Archives of Educational Studies
Vol. 3, No. 2, Dec., 2023, 197-210
https://ares.pk/

Drug Abuse Deteriorating Cognitive Ability of Adult Learners Studying in Continuous Education in Sokoto, Nigeria

Yusuf Sarkingobir[1], *Dr. Aminu Umar Imam[2] & Ahmad Zayyanu[3]*

[1]Lecturer, Department of Environmental Education, Shehu Shagari University of Education, Sokoto, Nigeria.
E-Mail: superoxidedismutase594@gmail.com
[2]Head of Department of Biochemistry, Sokoto State University Sokoto, Nigeria. E-Mail: aminu.imam@ssu.edu.ng
[3]Lecturer, Sultan Abdurrahman College of Health Technology Gwadabawa, Sokoto State, Nigeria. E-Mail: jatauinitive@gmail.com

Abstract

Education is the most essential tool for developing all societies and individuals. In Nigeria, almost all levels of education are affected by drug abuse because of its all-pervasiveness. Thus, this work utilized a survey and Montreal Cognitive Assessment to determine the negative effect of drug abuse on the cognitive potential of adult learners studying in adult learning schools (continuing education), and the link/effect between drug abuse and anemia and, in turn, cognitive capacity was explored. Participants included 30 adult learners using cannabis and 30 non-drug. Additionally, 30 adult learners abusing cigarettes and their control (30 respondents) were examined using the Montreal Cognitive Assessment. Fifteen adult learners who were taking cigarettes and cannabis and were diagnosed with anemia, and 15 normal respondents were recruited. The scored mean marks were managed using the chi-square test, which revealed a significant difference at $p<0.05$. The cigarette abusers earned lower marks (545.0 ± 8.03) than their counterparts' controls (875 ± 2.87). The cannabis abusers scored lower marks (420.0 ± 35.59) compared to the normal individuals (854.0 ± 2.75). Likewise, anemic learners scored lower than the control. Thus, drug abuse may be linked to anemia and can affect cognition and, likely, the learning process. More measures are needed to address drug abuse in the region because poor cognition can easily affect

learning, education, and the overall potential of people and, in turn, hinder the growth and development of societies.

Keywords: *Heavy metals, education, adult education, drug abuse, cigarettes, cannabis, Sokoto.*

Introduction

No one argues that from the ancient time to date, education keys development as well as growth of societies and individuals (Akello & Lutwama-Rukundo, 2022). At all stages of human life, education is involved if successes and uprightness are needed. Therefore, at adult stage of life education shall not be abandoned (Akello & Lutwama-Rukundo, 2022). Adult education or learning give adults the right and composure to live throughout life stages. It is emphatic to prepare people for life achievement and challenges, to live prosperously, and to contribute meaningfully in growth and development of "self" and societies (Onyenemezu, 2012). In the same vein, adult education works to ensure literacy, continuing education, completion of education for all (irrespective of difficulties or differences) in any society or environment (Garba, 2012; Hiliya et al., 2022; Sarkingobir et al., 2022; Miya et al., 2023). Nowadays, like other stages of education, adult education is affected by all pervasive menace of drug abuse (Dsilva et al., 2023).

Nevertheless, adult continuing education gives members of any country the opportunity to be educated after secondary education by allowing citizens to be educated at polytechnics, universities, colleges etc. This system of education functions in uplifting the standard of the students/ learners and the societies through research, and inculcating knowledge (Waheed, 2016; Monday & Mallo, 2021). Human resources are developed for social and economic growth only through the path that ensures education of the adult members of the society, diffusing and creating knowledge, and developing a chunk of salubrious civilians that foster social progress and cohesion (Monday & Mallo, 2021). However, adult learners are affected by the prevalence of drug abuse in various societies of Nigeria; and particularly in Sokoto, drug abuse is of great concern to the entire education system (Ibrahim et al., 2022). Widespread drug abuse practice had been reported among higher education learners due to issues such as family factors, school factors, economic factors, psychology, and quasi. The drug abuse

scourge invariably spurs significant consequences such as poor learning, poor education, and health problems (such as kidney issues, liver problem, death) (Monday & Mallo, 2021).

