Comparison of Determinants of Enuresis among Children and Adolescents Living with HIV/AIDS and Children and Adolescents Living with Sickle Cell Disease in Maiduguri: A Critical Nigerian Research Article

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Abstract

Introduction: Enuresis is a common but often hidden paediatric condition. It becomes clinically more important when it occurs in children and adolescents with chronic illnesses such as HIV/AIDS and sickle cell disease (SCD), where biological vulnerability, sleep disruption, stigma, family stress and repeated clinic contact may interact. This study compares the prevalence and determinants of enuresis among children and adolescents living with HIV/AIDS and those living with SCD attending specialist clinics in Maiduguri, Nigeria.

Methodology: This manuscript reframes and strengthens a comparative cross-sectional study conducted among 320 participants aged 6-18 years, with 160 children/adolescents living with HIV/AIDS and 160 living with SCD. Participants were age- and sex-matched. Enuresis was assessed using the screening and diagnostic components of the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version. Clinical data were extracted from case notes. The review further interprets the findings using published literature on paediatric enuresis, sickle cell nephropathy, adolescent HIV, chronic illness and Islamic psychoeducational care.

Results: The mean age was 11.4 years (SD 3.15), and males constituted 51.9% of participants in each group. Current nocturnal enuresis was more common among children/adolescents with SCD than among those with HIV/AIDS: 28.8% (95% CI 22.23-36.30) versus 22.5% (95% CI 16.65-29.67). Among the SCD group, disease awareness, medication adherence and family history of mental illness were associated with nocturnal enuresis in bivariate analysis, while awareness of SCD independently predicted lower odds of nocturnal enuresis (OR 0.26; 95% CI 0.08-0.82; p=0.022).

Conclusion: Enuresis is a substantial, under-recognised clinical and psychosocial problem among children and adolescents with HIV/AIDS and SCD in Maiduguri, with a higher burden among those with SCD. Routine screening, non-punitive family education, disease-specific care, school support and culturally sensitive Islamic psychoeducation should be integrated into paediatric HIV and SCD clinics in Nigeria.

Keywords: Enuresis, HIV/AIDS, sickle cell disease, children, adolescents, Maiduguri, Islamic psychoeducation.

Introduction

Enuresis is not merely a benign developmental inconvenience. In clinical settings it may indicate delayed nocturnal bladder control, sleep-arousal difficulty, increased nocturnal urine production, psychosocial stress, familial vulnerability or disease-related renal and neurological mechanisms. The International Children's Continence Society defines nocturnal enuresis as intermittent incontinence during sleep in a child old enough to have achieved continence, while stressing the need for standardised terminology and careful distinction between nocturnal and daytime symptoms [3].

The problem becomes more complex when it occurs in children and adolescents who live with chronic medical conditions. HIV/AIDS and SCD impose repeated clinic attendance, medication demands, disclosure challenges, pain, stigma, school disruption and family economic strain. These factors may intensify emotional distress and impair

continence routines. In SCD, the mechanism is also biological: hyposthenuria from renal medullary injury may reduce urinary concentrating ability, increasing nocturnal urine production and bedwetting risk [4,5].

Nigeria is central to this discussion. The country carries one of the world's largest SCD burdens, and global modelling indicates that sickle cell disease remains concentrated in sub-Saharan Africa, India and other high-burden regions [6,7]. Nigerian children with chronic illnesses also live within health systems where specialist services are concentrated in tertiary hospitals, out-of-pocket payment remains important, and psychosocial care is often under-resourced. In north-eastern Nigeria, conflict, displacement, poverty and interrupted schooling may further amplify child mental health risks.

Children and adolescents living with HIV/AIDS form another vulnerable group. Advances in antiretroviral therapy have improved survival, but adolescents living with HIV face adherence, disclosure, stigma and mental health challenges that require developmentally appropriate support [8,9]. In this context, enuresis may worsen shame, reduce school participation, create family conflict and impair quality of life. Yet it is rarely screened for systematically in routine paediatric HIV or SCD care.

