

Psychological Maladjustment of Children Living with HIV Versus Healthy Controls: A Cross-sectional Approach of Association with Sociodemographic and Clinical Variables

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ABSTRACT

Background: Children Living with HIV (CLWH) have adverse events, including predisposition to Psychological Maladjustment (PM), which may impair functional abilities. It is imperative to determine the factors that predispose to PM, as some of these factors may be modifiable, enabling timely interventions. However, there are gaps in knowledge regarding these factors, particularly in low-resource settings. **Objectives:** To determine the sociodemographic and clinical factors associated with PM among CLWH in Umuahia. **Materials and Methods:** A cross-sectional analytical study of 386 participants comprising 193 CLWH and 193 healthy controls. Their sociodemographic and clinical variables were obtained, and PM was determined using the Strengths and Difficulties Questionnaire. **Results:** The CLWH had a significantly higher PM burden than the controls. Factors associated with PM in the CLWH were the CLWHs' age, sex, Socioeconomic Class (SEC), orphan status, relationship with their caregivers, and caregivers' marital status. Those aged 14/15 years (AOR=4.92, $P=0.035$), females (AOR=2.76, $P=0.023$), double-orphaned (AOR=11.12, $P=0.032$), belonging to the middle (AOR=4.18, $P=0.018$) and lower (AOR=4.69, $P=0.004$) SECs were five, three, 11, four and five times more likely to have PM, respectively. Also, those residing with non-biological (AOR=3.2, $P=0.010$), divorced (AOR=8.16, $P=0.001$), and widowed (AOR=6.91, $P=0.016$) caregivers were three, eight, and seven times more likely to have PM, respectively. **Conclusion:** There is a high PM burden among CLWH. Factors associated with this include CLWH's age, sex, SEC, orphan status, relationship with their caregivers, and caregivers' marital status. The strongest association was with double-orphans and residing with widowed or divorced caregivers.

Keywords: Mental Health Abnormalities, HIV infection, Children, Predictors, Low-resource settings.

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Article Metrics

Submitted: 10 Nov. 2025

Accepted: 31 Jan. 2026

Published: Jan-June 2026

Citation:

Ogbonna IF, Odinaka KK, Ezeogu J, Uthman KA. Psychological maladjustment in children living with HIV versus healthy controls: a cross-sectional approach of association with sociodemographic and clinical variables. Trop J Med Res. 2026;25(1);85-100. DOI: 10.5281/zenodo.21462371.

Journal Metrics

ISSN: p1119-0388, e2505-0338

Website: www.tjmr.org.ng

E-mail: info.tjmr@gmail.com

Publisher: cPrint, Nig. Ltd

Email: cprintpublisher@gmail.com

Access Code



www.tjmr.org.ng

INTRODUCTION

HIV infection poses a significant public health crisis,[1,2] particularly in low-resource settings[3,4], and its burden is more worrisome in children.[1,5] Due to its chronicity, significant morbidity and mortality, Children Living with HIV (CLWH) are predisposed to Psychological Maladjustments (PM), [5,6-8] which significantly impair the ability to function independently and present with varying symptoms due to deviations from the normal patterns of thoughts, emotions, behaviours, and relationships.[9,10] Despite improved physical care of CLWH, the psychological aspect has been largely ignored.[11] The negative effects of HIV (chronic medication intake, stigma, discrimination, uncertainty about the future, and social limitation) may predispose CLWH to PM.[7,12] Consequently, CLWH may adhere poorly, resulting in worsening of morbidity and mortality.[13] Additional implications may include school absenteeism, poor academic performance, and school dropouts.[14]

Studies in South Africa, [14] Malawi, [15] and Nigeria. [16, 17] reported high PM burden in CLWH, and their propensity to develop PM may be attributable to certain risk factors. Thus, it becomes necessary to determine the factors that predispose CLWH to PM, which are specific variables that increase the likelihood of PM. [18,19] Among their categorisation are sociodemographic and clinical variables. [18,20] These variables may be burdensome and pose as stressors. [21] and may predispose to PM with consequent poor quality of life. [21,22] Fortunately, they may be modifiable, and targeted interventional strategies can help mitigate the occurrence or complications of PM, and thus improve overall quality of life.

Fewer studies exist regarding sociodemographic and clinical factors that predispose CLWH to PM. [23,24] Mpango et al, [25] in 2022 in Uganda, reported that CLWH's age, caregivers' age, caregivers' relationship and HIV severity were associated with PM in CLWH. Gentz et al, [26] in 2017 in Namibia, reported low SEC (poverty), while

Ayano et al,[27] in 2021 in Ethiopia and Pilia et al,[28] in 2020 in India, reported CLWH's age to be associated with PM.