Meanwhile, the brain is an entity of the nervous system (dealing with coordination and homeostasis) that possessed various regions that are responsible for diverse array of functions. For example, the regions of the brain specialized in craving for drugs are also responsible for cognitive activities such as reasoning, learning and memory (Gould, 2010). Thus, continuous use of drugs such as cigarette and cannabis could forcefully reduce cognitive ability on temporary or permanent basis. People who have been into drugs from childhood to adulthood are very vulnerable to the reduction in cognition due to the effects of drugs on centers or regions of the brain (Gould, 2010). Additionally, the regions or centers of the brain require some biochemical chemicals such as oxygen and micronutrients (Fe included) for proper functioning. These essential requirements are depleted in drug abusers due to the ability of drugs to incite anemia occasionally. From the forgone, it can be elucidated that, the cognition which is a pivotal part of learning in both children and adults can be affected by drug abuse or low Fe levels in the body due to poor nutrition or poor utilization of food nutrients caused by drug abuse (Michael & Thankachan, 2019). Moreover, the factor of drug abuse among students (adults and children) is a thing of concern that affects learning, because a learner must play vital role in promoting or limiting effective learning (Michael & Thankachan, 2019).

Meanwhile, cigarette and cannabis are among the dominantly use drugs in our societies. The duo drugs are carriers of various hazardous substances that affect the body in three different synergetic forms. Firstly, cannabis and cigarette chemicals cause mind alteration and in turns hampering the cognitive ability of adult learners (Nkporbu & Stanley, 2023). Secondly, cannabis and cigarette have the potential to cause harms upon the other parts of the body besides the brain and leading to morbidities or deaths. Morbidities cause hospitalizations or sickness that prevent learning or academic (Adeniyi, 2022). Thirdly, cannabis and cigarette inhibit the parts of the nervous system that control cognition and result in poor cognitive capacity (Umar et al., 2023a). Phytochemicals (such as antinutrients) are components of the cigarette and cannabis drugs that prevent proper intake

or usage of adequate nutrients by the body system. Poor nutrition of the brain affects cognition (Chukwuebuka & Chinenye, 2015; Dar et al., 2023). Similarly, heavy metals (such as lead, cadmium, etc) that might be present in cigarettes and cannabis due to pollution and contamination are able to cause neurological impairment that is negative to the cognitive capacity of adult learners (see Figure 1) (Aved et al., 2021; Balali-Mood et al., 2021; Al-Thani et al., 2023). Objectively, this work was designed to determine the effects of cigarettes and cannabis abuse on cognitive capacity of adult learners in Sokoto, Nigeria.

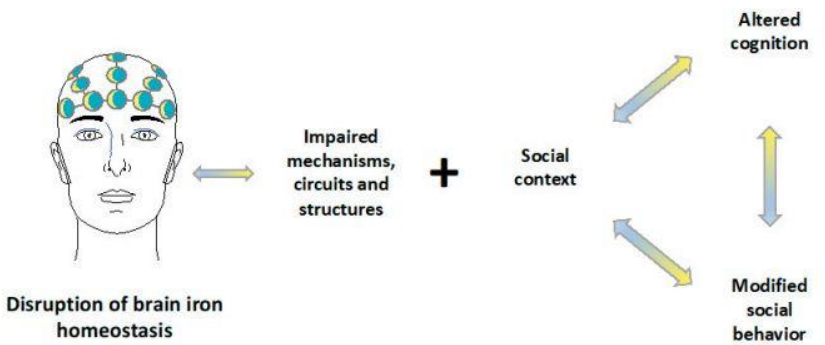

Figure 1: Disruption of iron metabolism facilitated by environmental factors such as nutrition of the body affects cognition, Source: Ferreira et al., 2019

Research Questions

The following research questions are developed for this study:

- What is the effect of cigarette drug abuse on cognitive ability of adult learners in continuing education in Sokoto?
- What is the effect of cannabis drug abuse on cognitive ability of adult learners in continuing education in Sokoto?
- What is the effect of anemia in drug abusers on cognitive ability of adult learners in continuing education in Sokoto?