The pasted Maiduguri study is therefore important because it directly compares enuresis in two paediatric chronic illness populations within the same tertiary health environment. Its comparative design, use of a structured psychiatric instrument and attention to clinical determinants provide a useful platform for an IMAN Medical Journal research article. This revised manuscript strengthens the work by improving the structure, standardising tables, clarifying limitations, integrating published literature and translating Islamic psychoeducational principles into non-stigmatising, practical clinical care.

Methodology

Study design and setting

The primary study was a comparative cross-sectional study conducted at the University of Maiduguri Teaching Hospital, Maiduguri, Borno State, Nigeria. Participants were recruited from paediatric and adult antiretroviral therapy clinics, paediatric SCD clinic and haematology clinic. The setting is a major tertiary referral centre for north-eastern Nigeria, a region affected by chronic insecurity, population displacement and health-system strain.

Study population

The study population comprised children and adolescents aged 6-18 years living with HIV/AIDS or SCD who had been receiving treatment and follow-up for at least six months. Those with a history of psychiatric disorder before HIV/AIDS diagnosis and those with other chronic medical conditions apart from HIV/AIDS or SCD were excluded. A total of 320 participants were recruited: 160 children/adolescents living with HIV/AIDS and 160 children/adolescents living with SCD. The two groups were matched for age and gender.

Sampling and sample size

The Kirkwood formula was used to calculate the sample size using the formula for comparing two groups as follows, $n = (Z\alpha + Z1\text{-}\beta)\ 2\ [p1\ (1- p1) + p2\ (1- p2)] / (p1- p2)2$

Where, n = minimum sample size in the two groups

$Z\alpha$ =standard normal deviate corresponding to 5% level of significance = 1.96

$Z1\text{-}\beta$ = standard normal deviate corresponding to a power of 80% = 0.84

p1 = prevalence of psychiatric morbidity among children and adolescents receiving ART = 48%

p2 = the prevalence of psychiatric morbidity among adolescents with SCD is reported to be 12.5%.

p1- p2: For this study the minimum difference to be detected was conservatively taken to be 15%. This assumption was taken in order to increase the power and to get a larger sample size.

n=([(1.96+ 0.84)2 [0.48(1-0.48) + 0.12(1-0.125)])/⟦(0.15)⟧^2 =125

However, to correct for non-response rate assumed at 20%, hence 156 was estimated (approx. 160). Thus, 160 participants were recruited for each group, giving a total sample size of 320.

A systematic random sampling technique was used to enrol study participants from the ART clinics. The sampling interval calculated as sampling

frame/sample size = 700/160= 4.4. For the comparative group, they were matched with the study group for age and gender in SCD clinic.

Measures

The instruments were a socio-demographic questionnaire, clinical proforma and the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime Version (K-SADS-PL). The K-SADS-PL is a semi-structured diagnostic interview designed to assess current and lifetime psychopathology in children and adolescents [10,11]. The enuresis screening and diagnostic supplement was used to evaluate nocturnal and daytime enuresis, symptom frequency, duration, onset, primary or secondary pattern, impairment and impact on functioning. Study instruments were translated and back-translated into Hausa. Inter-rater reliability was reported as satisfactory, with Cohen's kappa of 0.732.

Data analysis

The source study analysed data using STATA version 18.0. Descriptive statistics were reported as frequencies, percentages, means and standard deviations. Chi-squared and Fisher's exact tests were used for bivariate analyses. Variables significant at bivariate analysis were entered into logistic regression to identify independent predictors of nocturnal enuresis. Statistical significance was set at $p<0.05$.

Narrative strengthening of the manuscript

For this submission-ready revision, the pasted study was treated as the primary data source. Published literature was used to deepen interpretation, especially on enuresis terminology, SCD-related hyposthenuria, adolescent HIV, chronic illness mental health, paediatric quality of life, quaternary prevention and Islamic medical ethics. The IMAN Medical Journal review on falls among elderly patients was used only as a packaging and flow guide, not as a source of wording or topic structure [2].