There was no similar study in South-Eastern Nigeria, including Umuahia. Findings from aforementioned studies [26-28] may be at variance with the expected findings in Umuahia, and thus, may not be readily applied to the CLWH in Umuahia, possibly due to geographical differences. This informed the need for this study, as there have been growing concerns about the worsening mental health status of CLWH, including those in Umuahia, and it is important to determine the factors associated with PM in these children. Therefore, our study aimed to determine the sociodemographic and clinical factors associated with PM among CLWH in Umuahia, as early recognition of these factors can help in instituting timely preventive and curative measures for the PM.

MATERIALS AND METHODS

Study design and study participants:

This was a cross-sectional analytical study whose study participants were categorised into CLWH and healthy controls. The CLWH were aged 2-15 years and recruited from the Paediatric HIV Clinic (PHC) of Federal Medical Centre, Umuahia (FMCU). The healthy controls were age- and sex-matched HIV-negative children recruited from primary or secondary schools in Umuahia.

Only the study participants whose caregivers consented and those older than seven years who assented participated in the study. Study participants and/or their caregivers with unconfirmed HIV status, evidence of any chronic disease, or a family history of a chronic disease were excluded. Also excluded were HIV-negative controls with evidence of any acute illness.

Sample size determination

The calculated sample size was 386, comprising 193 CLWH and 193 HIV-negative controls. This was derived from sample size calculation for proportions, [29] based on a 95% confidence interval (1.96), tolerable error (0.05), a previous study's PM

prevalence (50.7%), [14] and the total number of CLWH attending the PHC (387).

The recruitment processes

The sampling method: To ensure equal selection opportunities, the CLWH were enrolled using simple random and healthy controls were enrolled using multi-stage random sampling. The CLWH were assigned serial numbers using the PHC clinic registers, after which 193 was chosen. The 193 healthy controls were enrolled from 16 (7 private and 5 public primaries, and 3 private and 1 public secondary) schools. The sampling considered the ratio of the students in the private to public schools and that of primary to secondary schools in Umuahia. To ensure a wider representation of the schools, only about 6.3% of the overall sample size was drawn from each of the selected schools. The final selection process for the healthy controls involved using the class registers to select all the students who fell within the same age group and sex categories as the CLWH, before randomly choosing the required number of healthy controls based on the CLWH's age group and sex.

Study participants' HIV screening: The CLWH and their caregivers, and the healthy controls and their caregivers, underwent HIV screening. Prior to this, all the caregivers and CLWH (and their healthy controls) older than seven years of age were counselled, and only those who opted in were screened. The HIV screening was based on the Nigerian HIV algorithm [30] and was performed using Determine™, Uni-Gold™, and Stat-Pak™ kits. These kits, which assay HIV antibodies, [7] have high sensitivity and specificity. [31,32]. Based on the screening outcome, the CLWH and healthy controls were sorted and enrolled. Caregivers of school children who were found to be HIV-positive were re-counselled and referred to the PHC of FMCU for further evaluation.

Assessing the sociodemographic variables of the CLWH: The sociodemographic variables of interest were the CLWH's age, CLWH's sex, SEC, caregivers' age, caregivers' sex, marital status, and relationship with their caregivers. The same

information was obtained from the caregivers of the CLWH and those of the healthy controls, and this was done with a proforma. The SEC was determined using Oyediji's classification, [33] which categorises the SEC using mean parental educational and occupational scores. Based on these scores, the SEC was categorised into upper, middle, and lower.

Assessing the clinical variables of the CLWH: The clinical variables of interest were HIV severity, orphan status, and duration of HIV diagnosis. The CLWH's HIV severity was assessed using the WHO HIV immunologic classification. [34] This categorises severity using CD4+ lymphocyte counts and percentages, with the CD4+ lymphocyte counts used for the CLWH aged five years and above and the CD4+ percentages used for those aged below five years. [34] Lower CD4+ lymphocyte counts and percentages indicated worsening severity. [34] The CLWH were categorised into non-significant, mild infection, advanced infection, and severe infection. Orphan status was determined by verifying and collecting information regarding the CLWH's biological parental status (alive or dead), current living arrangements, support systems, and current primary caregiver. Based on this, the CLWH were categorised into non-orphans, single orphans, and double orphans. The CLWH's duration of HIV diagnosis was determined by calculating the time interval difference between the CLWH's diagnosis and clinic enrolment, and the period of contact for the present study. Thus, the CLWH were categorised into those with less than six months, 6-12 months, and greater than 12 months' duration of HIV diagnosis.