Methodology

The study was conducted at Sokoto among some participants that are adult learners and are engaging in cigarette or cannabis abuse. 30 participants abusing cannabis, 30 abusing cigarette; while 60 controls were included. The participants' cognitive potential was studied with Montreal Cognitive

Assessment (MCA) according to methods of Zaky et al., (2021) and Roseweigh (2023). Furthermore, the 15 participants diagnosed in a hospital with Fe-deficiency anemia were compared with control participants using MCA.

Research Design

A survey fashion of research design was suitable for this work and was applied among a population of respondents that possessed the specifications of been drug abusers (taking cigarette and cannabis) and been adult learners in learning institutions in Sokoto, Nigeria.

Instrumentation

The Montreal Cognitive Assessment sheet was the major instrument used for this work.

Procedure

The process used in this work was Montreal Cognitive Assessment, a simple cognitive testing tool that determines mild cognitive problems by testing attention and concentrations, memory, executive functions, orientation, language, calculations, visuoconstructional skills, and thinking. The assessment is carried out in the timeframe of 10-15 minutes, and a score of 26 or 30 above is normal. The following tips were used (as indicated in Figure 2):

Alternating Trail Making

The respondent was asked to draw a line, starting from number 1 to letter A and up-to number 5 and letter E; without a line that cross or any error. The score is 0 if an error occurs.

Visuoconstructional Skills

The respondent was asked to draw a cube accurately. 1 point is given for a corrected drawing.

Visuoconstructional Skills of Clock

The respondent was instructed to draw a clock and set it at 10 past 11. Contour, numbers, and hands each had 1point mark.

Naming
Respondent was asked to name animals starting from lion, rhinoceros, and camel. One point is allocated for correct naming of any animal.

Memory
The administrator read 5 words during trail one, two, and three. After, the third reading, the respondent was asked to recall the words.

Attention
The administrator asked the respondent to read 5 numbers exactly as spoken. Then respondent was asked to repeat the words in backward. Respondent was asked to tap his hand at each letter A. Point was not given for more than 2 mistakes. Serial of Subtraction beginning at 100. 4 or 5 right subtractions scored 3 points; 2 or 3 right subtractions score 2 points; less than 2 correct subtractions score 0 point (See Figure 2).

Language
Two sentences (one after the other) were read and respondent was asked to repeat. Correct repetition earned 1 point. Then, respondent was asked to mention words beginning with letter F. 1 words per second are given 1 point.

Abstraction
Respondent tell the similarities between words such as banana and orange= fruit, train and bicycle= transport, watch and ruler= instruments

Delayed Recall
The respondent shall recall words with no cue; viz, face, velvet, church, Daisy, red. Each correct response had 1 point.

Orientation
The respondent was asked to tell the followings: date, month, year, day, place, city. Each correct answer earns 1 point.

