



**Figure 1. Flow chart of the study selection process**

### Study characteristics

All thirteen studies were conducted in three of the six geopolitical zones in Nigeria between 2003 and 2016 [20-32]. These were in South Western [21-23,25-28,31-32] and South

Eastern [24,29,30] parts of Nigeria while North Central region had only one study [20]. There were no studies meeting the eligibility criteria from the South-Southern, North-Eastern and North-Western regions of Nigeria. All the studies employed a cross-sectional design, although one was the baseline data from an intervention study [31]. The sample sizes ranged from 215 [22] to 4,286 [27] adolescents with a total sample size of 11,631 adolescents in all thirteen studies, comprising of 5,950 males and 4,821 females. One study gave total sample size of 860 without the gender distribution [29] and so was included in the total sample size but not in the gender distribution of this review. The mean ages ranged from 14.2 to 17.2 years. Ten (76.9%) studies were conducted amongst secondary school adolescents [20,24-32] while the remaining three (23.1%) were community based including out of school adolescents [21-23]. All included studies compared adolescents who reported psychoactive substance use with those who did not [20-32]. Eight studies (61.5%) evaluated multiple psychoactive substances [20,24,25,27-30,32]. Three (23.1%) examined only tobacco/cigarette [21,22,31], one (7.7%) examined only Kolanut [26] and one (7.7%) examined only alcohol [23]. All included studies used quantitative designs with self-reported questionnaires except one that used interviewer administered questionnaire [31].

### Methodological quality of included studies

The National Institute of Health Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies checklist [19] was used to assess the quality of the methodology of the selected studies. This was done against certain criteria (research question, study population, groups recruited from the same population and uniform eligibility criteria, Sample size justification, exposure assessed prior to outcome measurement etc.). Five (38.5%) of the included studies were rated good as they conducted logistic regression analysis to measure possible confounding variables, showed low risk of selection bias, measurement bias and low to moderate risk of information bias [20,21,25,30,31]. Seven (53.8%) studies were rated fair because they conducted bivariate analyses only but showed low risk of selection bias, measurement bias and low to moderate risk of information bias [23,24,26-29,32] while one (7.7%) study did not have any form of inferential statistics and was rated poor [22]. All included studies had a cross-sectional design and since cross sectional designs evaluate both exposure and outcome at the same time, some of the criteria for assessing measurement bias had a "No or Not applicable" response ( Appendix B).

### Prevalence psychoactive substance use

The results of prevalence, pattern and correlates of psychoactive substance use among adolescents in this review are summarized in Table 2 and Figures 2 and 3. The lifetime prevalence of any psychoactive substance use in the eight studies [20,24,25,27-30,32] that examined multiple substances was high and ranged from 40.1% [20] to 87.3% [32] while current prevalence ranged from 32.9% [24] to 69.2% [32]. Seven studies [20,24,26,27,29,30,32] evaluated the use of caffeine (coffee and kolanut) and it was the most commonly used substance reported with a mean lifetime prevalence of 74.8% and mean current prevalence of 34.5%. One study reported lifetime use (37.5%) and current use (20.9%) of stimulants without specifying the types of stimulants [28]. This was excluded from the mean prevalence calculation of caffeine

use. Six studies examined lifetime use of alcohol [20,23,27,28,30,32] and reported a prevalence range of 9.2% [32] to 59.3% [30] with a mean prevalence of 33.2%. Current alcohol use was likewise evaluated in six studies [23,24,28-30,32] which reported a current prevalence range of 8.9% [32] to 37.2% [23]. The mean current prevalence of alcohol was 23.4%. Four studies evaluated lifetime use of hypnotics/tranquilizers [27,28,30,32] reporting a prevalence range of 10.0% [30] to 33.9% [27] with a mean prevalence of 22.7%. Current hypnotics/tranquilizers use was also examined in four studies [28-30,32]. The prevalence of current use ranged from 4.7% [30] to 6.7% [32] with a mean of 11.9%. Tobacco/cigarette lifetime use was evaluated in eight studies [20-22,27,28,30-32] which reported a lifetime prevalence range of 4.8% [20] to 24.9% [21] with a mean of 11.9%. Similarly, eight studies evaluated current use of tobacco/cigarette use [21,22,24,28-32] and reported a prevalence range of 2.9% [30] to 14.7% [21] with a mean of 8.4%. Community based tobacco/cigarette studies found higher rates of use than secondary school based studies.

