



VOLUME 03 ISSUE 02 (2024)

AMERICAN JOURNAL OF
**LIFE SCIENCE
AND INNOVATION**
(AJLSI)

ISSN: 2833-1397 (ONLINE)

PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Spectrum of Adolescent Marijuana Use in Secondary Schools at Sagamu, South-West Nigeria: Factors, Determinants and Scope

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Article Information

Received: May 22, 2024

Accepted: June 25, 2024

Published: June 28, 2024

Keywords

Spectrum, Adolescent, Marijuana Use, Secondary Schools, Sagamu, South-West Nigeria, Factors, Determinants, Scope

ABSTRACT

Adolescents' use of marijuana is a challenge of public health concern, and this also relates to several communities in Nigeria. The use of marijuana and other substances has been reported among the youths. However, the contributing factors to its consumption among these consumers are yet to be fully documented in some Nigerian states. This research aimed to investigate the spectrum of marijuana use among adolescents in secondary schools at Sagamu. The study employed a descriptive, cross-sectional design. A multi-stage sampling technique was used to select 388 respondents. A semi-structured questionnaire with Cronbach's alpha of 0.72 was employed. The predisposing, reinforcing, and enabling factors were measured on an 18-point rating scale. Pearson's correlation and linear regression analysis were conducted to give statistical responses to the research hypotheses using SPSS version 23. The response rate in this research was 98%. The mean age of the respondents was 15.46 ± 1.37 years. 56.2% were females, 74.5% were Christians, and 84% were Yoruba. 4.6% of the respondents have an uneducated dad, 3.9% have an uneducated mum, 70.6% have a self-employed dad, and 78.1% have a self-employed mum. 92.5% of the respondents have a good knowledge of marijuana use. 77.6% have a positive attitude towards marijuana use. 48.7% of the respondents could be influenced by the reinforcing and enabling factors, and there was a 7.2% prevalence rate of marijuana use. There was a significant association between peer influence and marijuana use ($R=0.105$; $R^2=0.11$; $p=0.39$), but none between respondents' predisposing factors and marijuana use ($p>0.05$). Peer influence was the only significant determinant of marijuana use among the respondents. Peer education from homes, schools, and governments is therefore recommended to promote the non-use of marijuana and other substances among adolescents.

INTRODUCTION

Adolescent substance use involves the use of illegal drugs, cigarette smoking, alcohol consumption, and misuse of prescription drugs among adolescents, whom the World Health Organization (WHO) described as people aged between 10 to 19 years and make up 20% of the global population (United Nations Children's Emergency Fund (UNICEF), 2022). Substance use burden increases among adolescents and young adults, with an unequal distribution across age groups, countries, and epidemiological parameters (Global Burden of Disease Collaborative Network, 2015).

The use of marijuana poses a danger to adolescents, which ripple with long-term consequences for the general population. The age of initiation is the mid-teens in many developed countries (United Nations Office of Drugs and Crime [UNODC], 2021; WHO, 2016). In the United States of America, 75.6% of high school students were reported to have used addictive substances, including marijuana, cigarettes, alcohol, or cocaine. In addition, 90% of the US population is initiated into substance use before the age of eighteen, of which 25% become addicted (Center on Addiction and Substance Abuse [CASA], 2011).

Apart from marijuana, other substances such as alcohol, tobacco, illicit drugs, e.g., cocaine, heroin, and opiates

which are commonly abused, have harmful effects on the brain and other vital organs, e.g., lungs (Baysah, 2023; Udeh, 2023a; Udeh, 2023b). Cystic fibrosis is a genetic disease affecting mainly the lungs (Ikwuka, 2023a). Other affected organs include the pancreas, liver, kidneys, and intestine. Clinical features of cystic fibrosis include dyspnea, cough with sputum, sinusitis, poor growth, fatty stool, finger and toe clubbing, etc (Ikwuka, 2023a). Cough with sputum can be complicated by blood in the sputum (hemoptysis), which can lead to anemia (Ikwuka, 2023; Musa, 2023).

Marijuana use has been linked to mental health disorders. Different researchers are still investigating the links between marijuana use and metabolic disorders, although some studies have reported no significant association between marijuana use and metabolic disorders. Among emerging adults, current marijuana users were 54% less likely than never to present with metabolic syndrome. Current (AOR 0.49; 95% CI, 0.25-0.97) and past (AOR 0.61; 95% CI, 0.40-0.91) middle-aged adult marijuana users were less likely to have metabolic syndrome than never users (Vidot, 2016). Metabolic disorders, e.g. Hypertension, Adiposity, Diabetes mellitus and Dyslipidemia, collectively known as Metabolic Syndrome Diseases (MSDs) are diseases related to one another (Ikwuka, 2015; Ikwuka, 2017a; Ikwuka, 2017c; Ikwuka,

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2023c; Ikwuka, 2023f; Ikwuka, 2024; Virstyuk, 2016). Different studies have shown that MSDs are associated with asymptomatic hyperuricemia, systemic immune inflammatory processes, and fibrogenesis all of which can lead to nephropathy (Ikwuka, 2017d; Ikwuka, 2017e; Ikwuka, 2018c; Ikwuka, 2018d; Ikwuka, 2019a; Ikwuka, 2019c; Ikwuka, 2022; Ikwuka, 2023d; Virstyuk, 2017a; Virstyuk, 2018a; Virstyuk, 2019; Virstyuk, 2021a; Virstyuk, 2021b).

Substance use disorder is an expensive and preventable public health problem. The assessment of the annual cost of substance use disorder in United States hospitals showed that a total of 13.2 billion dollars was the annual estimated attributable medical cost for substance use disorders (Peterson, 2021). A single cause (determinant) cannot initiate the use of marijuana among adolescents, rather it is a complex of predisposing, reinforcing, and enabling factors. There is a multilevel complexity as these factors are further composed of individual determinants as described and used in constructing the research instrument for this study.

The predisposing factors include age, gender, ethnicity, parents' socio-economic status, knowledge, and attitude. Reinforcing factors include family and/or siblings' use of marijuana; and peer influence. The enabling factors include easy access, availability, cost of marijuana, and the school environment. Physiological, genetic, and psychological determinants are also associated with substance use. These determinants are strongly influenced and the key influencers include family, social networks, and peer pressure, with best friend use reported to influence the most (English, 2023).