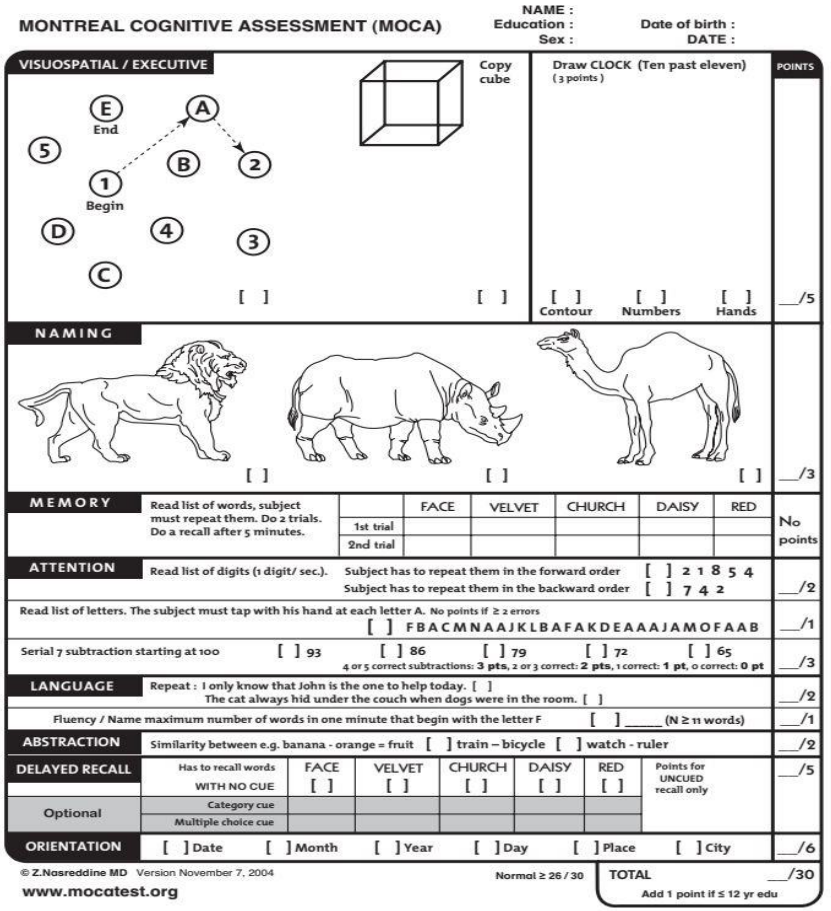

Figure 2: Showing a form used for MCA, Source: Montreal Cognitive Assessment, 2004.

Results and Discussion

The outcomes result of this study conducted to determine the effect of drugs on cognition and effect of anemia among (adut leraners) drug abusers on cognition in Sokoto were shown in Tables 1-3.

Table 1

Effects of cigarette abuse on cognitive ability of adult students in Sokoto, Nigeria

Participants	N (individuals)	Mean marks	Std	Chi-square	Remark

Cigarette consuming	30	545.0	8.0347	42.844	Significant
Non-drug users	30	875.0	2.875	1632.571	Significant
Total	60				

Source: Field data (2023)

Education is a key to achieving life goals of groups, individuals, and societies. Adult education is an education type conferring the right to education to the adult members of the societies. However, like other members of the society adults are affected by issue of drug abuse (Garba, 2012; Young et al., 2017; Paul & Aremu, 2020; Reis, 2021). Drug Abuse is a threat to education of youngsters and adults alike (Nasiru et al., 2019abc). Likewise, among the effects of the drugs, are their ability to alter mind or nervous system and in turns affect how humans learn (Adeniyi, 2022). This work analyzes the effects of drug abuse on cognition of adult individuals learning in continuing education in Sokoto, Nigeria.

Table 1 shows the effects of cigarette abuse on cognitive ability of adult learners in Sokoto. Therein, the cigarette abusers scored mean marks of 545.0, which regarded as mild or moderate amelioration on cognitive capacity of the subjects. The scored marks by cigarette smokers are lower than those of non-smokers; that earned 875.0 mean marks, which are within normal range of cognition. A similar report related in a cohort study revealed that, smoking incites cognition reduction in old people (Sabia et al., 2016). An observation of some cohorts pertaining effects of smoking, shows that, smoking affects both physical and cognitive abilities of people (North et al., 2015).

