



## ASSOCIATION BETWEEN ADVERSE CHILDHOOD EXPERIENCES AND SUBSTANCE USE DISORDERS IN ADULTHOOD

Irene ESU<sup>1</sup> and Chukwuma U. OKEAFOR<sup>2</sup>

<sup>1</sup>Department of Public Health, Federal Ministry of Health, Nigeria

<sup>2</sup>Department of Mental Health/Neuropsychiatry,  
University of Port Harcourt Teaching Hospital, Rivers, Nigeria

E-mail corresponding author: [chukwuma.okeafor@uniport.edu.ng](mailto:chukwuma.okeafor@uniport.edu.ng)

Phone numbers: +234-8033185332

### ABSTRACT

*Adverse Childhood Experiences (ACEs) are potentially traumatic life experiences occurring before the age of 18 years and have tremendous negative impacts on the health and wellbeing of their victims. The study sought to examine the relationship between adverse childhood experiences and the occurrence of substance use disorder in adult life.*

*A case-control study was employed in the study. One hundred and ninety patients diagnosed with substance use disorders comprised the cases, and 190 patients who had no substance use disorder and were the controls. Adverse Childhood Experiences international questionnaire and the Connor-Davidson Resilience Scale were used to obtain information on adverse childhood adversities and resilience respectively. The null hypothesis states that there is no significant association between ACE and substance use disorders. The hypothesis was tested using bivariate and multivariate analysis at 0.05 significant level.*

*The cases had significantly higher proportion of exposure to adverse childhood adversities in comparison to the controls [48.4%(n=92) versus 25.8 %(n=49);p=0.0001]. The odds of exposure to adverse childhood adversities were two times higher among cases than controls after controlling for socio-demographic variables (Adjusted OR-2.320; 95%CI: 1.44-3.75). Adverse childhood experience is associated with the occurrence of substance use disorders in adulthood irrespective of socio-demographic characteristics. Thus, public health enlightenment to family and schools are hereby advocated.*

**Key words:** Substance use disorder, Adverse Childhood Experience, Resilience

### INTRODUCTION

Adverse Childhood Experiences (ACEs) are distressing life experiences occurring before the age of 18 years and have undesirable impacts on health and wellbeing of its victims (Ige& Illesanmi, 2012, Monnat & Chandler, 2015). These adverse experiences include but not limited to abuse (physical, emotional and sexual), neglect (physical and emotional), incarcerated relative, mother treated violently, household substance abuse, mental illness in a family member, loss of a parent among others (Warne et al., 2017). Millions of children all over the world irrespective of their social and economic status, culture, ethnicity or religion are subjected to daily adverse childhood experiences (UNICEF, 2019).

Substance use disorder (SUD) is the harmful or hazardous use of psychoactive substances including alcohol and illicit drugs (First et al., 2015). It has been described as one of the possible health outcomes linked with ACEs (Rothman et al., 2008). Furthermore, it is a major public health problem that has grave adverse effects on individuals, families and communities, and it is associated with increased morbidity and mortality (UNICEF, 2019). According to the Disease Statistical Manual (DSM-V) classification, SUD is a cluster of cognitive, behavioural and physiological symptoms arising from the use of ten classes of drugs including alcohol, caffeine, cannabis, hallucinogens, inhalants, opioids, sedatives, hypnotics/anxiolytics; stimulants, tobacco and other or unknown substances (First et al., 2015).

Notably, population growth and a changing age profile in developing countries are producing a change in the disease burden from communicable to non-communicable diseases including neurological and mental diseases. This calls for a concerted effort to respond by implementing reputable and effective interventions through research on possible cause of SUDs and the development of better prevention and treatment options (Whiteford et al., 2015). There is however

inadequate policy attention and resources directed towards addressing issues of SUDs and its potential risk factors such as ACEs.

In order to develop a program or policy to help victims of SUDs, it is important to identify childhood risk factors that play major roles in the individual's behavioural characteristics. This study therefore sought to examine the role of ACEs on the occurrence of SUDs in adulthood. It is hoped that findings from this study would be useful in informing child and social policies that could help in reducing the menace of ACEs and its consequences.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Rivers State, located in the south-south geopolitical zone in Nigeria, West Africa. The study was carried out at the tertiary health facility that provides medical specialist care, training and research. The study duration spanned three months, from January to March, 2020.