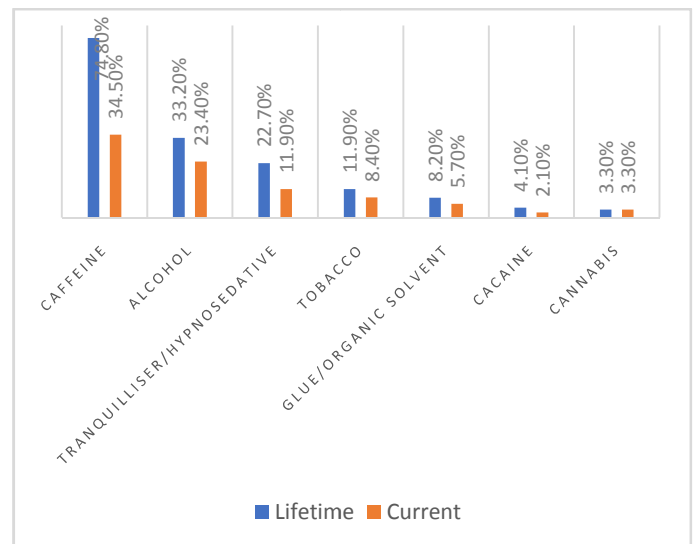


Figure 2. The mean prevalence of psychoactive substance use among adolescents in Nigeria

Illicit substances had low prevalence rates as shown in Table 2 and figure 2. The prevalence of multiple substance use was high. Three studies reported multiple substance use [24,29,32] with prevalence ranging from 47.0% [24]<sup>4</sup> to 75.2% [29]. The only study that measured problematic substance use reported 10% of problematic use [25].

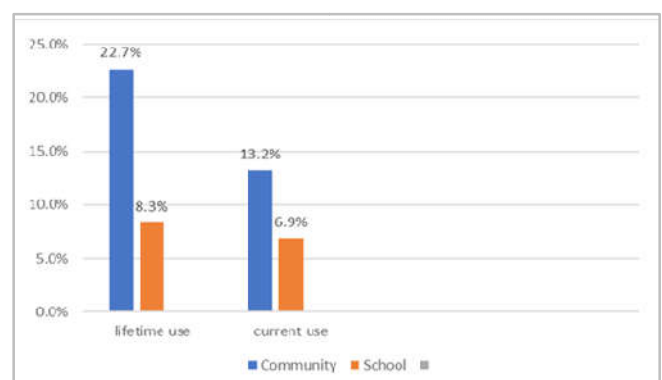


Figure 3. Comparison of mean prevalence of adolescent tobacco use between community and secondary school based studies in Nigeria

Table 2. Study Characteristics, Prevalence and Pattern of Psychoactive Substance Use among Adolescents in Nigeria