Results

Socio-demographic characteristics of participants

The study included 320 participants, comprising 160 children and adolescents living with HIV/AIDS (CALWHA) and 160 children and adolescents living with sickle cell disease (CALSCD). The sample was matched by age and gender. There were 166 males (51.9%) and 154 females (48.1%). The mean age was 11.4 years (SD = 3.15), with an age range of 6-18 years. Most participants in both groups were younger than 14 years and lived in urban areas.

The two groups were exactly matched by age group and gender. There was no statistically significant difference between the groups in educational level, family type or area of residence. However, family size differed significantly by diagnostic group, with large family size being more common among CALSCD than CALWHA (32.5% versus 21.9%; $\chi^2 = 4.562$, $p = 0.033$).

Clinical characteristics of participants

The clinical profiles of the two diagnostic groups differed substantially. CALSCD had more recurrent admissions, longer treatment exposure, greater illness awareness and complete medication adherence as recorded in the baseline clinical table.

Recurrent admission was significantly more frequent among CALSCD than CALWHA (46.9% versus 20.0%; $\chi^2 = 25.961$, $p < 0.001$). Disease awareness was markedly higher among CALSCD than CALWHA (90.6% versus 18.1%; $\chi^2 = 169.498$, $p < 0.001$). Among those aware of their illness, CALSCD were also more likely to have become aware before the age of 8 years (77.2% versus 38.5%; $\chi^2 = 16.218$, $p < 0.001$). Medication adherence differed significantly between groups, but this comparison should be interpreted cautiously because the baseline table recorded all CALSCD as adherent.

Prevalence of current nocturnal enuresis

The table demonstrates a relatively high prevalence of enuresis, particularly among children living with sickle cell disease than among those with HIV/AIDS. Enuresis was also more at night (nocturnal) than daytime enuresis, and also in the past than currently. Nocturnal enuresis was the most common subtype among respondents with SCD than with HIV. Current nocturnal enuresis prevalence was 28.8% (95% CI: 22.23-36.30)

Table 1: Socio-demographic characteristics of participants by diagnostic group

Variable	Category	CALWHA n (%)	CALSCD n (%)	Test statistic	p-value
Age group (years)	<14	117 (73.1)	117 (73.1)	$\chi^2 = 0.000$	1.000
	14-18	43 (26.9)	43 (26.9)		
Gender	Male	83 (51.9)	83 (51.9)	$\chi^2 = 0.000$	1.000
	Female	77 (48.1)	77 (48.1)		
Educational level	Below secondary	160 (100.0)	157 (98.1)	Fisher's exact	0.248
	Post-secondary	0 (0.0)	3 (1.9)		
Family type	Monogamous	104 (65.0)	97 (60.6)	$\chi^2 = 0.656$	0.418
	Polygamous	56 (35.0)	63 (39.4)		
Family size	Small (≤7 members)	125 (78.1)	108 (67.5)	$\chi^2 = 4.562$	0.033
	Large (>7 members)	35 (21.9)	52 (32.5)		
Area of residence	Rural	32 (20.0)	26 (16.2)	$\chi^2 = 0.758$	0.384
	Urban	128 (80.0)	134 (83.8)		

Note: CALWHA = children/adolescents living with HIV/AIDS; CALSCD = children/adolescents living with sickle cell disease; χ^2 = Pearson chi-square test. Fisher's exact test was used where sparse cells were present.

Table 2: Clinical characteristics of participants by diagnostic group

Variable	Category	CALWHA n (%)	CALSCD n (%)	Test statistic	p-value
Number of admissions	<3 times	128 (80.0)	85 (53.1)	$\chi^2 = 25.961$	<0.001
	≥3 times	32 (20.0)	75 (46.9)		
Duration of treatment	≤5 years	84 (52.5)	68 (42.5)	$\chi^2 = 3.208$	0.073
	>5 years	76 (47.5)	92 (57.5)		
Child awareness of disease	Yes	29 (18.1)	145 (90.6)	$\chi^2 = 169.498$	<0.001
	No	131 (81.9)	15 (9.4)		
Age at awareness	<8 years	10 (38.5)	112 (77.2)	$\chi^2 = 16.218$	<0.001
	≥8 years	16 (61.5)	33 (22.8)		
Medication adherence	Yes	94 (58.8)	160 (100.0)	Fisher's exact	<0.001
	No	66 (41.2)	0 (0.0)		