**Study design and study population:** An unmatched 1:1 case-control design was employed. Substance Use Disorders was the outcome of interest while ACE comprised the exposure of interest. The participants of the study comprised of cases and controls. Cases were adult patients, who were attendees at the mental out-patient clinic and diagnosed with substance use disorders according to DSM-V Criteria by the mental health physicians. The controls were adult patients attending the general out-patient clinic who had no substance use disorder. The controls were screened for substance use disorders using the WHO Alcohol, Smoking and Substance involvement Screening Test (ASSIST) version 3 to ensure that they do not have the outcome of interest (Humeniuk et al., 2008). Controls with ASSIST score of 3 and below were included in the study. Cases with severe psychological disturbance, dementia or other cognitive difficulties precluding them from participating were excluded from the study. Also, controls that were severely ill to respond to the questionnaire were excluded.

**Sample Size Calculation and Sampling Technique:** A minimum sample size of 145 was obtained based on alpha of 0.05, beta of 0.20, prevalence of ACEs among adults with SUDs and without SUDs in previous research carried out in Nigeria, which reported 46.2% (Oladeji et al., 2010) and 30% (Oluwagbemiga & Micheal, 2018) respectively, using the formula for analytical studies. Following adjustment for 20% non-response rate, an approximated sample size of 190 per group was obtained. Thus, the study had a total sample size of 380.

**Data Collection:** Cases and controls who met the eligibility criteria were given the study questionnaire. The study questionnaire was interviewer administered requiring a total time of 15-30 minutes for completion. The participants were counselled and reassured on confidentiality of information prior to the administration of the study questionnaire. Data on the exposure and socio-demographic findings were collected from both cases and controls in the same manner using the same study questionnaire. The study questionnaire was used to elicit information on socio-demographic characteristics, resilience and childhood adverse experiences.

The socio-demographic data comprised of age, sex, marital status, educational level, employment status, and childhood family setting. Data on exposure of interest were obtained using the Adverse Childhood Experience-International Questionnaire (ACE-IQ). This is a structured questionnaire to assess the exposure to ACEs based on WHO definition.(World Health Organization (WHO), 2019) Studies done to validate ACE-IQ has found it to be a reliable and valid index for measuring adverse childhood experience in Africa (Kazeem, 2015)(Meinck F, Cosma AP, Mikton C, 2017). ACEs exposure in this study was defined by ACEs score greater than two (SK et al., 2018). The Connor-Davidson Resilience Scale was used to obtain information on resilience (Aloba et al., 2016). It is a validated tool consisting of 10 items with a 5-point Likert-response (0 =never to 4=almost always), which sums up to a minimum of 0 and a maximum of 40. Higher scores indicate higher

levels of resilience. Respondents scoring above the 75<sup>th</sup> percentile are categorized as resilient (Aloba et al., 2016).

The Alcohol, Smoking, and Substance Involvement Screening Test version 3 is a validated tool for substance and alcohol use screening in primary care settings (Kane et al., 2016). It was used in the index study to ensure that the controls do not have the outcome of interest. The ASSIST questionnaire consists of eight items, a total score of 4 and above for any substance is an indication of hazardous or harmful use of that substance. Thus, only controls with score of 3 and below were included in the study.

**Statistical Analysis:** Data entry was done using Microsoft Excel and analyzed using the EPI info version 7 statistical package, designed by the United States Centers for Disease Control and Prevention (CDC). The socio-demographic variables were presented in tabular forms. Means and standard deviation for the quantitative variables were calculated. The chi square ( $\chi^2$ ) test was employed for comparing differences in proportions between the two groups. Odds ratios and confidence levels set at 95% was calculated to measure the strength of association between ACEs and substance use disorders. The relationship between the dependent variables (substance use disorders) and the independent variables (socio-demographics, ACEs and resilience factors) was explored using unconditional logistic regression. The level of statistical significance was set at  $p < 0.05$ . Confidence intervals calculated at the 95% level.

**Ethical consideration:** Ethical clearance was obtained from the Research and Ethics Committee from the University of Port Harcourt Teaching Hospital (UPTH). Written informed consent was obtained from the respondents prior to inclusion in the study. Anonymity was maintained by coding the questionnaires in consideration of confidentiality during the entire study period. Participation was voluntary and any unwillingness to participate did not affect their care and treatment in the hospital.