Assessing PM in the CLWH: The PM of the CLWH and those of the healthy controls were assessed using the parent-report version of the Strengths and Difficulties Questionnaire (SDQ). It was administered to the caregivers of the CLWH and the healthy controls using the same principle. Thus, they were allowed to independently read out the items on the questionnaires and provide responses without any form of eye contact or interaction with the researchers. The SDQ was developed by Goodman.[35] and used to assess PM in children

aged 2-17 years,[35] including CLWH[15,36], both in Nigeria[16,17] and internationally.[37] The SDQ has good psychometric properties[17,35,37] and consists of 25 strongly worded items arranged in five domains and scored on a three-point scale.[35,37] These domains are emotional, conduct, hyperactivity/inattention, peer-relationship, and prosocial domains.[17,35,37] The developer states that prosocial plays no part in PM determination; thus, only scores from other domains were cumulatively added to generate a Total Difficulty Score (TDS) ranging from zero to 40 and enabling the categorisation of the children's scores into normal, borderline and abnormal scores.[15,37] The cut-off score for this study was based on abnormal score; thus, a TDS greater than 16 in the CLWH and health controls aged 4-17 years and greater than 15 in those younger than four years were considered abnormal scores.[15,35,37] These indicated PM presence, while TDS scores lower than the stated cut-off indicated PM absence. [15,35,37]. The CLWH and healthy controls with abnormal scores were referred to the Psychiatry Department of FMCU for further evaluation.

Pre-testing of the questionnaires: To detect any ambiguity, the questionnaires were pre-tested on 10 caregivers of CLWH in the PHC of FMCU and 10 caregivers of healthy controls from some selected schools in Umuahia before the main study. Participants were told to skip any item on the questionnaires that they did not understand. At the end of the exercise, no item was skipped, and all questions were answered correctly, indicating that the terminologies were well understood. These participants were excluded from the main study.

Operational definitions

Psychological Maladjustments: The inability to cope due to deviations from the normal patterns of thoughts, emotions, behaviours, and relationships. [10]

Sociodemographic variables: Variables that describe specific characteristics that deploy social

and demographic status of a target population to predict disease occurrence. [19,20]

Clinical variables: Variables that describe specific characteristics that deploy clinical assessments, including laboratory evaluations, of a target population to predict disease occurrence. [19,20]

Strengths and Difficulties Questionnaire: A psychometric instrument with good psychometric properties, used in assessing mental health abnormalities of children, including children living with HIV. [15,35]

Study participants: The Children Living with HIV (CLWH) attending the Paediatric HIV Clinic of Federal Medical Centre, Umuahia, and the healthy HIV-negative children (controls) attending primary or secondary schools in Umuahia, including their caregivers who consented to participate in this study.

Data handling and analysis: The data obtained using hard copies of the questionnaires was handled with great caution. It was later converted to an electronic version and transferred into a Microsoft Excel sheet. Data confidentiality was ensured as the questionnaires were coded, requiring only serial numbers and not names. The hard copies were stored in a secure cabinet, and the electronic version was stored in a password-protected personal computer.

The electronic data was transported from the Microsoft Excel sheet into an SPSS version 21 statistical software for statistical analysis. Frequencies and percentages were used to describe the participants' age groups, sex, SEC, type of caregivers, and marital status. The Chi-square test was used to check for a significant association between PM and the independent variables (sociodemographic and clinical variables). Furthermore, multivariate logistic regression was used to determine the strength of the association between the significant independent variables and PM. Statistical analysis with $P < 0.05$ was considered significant, and all reported P -values were two-sided. The findings from this study were presented in prose, tables, or charts.

Ethical approval and consent to participate: Ethical approval, with approval number FMC/QEH/G.596/VOL.10/377, was obtained from the Health Research Ethics Committee of FMCU. Permission was also obtained from the Abia State Ministry of Education. Study details were explained to the caregivers, and only the caregivers who consented, the children whose caregivers consented and those older than seven years who assented were enrolled. The consenting caregivers completed (or thumb-printed) an informed consent form. The role of the caregivers was to provide responses to the questionnaires and pro forma and to permit blood sample collection for HIV screening, while the role of the CLWH and healthy controls was to permit blood sample collection for HIV screening and CD-4 count estimation.

RESULTS

This six-month-old study enrolled 386 participants, comprising 193 CLWH and 193 HIV-negative controls. All participants were actively involved in the study, yielding a response rate of 100% (Figure 1).