Certain substances used and abused are derived from agricultural products e.g. beer from wheat and barley, hallucinogens from certain plants, tobacco from dried tobacco leaves, and marijuana from varieties of cannabis plants such as the *Cannabis sativa*, *Cannabis ruderalis*, and *Cannabis indica* (Gloss, 2015). The agricultural source of marijuana therefore makes it easy to procure for recreational use. Marijuana plant contains numerous cannabinoids including Δ -9-tetrahydrocannabinol (the principal cannabinoid) and cannabidiol (World Health Organization [WHO], 2024; National Center for Complementary and Integrative Health, 2018). Cannabis usage is associated with oxidative stress. Linked to the induction of oxidative stress are major free radicals. Among these major free radicals, superoxide anions, hydroxyl radicals, and hydroperoxyl radicals are of physiological significance. A non-radical of physiological significance is hydrogen peroxide (Ama, 2023; Ekechi, 2023a; Ikwuka, 2023b; Uche, 2023).

Marijuana use has been reported to lead to addiction, poor concentration, poor academic performance, thefts, organized crime, violence, mental illnesses, injuries, infections, and behavioral disorders in the involved individuals (Centers for Disease Control and Prevention [CDC], 2023; National Center for Drug Abuse Statistics [NCDAS], 2024). Other substances including tobacco,

alcohol, and illicit drugs like opiates, heroin, and cocaine are also popular and toxic (Baysah, 2023; Udeh, 2023a; Udeh, 2023b). Interestingly, marijuana and individual cannabinoids have been reported to help manage the side effects of cancer and cancer therapies, but no research has shown that they can cure cancer (National Academies of Sciences, Engineering, and Medicine, 2017).

Substance use burden increases in adolescence and young adulthood (Center on Addiction and Substance Abuse, 2011). Globally, an estimated 181.8 million individuals who were between 15 and 64 years old used non-medical marijuana in 2013. Marijuana was the most commonly used hard drug among youths in 2019, and in 2021 it became the most cultivated and trafficked drug worldwide (United Nations Office of Drugs and Crime [UNODC], 2021). In 2023, among teenagers in the United States of America (USA), marijuana was the second most abused substance after alcohol (National Center for Drug Abuse Statistics, 2024).

There were 70.46 million users in the USA, 61.99 million users in Asia, 53.6 million users in Africa, 29.47 million users in Europe, and 3.4 million users in Oceania (Statista, 2023). Irrespective of age, 37.7% of women in developed countries/regions like the USA, West and Central Europe (European Monitoring Center for Drugs and Drug Addiction [EMCDDA], 2023), Australia, and New Zealand consume marijuana, while only 10.5% of women in Africa and Asia use it (Statista, 2023). In a national survey in Nigeria, the Northwest region has the highest number of marijuana users (Akannam, 2008). It is also published from a high school students survey that 65% of the students used drugs to be happy with their friends (Abudu, 2008). In Sagamu, the people call marijuana other names like hemp, "ganja", "igbó", "pot", "káyá", "wee-wee", "ojà", gbáná and abana. It was also reported that 76% of secondary school students in Sagamu used illicit drugs, and 49.3% used them for calmness and sleep (Ojieabu, 2017), in the form of self-medication (Oriavwote, 2022).

Metabolic syndrome diseases (MSDs) are interrelated diseases with very high economic costs, morbidity, and mortality rates, thus requiring the search for new and effective treatment options (Ikwuka, 2024). Treatment optimization in MSD patients using a combination of HMG-CoA and SGLT-2 inhibitors, and A2RB (AT1) has resultant clinical effectiveness as indicated by marked improvements in metabolic functions of the heart, liver, pancreas, and kidney (Ikwuka, 2017b; Ikwuka, 2018a; Ikwuka, 2018b; Ikwuka, 2021; Virstyuk, 2017b; Virstyuk, 2018b; Virstyuk, 2018c; Ikwuka, 2024). In addition, Glucagon-like Peptide 1 Receptor Agonists (GLP-1 RAs) e.g. Liraglutide have been found to improve the efficacy of treatment and clinical course of type 2 diabetes mellitus and hypertension in patients with such comorbidities (Ikwuka, 2019b). It has also been reported that coconut water has hepatorenal protective functions against alloxan-induced type 1 diabetes mellitus (Ekechi, 2023b).

With the increased prevalence of marijuana use among adolescents and the high incidence of implications on health and the economy, evaluating the spectrum of marijuana use among adolescents would be very important. It will also be important to analyze the association between predisposing factors, reinforcing factors, enabling factors, and marijuana use. An efficient approach to prevent adolescent marijuana use would be very beneficial to both public health and the economy. Therefore, as part of the Sustainable Development Goals (SDG), this study would give clearer insights into the determinants and scope of marijuana use among adolescents and provide answers to strengthen the prevention of its use among adolescents especially those in secondary schools. In addition, this study will expose where further research can be done, and suggest areas where laws, policies, and interventions can be developed and implemented.

MATERIALS AND METHODS

Study Area

The study was conducted at Sagamu, the headquarters of Sagamu Local Government Area (LGA) in Ogun State, South-West Nigeria. With a land area of 68.03 km², it is surrounded by Odogbolu LGA in the east, Lagos State in the south, Ikenne LGA in the north, and Obafemi Owode LGA in the west. The major economic engagement of the locals is kolanut farming.

Study Population

The study population comprised adolescents between the ages of 11 and 19 who attended secondary schools located within the study area.

Sample Size

The Cochran formula for descriptive, cross-sectional, qualitative study was used:

$$\text{Sample size for large population } >10,000 = n = (Z^2 PQ)/d^2$$

Z = standard normal deviate (at 5% type 1 error) = 1.96

P = prevalence of drug use in Nigeria = 65% (Abudu, 2008)

Q = complementary proportion equivalent to = 1-P = 1-0.65 = 0.35

d = degree of accuracy desired (absolute precision) = 5% = 0.05

$$n = (1.96^2 \times 0.65 \times 0.35) / 0.05^2 = 359.57 \sim 360$$

With the inclusion of a 10% non-response rate, 396 students were later expected to be recruited for the study.

Sample Size Justification

The Cochran formula was appropriate for this descriptive, cross-sectional, qualitative study. A cross-sectional study could be qualitative or quantitative, with specific formulas

for each, and in situations where the study population is less or greater than 10,000 (Udeh, 2023c). The appropriate formula was used with a study population above 10,000, thereby justifying the sample size.

Inclusion and Exclusion Criteria

Respondents included students between the ages of 11 and 19 who consented to participate voluntarily. Students outside the age range who did not consent to participate voluntarily were excluded.