Table 2

Effects of cannabis abuse on cognitive ability of adult students in Sokoto, Nigeria

Participants	N (individuals)	Mean marks	Std	Chi-square	Remark
Cannabis consuming	30	420.0	35.590	27.143	Significant
Non-drug users	30	854.0	2.750	255.882	Significant
Total	60				

Source: Field data (2023)

Table 2 shows the effect of cannabis abuse among adults learners in Sokoto, Nigeria. Therein, the drug users earned 420.0 points which are within the moderately ameliorated cognitive capacity of the respondents. Additionally, it is lower than the earned points (854.0) obtained by non-drug users. The effects of cannabis abuse on cognition could not be a surprise, because many works related the potential impacts of cannabis on nervous system (Niloy et al., 2023). Parable, the Tetrahydrocannabinol (THC), component of cannabis is ralated to cause deficit in mind activities (Niloy et al., 2023). Associations between cannabis abuse and low academic capabilities were reported, because the drug reduces memory, planning, judgement, decision making, processing, cognitive function, and problem-solving abilities (Sultan et al., 2023).

Table 3

Effects of anemia on cognitive ability of adult students (drug abusers) in Sokoto, Nigeria

Participants	N (individuals)	Mean marks	Std	Chi-square	Remark
Anemic	15	180.0	10.0	2.222	Significant
Normal	315	394.0	1.95	80.416	Significant
Total	60				

Source: Field data (2023)

In Table 3, the results indicate anemic participants had a mean score of 180.0 compared to the 394.0 points scored by the control respondents. The finding is in-line with a work that revealed Fe supplementation in schooling-children causes positive improvement in intelligence, concentration, attention, and memory (Gutema et al., 2023). Zaky et al., (2021) in their work found out that, Fe-deficiency anemia in children elicits low intelligence quotient and in turns leads to neurocognitive disadvantage. It can putatively be reiterated that the drugs (cigarette and cannabis) contain chemicals that affect biological system or the nervous system in particular and in turn diminishing the cognitive capacity. Particularly, the drugs might contain antinutrients (phytoconstituents) or heavy metals that interfere with the proper intake or functioning of Fe. Likewise, the drugs cause diseases or ailments that affect the entire body including the brain (Cairo et al., 2014; Chukwuebuka & Chinenye, 2015;

Chandra & Ramachandra, 2019; Mamasoliev et al., 2020; Dar et al., 2023). Fe-deficiency anemia is due to low level of Fe in the body and a condition when hemoglobin falls below 130g/l (in men) or 120g/l (in female). The condition of Fe-deficiency anemia may be caused by nutritional problems among other things (Mamasoliev et al., 2020). It is believed that Fe-deficiency affects the brain in a number of ways. Firstly, it is believed that Fe-deficiency is linked to low brain Fe level and ultimately effects such as reduced neurotransmitters, and impaired functions of neurotransmitters. Secondly, it is believed that indirectly, Fe-deficiency elicit low oxygen condition in the brain. People in the state of low level of brain oxygen suffer from lack of attention, lack of response, low score, and poor interaction (Hulthen, 2003).

Generally, the negative effect of drugs on cognitive capacity of adult learners was in-line with other work elsewhere (Zhou, 2021). For instance, Abiodun (2023) who relates that secondary school students involvement in drug abuse is linked with effects on their academic performances. Additionally, Umar et al., (2023b) reveal that students of tertiary institutions are affected by drug abuse. Therewith, mind altering potential of drugs incite students to have deficits in behaviors and academic attainments as well. Drug abuse alters the mind/brain or the nervous system through the chemistry of drugs. For instance, drugs of abuse are able to cause effects on cognition by altering the higher areas of brain. Drugs affect learning, memory, and other cognitive functions; cannabis and tobacco are typical categories that alter mind (Vilchez, 2018).