The sociodemographic variables of the CLWH and healthy controls: The sociodemographic variables of the CLWH and those of the healthy controls showed no significant difference between them ($P>0.05$) and, as such, were comparable, as shown in Table 1. The highest proportion of the CLWH were aged 2-5 years (33.2%), were males (53.9%), and belonged to the middle socioeconomic class (39.4%). The highest proportion included those residing with caregivers aged 20-39 years (36.8%), female caregivers (65.8%), married caregivers (45.1%), and biological caregivers (69.4%).

The clinical variables of the CLWH: The clinical variables of the CLWH revealed the highest proportion to be those with a duration of HIV diagnosis of 6-12 months (43.5%), non-significant infection (52.3%), and non-orphans (75.6%). Table 2 describes the clinical variables of the CLWH.

Comparison of the PM burden between the CLWH and healthy controls: Among the 193 CLWH, 61

(31.6%) had PM, while among the 193 healthy controls, 15 (7.8%) had PM, according to their SDQ scores. This difference was significant as the CLWH had significantly higher PM prevalence than the healthy controls ($\chi^2=34.67$, $df=1$, $P<0.001$). Table 3 compares the PM burden between the CLWH and the healthy controls.

Association between PM and the sociodemographic variables of the CLWH: The association between the high PM prevalence and the sociodemographic variables of the CLWH was further determined. There was a significant association between PM prevalence, CLWH's age, CLWH's sex, SEC, and relationship with caregivers (CLWH's age: $\chi^2=17.93$, $df=3$, $P<0.001$; CLWH's sex: $\chi^2=7.59$, $df=1$, $P=0.008$; SEC: $\chi^2=11.89$, $df=2$, $P=0.003$; relationship with caregiver: $\chi^2=6.11$, $df=1$, $P=0.018$). In addition, a significant association was found between PM prevalence, caregivers' age, and marital status (Caregivers' age: $\chi^2=14.29$, $df=2$, $P=0.01$; marital status: $\chi^2=27.20$, $df=3$, $P<0.001$). Furthermore, there was a trend; the PM prevalence increased as the ages of the CLWH and their caregivers increased. Despite a higher PM prevalence among the female caregivers (34.6%) compared to their male counterparts (25.8%), there was no significant association between PM prevalence and the caregivers' sex ($\chi^2=1.59$, $df=1$, $P=0.25$). Table 4 describes the association between PM prevalence and the sociodemographic variables of the CLWH.

Association between PM and the clinical variables of the CLWH: The association between the high PM prevalence and the CLWH's clinical variables was determined. Orphan status had a significant association with PM prevalence ($\chi^2=19.31$, $df=2$, $P<0.001$). There was also a trend that showed an increasing PM prevalence as the orphan status worsened. Despite a similar trend, that the PM prevalence increased following a prolonged duration of HIV diagnosis and an increased HIV severity, there was no significant relationship between PM prevalence, duration of HIV diagnosis, and HIV severity ($P>0.05$). Table 5 describes the association

between PM prevalence and the clinical variables of the CLWH.

Multivariate regression analysis of the strength of the association between PM and the significant variables of the CLWH: To determine the strength of the association between the significant variables of the CLWH and to eliminate confounders, all the significant sociodemographic and clinical variables were evaluated using a multivariate logistic regression model. Variables with significant association with PM were the CLWH's age, sex, and orphan status. Others were SEC, relationship with their caregivers, and caregivers' marital status. The CLWH aged 14/15 years and female CLWH were five and three times more likely to have PM, respectively (CLWH aged 14/15 years: AOR=4.92 [95% CI 1.12, 21.59], $P=0.035$; female CLWH: AOR=2.76 [95% CI 1.15, 6.62], $P=0.023$). Also, double-orphaned CLWH, those in the middle SEC, and those in the lower SEC were 11, four, and five

times more likely to have PM, respectively (double orphans: AOR=11.12 [95% CI 1.23, 100.68], $P=0.032$; middle SEC: AOR=4.18 [95% CI 1.28,