Study Design

All the secondary schools in Sagamu were listed. The engaged secondary schools were selected using simple random sampling by balloting. A proportionate sampling technique was used to derive the number of participants per school, and a systematic sampling technique was used to get the number of students needed from each school. Structured, self-administered questionnaires were presented to the respondents and the sections included the socio-demographic characteristics, knowledge of marijuana use, attitude towards marijuana use, and associated factors (reinforcing and enabling) for marijuana use. The questionnaire was validated by face validity, item validity, and construct validity. The questionnaire was confirmed reliable after a pilot study was conducted with 10% of the sample size among students outside the study area. Also, the Cronbach alpha analysis was 0.72.

Data Analysis

Participants responded to the questions on knowledge with a "Yes" or "No". The attitude, reinforcing, and enabling factors were responded to, using a four-point Likert scale. The Likert scale rating was calculated by multiplying the highest point by the number of variables. The hypotheses were tested with Pearson correlation and linear regression analysis at p-value < 0.05. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23.

Ethical Considerations

The Babcock University Health Research Ethical Committee (BUHREC) granted permission to conduct this study. The Ministry of Education at Sagamu, and the secondary schools involved also permitted the conduct of this study. Each participant individually consented willingly, and all data extracted were kept confidential.

RESULTS AND DISCUSSIONS

Eight questionnaires were invalid as the participants did not fill in the parameters asked, giving a 98% response rate. The results are presented below in tables and figures.

Table 1: Socio-demographic characteristics of the respondents (n=388)

Socio-demographic variables considered	Respondents in this study (n=388)	
	Frequency(n)	Percentage (%)
Age (in years)		
11-13	19	4.9

14-16	295	76.0
17-19	74	19.1
Mean age (\bar{x}) = 15.46±1.37		
Gender		
Male	170	43.8
Female	218	56.2
Religion		
Christianity	289	74.5
Islam	96	24.7
Traditional	3	0.8
Class		
SS1 (Grade 10)	110	28.4
SS2 (Grade 11)	138	35.6
SS3 (Grade 12)	140	36.1
Ethnicity		
Yoruba	326	84.0
Igbo	45	11.6
Hausa	7	1.8
Others	10	2.6
Father's educational level		
No formal education	18	4.6
Elementary school	30	7.7
Secondary school	153	39.4
HND/University	129	33.2
Postgraduate	58	14.9
Mother's educational level		
No formal education	15	3.9
Elementary school	34	8.8
Secondary school	176	45.4
HND/University	110	28.4
Postgraduate	53	13.7

A majority (76.0%) of the students were between ages 14-16, with the mean age of respondents being 15.46±1.37 years. 218 (56.2%) were female, and the majority (74.5%) were Christians. The students were somewhat evenly distributed among the classes. However, the lowest number was in senior secondary school one (SS1) or Grade 10. 84.0% were Yorubas. Approximately 39.4% of

the respondents' fathers had secondary school education and less than half (45.4%) of their mothers had secondary school education.

Predisposing Factors to Marijuana Use among the Respondents

Virtually all (96.1%) of the respondents have heard of

Table 2: Respondents' knowledge about marijuana use (n=388)

Socio-demographic variables considered	Respondents in this study (n=388)	
	Frequency(n)	Percentage (%)
Have you heard about marijuana before?		
Yes	373	96.1
No	15	3.9
My knowledge about marijuana is from		
Family members	22	5.7
Friend	54	13.9

Media	107	27.6
School	205	52.8
Marijuana is an illicit drug.		
Yes	373	96.1
No	15	3.9
Marijuana is used to treat mental disorders like anxiety at a low dose.		
Yes	316	81.4
No	72	18.6
Using marijuana is harmful to health.		
Yes	371	95.6
No	17	4.4
Addiction is an effect of marijuana use.		
Yes	362	93.3
No	26	6.7
*Forms of marijuana use		
Cigarette	275	33.0
Powder	245	29.4
Liquid	112	13.4
Eating/Chewing	89	10.7
Inhalable vapor	112	13.4
*Marijuana used can result to		
Anxiety	97	18.4
Poor judgment	71	13.5
Death	85	16.1
Increased appetite	93	17.6
Cancer	181	34.3

Note: * indicates questions with multiple response

marijuana use before the study. More than half (52.8%) of the respondents knew about marijuana from school, while only 5.7% knew about marijuana from family members. A majority (96.1%) of the respondents knew that marijuana is an illicit drug and 81.4% of them knew that marijuana is used to treat mental disorders like anxiety when administered at a low dose. A majority (95.6%) of the respondents knew that marijuana is harmful to health.

93.3% of the respondents knew that addiction is an effect of marijuana use.

Concerning forms of marijuana use, cigarette (33.0%) and powder (29.4%) forms were the most popularly known forms among the respondents. Other forms were known by just a few number of the respondents viz liquid (13.4%), eating/chewing (10.7%), and inhalable vapor (13.4%).

Table 3: Respondents' attitude towards marijuana use (n=388)

S/No.	Items	SA	A	D	SD
		n (%)	n (%)	n (%)	n (%)
1	My family and friends use it, therefore, I should do so too.	9(2.3)	8(2.1)	87(22.4)	284(73.2)
2	I will openly discuss about marijuana use among adolescents.	100(25.8)	161(41.5)	65(16.8)	62(15.9)
3	I believe marijuana boosts self-confidence.	34(8.8)	64(16.5)	108(27.8)	182(46.9)
4	I would likely use marijuana because it helps the brain to function better.	5(1.3)	8(2.1)	89(22.9)	286(73.7)
5	I will make use of small quantities of marijuana since it is not dangerous.	7(1.8)	12(3.1)	94(24.2)	275(70.9)
6	I do not like my friends using marijuana.	189(51.3)	88(22.7)	36(9.3)	65(16.7)

Note: SA (Strongly Agree, 3); A (Agree, 2); D (Disagree, 1); SD (Strongly Disagree, 0). Likert rating scale = 3×6 = 18

Most (73.2%) of the respondents strongly disagreed that they should use marijuana because their family and friends use it. 67.3% of the respondents either strongly agreed or agreed that they can openly discuss marijuana use among adolescents. 27.8% of the respondents disagreed that marijuana boosts self-confidence whereas 46.9% strongly disagreed. A majority (73.7%) of the respondents strongly disagreed that they would use marijuana because

it helps the brain to function better. Most (70.9%) of the respondents strongly disagreed that they would make use of small quantities of marijuana since it is not dangerous. More than half (51.3%) of the respondents strongly agreed that they do not like their friends to use marijuana.