Article/author	Participants and setting	Study design/methods	Key Findings (Type of drugs and prevalence)	Key findings: Correlates
Drug Use among Adolescents in Ilorin, Nigeria <sup>20</sup>	Sample size: 1181 adolescents secondary school students in Ilorin Metropolis Age range: 10- 19 years 563 females 608 males	Cross-sectional survey/ A pre-tested self-report WHO Student Drug Use Questionnaire	Lifetime prevalence of any substance use: 40.1% Coffee and kolanut: 26.2% Alcohol: 14.5% Sniffing agent: 7.2% Amphetamine and Ephedrine: 6% Cigarette: 4.8% Heroin: 4.4% Cocaine: 3.6% Cannabis: 3.4%	Adolescent cigarette smoking was significantly associated with cannabis use (P<0.001, with relative risk (RR) of: 37.4, 95%CI: 21.4-57.8), cocaine use (P<0.001, with RR of 21.8, 95%CI: 13.9-34.5) and heroin use (P<0.001). Alcohol use was significantly associated with cigarette smoking (P<0.001 with an RR of 6.8 95%CI: 5.4-8.6).
Age of Initiation, Determinants and Prevalence of Cigarette Smoking among Teenagers in Mushin Local Government Area of Lagos State, Nigeria <sup>21</sup>	Sample size: 402 adolescents in Mushin council area in Lagos (community based study) Mean age: 16.4 SD 1.65 years Gender: 147 female, 255 males	Cross-sectional survey/ A pre-tested structured interviewer-administered Questionnaire adapted from WHO Global Youth Tobacco Survey Tool (CDC, 2008)	Cigarette prevalence: 24.9% had initiated smoking, 14.7% were current smokers	Adolescents who were males (OR: 12.77, 95%CI: 2.90-56.28), married (OR: 19.24, 95%CI: 2.05-180.45), had ≤primary school education (OR: 7.85, 95%CI: 2.37-26.01), influenced by friends (OR: 28.56, 95%CI: 10.86-75.07), and influenced by advertisements (OR: 5.95, 95%CI: 1.72-20.61) were more likely to be current cigarette smokers
Tobacco Use among out of School Adolescents in a Local Government Area in Nigeria <sup>22</sup>	Sample size: 215 out of school adolescents in Oyo state Age range: 10-19 years 101 females 114 males	Cross-sectional survey/ A pre-tested self-report researcher designed questionnaire following review of literature on substance use in Nigeria.	Tobacco Prevalence: Lifetime use: 20.5% Current use: 11.6%	Males accounted for 60% of tobacco users. 72% of tobacco users were introduced to tobacco by friends, 20% by relatives and 8% by casual contacts
Correlates of Alcohol Consumption among Adolescents in Ibadan North Local Government Area of Oyo State, Nigeria <sup>23</sup>	Sample size: 313 community based adolescents in Ibadan North, Oyo state Mean age: 17.2 SD 1.7 years 114 females; 199 males	Cross-sectional survey/ A pre-tested self-report researcher designed questionnaire	Alcohol prevalence: Lifetime use: 57.5% Current Use: 37.2%	Being male (p<0.001) and peer influence (P=0.001) were associated with lifetime alcohol drinking. Being male was associated current drinking (P=0.001).
Pattern of Substance Use among adolescents Secondary School Students in Abakaliki <sup>24</sup>	Sample size: 620 adolescent secondary school students in Abakaliki, Ebonyi State Mean age: 16.57 (SD 1.39) years Gender: 323 females, 297 males	Cross-sectional survey A pre-tested self-report WHO Student Drug Use Questionnaire	Prevalence of current substance use: 32.9% Alcohol: 29.0% Kolanut: 24.5% Coffee: 15.6% Cigarette: 14.4% Cannabis: 5.2% Cocaine: 2.3% 47% of lifetime users had used multiple substances	Being male was significantly associated with use of alcohol (P=0.012), cigarette (P=0.045), Cocaine (p=0.042) and coffee (P=0.031). Being orphaned was significantly associated with cigarette (P=0.027) and cannabis (P=0.042). Cigarette, kolanut, alcohol and cannabis were used significantly higher in adolescents from divorced families (P=0.002, 0.024, 0.046 and 0.006 respectively).