## RESULTS

### *Socio-demographic findings*

Data were obtained from three hundred and eighty (380) respondents, consisting of 190 cases (SUDs) and 190 controls (no SUD). The overall mean age (SD) was  $32.6 \pm 22.7$  years while for the cases and controls, it was  $31.2 \pm 7.1$  years and  $33.3 \pm 8.9$  years respectively. The age range for the cases were 18 to 57 years while for the controls, it was 19 to 56 years. There was no significant difference in the proportion of age categories ( $\chi^2 = 6.331$ ,  $p = 0.176$ ) and childhood family settings ( $\chi^2 = 3.676$ ,  $p = 0.452$ ) between the cases and controls in the study. Socio-demographic variables comprising of sex, marital status, education, employment status, income and resilient showed statistically significant differences in the comparison between cases and controls. (Table 1).

### *ACE and SUD – Bivariate analysis*

The cases had significantly higher proportion of ACE exposure in comparison to the controls (48.4% versus 25.8%;  $p = 0.0001$ ). The odd of exposure to ACEs was 2.7 times higher among cases in comparison to the controls as shown in Table 2. (Crude Odds Ratio-2.70; 95% CI: 1.75-4.16).

### *ACE and SUD – Multivariate analysis*

After adjusting for sex, marital status, educational level, income, and resilience, ACE exposure showed statistically significant relationship with SUD. (Table 3) The ACE exposed were 2 times more likely to have SUD compared to ACEs unexposed (Adjusted Odds Ratio-2.32; 95% CI: 1.44 – 3.75). Resilient persons were two times less likely to have SUD compared to non-resilient persons (Adjusted Odds Ratio- 0.571; 95% CI: 0.34 – 0.96).

**Table 1: Comparison of socio-demographic characteristics between cases and controls**

Variable	Cases N = 190 n (%)	Controls N = 190 n (%)	Total N = 380 n (%)	Chi Square	p-value
<b>Age category</b>					
≤ 20 years	5 (2.6)	6 (3.2)	11 (2.9)	6.331	0.176
21 – 30 years	107 (56.3)	88 (46.3)	195 (51.3)		
31 – 40 years	59 (31.1)	62 (32.6)	121 (31.9)		
41 – 50 years	13 (6.8)	22 (11.6)	35 (9.2)		
51 – 60 years	6 (3.2)	12 (6.3)	18 (4.7)		
Mean age ± SD	31.17 ± 7.13	33.25 ± 8.90			
<b>Sex</b>					
Female	35 (18.4)	102 (53.7)	137 (36.1)	51.240	0.0001*
Male	155 (81.6)	88 (46.3)	243 (63.9)		
<b>Marital Status</b>					
Married	39 (20.5)	72 (37.9)	111 (29.2)	17.478	0.001*
Single	147 (77.4)	112 (58.9)	259 (68.2)		
Separated/Divorced	4 (2.1)	4 (2.1)	8 (2.1)		
Widowed	0 (0.0)	2 (1.1)	2 (0.5)		
<b>Educational level</b>					
No formal education	13 (6.8)	6 (3.2)	19 (5.0)	14.571	0.002*
Primary	5 (2.6)	0 (0.0)	5 (1.3)		
Secondary	78 (41.1)	63 (33.2)	141 (37.1)		
Tertiary	94 (49.5)	121 (63.7)	215 (56.6)		
<b>Family setting raised in childhood</b>					
Single parent	15 (7.9)	21 (11.1)	36 (9.5)	3.676	0.452
Monogamous	114 (60.0)	112 (58.9)	226 (59.5)		
Polygamous	52 (27.4)	44 (23.2)	96 (25.3)		
Extended family	8 (4.2)	9 (4.7)	17 (4.4)		
<b>Employment status</b>					
Self-employed	96 (50.5)	75 (39.5)	171 (45.0)	16.541	0.001*
Unemployed/student	58 (30.5)	37 (19.5)	95 (25.0)		
Private-sector employed	22 (11.6)	50 (26.3)	72 (18.9)		
Government-employed	14 (7.4)	28 (14.7)	4 (11.1)		
<b>Income (NGN)</b>					
≤ N20,000	43 (22.6)	52 (27.4)	95 (25.0)	34.381	0.0001*
>N20,000 – N50,000	77 (40.5)	48 (25.3)	125 (32.9)		
>N50,000 – N100,000	51 (26.8)	30 (15.8)	81 (21.3)		
>N100,000 – N200,000	10 (5.3)	31 (16.2)	41 (10.8)		
>N200,000 – N300,000	7 (3.7)	21 (11.1)	28 (7.4)		
> N300,000	2 (1.1)	8 (4.2)	10 (2.6)		
<b>Resilient</b>					
Yes	43 (22.6)	63 (33.2)	106 (27.9)	5.233	0.022*
No	147 (77.4)	127 (66.8)	274 (72.1)		