Reinforcing and Enabling Factors for Marijuana Use among the Respondents

Table 4: Respondents’ reinforcing and enabling factors for marijuana use (n=388)

S/No.	Items	SA	A	D	SD
		n (%)	n (%)	n (%)	n (%)
1	Peer influence is not a consideration in adolescents’ marijuana use	44(11.3)	75(19.3)	119(30.7)	150(38.7)
2	Family and siblings’ use of marijuana may encourage adolescents to use it	79(20.4)	103(26.5)	66(17.0)	140(36.1)
3	Easy access to marijuana may aid its use	92(23.7)	148(38.1)	64(16.5)	84(21.7)
4	Marijuana’s low cost enables one to easily access the substance	81(20.9)	127(32.7)	92(23.7)	88(22.7)
5	The school environment supports adolescents’ marijuana use	14(3.6)	18(4.6)	75(19.3)	281(72.5)
6	Enforcing substance use regulations and policies will reduce marijuana use	149(28.4)	132(34.0)	43(11.1)	64(26.5)

Note: Items 1 and 2 are reinforcing factors; Items 3-6 are enabling factors; SA (Strongly Agree, 3); A (Agree, 2); D (Disagree, 1); SD (Strongly Disagree, 0). Likert rating scale = 3×6 = 18

38.7% strongly disagreed and 30.7% only disagreed that peer influence is not a consideration in adolescents’ marijuana use. Few (20.4%) of the respondents strongly agreed that family and siblings’ use of marijuana may encourage adolescents to use marijuana. Approximately 23.7% of the respondents strongly agreed that easy access to marijuana aids its use. The respondents almost equally agreed and disagreed that the low cost of marijuana enables one to easily access the substance. Most (72.4%) of the respondents strongly disagreed that the school environment supports adolescents’ marijuana use. Few (28.4%) of the respondents strongly agreed

that enforcing substance use regulations and policies will reduce marijuana use.

The respondents’ attitude towards marijuana use measured on an 18-point rating scale showed that the respondents’ mean score was 13.98±2.52, translating to an attitudinal prevalence of 77.6% which means that only 77.6% of the respondents have a positive attitude towards marijuana use (see Table 5). In addition, on an 18-point rating scale, the reinforcing and enabling factors for marijuana use among the respondents had a mean score of 8.77±3.20 which means that these factors can influence 48.7% of the respondents (See Table 5).

Table 5: Summary of descriptive statistics of variables in the study

Variables	Maximum Points on a Scale of Measure	Respondents in this study (n=388)		Prevalence (%)
		\bar{x} (S.E.)	±SD	
Attitude towards marijuana use	18	13.98(0.13)	2.52	77.6
Reinforcing and enabling factors	18	8.77(0.16)	3.20	48.7

Table 6: Table 6: Relationship between predisposing factors (level of knowledge and attitude), reinforcing factors (peer influence and family influence), and enabling factors with marijuana use among the respondents

Hypotheses	Factors	Variables	Marijuana use; (n=388)	
			R	p-value
1	Predisposing	Level of knowledge	0.14	0.79**
		Attitude towards marijuana use	-0.05	0.30**
2	Reinforcing	Peer influence	0.11	0.03*
		Family influence	-0.29	0.57**

3	Enabling	Easy access to marijuana	-0.09	0.69**
		Affordability of marijuana	-0.02	0.59**
		School support for non-use	0.06	0.18**
		Policies on marijuana use	-0.03	0.55**

Note: * = statistically significant; **= not statistically significant

Table 7: Association between peer influence and marijuana use among the respondents

Variable	Marijuana use					
	Respondents in this study (n=388)					
Peer influence	R	R ²	B	Beta	F	p-value
	0.105	0.011	0.245	0.245	4.311	0.039

Test of Hypotheses

Pearson correlation and linear regression analysis were conducted at a 0.05 level of significance. At $p \leq 0.05$, the null hypothesis was rejected and the alternate hypothesis was accepted. On the other hand, with $p > 0.05$, the null hypothesis was accepted and the alternate hypothesis was rejected.

Hypothesis 1

H_0 : There is no significant relationship between predisposing factors and marijuana use among adolescents.

H_1 : There is a significant relationship between predisposing factors and marijuana use among adolescents.

Result

As seen in Table 6, the respondents' predisposing factors (knowledge [R=0.14; $p=0.79$], and attitude [R=-0.05; $p=0.30$]) had a p -value > 0.05 , thus confirming H_0 and rejecting H_1 . Therefore, there is no significant relationship between predisposing factors and marijuana use among adolescents.

Hypothesis 2

H_0 : There is no significant relationship between reinforcing factors (peer influence and family influence) and marijuana use among adolescents.

H_1 : There is a significant relationship between reinforcing factors (peer influence and family influence) and marijuana use among adolescents.

Result

As seen in Tables 6 and 7, peer influence has $p < 0.05$ while family influence has $p > 0.05$. This means that there is a significant relationship between peer influence and marijuana use. On the other hand, there is no significant relationship between family influence and marijuana use.

Hypothesis 3

H_0 : There is no significant relationship between enabling factors and marijuana use among adolescents.

H_1 : There is a significant relationship between enabling factors and marijuana use among adolescents.

Result

Table 6 shows that easy access to marijuana, affordability of marijuana, school support for non-use of marijuana, and policies on marijuana use, all had a p -value > 0.05 , thus confirming H_0 and rejecting H_1 . Therefore, there is no significant relationship between enabling factors and marijuana use among adolescents.

DISCUSSION

Adolescents in high school tend to be exposed to various vices like alcohol abuse, illicit drug use, smoking, prostitution, etc by their peers. To shy away from segregation or avoid being termed weak, some of them bend to peer influence and get engaged in these bad habits. In this study, the spectrum of adolescent marijuana use including associated factors, determinants and scope among adolescents attending secondary schools in Sagamu, South-West Nigeria were evaluated.

This study shares similar socio-demographic characteristics with that of another study (Almahdi, 2018). The similarities are that most of the respondents were 14-16 years old, and female respondents were more than males. Sagamu is the headquarters of Sagamu Local Government Area (LGA) in Ogun State, South-West Nigeria. South-West Nigeria is a geopolitical zone, occupied and dominated by the Yoruba tribe. This fact explains why most (84.0%) of the respondents were Yorubas. Less than half of the parents had university degree or postgraduate qualification. Fathers achieved this feat as 48.1% of them either had a first degree or a postgraduate degree, as against 42.1% of the mothers.

The data obtained on the predisposing factors (knowledge and attitude towards marijuana use) indicated that a majority (92.5%) of the respondents have a high basic knowledge of marijuana use and 77.6% of them have a positive attitude towards marijuana use. This result on knowledge is similar to the finding of another study which reported that most of the school-going adolescents in Ramotswa, Botswana are aware of substance use and abuse (Gotsang, 2017). However, unlike this study which showed that the highest number of the students first learned about marijuana in school, most of the students in Ramotswa learned about marijuana from television.