Beyond Prevalence and Pattern: Problematic Extent of Alcohol and Substance Use among Adolescents in Ibadan South-West Nigeria <sup>25</sup>	Sample size: 538 adolescent secondary school students in Ibadan South-West, Nigeria Mean age: 15.1 (SD 1.4) years Gender: 294 females, 244 males	Cross-sectional survey/ A pre-tested self-report CRAFFT Questionnaire	Past one year prevalence of substance use: 21.4% Alcohol: 11.5% Tobacco: 7.0% Glue and other solvents: 3.9% Problematic substance use (CRAFFT score >2): 10%	Parental alcohol and substance use (Father; adjusted OR: 3.38, 95%CI: 2.00-4.70 and mother; adjusted OR: 2.00, 95%CI: 1.81-4.77), being male (adjusted OR: 1.71, 95% CI: 1.23- 2.88), older age (adjusted OR: 0.61, 95%CI: 0.44-0.88), and lower than average school performance (adjusted OR: 3.39, 95% CI: 2.00-3.71) were independently associated with 12-months use of alcohol or other substances.
Prevalence and Associated Risk Factors of Kolanut Chewing among Secondary School Students in Osogbo, Nigeria <sup>26</sup>	Sample size: 385 adolescent secondary school students in Osogbo, Nigeria Mean age: 16.65 (SD 0.97) years Gender: 174 females, 211 males	Cross-sectional survey A pre-tested self-report WHO Student Drug Use Questionnaire	Prevalence of kolanut: Lifetime: 74.8% Past one year: 29.1% Current use: 11.2%	Adolescents who were 14-15 years (P<0.05), had good school attendance (P<0.05), were from polygamous family (P<0.01), whose fathers had higher education (P<0.05), mothers had low education (p<0.05), described fathers as kind (P<0.05) and mothers as loving (P<0.05) were significantly associated with past one year use of kolanut.
Epidemiology of psychoactive drug use amongst adolescents in metropolitan Lagos, Nigeria <sup>27</sup>	Sample size: 4,286 adolescent secondary students in Lagos Mean age: 15.2 (SD 1.66) years Gender: 1676 females, 2,610 males	Cross-sectional survey A pre-tested self-report researcher designed questionnaire using Oppenhen's principle	Lifetime prevalence of any substance use: 61.8%, past one year prevalence of any substance user: 32.1%, Coffee: Lifetime: 61.8%, past one year: 32.1% Kolanut (Caffeine): lifetime: 42.6%, past one year use: 22.5% Cough syrup: Lifetime: 33%, past one year: 16.6% Alcohol: Lifetime: 32.2%, past one year: 16.7% Barbiturate: Lifetime: 17.5%, past one year: 6.5% Minor tranquilizer: Lifetime: 16.4%, past one year: 9.8% Glue: Lifetime: 12.5%, past one year: 1.9% Cigarette: Lifetime: 11.4%, past one year: 6.1% Cocaine: Lifetime: 4.8%, past one year: 1.2% Cannabis: Lifetime: 4.7%, past one year: 1.2% Heroin: Lifetime: 4.1%, past one year: 1.1%	Being male was associated with adolescent lifetime use of cigarette, alcohol, coffee, kolanut and glue; all with P=0.001. Adolescent cigarette smoking was significantly associated with alcohol, cannabis, heroin, cocaine and dexamphetamine use, all with P<0.001