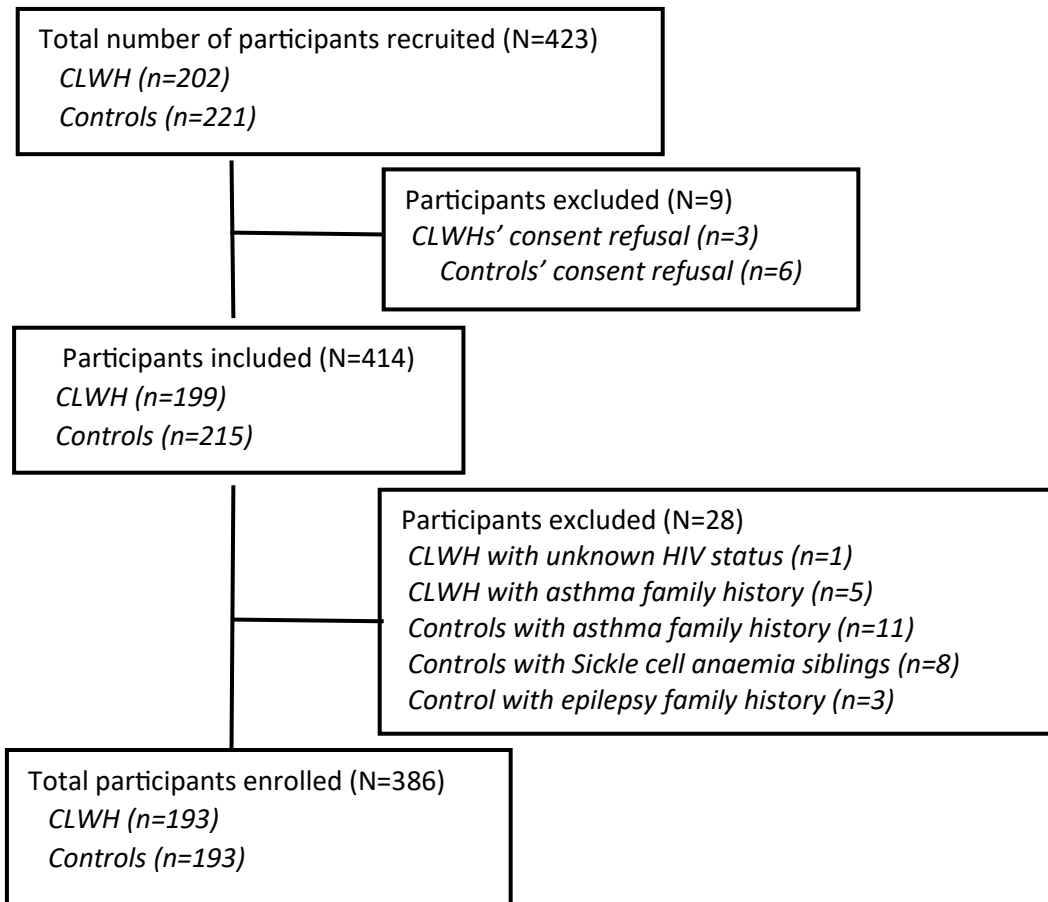


Fig. 1: A flow diagram showing the inclusion process of the study participants

Table 1: Sociodemographic variables of the CLWH and healthy controls

Sociodemographic variables	CLWH (N=193) n (%)	Controls (N=193) n (%)	χ^2	P-value
Children's age (years)				
2-5	64 (33.2)	64 (33.2)	0.00	>0.99
6-9	61 (31.6)	61 (31.6)		
10-13	50 (25.9)	50 (25.9)		
14/15	18 (9.3)	18 (9.3)		
Children's sex				
Male	104 (53.9)	104 (53.9)	0.00	>0.99
Female	89 (46.1)	89 (46.1)		
Caregivers' age (years)				
20-39	71 (36.8)	64 (33.2)	1.88	0.39
40-59	65 (33.7)	78 (40.4)		
>59	57 (29.5)	51 (26.4)		
Caregivers' sex				
Male	66 (34.2)	74 (38.3)	0.72	0.50
Female	127 (65.8)	119 (61.7)		
Caregivers' marital status				
Single	25 (13.0)	31 (16.1)	3.26	0.35
Married	87 (45.1)	96 (49.7)		
Divorced	45 (23.3)	41 (21.2)		
Widow(er)	36 (18.7)	25 (13.0)		
Relationship with caregiver				
Biologic	134 (69.4)	145 (75.1)	1.57	0.26
Non-biologic	59 (30.6)	48 (24.9)		
Socioeconomic class				
Upper	46 (23.8)	49 (25.4)	1.71	0.426
Middle	76 (39.4)	85 (44.0)		
Lower	71 (36.8)	59 (30.6)		

CLWH = Children Living with HIV; Controls: Healthy HIV-negative school children

Table 2: Clinical variables of the CLWH

Clinical variables (N=193)	Frequency (n)	Percentage (%)
HIV diagnosis duration		
< 6 months	37	19.2
6-12 months	84	43.5
> 12 months	72	37.3
HIV severity		
Not significant	101	52.3
Mild infection	48	24.9
Advanced infection	31	16.1
Severe infection	13	6.7
Orphan status		
Non-orphans	146	75.6
Single	39	20.2
Double	8	4.1