An international prospective study on the knowledge and attitude of adolescents to marijuana use also showed that 20% of the respondents admitted not being knowledgeable about marijuana while the remaining 80% only had partial knowledge of marijuana (Jacobs, 2021). As only a few of them could identify the forms of marijuana; therefore, the level of knowledge does not translate to respondents using marijuana. It was also reported that 40% of secondary school students in Oyo State, Southwest Nigeria had positive attitude towards substance use (Ajibola, 2018) which is lower than the 77.6% reported in this study. The high values reported on knowledge and attitude in this study could be attributed to the measures the schools are currently taking to enlighten their students on substance use and its adverse effects.

The reinforcing and enabling factors were evaluated to likely influence 48.7% of the respondents in this study. The reinforcing factors made up of peer influence and family influence are similar to the variables evaluated by another study on the assessment of alcohol and substance use among undergraduates in Southwest Nigeria (Adekeye, 2012). The answers on the enabling factors including easy access to marijuana, its affordability, school support for non-use of marijuana, and policies on marijuana use were distributed almost evenly among the respondents. This divided opinion explains why the reinforcing and enabling factors could influence almost half (48.7%) of the respondents.

The prevalence rate of marijuana use among the respondents was low as approximately 30 (7.2%) out of the 388 agreed to have either used or are currently using marijuana. A different study reported a higher prevalence rate and found that 65% of high school students in Nigeria use substances like tobacco, alcohol, cannabis, etc. (Abudu, 2008). This nationwide analysis showed that students use these drugs for a good time with their pals (Abudu, 2008). A similar study in Sagamu, this study area, reported a 76% prevalence rate among secondary school students (Ojieabu, 2017), and a 17.4% prevalence rate of substance use among students in Ramotswa, Botswana has also been reported (Gotsang, 2017). Another study reported 2% prevalence rate of marijuana use among school-going adolescents in eight Sub-Saharan African countries: Benin, Ghana, Liberia, Mauritius, Mozambique, Namibia, Seychelles, and Tanzania (Kugbey, 2023).

The test of Hypothesis 1 in this study revealed that there is no significant relationship between predisposing factors (knowledge and attitude) and marijuana use among adolescents. This means that knowledge and attitude are not significant determinants of marijuana use, a hypothesis supported by the findings of another study (Duru, 2017) which stated that predisposing factors do not influence substance use. However, another study has reported that there is a significant relationship between knowledge and marijuana use (Kugbey, 2023). Adolescence comes with various challenges. A child acquires knowledge as he grows. However, due to the curious nature of adolescents, they tend to indulge in

some acts they categorically know have implications. This explains why the high knowledge and positive attitude do not significantly determine marijuana use by the respondents.

The test of Hypothesis 2 showed that peer influence is a significant determinant of marijuana use ($p < 0.05$), whereas family influence is not ($p > 0.05$). The findings on reinforcing factors in this study are almost similar to that of another study which stated that both parental use and peer influence have no significant contribution ($p > 0.05$) to student's use of alcohol and other substances including marijuana (Adekeye, 2015). As adolescents progress to secondary school, they spend more time with their friends at school as their time at home reduces. This idea gives insight to why peer influence could significantly determine marijuana use and family influence could not. Strict training by a parent that uses marijuana may likely make an adolescent not use marijuana, but once there is an interaction with friends that use it, such an adolescent may choose to have a taste of it due to adolescent curiosity.

Finally, the test of Hypothesis 3 in this study showed that the enabling factors are not significant determinants of marijuana use among the respondents. Prospects for further research will be to recommend that socio-demographic variables like age, gender, religion, family size, and family income be statistically analyzed to identify their significant relationships with marijuana use.

CONCLUSION

Peer influence was the only significant determinant of marijuana use among adolescents attending secondary schools in Sagamu, South-West Nigeria. Other determinants e.g. knowledge, attitude, family or siblings' use of marijuana, easy access to marijuana, low cost of marijuana, school support for non-use of marijuana, and policies on marijuana use are not significant determinants of marijuana use among adolescents. The scope of marijuana use in this study includes the prevalence rate of marijuana use, which was low (7.2%), and the purpose of marijuana use, which was mainly for exam success.

Even though the variables that make up the predisposing, reinforcing (except peer influence), and enabling factors have no significant relationship with marijuana use; nevertheless, 48.7% is a huge figure to ignore. Therefore, families, schools, and governments must contribute their quota in reducing marijuana use among adolescents.

Acknowledgments

Special thanks to all secondary school students in Sagamu, South-West Nigeria who voluntarily consented to participate in this study after making an informed decision. Their assistance in conducting this research is highly appreciated.

REFERENCES

Abudu, R. V. (2008). Young people and drugs abuse. Biennial International Conference on Alcohol, Drugs