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Table 2 (continued)

Article/author	Participants and setting	Study design/methods	Key Findings (Type of drugs and prevalence)	Key findings: Correlates
Psychosocial Correlates of Substance use among Secondary School Students in South Western Nigeria <sup>28</sup>	Sample size:560 secondary school students in South Western Nigeria Mean age: 17.0 SD 1.69 years 295 females 265 males	Cross-sectional survey/ A pre-tested self-report WHO Student Drug Use Questionnaire	Stimulants: Lifetime: 37.5%, Current: 20.9%, Alcohol: lifetime: 26.4%, current: 13.4% Hypnotosedatives: Lifetime: 14.7%, current: 8.9% Tobacco: Lifetime: 8.4%, current: 3%	Being male was significantly associated with lifetime alcohol use (P<0.01), current alcohol use(P<0.001), lifetime cigarette use (P<0.001) and current cigarette use (P<0.001) Self-poor/below average rating of academic performance was significantly associated with lifetime and current use of stimulants, hypnotosedatives, alcohol and cigarette all with a P< 0.001 except for lifetime stimulant use (P<0.05) Living alone/with friend was significantly associated with lifetime stimulant use (P<0.001), lifetime alcohol use (P<0.001), lifetime hypnotosedatives use (P<0.001) and current hypnotosedatives use (P<0.001) Rural location of school was significantly associated with lifetime tobacco use (P<0.005) Low socioeconomic status was significantly associated with current stimulant use(P<0.005) Being from polygamous family was significantly associated with lifetime use of stimulants (P<0.05), current use of stimulants (P<0.05), lifetime alcohol use (P<0.001) and current alcohol use (P<0.001) Not being religious was significantly associated with lifetime use of cigarette (P<0.05), current use of cigarette(P<0.005), lifetime alcohol use (P<0.005) and current alcohol use (P<0.001)
Socio-demographic Correlates of Psychoactive Substance Abuse among Secondary Students in Enugu, Nigeria <sup>29</sup>	Sample size:860 secondary school students in Enugu, Nigeria Mean age: 16.9(SD 1.7) years	Cross-sectional survey/ A pre-tested self-report WHO Student Drug Use Questionnaire	Lifetime use: 63.2%, Current use:33.7% Pattern of current substance use: Alcohol: 31.6%, Caffeine (Coffee &kolanut) 36.4%, Cigarette: 14.3% Inhalant: 9%, Tranquilizer: 7.4% Cannabis: 4.1% 75.2% of current users were multiple substance users	Being adolescent male was significantly associated with alcohol use (P<0.001) and kolanut use (P<0.001).Cigarette and cannabis exclusively used by males. Low socioeconomic class was significantly associated with kolanut use (P<0.001).
Correlates for Psychoactive Substance Use among Boarding Secondary School Adolescents in Enugu, South East, Nigeria <sup>30</sup>	Sample size:896 secondary school students in Enugu South East Nigeria Mean age: 15.9(SD 1.04) years 414 females 482 males	Cross-sectional survey/ A pre-tested self-report WHO Student Drug Use Questionnaire	Caffeine (coffee & kolanut): Lifetime: 83.1%, past one year: 69.4%, current: 48.4% Alcohol: Lifetime: 59.3%, past one year: 48.5%, current: 20.4% Tobacco: Lifetime: 10.3%, past one year: 6.1%, current: 2.9% Tranquilizers: Lifetime: 10.0%, past one year: 7.0%, Current: 4.7% Cannabis: Lifetime: 0.8%, past one year: 0.8%, current: 0.4%	Early age of onset of first use of substance had an independent significant association with lifetime use (P<0.001, OR: 0.59, 95%CI: 0.51-0.68), previous one year use(P<0.00, P<0.001, OR: 0.79, 95%CI: 0.74-0.84) and current use of alcohol (P<0.00, OR: 0.66 95%CI: 0.64-0.69). Belonging to middle social class had an independent significant association with lifetime use (P<0.001, OR: 2.16, 95%CI: 2.01-2.31) current use (P=0.015, OR: 1.35, 95%CI: 1.29-1.42) of alcohol.
Determinants of Smoking Initiation and Susceptibility to Future Smoking among School-Going Adolescents in Lagos State, Nigeria <sup>31</sup>	Sample size:973 secondary school students in Lagos Mean age: 14.2(SD 2.00) years Gender: 458 females, 515 males	Baseline data of an intervention study Pre-tested structured interviewer administered adapted from previous studies and WHO Global Youth Tobacco Survey Tool(CDC, 2008)	Susceptibility to smoking: 15% 9.7% had initiated smoking tobacco, Of this, current smokers: 36.1% Cigarette: 75.5% Rolled tobacco:21.3% Cigar:2.1% Pipe: 2.1% Other substances: NA	Adolescents who were males (OR: 2.77, 95%CI: 1.65-4.66), whose parents smoked OR: 3.47, 95%CI: 1.50-8.05), friends smoked (OR: 2.26, 95%CI: 1.27-4.01) and had pro attitude towards smoking (OR: 1.44, 95%CI: 1.34-1.54) were more likely to have initiated tobacco smoking. Adolescents who were in a private school (OR: 5.08 95%CI: 3.22-8.03), had friends who smoked (OR: 5.09, 95%CI: 3.09-8.37), had been sent to purchase cigarette (OR: 3.68 95%CI: 2.41-5.61) and had pro- attitude to smoking (OR:1.13, 95%CI 1.06-1.22) were more likely to be susceptible to future smoking.
Substance use among secondary school students in an urban setting in Nigeria: prevalence and associated factors <sup>32</sup>	Sample size:402 secondary students in Lagos Mean age: 15.9(11-20)years Gender: 227 females, 175 males	Cross-sectional survey A pre-tested self-report WHO Student Drug Use Questionnaire	Lifetime prevalence of any substance use: 87.3%, current prevalence of any substance use 69.2%, Multiple substance:57.4% Caffeine(Kolanut & coffee): Lifetime: 85.7%, Current: 36.5% Hypnotosedatives: Lifetime: 32.3%, Current:26.7% Alcohol: Lifetime: 9.2%, Current: 8.9 Tobacco: Lifetime:5.2%, Current: 3.0% Glue/organic solvent: Lifetime: 4.8%, current: 2.4% Cannabis: Lifetime:4.4%, Current:3.3% Heroin: Lifetime: 3.8%, Current:3.3% Cocaine: Lifetime: 3.8%, Current:1.9%	Adolescent caffeine use was associated with being male P <0.05