SD-Standard deviation

\*Statistically significant

**Table 2: ACEs exposure among cases and controls**

ACEs Exposed	Cases n (%)	Controls n (%)	Total n (%)	Chi Square	p-value
Yes	92 (48.4)	49 (25.8)	141 (37.1)	20.850	0.0001*
No	98 (51.6)	141 (74.2)	239 (62.9)		
<b>Total</b>	<b>190 (100.0)</b>	<b>190 (100.0)</b>	<b>380 (100.0)</b>		

Odds ratio=2.70; 95% CI: 1.75 – 4.16 \*Statistically significant

**Table 3: Logistic regression analysis of factors associated with Substance Use Disorders**

Variables	Coefficient(B)	Adjusted Odds ratio (AOR)	95% CI	p-value
<b>Sex</b>				
Male	1.643	5.17	3.16–8.46	0.0001*
Female <sup>R</sup>		1	1	
<b>Marital status</b>				
Currently unmarried	0.620	1.86	1.09–3.17	0.022*
Currently married <sup>R</sup>		1	1	
<b>Educational level</b>				
Below secondary	01.150	3.16	1.01–9.42	0.039*
Secondary level and above <sup>R</sup>		1	1	
<b>Income</b>				
≤ N50,000.00	0.240	1.27	0.78–2.08	0.338
> N50,000.00 <sup>R</sup>		1	1	
<b>ACEs</b>				
Exposed	0.843	2.32	1.44–3.75	0.001*
Unexposed <sup>R</sup>		1	1	
<b>Resilient</b>				
Yes	-0.556	0.57	0.34–0.96	0.034*
No <sup>R</sup>		1	1	

R – Reference category

CI – Confidence Interval\*Statistically significant

## DISCUSSION

This study aimed to determine the relationship between adverse childhood experiences (ACEs) and substance use disorders (SUDs) in adulthood among patients in the University of Port Harcourt Teaching Hospital. In this study, prevalence of ACE exposure was found to be significantly higher among cases in comparison to controls (48.4% vs. 25.8%). Notably, higher ACE prevalence rates of 87% (Salawu & Owoaje, 2015), 93%(Kibiru et al., 2018) and 100%(Murtha, 2018) were reported among respondents with SUDs in studies conducted in Nigeria (Oyo state), Kenya and the United States respectively. These studies along with the present one reveal that exposure to ACEs is not uncommon among adults with SUDs, thus, highlighting the need to institute measures to forestall its occurrence.

The finding that those exposed to ACEs were two times more likely to have substance use disorder in adulthood in the index study is consistent with another case-control study in Spain (Navarro-Mateu et al., 2019). Notably, a study in south-west Nigeria to assess the relationship between ACEs and smoking, reported that those exposed to ACE were 2.4 times more likely to

smoke compared to the unexposed (Salawu& Owoaje, 2015). The finding of the present study is also similar to what was reported in a study carried out in Nebraska where the risks of smoking was 2.7 times higher among those exposed to ACEs than those not exposed (Yeoman et al., 2013). These findings could be explained by the ACEs Pyramid model, which reveals that exposure to ACEs early in life leads to disruptions in the development of important psychosocial skills, which can lead to mal-adaptation and unhealthy behaviours (Anda et al., 2006)(Naal et al., 2018).

Additionally, the logistic regression analysis of the index study revealed the protective effect of being female, married, having above secondary level of education, being unexposed to ACEs and being resilient had on the occurrence of SUDs. Strikingly, this study found that exposure to ACEs remained a determinant of SUDs, after adjusting for socio-demographic factors. This invariably implies that ACE is an independent risk factor for SUD in later life irrespective of demographic characteristics. However, this assertion contrasts with the notion that SUDs are multifaceted and the categories of adults predisposed to this disorder are those with several adversities cutting across individual, community and societal levels (Amaro et al., 2021). Nonetheless, the need to curtail ACE is highlighted in this study.