Drugs act as xenobiotics and in turn leading to induction of xenobiotics metabolizing enzyme species, and on the other hand inhibiting many enzymatic activities vital for normal functioning of the body system (Castro, & Viana, 2018; Umar et al., 2023a). Parable, xenobiotics act by binding to macromolecules such as proteins, DNA, RNA, and in turn leading to injuries or deaths of cells. Xenobiotics can incite autoimmune responses and on some cases incite cancer. Thereafter, effects resulting from drugs cause morbidities that in turn cause deficit in overall functioning of body system and cognition (Abbaspour et al., 2014; Basaran & Can eke, 2017; Umar et al., 2023abc). It is important to use persuasive approaches to intervene among drugs abusers, and also to utilize strict legal measures to curb cigarette and cannabis supplies. The three research

questions were answered because, the results of this work indicated that cannabis abuse, cigarette abuse, anemia could affect cognition among the adult learners.

Conclusion

Learning can occur properly when the learner is okay. However, due to drug abuse learners are uneasy and in turn show poor performance and other educational achievements. This work shows that people using cigarette and cannabis scored less than controls. And some drug abusers had anemia and low cognition. Thus, drug abuse may cause anemia, and can affect the cognition and likely the learning process. More measures are needed to address drug abuse in the region, because poor cognition can easily affect learning, education as well as the overall potential of people in growth and development of societies.

Recommendations

The following recommendations are enumerated to douse drug abuse among adult learners in the state:

- The government should use all means at disposal to curtail supply of cigarette and cannabis among its citizens
- The teachers should use health belief model to incite learners to persuade learners shun or rescind drug abuse
- Religious injunctions should be utilized to preach against drug abuse among citizens

References

Abbaspour, N., Hurrell, R. & Kelishadi, R. (2014). Review on iron and its importance for human health. *Journal of Research in Medical Science*, 19(2), 164-174.

Abiodun, E.O. (2023). Drug abuse involvement and secondary school in Kwara state. *EKSU Journal of Multidisciplinary Studies*,1(1),1-6.

Adeniyi, A.O. (2022). Effect of drug abuse on the academic performance of secondary school students in Nigeria. *European Journal of Biology and Medical Science Research*, 10(3), 72-79.

Akello, J.A., Lutwama-Rukundo, E. (2022). Adult learning: A alternative gateway to women's education in Hango region, Northern Uganda. *International Journal of Education, Training and Learning*, 6(2),26-32.

Al-Thani, G., Ibrahim, A.E., Alomairi, M., Salman, B.I., Hegazy, M.M., Al-Harrasi, A., & El-Deeb, S. (2023). Toxic elemental impurities in herbal weight loss supplements; A study using ICP-OES microwave – assisted digestion. *Toxics*, *11*(272). https://doi.org/10.3390/toxics11030272.

Ayed, MM., Mohamed, AE., & Abd el-Monem, H.H. (2021). Effect of iron deficiency anemia on academic performance among primary school children. *Egyptian Journal of Health Care*, 12(1), 418-432.

Balali-mood, M., Naseri, K., Tahergorabi, Z., Khazdair, M.R., & Sadeghi, M. (2021). Toxic mechanisms of five heavy metals: Mercury, lead, chromium, cadmium, and arsenic. *Frontiers of Pharmacology*, 12-19.

Basaran, R. & Can eke, B. (2017). Flavin containing monoxygenases and metabolism of xenobiotics. *Turkey Journal of Pharmacy Science*,14(1),90-94.

Cairo, R.C.D., Silva, L.R., Carneiro, N., & Marques, C.D.F. (2014). Iron deficiency anemia in adolescents: A literature review. *Nutricion Hospitalia*, 29,124-1249.

Castro, I.P., & Viana, M.B. (2018). Cognitive profile of children with sickle among children with sickle cell anemia compared to healthy controls. *Journal de Pediatria*, 9594), 451-457.

Chandra, S., & Ramachandra, (2019). A review on some therapeutic aspects of phytochemicals present in medicinal plants. *International of Pharmacy and Life Sciences*, 10(1), 6052-6058.

Chukwuebuka, E.& Chinenye, I.J. (2015). Biological functions and antinutritional effects of phytochemicals in living system. *IOSR Journal of Pharmacy and Biological Sciences*, 10(2), 10-19.