## Correlates of psychoactive substance use

Male gender had a consistent significant association with psychoactive substance use in ten of the studies in this review and this was with various psychoactive substances including alcohol, caffeine, glue, cannabis, tobacco and cocaine for lifetime use and/or current use [21,23-25,27-32]. Likewise, males were 5.17 times more likely to have initiated cigarette smoking and 12.77 times more likely to be current cigarette smokers than females [21]. Another study reported that males were 2.77 times more likely to have initiated cigarette smoking than females [31]. In one multiple substance study, being males had an adjusted OR of 1.71, 95%CI: 1.23-2.88 for past one year use of substances [25]. Similarly, several studies found that having friends or parents who used psychoactive substances was significantly associated with adolescent psychoactive substance use [21,23,25,31]. This was for alcohol and tobacco. One study reported that among those who had never smoked, the most important determinants for smoking susceptibility were having friends who smoked (OR: 5.09, 95%CI: 3.09-8.37) and being in private schools (OR: 5.08 95%CI: 3.22-8.03) [25]. Two studies measured the associations between various psychoactive substances [20,27]. One study found that adolescents' cigarette smoking increased the relative risk of cannabis use and cocaine use while alcohol use increased the relative risk of cigarette smoking and cannabis use [20]. Heroin use increased the relative risk of cocaine use [20]. The second study found that adolescents' cigarette smoking was significantly associated with alcohol, cannabis, heroin, cocaine and dexamphetamine use [27]. Three studies evaluated family/living conditions and psychoactive substance use [24,26,28]. One study found that being orphaned was significantly associated with cigarette smoking and cannabis use, this study also reported that cigarette, kolanut, alcohol and cannabis were used significantly more in adolescents from divorced families [24]. Similarly, another study found that living alone/with friends was significantly associated with lifetime stimulant use, lifetime alcohol use, lifetime hypnotosedatives use and current hypnotosedatives use [28]. Being from a polygamous family was found to be significantly associated with stimulants and alcohol use in two studies [26,28].

## DISCUSSION

The studies included in the review except one had good/fair quality assessment ratings as they showed low risk of selection bias, low to moderate risk of information bias (this is mainly because the included studies were cross-sectional in design) and low risk of measurement bias. Surprisingly, only thirteen studies met the inclusion criteria despite searching four different databases and all thirteen studies were conducted in South-Western, South-Eastern and North-Central with none in South-Southern, North-Central and North-Eastern regions of Nigeria. This might be due to dearth of epidemiological surveys focusing on psychoactive substance use in the adolescent population in Nigeria particularly in the Northern and South-Southern parts of Nigeria, reflecting an obvious gap in these regions. It is however possible that this apparent lack of epidemiological surveys may be due to the fact that such studies might not have been indexed in international databases selected for this review. Whatever the reason, this obvious gap in research underscores the need to implement and sustain national organs and structures for annual psychoactive substance use surveys across various age groups including