Note: Age at awareness applies only to participants reported to be aware of their illness. The CALWHA age-at-awareness sub-total is 26, although 29 participants were recorded as aware of diagnosis; this

suggests three missing age-at-awareness observations. Fisher's exact test was used for medication adherence because of a zero cell.

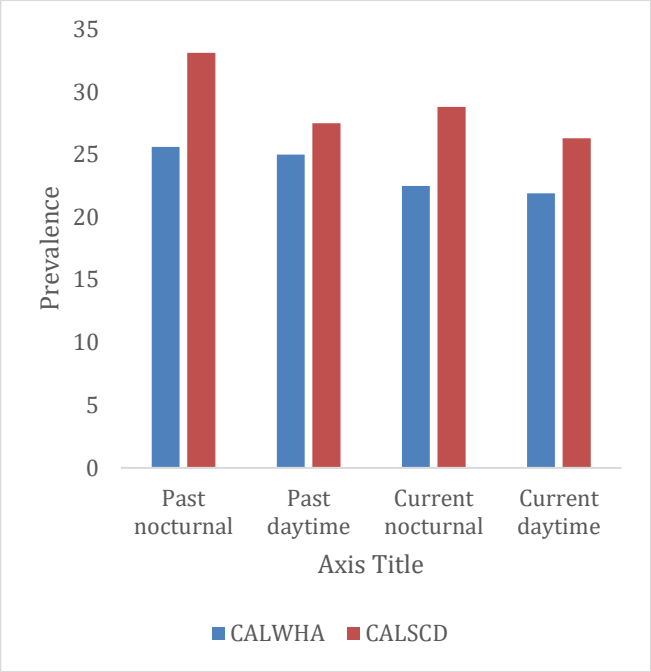

Figure 1: Prevalence of Enuresis Types among Children/Adolescents Living with HIV and SCD.

Current nocturnal enuresis was common in both groups. The prevalence was higher among CALSCD than CALWHA, although the difference did not reach statistical significance. Current nocturnal enuresis was observed in 22.5% of CALWHA and 28.8% of CALSCD. Although the absolute prevalence was 6.3 percentage points higher in the SCD group, the difference was not statistically significant ($\chi^2 = 1.640$, $p = 0.200$). This finding suggests a clinically relevant but statistically non-significant excess burden among CALSCD in this sample.

Clinical factors associated with current nocturnal enuresis

Bivariate analyses were conducted separately for CALWHA and CALSCD. In the CALWHA group, disease awareness, medication adherence and family history of mental illness were not significantly associated with current nocturnal enuresis. In the CALSCD group, illness awareness, medication adherence and family history of mental illness were significantly associated with current nocturnal enuresis.

Among CALWHA, none of the selected clinical factors was significantly associated with current nocturnal enuresis. Among CALSCD, lack of disease awareness was associated with a higher prevalence of enuresis. Current nocturnal enuresis was present in 53.3% of those not aware of their disease compared with 26.2% of those aware of their disease (Fisher's exact $p = 0.037$). Non-adherence was also associated with a higher prevalence of enuresis among CALSCD (63.6% versus 26.2%; Fisher's exact $p = 0.014$), although the adherence denominator conflict should be resolved before final submission. Family history of mental illness showed the strongest bivariate association among CALSCD, with enuresis present in 87.5% of those with a positive family history compared with 25.7% of those without such history (Fisher's exact $p = 0.001$).