### **Recommendations**

Undoubtedly, SUD is a mental health problem that can be averted through the institution of public health programs and policies. Identifying ACE as an independent predictor of this health problem in the index study highlights the need for the establishment of surveillance systems for ACE and call-in-centres for early detection and prompt response to forestall negative sequelae such as SUD in adulthood. Notably, in Nigeria, the Childs Rights Act (2003) is a law that guarantees that children are protected from adversity conditions described in the WHO definition of ACE. Nonetheless, the non-enforcement of this law puts several children at risk of suffering from such adversities and thus they are predisposed to SUD in adult life. Public health practitioners need to carry out advocacy visits to policy makers on the enforcement of the Childs Rights Act. Also health care workers and school staff providing services to children should have a high index of suspicion regarding adverse childhood adversities. This will aid timely detection for early intervention and possible rehabilitative care.

### **Limitations**

Recalling events that might date back to past decades is open to limitations of human memory and can be prone to errors. Even though, there could be some bias in retrospective reports, there is evidence that such bias is not sufficiently great to invalidate retrospective findings of major adversities of an easily defined kind (Hardt J, 2004). Also, in order to limit recall bias due to the nature of the study being a case-control design, the exposure of interest was collected from both groups in the same manner.

### **Suggestions for further studies**

Further studies adopting prospective cohort study designs are suggested in order to enrich the body of literature by providing information on incidence, relative risk, attributable risk and population attributable risk. These indices serve as basis for public health intervention by policy makers.

### **Conclusion**

Approximately 5 in 10 adults with substance use disorders and 3 in 10 adults without substance use disorders were exposed to adverse childhood adversities. There was a significant relationship between exposure to adverse childhood adversities and occurrence of substance use disorder in adult life. Conscientious efforts by stakeholders are required to curtail the menace of adverse childhood experiences.

**REFERENCES**

- Aloba, O., Olabisi, O., & Aloba, T. (2016). The 10-Item Connor–Davidson Resilience Scale. *Journal of the American Psychiatric Nurses Association*, 22, 43–51. <https://doi.org/10.1177/1078390316629971>
- Amaro, H., Sanchez, M., Bautista, T., & Cox, R. . (2021). Social vulnerabilities for substance use: Stressors, socially toxic environments, and discrimination and racism. *Neuropharmacology*, 188, 108518. <https://www.sciencedirect.com/science/article/pii/S0028390821000721>
- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience*, 256, 174–186. <https://doi.org/10.1007/s00406-005-0624-4>
- Federal Republic of Nigeria. (2003). *Child Rights Act*. Nigeria
- First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2015). Structured clinical interview for DSM-5–Research version (SCID-5-RV, Version 1.0. 0). Arlington: *American Psychiatric Association*.
- Hardt J. R. M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, 45, 260–273.
- Humeniuk, R., Ali, R., Babor, T. F., Farrell, M., Formigoni, M. L., Jittiwutikarn, J., De Lacerda, R. B., Ling, W., Marsden, J., Monteiro, M., Nihwatiwa, S., Pal, H., Poznyak, V., & Simon, S. (2008). Validation of the alcohol, smoking and substance involvement screening test (ASSIST). *Addiction*, 103(6), 1039–1047. <https://doi.org/10.1111/J.1360-0443.2007.02114.X>
- Ige, O. K., Illesanmi, O. S., Adebayo, A. M. (2012). Sexual Risk Behaviours among Young People with Adverse Childhood Experiences in Ibadan, Nigeria. *Greener Journal of Medical Sciences*,2(3),70-76.
- Kane, J. C., Murray, L. K., Bass, J. K., Johnson, R. M., & Bolton, P. (2016). Validation of a substance and alcohol use assessment instrument among orphans and vulnerable children in Zambia using Audio Computer Assisted Self-Interviewing (ACASI) HHS Public Access. *Drug and Alcohol Dependence*, 166, 85–92. <https://doi.org/10.1016/j.drugalcdep.2016.06.026>
- Kazeem, O. T. (2015). A Validation of the Adverse Childhood Experiences Scale in Nigeria. *Research on Humanities and Social Sciences*, 5(11), 2224-5766.
- Kiburi, S. K., Molebatsi, K., Obondo A., & Kuria, M. (2018). Adverse childhood experiences among patients with substance use disorders at a referral psychiatric hospital in Kenya. *BMC Psychiatry* 18, 1–12.
- Meinck F, Cosma AP, Mikton C, B. A. (2017). Psychometric properties of the Adverse Childhood Experiences Abuse Short Form (ACE-ASF) among Romanian high school students. - PubMed - NCBI. *Child Abuse Negl*, 72, 326–337.
- Monnat, S. M., & Chandler, R. F. (2015). Long-Term Physical Health Consequences of Adverse Childhood Experiences. *Sociological Quarterly*, 56(4), 723–752. <https://doi.org/10.1111/TSQ.12107>
- Murtha, T. (2018). Screening Adults with Substance Use Disorder for Adverse Childhood Experiences. *ScholarWorks UMass*.
- Naal, H., El Jalkh, T., & Haddad, R. (2018). Adverse childhood experiences in substance use disorder outpatients of a Lebanese addiction center. *Psychology, Health and Medicine*, 23(9), 1137–1144. <https://doi.org/10.1080/13548506.2018.1469781>
- Navarro-Mateu, F., Quesada, M. P., Escámez, T., Alcaráz, M. J., Seiquer De La Peña, C., Salmerón, D., Huerta, J. M., Vilagut, G., Chirlaque, M. D., Navarro, C., Husky, M., Kessler, R. C., Alonso, J., & Martínez, S. (2019). Childhood adversities and 5-HTTLPR polymorphism as risk factors of substance use disorders: Retrospective case-control study in Murcia (Spain). *British Medical Journal*, 9(9),1. <https://doi.org/10.1136/bmjopen-2019-030328>