Dar, R.A., Shahnawaz, M., Ahanger. M.A., Majid, I. (2023). Exploring the diverse bioactive compounds from medicinal plants: A review. *The Journal of Phytopharmacology*, 12(3),189-195.

Dsilva, A., Veena, B.K., Kamath, A., Mary, J.(2023). A study on relationship between substance abuse and academic performance among adolescents in Dakshina Kannada. *International Research*

Journal of Modernization in Engineering Technology and Science,5(2),1005-1011.

Ferreira, A., Neves, P., & Gozzelino, R. (2019). Multilevel impacts of iron in the brain; The crosstalk between neurophysiological mechanisms, cognition, and social behavior. *Pharmaceuticals*, 12(126), 1-26.

Garba, A. (2012). Secondary education in Nigeria: A synthesis of basic student-specific concerns from guidance and counselling perspective. *Journal of International Cooperation in Education*, 15(2), 195-205.

Gutema, B.T., Sorrie, M.B., Megersa, N.D., Yeseru, G.E., Yeshitila, Y.G., Paurels N.S., Henauw S, & Abeddou, S. (2023). Effects of iron supplementation on cognitive development in school-age children: Systematic review and meta-analysis. *PLoS ONE*, 18 (6),1-25.

Hiliya, A.A., Jabo, A.J., Naabu, A., Sarkingobir, Y., & Muhammad, B.I. (2022). The role of elementary school teachers as perceived by students in the Nasarawa local government area, Kano, Nigeria. *International Journal of Advances in Social and Economics*, 4, (2), 37~43. Doi:https://doi.org/10.33122/ijase.v4i2.231.

Hulthen, L. (2003). Iron deficiency and cognition. *Scandinavian Journal of Nutrition*,47(3),152-156.

Ibrahim AG, Hashimu S., & Yabo, S.(2022). The social impact of drug abuse on student academic performance in Umaru Ali Shinkafi Polytechnic Sokoto State Nigeria. The Beam: Journal of Arts and Science, 14(2),1118-5953.

Mamasoliev, N.S., Usmonov, B.U. & Tursunov, X.X.(2020). Iron deficiency anemia and drug addiction: Regional problems and ways of solution. *Global Journal of Medical Research: F Diseases*,20(13),1-7.

Michael R., & Thankachan, T.C. (2019). Programmes in continuing education centres and their impact on the empowerment of women and girl child. International Journal of Creative Research Thoughts,7(1),883-893.

Miya, Y.Y., Hassan, J.A., Saeed, Bandam, S.A., Sarkingobir, Y., Yabo, A.M., Bello, Z. (2023). Issues affecting Almajiri schools in Nigeria: Water, sanitation, and hygiene (WASH) parameters in Sokoto. *Interdisciplinary Social Studies*, 2387-2395.

Montreal Cognitive Assessment (2004). Montreal Cognitive Assessment (MOCA). www.mocatest.org.

Nasiru, B.S., Lydia, A., Alexander, A., & Maru, S.A. (2019a). The perception of youth on the effects of substance abuse in Sokoto, sokoto state, Nigeria. *World Journal of Pharmaceutical and Medical Research*,5(9), 122-129.

Nasiru, B.S., Lydia, A., Alexander, A., & Maru, S.A. (2019b). The perception of youth on the effects of substance abuse in Sokoto Nigeria. *World Journal of Pharmaceutical and Medical Research*, 5(9), 122-129.

Nasiru, B.S., Musawa, T.S., Hassan, H.M, & Ejembi, E.A. (2019c). Exploring the perceived factors that lead to substance abuse among youth in Northern Nigeria. *Advance Research Journal of Medical and Clinical Science*, 5(9), 15-23.