Logistic regression analysis

Disease awareness is the only statistically significant predictor of current nocturnal enuresis among CALSCD. Children and adolescents who were aware of their SCD status had significantly lower odds of current nocturnal enuresis than those who were not aware of their illness (OR = 0.260, 95% CI: 0.082-0.824, $p = 0.022$). This finding should not be interpreted as evidence that disclosure alone prevents enuresis. Rather, developmentally appropriate illness awareness may support self-management, communication with caregivers, medication routines and help-seeking behaviour.

Discussion

Principal findings

This study found a high burden of current nocturnal enuresis among children and adolescents with HIV/AIDS and SCD attending specialist clinics in Maiduguri. The burden was higher in SCD, where nearly three in ten participants had current nocturnal enuresis. This finding is consistent with published evidence that enuresis is substantially more frequent in children and adolescents with sickle cell anaemia than in the general population [4].

Table 3: Current nocturnal enuresis prevalence by diagnostic group

Diagnostic group	Total assessed	Current nocturnal enuresis n (%)	No current nocturnal enuresis n (%)	95% CI for prevalence	Test statistic	p-value
CALWHA	160	36 (22.5)	124 (77.5)	16.65-29.67	$\chi^2 = 1.640$	0.200
CALSCD	160	46 (28.8)	114 (71.2)	22.23-36.30		

Table 4: Selected clinical characteristics associated with current nocturnal enuresis

Clinical factor	Group	Category	Enuresis n (%)	No enuresis n (%)	Test statistic	p-value
Disease awareness	CALWHA	Aware	3 (10.3)	26 (89.7)	$\chi^2 = 3.001$	0.083
		Not aware	33 (25.2)	98 (74.8)		
	CALSCD	Aware	38 (26.2)	107 (73.8)	Fisher's exact	0.037
		Not aware	8 (53.3)	7 (46.7)		
Medication adherence	CALWHA	Adherent	22 (23.4)	72 (76.6)	$\chi^2 = 0.107$	0.744
		Not adherent	14 (21.2)	52 (78.8)		
	CALSCD	Adherent	39 (26.2)	110 (73.8)	Fisher's exact	0.014
		Not adherent	7 (63.6)	4 (36.4)		
Family history of mental illness	CALWHA	Yes	2 (20.0)	8 (80.0)	Fisher's exact	1.000
		No	34 (23.0)	116 (77.0)		
	CALSCD	Yes	7 (87.5)	1 (12.5)	Fisher's exact	0.001
		No	39 (25.7)	113 (74.3)		

Note: Fisher's exact test was used where expected cell counts were below 5. For sparse 2×2 tables, Fisher's exact p-value is reported instead of a chi-square statistic. The SCD medication-adherence counts in this association table differ from the baseline clinical table, where all CALSCD were recorded as adherent; this requires verification against the raw dataset.

Table 5: Logistic regression analysis of predictors of current nocturnal enuresis among CALSCD

Predictor	Category	Odds ratio	Standard error	p-value	95% CI
Disease awareness	Not aware	Reference	-	-	-
	Aware	0.260	0.153	0.022	0.082-0.824

Note: OR = odds ratio; CI = confidence interval. A chi-square test of independence is not applicable to this logistic regression table. A Wald test is normally used in logistic regression, but the full regression coefficient and model output are required for independent recalculation.

The SCD-HIV difference is clinically important. In SCD, renal medullary ischemia and hyposthenuria can impair urinary concentrating ability. This increases nocturnal urine output and may overwhelm bladder capacity during sleep. Pain crises, fatigue, hospitalisation and sleep disruption may further impair arousal from sleep. In HIV/AIDS, the pathways are likely to be more psychosocial and neurodevelopmental, including stigma, disclosure distress, adherence burden, opportunistic illness history, family stress and school disruption.

Interpretation in relation to Nigerian and global literature

Esezobor and colleagues reported that enuresis in Nigerian children and adolescents with sickle cell anaemia was more frequent and substantially different from enuresis in the general population [4]. Their work highlighted rates between 20% and 58% in SCA literature, with mechanisms including hyposthenuria, sleep-disordered breathing and functional bladder factors. The Maiduguri study's SCD prevalence of 28.8% falls within this known range and reinforces the need to treat enuresis as a routine SCD morbidity rather than a private family embarrassment.