- and Society in Africa, 23rd - 25th July 2008, Abuja, FCT, Nigeria.
- Adekeye, O. (2012). Knowledge level and attitude of school-going male adolescents toward drug use and abuse. *Kotangora Journal of Education*, 12, 122-130. Kotangora, Niger State, Nigeria.
- Adekeye, O. A., Adeusi, S. O., Chenube, O. O., Ahmadu, F. O., & Sholarin, M. A. (2015). Assessment of alcohol and substance use among undergraduates in selected private universities in Southwest Nigeria. *IOSR Journal of Humanities and Social Science*, 20(3), 1-7.
- Ajibola, I. A., Aremu, A., & Ayotunde, O. (2018). Substance abuse among students in selected secondary schools of an urban community of Oyo State, Southwest Nigeria: Implication for policy action. *African Journals Online*, 18(3), 776-785. <https://doi.org/10.4314/ahs.v18i3.36>.
- AKannam, T. (2008). North-West ranks highest in drug addiction. Nigerian Drug Statistics by Zone. Available online: <http://www.nairaland.com/203955/nigerian-drug-statistics-zone>
- Almahdi, H. M., Ali, R. W., Nasir, E. F., & Åström, A. N. (2018). Socio-cognitive correlates of intention to use Toombak: A cross-sectional study among students (13-16 years) in Khartoum State, Sudan. *BMC Public Health*, 18(88), 1-9. <https://doi.org/10.1186/s12889-017-4606-z>.
- Ama, M. I., Ikwuka, A. O., Udeh, F. C., Ekechi, H. O., & Eteudo, A. N. (2023). Sperm Parameters and Testicular Histology of Male Wistar Rats Treated with Phoenix dactylifera After Consumption of Local Mmahi Salt. *American Journal of Bioscience and Bioinformatics*, 2(1), 41-51. <https://doi.org/10.54536/ajbb.v2i1.2275>.
- Baysah, P. V., Ikwuka, A. O., Udeh, F. C., Bleh, D. P., & Vilorio, T. (2023). Pathophysiological effects of alcohol and tobacco consumption on semen parameters of men attending a fertility clinic in West Africa. *American Journal of Biomedical and Life Sciences*, 11(4), 73-81. <https://doi.org/10.11648/j.ajbls.20231104.13>.
- Centers for Disease Control and Prevention. (2023). Marijuana and Public Health: Health Effects. Available online: <https://www.cdc.gov/marijuana/index.htm>
- Center on Addiction and Substance Abuse (2011). Adolescent Substance Use: America's #1 Public Health Problem. The National Center on Addiction and Substance Abuse at Columbia University. Available online: <https://cdn-01.drugfree.org/web/prod/wp-content/uploads/2011/06/19202754/Adolescent-substance-use-americas-no-1-public-health-problem.pdf>
- Duru, C. B., Oluoha, U. R., Okafor, C. C., Diwe, K. C., Iwu, A. C., Aguocha, C. M., Ohale, I., & Nwaigbo, E. (2017). Socio-demographic determinants of psychoactive substance use among students of tertiary institutions in Imo State, Nigeria. *Journal of Addiction Research & Therapy*, 8(345), 1-9. <https://doi.org/10.4172/2155-6105.1000345>.
- Ekechi, H. O., Ikwuka, A. O., Udeh, F. C., & Abraham, J. C. (2023)a. Effects of Ethanol Extract of Rauwolfia vomitoria Leaf on Lipid Profile and Cerebellar Histology in Cisplatin-induced Oxidative Stress. *British Journal of Medical and Health Research*, 10(5), 16-39. <https://doi.org/10.5281/zenodo.8042521>.
- Ekechi, H. O., Ikwuka, A. O., Udeh, F. C., Epete, M. A., & Uche, V. U. (2023)b. Hepatorenal Protective Functions of Coconut Water in Alloxan-Induced Type 1 Diabetes Mellitus. *World Journal of Current Medical and Pharmaceutical Research*, 5(4), 114-122. <https://doi.org/10.37022/wjcmpr.v5i4.276>.
- English, F., & Whitehill, J. M. (2023). Risk factors for adolescent cannabis use in a state with legal recreational cannabis: The role of parents, siblings, and friends. *Clinical Therapeutics*, 45(6), 589-598. <https://doi.org/10.1016/j.clinthera.2023.04.002>.
- European Monitoring Center for Drugs and Drug Addiction (EMCDDA). (2023). European drug report 2023: Trends and developments. Available online: https://www.emcdda.europa.eu/publications/european-drug-report/2023_en
- Global Burden of Disease Collaborative Network. (2015). Global burden of disease study 2013 (GBD 2013): incidence, prevalence, and years lived with disability 1990-2013. Institute for Health Metrics and Evaluation (IHME). Available online: <https://ghdx.healthdata.org/record/ihme-data/gbd-2013-incidence-prevalence-and-ylds-1990-2013>
- Gloss, D. (2015). An overview of products and bias in research. *Neurotherapeutics*, 12(4), 731-734.
- Gotsang, G., Mashalla, Y., & Seloilwe, E. (2017). Perceptions of school-going adolescents about substance abuse in Ramotswa, Botswana. *Journal of Public Health and Epidemiology*, 9(6), 151-160. <https://doi.org/10.5897/JPHE2017.0930>.
- Ikwuka, A. O. (2015). Risk factors for the pathogenesis of diabetes mellitus type 2. *Materials of 84th Scientific and Practical Conference of Students and Young Scientists with International Participation "Innovations in medicine"*, p. 19. Available online: http://www.ifnmu.edu.ua/images/snt/files/konferenciya/Tezu_2015.pdf
- Ikwuka, A. O. (2017)a. Dyslipidemia risk severity in patients with diabetes mellitus type 2 and essential hypertension. *Journal of the 21st International Medical Congress of Students and Young Scientists*, p. 59.
- Ikwuka, A. O. (2017)b. Effectiveness of dapagliflozin in patients with diabetes mellitus type 2 and essential hypertension. *Book of abstracts of the 7th International Students' Scientific Conference of Young Medical Researchers*, p. 102. Available online: http://www.stn.umed.wroc.pl/files/lm/Accepted_papers.16113.pdf
- Ikwuka, A. O. (2017)c. Influence of dyslipidemia in patients with diabetes mellitus type 2 and essential hypertension. *The Pharma Innovation Journal*, 6(3), 101-103. Available online: <http://www.thepharmajournal.com/archives/?year=2017&vol=6&issue=3&part=B>
- Ikwuka, A. O., & Haman, I. O. (2017)d. Features of