CLWH = Children Living with HIV

Table 3: Comparison of the PM burden between the CLWH and healthy controls

PM	CLWH (N=193) n (%)	Controls (N=193) n (%)	χ^2	p-value
Present	61 (31.6)	15 (7.8)	34.67	<0.001*
Absent	132 (68.4)	178 (92.2)		

*Significant difference (p-value); degree of freedom = 1; PM = Psychological Maladjustment; CLWH = Children Living with HIV; Controls = Healthy HIV-negative school children

Table 4: Association between PM prevalence and the CLWH's sociodemographic variables

Sociodemographic variables	PM		χ^2	P-value
	Present (N = 61) n (%)	Absent (N = 132) n (%)		
Children's age (in years)				
2-5	13 (20.3)	51 (79.7)	17.93	<0.001*
6-9	14 (23.0)	47 (77.0)		
10-13	23 (46.0)	27 (54.0)		
14/15	11 (61.1)	7 (38.9)		
Children's sex				
Male	24 (23.1)	80 (76.9)	7.59	0.008*
Female	37 (41.6)	52 (58.4)		
Caregivers' age (in years)				
20-39	15 (21.1)	56 (78.9)	14.29	0.001*
40-59	17 (26.2)	48 (43.8)		
>59	29 (50.9)	28 (49.1)		
Caregivers' sex				
Male	17 (25.8)	49 (74.2)	1.59	0.25
Female	44 (34.6)	83 (65.4)		
Caregivers' marital status				
Single	6 (24.0)	19 (76.0)	27.20	<0.001*
Married	14 (16.1)	73 (83.9)		
Divorced	19 (42.2)	26 (57.8)		
Widow(er)	22 (61.1)	14 (38.9)		
Relationship with caregiver				
Biologic	35 (26.1)	99 (73.9)	6.11	0.018*
Non-biologic	26 (44.1)	33 (55.9)		
Socio-economic class				
Upper	9 (19.6)	37 (80.4)	11.89	0.003*
Middle	19 (25.0)	57 (75.0)		
Lower	33 (46.5)	38 (53.5)		

#Fischer's exact test; *Significant P-value; CLWH = Children Living with HIV; PM = Psychological Maladjustment.

Table 6: Multivariate regression analysis of the strength of the association between PM and the significant variables of the CLWH.

Independent variables	AOR	95% CI for OR	P-value
Children's age (in years)			
2-5	Reference	-	-
6-9	0.48	0.10 – 2.23	0.35
10-13	2.98	0.68 – 12.90	0.15
14-15	4.92	1.23 – 21.59	0.035*
Children's sex			
Male	Reference	-	-
Female	2.76	1.15 – 6.62	0.023*
Caregiver's age (in years)			
20-39	Reference	-	-
40-59	1.10	0.36 – 2.26	0.87
>59	2.45	0.84 – 7.13	0.10
Caregiver's marital status			
Single	Reference	-	-
Married	1.94	0.55 – 6.84	0.30
Divorced	8.16	2.38 – 27.98	0.001*
Widow(er)	6.91	1.43 – 37.38	0.016*
Relationship with caregiver			
Biological	-	-	-
Non-biological	3.20	1.32 – 7.76	0.010*
Socioeconomic class			
Upper	-	-	-
Middle	4.18	1.28 – 13.70	0.018*
Lower	4.69	1.66 – 13.29	0.004*
Orphan status			
Non-orphans	Reference	-	-
Single orphans	0.80	0.09 – 7.38	0.85
Double orphans	11.12	1.23 – 100.68	0.032*

DISCUSSION

Our study evaluated the sociodemographic and clinical factors associated with PM in CLWH, which was necessitated by reports of worsening PM burden in them. [15,16]. We found a significantly high PM burden in the CLWH compared to healthy HIV-negative controls, and this finding was not surprising. The consequences may include poor quality of life and suicidal tendencies. [38] This high PM burden in CLWH reported in our study was also observed in studies in Malawi, [15] South Africa, [14] Ilorin, [16] and Calabar, [17] both in Nigeria. It may have been precipitated by certain risk factors that pose as life stressors to these children. [39]

Our study identified the factors associated with PM among the CLWH as the CLWH's age, sex, orphan status, and Socioeconomic Class (SEC). Others included the relationship with their caregivers and their caregivers' marital status.