Niloy, N., Hediyal, T.A., Vichitra, C., Sonali, S., Chidambaram, S.B., Gorantk, V.R., Mahalakshmi, A.M.(2023). Effect of cannabis on memory consolidation, learning and retrieval and it's current legal status in India: A review. *Biomolecules*, 13(162),1-20.

Nkporbu, A.K. & Stanley, P.C.(2023). Does psychoactive substance use affect academic performance of medical students? A systematic review. *International Neuropsychiatric Disease Journal*, 19(2),39-46.

North, T., Palmer, T.M., Lewis, S.J., Cooper, R., Power, C., Pattie, A., Start, J.M., Deary, I.J., Martin, R.M. etal., (2015). Effect of smoking on physical and cognitive capability in later life: A multicohort approaches. *BMJ Open*, 5(e008393),1-12.

Paul, P.K, & Aremu, B. (2020). International center for curriculum and research development (ICCRD): the foundation, aim, and future of an interdisciplinary and Advanced unit of Crown University International Chartered Incorporated (CUICI), Argentina, South America- A case study. *Learning Community*,11(1),27-40.

Reis, P. (2021). Challenges of science education in troubled times. *Cienca & Educacao*, 27(e21000), 1-9.

Rosenweigh, A.(2023). Montreal Conitive Asessment (MCA) tst for dementia. www.verywellhealth.com.

Sabia, S., Elbaz, A., Dugravot, A. etal., (2016). Impact of smoking on cognitive decline in early old age: the whitehall II cohort study. *Archive in General Psychiatry*, doi:1001/archgenpsychiatry.2011.2016.

Sarkingobir, Y., Hiliya, A.A., & Umar, K. (2022). Schools in Nigeria; An assessment of water, sanitation, and hygiene in Sokoto sate. *Archives of Educational Studies*, 2(2), 223-242.

Sultan, R.S., Zhang, A W., Olfson, M., Kwizera, M.H., & Levin, F.R.(2023). Nondisordered cannabis use among US adolescents. *JAMA Network Open*, 6(5),1-13.

Umar A.I., Sarkingobir, Y., Dikko, M., Miya, Y.Y., & Salah, N.M. (2023c). Effect of anemia on cognitive capacity of adult students in Sokoto, Nigeria. *Journal of Health Sciences*, 16(2), 157-162. DOI: 10.33086/jhs.v16.i02.4195.

Umar, A., Garba, A., Jibrilu, A.L.(2023a). The effect and influence of drug abuse to the students of higher institutions in their educational attainment in tertiary institutions in Katsina State, Nigeria. *International Journal of Innovative Development and Policy Studies*,11(2),52-64.

Umar, A.I., Sarkingobir, Y., Adamu, H.W., Faruk, A., & Dikko, M. (2023b). Extent of some heavy metals in cough syrups abused in Sokoto, Nigeria. *Chula Medical Journal*, 67(4), 251-256.

Vilchez, J.I. (2018). Cognitive effects of drug abuse. *Biomedical Journal of Scientific and Technical Research*, 5(1),4272-4278.

Waheed, S.A. (2016, March). Identification of problems and prospective for bridging the gap between research and practice in educational science. Paper presented at the 5th Global Academic Meeting (GAM), Budapest, Hungary.

Young, J.L., Feille, K.K., & Young, J.R. (2017). Black girls as learners and doers' of science: A single-group summary of elementary science achievement. *Electronic Journal of Science Education*, 21(2), 1-20.

Zaky, E.A., Mahmoud, Z.K., And Elwahab, M.M., & Kamel, S.K. (2021). The effect of iron deficiency anemia on intelligence quotient in children. *MJMR*, 32(1),66-68.

Zhang, T., James, L., & Patnao, J. (2023). A literature review of adult education research. *Frontiers in Educational Research*, 6(6),79-82.

Zhou, Z. (2021). Drug abuse and adolescents' cognitive development based on the perspectives of etiology, impacts, and therapy. *Advances in Social Science, Education and Humanities Research*, 637,590-595.