- kidney damage in patients with diabetes mellitus type 2 and essential hypertension. *Journal of 86th Scientific and Practical Conference of Students and Young Scientists with International Participation "Innovations in medicine"*, p. 144. Available online: [http://www.ifnm.edu.ua/images/snt/86-konf-tezi%20\(1\).pdf](http://www.ifnm.edu.ua/images/snt/86-konf-tezi%20(1).pdf)
- Ikwuka, A. O., Virstyuk, N. G., & Luchko, O. R. (2017)e. Features of the functional state of kidneys in patients with diabetes mellitus type 2 and essential arterial hypertension. *Materials of scientific-practical conference with international participation "Babenkivski reading"*, p. 48.
- Ikwuka, A. O. (2018)a. Clinical dynamics in patients with diabetes mellitus type 2 and concomitant essential hypertensive disease treated with dapagliflozin. *Journal of the 22nd International Medical Congress of Students and Young Scientists*, p. 32.
- Ikwuka, A. O. (2018)b. Clinical effectiveness of SGLT-2 inhibitors in patients with diabetes mellitus type 2 and essential hypertensive disease. *Endocrine Practice*, 24(1), 74. [https://doi.org/10.1016/S1530-891X\(20\)47129-0](https://doi.org/10.1016/S1530-891X(20)47129-0).
- Ikwuka, A. O. (2018)c. Features of kidney damage in patients with arterial hypertension and type 2 diabetes mellitus and optimization of treatment. *Specialized Academic Council IFNMU*, Available online: http://www.ifnm.edu.ua/images/zagalna_informacia/spec_vcheni_radi/2017-2019/%D0%9420.601.01/Ikwuka/Avtoreferat.pdf
- Ikwuka, A. O., & Paliy, Yu. (2018)d. Structural changes of the left ventricular myocardium in patients with essential arterial hypertension and diabetes mellitus type 2. *Abstracts of the 87th Scientific Conference of Students and Young Scientists with International Participation "Innovations in medicine"*, p. 25-26. Available online: https://www.ifnm.edu.ua/images/snt/zaproshehnia_eng.pdf
- Ikwuka, A. O. (2019)a. Clinical dynamics of nephropathy in patients with diabetes mellitus type 2 and concomitant essential hypertensive disease. *Clinical Medicine*, 19(2), s39. <https://doi.org/10.7861/clinmedicine.19-2-s39>.
- Ikwuka, A. O. (2019)b. Clinical effectiveness of GLP-1 RAs in patients with metabolic syndrome diseases. *Endocrine Practice*, 25(1), 104-105. [https://doi.org/10.1016/S1530-891X\(20\)46611-X](https://doi.org/10.1016/S1530-891X(20)46611-X).
- Ikwuka, A. O., & Virstyuk, N. G. (2019)c. Pattern of cardiac remodelling of the left ventricle in patients with essential hypertensive disease and concomitant type 2 diabetes mellitus. *Clinical Medicine*, 19(3), s92. <https://doi.org/10.7861/clinmedicine.19-3-s92>.
- Ikwuka, A. O., & Virstyuk, N. G. (2021). Influence of SGLT2 inhibitor and A2RB (AT1) on fibrogenesis and heart failure in patients with essential hypertensive disease combined with diabetes mellitus type 2. E-Poster No. 143 of the 44th & 45th Annual General and Scientific Meeting of the West African College of Physicians (WACP), 1 - 3 November, 2021. <https://doi.org/10.13140/RG.2.2.26912.87047>.
- Ikwuka, A. O., & Virstyuk, N. (2022). Prognostic markers of nephropathy in patients with dual metabolic syndrome diseases (essential hypertensive disease and concomitant type 2 diabetes mellitus). *Endocrine Practice*, 28(5), S65-S66. <https://doi.org/10.1016/j.eprac.2022.03.164>.
- Ikwuka, A. O. (2023)a. *Dr. Aloy's Core Essential Series (DACES) Medical Genetics*. 1st Edition. Science and Education Publishing, USA, p. 15. ISBN: 978-1-958293-02-7.
- Ikwuka, A. O. (2023)b. *Dr. Aloy's Core Essential Series (DACES) Immunology*. 1st Edition. Science and Education Publishing, USA, p. 30. ISBN: 978-978-795-866-7.
- Ikwuka, A. O., & Virstyuk, N. (2023)c. Patterns and Influence of Cardio-Metabolic Insufficiency in Patients with Essential Hypertensive Disease and Concomitant Type 2 Diabetes Mellitus. *Endocrine Practice*, 29(5), S32-S33. <https://doi.org/10.1016/j.eprac.2023.03.076>.
- Ikwuka, A. O., Virstyuk, N. G., Luchko, O. R., & Kobitovych, I. (2023)d. Heterogeneity Of Renal Pathogenicity On The Background Of Asymptomatic Hyperuricemia In Patients With Dual Metabolic Syndrome Diseases (Essential Hypertensive Disease and Type 2 Diabetes Mellitus). *British Journal of Medical and Health Research*, 10(2), 1-9. <https://doi.org/10.5281/zenodo.7690636>.
- Ikwuka, A. O. (2023)e. *Dr. Aloy's Core Essential Series (DACES) Hematology*. 1st Edition. Science and Education Publishing, USA, p. 84. ISBN: 978-1-958293-09-6.
- Ikwuka, A. O., Omoju, D. I., & Mahanera, O. K. (2023) f. Profiling of Clinical Dynamics of Type 2 Diabetes Mellitus in Patients: A Perspective Review. *World Journal of Current Medical and Pharmaceutical Research*, 5(5), 210-218. <https://doi.org/10.37022/wjcmpr.v5i5.294>.
- Ikwuka, A. O., Virstyuk, N., Luchko, O., & Kobitovych, I. (2024). Optimization of treatment in MSD patients using a combination of HMG-CoA reductase inhibitor, SGLT-2 inhibitor and A2RB (AT1): Resultant clinical effectiveness. *Endocrine Practice*, 30(5), S60-S61. <https://doi.org/10.1016/j.eprac.2024.03.243>.
- Jacobs, G. P., Golshan, T., Lande, S., Nickfardham, K., Roitblat, Y., Morgan, A., Mayo, T., Mametov, K., Nehuliaieva, L., & Shterenshis, M. (2021). Knowledge and attitude of adolescents to marijuana: an international prospective study. *Children and Youth Services Review*, 131(2), 106306. <https://doi.org/10.1016/j.chilyouth.2021.106306>.
- Kugbey, N. (2023). Prevalence and correlates of substance use among school-going adolescents (11-18 years) in eight Sub-Saharan African countries. *Substance Abuse Treatment, Prevention, and Policy*, 18(1), 44 -52. <https://doi.org/10.1186/s13011-023-00542-1>.
- Musa, S., Ikwuka, A. O., Udeh, F. C., Musa, A. A., &