The CLWH's age was associated with PM in the CLWH, as those aged 14/15 years were eight times more likely to have PM than those in other age groups. This was an expected finding, plausibly because this age group corresponds to late adolescence, a period during which children acquire appreciable knowledge, independence, and confidence, including paying more attention to friends as a result of increasing socialization.[40,41] The children in this age group have more cognitive knowledge and are fully aware of themselves, their friends, and their external environment.[40] Also, they learn how to manage their emotions and friendships.[41] Unfortunately, HIV's physical effects, coupled with stigma and social isolation, may pose as stressors that precipitate PM in them.[41,42] These may have potentiated the PM in them and may have been responsible for their increased likelihood of developing PM compared to those in the other age groups. The high PM burden among the CLWH aged 14/15 years reported in our study was corroborated by Pilania et al, [28] in 2020 in India, Van den Heuvel et al, [43] in 2019 in Uganda, Ayano et al, [27] in 2021 in Ethiopia, and Degun et al, [44] in 2011 in Zambia.

Also, the CLWH's sex was associated with PM in the CLWH in our study, as the female CLWH were three times more likely to have PM than their male counterparts. This finding was not surprising to the researchers and may be due to the effects of some sociocultural and biological factors on females. For instance, certain sociocultural traditions, particularly in low-resource settings, label females as subordinates, [45,46], as reflected in the roles some females, especially female children, play in the community. They may be confined to performing housekeeping chores and certain household responsibilities. [46] These are stressors that, while coexisting with HIV, may increase burnout, limit socialization with peers, and provoke family disharmony. [47] In addition, females, especially female adolescents, are more self-aware than males. Thus, they may be fully aware of the negative effects of HIV and their confinement to household responsibilities, resulting in low self-esteem and a further limitation of socialization. These are significant stressors that may precipitate PM in female CLWH, [48] Apart from these sociocultural factors, certain biological factors may be contributory. Among these is serotonin levels, a neurotransmitter that regulates emotions and behaviours, in females. [49] Lower brain levels in females have been implicated in PM. [49] These may also be responsible for the high PM burden and increased likelihood of developing MHA in female CLWH. The high female preponderance of PM from our study was also observed in studies by Ananworanich et al, [50] in 2008 in Thailand.

Our study showed that SEC was associated with PM in the CLWH, as the CLWH who belonged to the lower and middle SEC were five and four times more likely to have PM, respectively, than those in the upper class. The finding from the lower class is expected as there may be an inability of their caregivers to provide some necessities, including adequate food, proper shelter, clothing, good health, security, and transportation. This may be burdensome, as the CLWH may be unable to regularly access healthcare services, despite their

healthcare needs, thus worsening the physical and emotional impacts of HIV on them. Apart from these, they may encounter difficulties in regular school attendance and adequate feeding. Thus, adjustment to, or coping with, stressful life situations becomes a herculean task for them. [51,52] This may be responsible for the high burden and increased likelihood of developing PM in those in the lower SEC. However, the finding from the middle SEC is somewhat surprising. It is possible that the need to fully integrate into social activities, both in school and the community, may have resulted in increased stressors and triggered the PM in the CLWH in this category. The high PM burden and increased likelihood of developing MHA among the CLWH belonging to the lower SEC were also reported by Dessauvagie et al, [42] in 2020.

The caregivers' marital status was also associated with PM in our study. The CLWH residing with widowed and divorced caregivers were seven and eight times more likely to have PM, respectively, than those in other categories. This may have been due to a lack of previously available physical, emotional, social, and psychological support from the deceased and separated caregiver (spouse), and other family members. [53,54] The family is considered the main support structure of children, and the failure of this structure due to the death or separation of a spouse may result in dissatisfaction or improper functioning of children, [22] including CLWH. The contributory role of an intact family and its support system in promoting, protecting, and supporting the mental well-being of children, including CLWH, is well documented, as reported by Butler et al, [55] in 2022 in the UK. This was reiterated by Almatham et al, [56] in 2022 in Saudi Arabia, who stated that the loss of a close relative and family disharmony are risk factors of PM in children. Thus, the widowed and divorced caregivers may have unilaterally and regularly provided all the necessities of the CLHW, including their non-infected children, even during stressful periods. This is burdensome and may have potentiated the PM in them. Despite the high MHA burden and increased likelihood of developing PM in CLWH residing with

widowed and divorced caregivers, to the best of our knowledge, there was no similar study that evaluated the relationship between caregivers' marital status and PM in CLWH, to enable comparison.