adolescents in Nigeria. The mean prevalence rates of substance use found in this review were quite high. Lower rates were reported in Senegal, Ghana, Namibia and Zambia with lifetime prevalence rates of 3% and 2% in Senegal, 23% and 24% in Ghana, 31% and 26% in Namibia and 37% and 39% in Zambia for 13 to 15 years old male and female adolescents respectively [33]. These high and worrisome levels of use in this review were mainly accounted for by high prevalence of caffeine followed by alcohol both for lifetime and current use. Hypnotosedatives and tobacco also recorded relatively high levels of use while the use of most illicit psychoactive substances like cannabis, heroine, amphetamine and cocaine was relatively low, perhaps because the society perceives them as harmful and frowns at their use while setting low threshold for the identification of disorders related to their use [34]. High rates of caffeine and alcohol use and relatively high rates of hypnotosedatives and tobacco use among adolescents were reported in several studies in Nigeria more than two decades ago [6,15,35]. This pattern of psychoactive substance use is quite comparable with adolescents' psychoactive substance use in Europe and America where licit psychoactive substances like alcohol and tobacco appear to be more commonly used compared to the illicit ones [36,37]. This high level of use of caffeine which was in the form of coffee and Kolanut (a local caffeine containing mild stimulant) may be partly explained by the fact that caffeine, like alcohol is legal, cheap, easily available and socially acceptable. Globally, caffeine consumption is well incorporated into everyday cultural practices [38] e.g. the coffee break in the United States, tea time in the United Kingdom, and kola nut chewing or breaking in Nigeria. Secondly, students who formed a majority of the participants in this review have been reported to use caffeine to keep awake during examinations, this is probably because caffeine has been associated with delayed sleep onset, difficulty remaining asleep and early morning awakening [39]. These associated properties may make caffeine liable to abuse. Although cough syrup (codeine) was evaluated in only one study, the prevalence reported was high. This relatively high prevalence may be reflecting new trends in the use of prescription drugs that will require further research. A recent documentary on "Sweet Codeine" in Nigeria by the British Broadcasting Corporation (BBC) Africa, revealed that codeine was in high use in Northern Nigeria. It exposed a cartel of codeine dealers in Nigeria and the porousness in the control of codeine by the relevant agencies.<sup>40</sup>

Adolescents in the community including out-of-school adolescents used tobacco more than in-school adolescents, although only two tobacco studies were community based compared to six school based studies. Out of school adolescents may be more at risk of psychoactive substance use as they are likely to be less supervised, more likely to be poorly educated on the harmful effect of psychoactive substances and socialize more with the drug sub-culture within the community. This finding underscores the need for stakeholders in psychoactive substance research and policy to pay more attention to adolescents within the community both for epidemiological surveys and intervention programmes. The male gender was consistently associated with caffeine (coffee and kolanut), tobacco, alcohol, glue and cocaine, while this is consistent with much older studies in Nigeria [6,18,41], western cultures tend to generally report gender parity in psychoactive substance use among adolescents [42]. Unlike in western culture where gender role is moving toward greater equality, most indigenous African societies like Nigeria are

likely more permissive of males than females. Female adolescents are usually assigned domestic activities which limit their interaction with the drug sub-culture in the general community [27]. Peer influence and parental psychoactive substance use were strong predictors for psychoactive substance use by adolescents in this review. Studies in western countries also found peer pressure and parental psychoactive substance use as correlates of substance use [1]. These findings should not be surprising as peer group pressure has been identified as an initiating force in adolescents alcohol and drug use [43]. Parents in most cases are their immediate objects of socialization and role model. In interpreting similar findings among American Students, it was stated that the greatest influence on drinking patterns was parental drinking behaviour [44]. Biological and genetic variation may also play a role in this observation [45]. Family, twin and adoption studies have demonstrated that genes play an important role in the development of alcohol dependence, with heritability estimate in the range of 50 – 60% [46,47]. Only two authors evaluated the relationship between various substances and found that tobacco/cigarette use was associated with alcohol, cannabis, heroin, cocaine and dexamphetamine. This supports the “gateway” theory that cigarette and alcohol can serve as gateway to other drugs including illicit and hard drugs [18,50]. It has been suggested that poor resource countries should direct efforts at controlling drug use on “gateway” drugs [48]. Cannabis and heroin were associated with use of cocaine. This shows how the use of one illicit substance can lead to other illicit substances and to multiple substance use which was reported to be high in this review. Only few studies found a relationship between living alone/with friends; being from a polygamous family; being orphaned or being from a divorced family and psychoactive substance use. Their association may reflect the impact of lack or poor parental supervision on adolescent psychoactive substance use. The association between poor parental supervision and adolescent psychoactive substance use has been reported [35].