- Chukwuezie, U. C. (2023). CRISPR-Cas9 Genomic Editing as an Innovation in the Management of Sickle Cell Disease: A Systematic Review. *American Journal of Medical Science and Innovation*, 2(2), 36-48. <https://doi.org/10.54536/ajmsi.v2i2.1760>.
- National Academies of Sciences, Engineering, and Medicine. (2017). *The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24625>.
- National Center for Complementary and Integrative Health. (2018). Marijuana and cannabinoids. Available online: <https://nccih.nih.gov/health/marijuana>
- National Center for Drug Abuse Statistics. (2024). Marijuana Addiction: Rates & Usage Statistics. Available online: <https://drugabusestatistics.org/marijuana-addiction/>
- Ojieabu, W. A., Eze, U. I. H., Ojieabu, C. I., & Osunkoya, O. K. (2017). Substance abuse in Sagamu Local Government of Ogun State. *Nigerian Journal of Pharmaceutical Research*, 11(1), 140-146. Available online: www.ajol.info/index.php/njpr/article/view/163016
- Oriavwote, P. E., & Ikwuka, A. O. (2022). Patterns and factors influencing self-medication among students of the American International University West Africa (AIUWA), The Gambia. *European Journal of Clinical Medicine*, 3(2), 33-37. <https://doi.org/10.24018/clinicmed.2022.3.2.181>.
- Peterson, C., Li, M., Xu, L., Mikosz, C. A., & Luo, F. (2021). Assessment of annual cost of substance use disorder in US hospitals. *JAMA Network Open*, 4(3), e210242. <https://doi.org/10.1001/jamanetworkopen.2021.0242>.
- Statista. (2023). Estimated number of cannabis users worldwide from 2011 to 2021, by region. *Health, Pharma and Medtech*. John Elflein Publisher.
- Uche, V. U., Ikwuka, A. O., Udeh, F. C., Okorochoa, A. E., Epete, M. A., Ekechi, H. O., Abraham, J. C., & Igwe, E. C. (2023). Associated Risks and Pathogenic Effects of Consumption of Calcium Carbide-Ripened Banana Before and/or During Pregnancy on Maternal and Neonatal Livers. *American Journal of Food Science and Technology*, 2(2), 54-64. <https://doi.org/10.54536/ajfst.v2i2.2197>.
- Udeh, F. C., Ikwuka, A. O., Epete, M. A., & Igwe, E. C. (2023)a. Effects of Local Tobacco Snuff Ingestion during Pregnancy on Renal Functions and Histology Architecture of Female Wistar Rats and on the Birth Weight of Their Pups. *American Journal of Medical Sciences and Medicine*, 11(1), 1-5. <https://doi.org/10.12691/ajmsm-11-1-1>.
- Udeh, F. C., Ikwuka, A. O., Epete, M. A., & Igwe, E. C. (2023)b. Effects of Oral Consumption of Nicotiana Tabacum During Pregnancy on the Liver and Prolactin Levels of Adult Female Wistar Rats. *European Journal of Veterinary Medicine*, 3(2), 1-5. <https://doi.org/10.24018/ejvetmed.2023.3.2.93>.
- Udeh, F. C., Ikwuka, A. O., Nwandu, T. C., Ewunonu, E. O., Egwu, O. A., Ezinwa, G. A., & Anaetor, I. S. C. (2023)c. Human Anatomy Education: Knowledge, attitude, perception and challenges encountered by medical and nursing students in two Gambian Universities. *Journal of Tertiary Education and Learning*, 1(3), 29-38. <https://doi.org/10.54536/jtel.v1i3.2277>.
- United Nations Children's Emergency Fund. (2022). Investing in a safe, healthy and productive transition from childhood to adulthood is critical. *Adolescent*. Available online: <https://data.unicef.org/topic/adolescents/overview/>
- United Nations Office of Drugs and Crime. (2021). *World Drug Report 2021*. United Nations. Available online: <https://www.unodc.org/unodc/data-and-analysis/wdr2021.html>
- Vidot, D. C., Prado, G., Hlaing, W. M., Florez, H. J., Arheart, K. L., & Messiah, S. E. (2016). Metabolic Syndrome Among Marijuana Users in the United States: An Analysis of National Health and Nutrition Examination Survey Data. *The American Journal of Medicine*, 129, 173-179.
- Virstyuk, N. G., Ikwuka, A. O., Haman, I. O., & Adebomi, M. S. (2016). Diabetes mellitus type 2, arterial hypertension and dyslipidemia. *Materials of 2nd International Scientific and Practical Conference "Therapeutic readings: modern aspects of diagnosis and treatment of diseases of internal organs"*, p. 46-47.
- Virstyuk, N. G., & Ikwuka, A. O. (2017)a. Diagnostic and prognostic markers of the diabetes mellitus type 2 course in connection with essential arterial hypertension taking into account the kidney function. *Precarpathian Journal Pulse*, 8(44), 53-62.
- Virstyuk, N. H., Ikwuka, A. O., Losyuk, L. V., Kobrynska, O. Ya., & Markiv, H. D. (2017)b. Dapagliflozin utility in patients with diabetes mellitus type 2 and essential hypertensive disease. *Actual Problems of Modern Medicine*, 4(60)1, 76-79. Available online: http://www.umsa.edu.ua/journal2stat4_2017_eng.html
- Virstyuk, N. G., & Ikwuka, A. O. (2018)a. Features of asymptomatic hyperuricemia in patients with diabetes mellitus type 2 and concomitant essential arterial hypertension. *Clinical and Experimental Pathology*, 1(63), 22-26. <https://doi.org/10.24061/1727-4338.XVII.1.63.2018.5>.
- Virstyuk, N. G., Ikwuka, A. O., & Didushko, O. M. (2018) b. Effect of dapagliflozin on the level of uric acid during asymptomatic hyperuricemia in patients with diabetes mellitus type 2 and concomitant arterial hypertension. *Art of Medicine*, 1(5), 21-26. Available online: <https://art-of-medicine.ifnmu.edu.ua/index.php/aom/article/view/179/150>
- Virstyuk, N. H., & Ikwuka, A. O. (2018)c. Dapagliflozin influence on the clinical course of diabetes mellitus type 2 and essential hypertension in patients. *Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions*, p. 2007-2008. https://doi.org/10.1007/978-3-319-70548-4_582.

- Virstyuk, N. G., & Ikwuka, A. O. (2019). Nephropathic characteristics in patients with diabetes mellitus type 2 and essential hypertensive disease. *Art of Medicine*, 1(5), 44-47. DOI: 10.21802/artm.2019.1.9.44.
- Virstyuk, N. G., & Ikwuka, A. O. (2021)a. Asymptomatic hyperuricemia and functional state of the kidneys in patients with essential arterial hypertension and concomitant diabetes mellitus type 2. *European Journal of Clinical Medicine*, 2(3), 100-104. <https://doi.org/10.24018/clinicmed.2021.2.3.65>.
- Virstyuk, N. H., Ikwuka, A. O., Luchko, O. R., & Kocherzhat, O. I. (2021)b. Peculiarities of renal insufficiency in patients with diabetes mellitus type 2 and arterial hypertension. *Materials of scientific-practical conference with international participation "Achievements and prospects of experimental and clinical endocrinology" Twentieth Danilevsky readings*, p. 86-87.
- World Health Organization Alcohol, Drugs and Addictive Behaviours Unit. (2016). The health and social effects of non-medical cannabis use. *Cannabis*. Available online: https://www.who.int/substance_abuse/publications/cannabis_report/en/index4.html
- World Health Organization Alcohol, Drugs and Addictive Behaviours Unit. (2024). *Cannabis*. Available online: <https://www.who.int/teams/mental-health-and-substance-use/alcohol-drugs-and-addictive-behaviours/drugs-psychoactive/cannabis>