The relationship with their caregivers was associated with PM in the CLWH, as those who reside with non-biological caregivers were three times more likely to have PM than those who reside with biological caregivers, a finding that was not surprising. The CLWH residing with non-biological caregivers may have had some disruptions in their previously intact biological family structure and functioning, either due to poverty or the demise of their biological caregivers. [57] This may have altered how the family members relate with one another, [57] with consequent unavailability of previously available parental support. The implication may include defective provision of care, increased school dropouts, school absenteeism, and increased risk of child labour, abuse, and neglect by non-biological caregivers. [22,57] These are life stressors that may have been responsible for the high burden and increased likelihood of developing PM in CLWH residing with non-biological caregivers. The high burden and increased likelihood of developing PM among the CLWH residing with non-biological caregivers were also observed by Kefale et al,[58] in 2019 in Ethiopia.

Furthermore, orphan status was associated with PM, as double orphans were 11 times more likely to have PM than those in other categories. This was an expected finding as the demise of a parent is greeted with a loss of emotional, physical, and psychological support. This lack is aggravated when there is a demise of both parents. This demise disrupts family functioning and alters how family members relate with one another. [42]. Therefore, the absence of parental care and support may exacerbate significant stressors in the CLWH,[57] with consequent reduction in the level of care and high risk of child abuse.[57] It is important to note that the nuclear family is the strongest support system for children; the absence of which may have triggered some psychological and social stressors that may have predisposed the CLWH to PM.[57,58] This may be

responsible for the high burden and increased likelihood of developing PM in the double-orphaned CLWH. The high burden reported in this study was also corroborated by Kefale et al, [58] in 2019 in Ethiopia.

Contrary to expectations and despite a high burden of PM in the CLWH with severe HIV infection, those with a duration of HIV diagnosis of more than one year, those residing with caregivers older than 59 years and those residing with female caregivers, these variables were not associated with PM in CLWH. A plausible explanation for this finding is that HIV's physical effects, chronic medication intake, limitation of socialisation, and uncertainty about the future may have triggered PM in the CLWH irrespective of the HIV severity, duration of the diagnosis, or caregivers or sex. This lack of a significant relationship between PM, HIV severity, and duration of HIV diagnosis was also corroborated by Ananworanich et al, [50] in 2008 in Thailand, Kalembo et al, [15] in 2019 in Malawi, and Dow et al, [59] in 2016 in Tanzania. To the best of the authors' knowledge, there were no documented studies that evaluated caregivers' age and sex as predictors of PM in CLWH, to enable comparison with our present study.

Our study's strength lies in the fact that we deployed a validated screening tool to determine the socio-demographic and clinical risk factors for PM in CLWH in a non-psychiatric clinical setting. Our study's limitation lies in the fact that the SDQ is a screening tool and not a diagnostic tool. Also, it was a cross-sectional study and did not encourage follow-up of the CLWH.

CONCLUSION

Our study showed that, there is a high PM burden among CLWH, and this is associated with the CLWH's age, sex, SEC, orphan status, relationship with their caregivers, and their caregivers' marital status. Double-orphaned CLWH and those residing with a divorced or widowed caregiver had the strongest association with PM. It is recommended to provide mental health evaluation and assistance to

CLWH in Umuahia, particularly those with evidence of the aforementioned risk factors for PM.

List of abbreviations:

CD4: Cluster of Differentiation-4

CLWH: Children Living with HIV

FMCU: Federal Medical Centre, Umuahia

HIV: Human Immunodeficiency Virus

PHC: Paediatric HIV Clinic

PM: Psychological Maladjustment

SDQ: Strengths and Difficulties Questionnaire

SEC: Socioeconomic Class

SPSS: Statistical Package for Social Sciences

WHO: World Health Organization

Acknowledgement: The authors deeply appreciate everyone who assisted in one way or the other in making this research a reality, particularly the participants, and the management and staff of the study sites.

Funding: The authors did not receive any funding or financial support for this study.

Authors' contributions: OIF conceptualized and designed the study. OIF and OKK were involved in data collection/acquisition and statistical analysis. All authors (OIF, OKK, EJ, and KAU) were involved in the writing and revising of the manuscript for intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

Conflict of interest statement: The authors have no conflict of interest to declare.

Data availability statement: The authors are available and ready to supply the research data upon any request through the corresponding author.

Institutional review board statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Federal Medical Centre, Umuahia, Nigeria (protocol code: FMC/QEH/G.596/Vol.10/377 and date of approval: 27th March, 2019). The researchers ensured strict adherence to ethical values in accordance with the ethical principles of the Helsinki Declaration.

Informed consent: Informed consent was obtained from all subjects involved in this study. The study details were explained, and caregivers and children voluntarily opted in or out. Only the caregivers who consented and the children (>7 years) who assented were enrolled. Informed written consent was obtained before enrolment.

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