### Limitations

Only thirteen studies met the inclusion criteria and were included in the review. The variations in the number of psychoactive substances examined by the various studies made comparison within the review difficult and cumbersome. All the included studies were cross-sectional, longitudinal studies were not found and so causal inferences could not be made. Prevalence estimation was mainly by use of questionnaire (self-report in twelve studies and interviewer administered in one). This can pose the risk of under-reporting or over-reporting. However biological testing for substance use also has its limitations because of the possibility of elimination of substance from the system before testing thereby giving false negative.

### Strength of the study

This is the first systematic review in the last two decades or more that has explored multiple psychoactive substance use among in and out of school adolescents in Nigeria. All included studies used pre-tested questionnaires, this allowed potential errors to be corrected before the main study. Nine of these studies used WHO validated specific drug use questionnaires, one used CRAFFT. Only three studies used researcher designed questionnaires. Most of the studies included in the review had relatively large samples size and

this made generalization possible. Although, the included studies were cross-sectional, their quality assessment was good for five studies which was the highest rating for the tool used and fair for seven and poor for only one.

### Conclusions/Implications

This review found high prevalence rates of psychoactive substance use for lifetime and current use. Specifically, high rates were recorded for caffeine (coffee and kolanut) and alcohol, while hypnotosedatives, cigarette, glue and cough syrup recorded moderately high rates. There were research gaps identified, it appears not much has been done in terms of epidemiological studies on adolescent psychoactive substance use in Nigeria particularly in the Northern and South-Southern parts of Nigeria and also in out of school adolescents, more studies are needed in these areas. National annual epidemiological surveys on the use of psychoactive substances among adolescents are recommended. Longitudinal studies on the common psychoactive substances (caffeine, alcohol, tobacco, hypnotosedatives and codeine) identified are also recommended to explore the determinants of their use. The findings from such studies will inform meaningful intervention and policy implementation strategies to curb psychoactive substance use and abuse among adolescents. Programmes structured to target males, resist peer pressure and other factors identified in this review will help to reduce adolescent's substance use. Implementation of such programmes should be strengthened and supported by the government.

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### Competing interest statement

The views expressed are those of the authors and not those of the funding body. The sponsors had no role in the study design, data collection, data synthesis, data interpretation, or writing of the report.

**Conflict of interest:** none to declare

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#### APPENDIX A: PRISMA 2009 checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4-5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA*
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I <sup>2</sup> ) for each meta-analysis.	NA

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
<b>RESULTS</b>			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	7-8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-11
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
<b>DISCUSSION</b>			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11-14
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	14
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14-15
<b>FUNDING</b>			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	15

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097  
 For more information, visit: www.prisma-statement.org. Page 2 of 2  
 \*NA- not applicable

**APPENDIX B: Quality assessment of the methodology of included studies**

Criteria	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
1. Was the research question or objective in this paper clearly stated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Was the study population clearly specified and defined?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3. Was the participation rate of eligible persons at least 50%?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study pre specified and applied uniformly to all participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5. Was a sample size justification, power description, or variance and effect estimates provided?	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	N
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	N	N	N	N	N	N	N	N	N	N	N	N	N
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	N	N	N	N	N	N	N	N	N	N	N	N	N
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10. Was the exposure(s) assessed more than once over time?	N	N	N	N	N	N	N	N	N	N	N	N	N
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12. Were the outcome assessors blinded to the exposure status of participants	N	N	N	N	N	N	N	N	N	N	N	N	N
13. Was loss to follow-up after baseline 20% or less?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)	Y	Y	N	N	N	Y	N	N	N	N	Y	Y	N
Overall rating	Good	Good	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Good	Fair

Y=YES; N=NO; NA=NOT APPLICABLE

S1: [20]; S2: [21]; S3: 3 [22]; S4: 4 [23]; S5: [24]; S6: [25]; S7: [26]; S8: [27]; S9: [28]; S10:[29]; S11: [30]; S12: [31]; S13: [32]

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