Oladeji, B. D., Makanjuola, V. A., & Gureje, O. (2010). Family-related adverse childhood experiences as risk factors for psychiatric disorders in Nigeria. *British Journal of Psychiatry*, 196(3), 186–191. <https://doi.org/10.1192/bjp.bp.109.063677>

Oluwagbemiga, O., & Micheal, J. (2018). Childhood Adversity and Factors Determining Resilience among Undergraduate Students. *International Journal of Emergency Mental Health and Human Resilience*, 20(2), 1–9. <https://doi.org/10.4172/1522-4821.1000400>

Rothman, E. F., Edwards, E. M., Heeren, T., & Hingson, R. W. (2008). Adverse Childhood Experiences Predict Earlier Age of Drinking Onset: Results From a Representative US Sample of Current or Former Drinkers What’s Known on This Subject. *Pediatrics*, 122(2), e298–e304. <https://doi.org/10.1542/peds.2007-3412>

Salawu, M. M., & Owoaje, E. (2015). Adverse Childhood Experiences and Smoking among Urban Youths in Oyo State, South Western Nigeria. *ISDS 2013 Conference Abstracts*, 1–2. <https://doi.org/10.5210/ojphi.v6i1.5020>

UNICEF. (2019). Adverse Childhood Experiences Research in Serbia (ACE study). *UNICEF Serbia*, 1–110.

Warne, D., Dulacki, K., Spurlock, M., Meath, T., Davis, M. M., Wright, B., & McConnell, K. J. (2017). Adverse Childhood Experiences (ACE) among American Indians in South Dakota and Associations with Mental Health Conditions, Alcohol Use, and Smoking. *Journal of Health Care for the Poor and Underserved*, 28(4), 1559–1577. <https://doi.org/10.1353/hpu.2017.0133>

Whiteford, H. A., Ferrari, A. J., Degenhardt, L., Feigin, V., & Vos, T. (2015). The global burden of mental, neurological and substance use disorders: An analysis from the global burden of disease study 2010. *PLoS ONE*, 10(2). <https://doi.org/10.1371/journal.pone.0116820>

World Health Organization (WHO). (2019). Adverse Childhood Experience-International Questionnaire. *WHO Publications*. [https://www.who.int/publications/m/item/adverse-childhood-experiences-international-questionnaire-\(ACE-IQ\)](https://www.who.int/publications/m/item/adverse-childhood-experiences-international-questionnaire-(ACE-IQ))

Yeoman, K., Safranek, T., Buss, B., Cadwell, B. L., & Mannino, D. (2013). Peer reviewed: adverse childhood experiences and adult smoking, Nebraska, 2011. *Preventing chronic disease*, 10, E159.

Source(s) of support: Nil

Acknowledgement: Ibitein Okeafor and Eagles Watch Research Centre for research support services.

Previous presentation/publication of work: None

Conflicts of Interest: None

Criteria for authorship

Categories of contribution details	Initials of contributing author
Concept	IE
Design	IE, CUO
Definition of intellectual content	IE
Literature search,	IE
Data acquisition	IE
Data/statistical analysis	CUO
Manuscript preparation, manuscript editing and manuscript review.	CUO, IE
Guarantor	CUO

The manuscript has been read and approved by all authors. The requirements for authorship as stated earlier in this document have been met. The manuscript represents honest work.