The HIV/AIDS findings also deserve attention. Although the prevalence was lower than in SCD, current nocturnal enuresis affected more than one fifth of participants living with HIV/AIDS. Adolescents living with HIV are known to face complex adherence, disclosure and mental health challenges [8,9]. Enuresis may intensify these challenges by increasing shame, reducing sleep quality and exposing children to punishment or ridicule. It should therefore be included in psychosocial assessment during ART follow-up.

The study also contributes to child mental health evidence from north-eastern Nigeria. Chronic illness, economic hardship, insecurity, displacement and educational disruption may interact. A child with SCD or HIV/AIDS who wets the bed is not only managing a symptom; the child may be negotiating family stress, bedding costs, school embarrassment and fear of disclosure. Clinical care should therefore include the caregiver, school context and household realities.

Several issues require strengthening before final publication. First, the cross-sectional design cannot establish causality. Disease awareness may reduce enuresis, but it may also be a marker for better family communication, older developmental maturity, better clinic engagement or lower disease concealment. Second, the study did not include a non-chronic-illness control group, which would have helped quantify excess risk relative to the general paediatric population.

Third, the actuarial design is underdeveloped. A clinically useful actuarial approach would define a risk score for clinic screening, using age, sex, diagnosis, disease awareness, medication adherence, frequency of admission, sleep symptoms, urinary tract symptoms, family history and psychosocial stress. Such a score could classify children into low-, moderate- and high-risk groups for stepped care. The present study identifies predictors but does not yet translate them into a validated risk stratification tool.

Fourth, some source tables contain internal inconsistencies, especially around SCD medication adherence and treatment-duration association data. These inconsistencies do not invalidate the main prevalence finding, but they should be resolved using the raw dataset before final statistical submission. Transparent table correction is essential because paediatric chronic illness studies may later inform clinic protocols, insurance benefit design and public health planning.

Fifth, the study underdevelops health-economic implications. Enuresis generates hidden costs: bedding, laundry, clinic visits, school absence, caregiver time and psychological distress. In low-income and informal-sector households, these costs may be significant. The National Health Insurance Authority and state schemes should consider whether paediatric chronic illness benefit packages include psychosocial screening, continence counselling and referral support, especially for SCD.

Implementation in Nigerian paediatric services

Implementation should begin at specialist clinics but not end there. Paediatric HIV and SCD clinics should add two or three screening questions on current nocturnal enuresis, daytime wetting, distress and school impairment. Positive screens should prompt brief psychoeducation, assessment for red flags and referral when necessary. Nurses, counsellors and social workers can deliver a structured five-minute family education script, while

complex cases can be referred to child psychiatry, psychology, nephrology or urology.

Clinical implications

To optimise clinical management, routine enuresis screening should be systematically incorporated into paediatric HIV and sickle cell disease (SCD) clinic review forms. When nocturnal enuresis is identified in patients with SCD, clinicians must evaluate underlying physiological and clinical factors, including hyposthenuria, sleep disturbances, pain frequency, fluid consumption patterns, and potential renal complications. Conversely, for children and adolescents living with HIV/AIDS who present with enuresis, the diagnostic focus should shift toward psychosocial determinants, necessitating comprehensive assessments for adherence stress, disclosure concerns, anxiety, depression, bullying, and family functioning. Across both chronic disease cohorts, clinics should look beyond simple wetting frequency by meticulously documenting secondary morbidities such as school impairment, diminished self-esteem, and peer difficulties. Management strategies must prioritize equipping caregivers with non-punitive psychoeducation alongside practical sleep, toileting, and bedding guidance, while cases classified as severe, persistent, daytime, secondary, or functionally impairing should promptly trigger a referral to appropriate specialist services.

Actuarial and health-financing implications

The study has actuarial relevance because it identifies a measurable burden among defined chronic illness populations. Paediatric SCD and HIV programmes can use risk stratification to decide who needs brief education, who needs clinical review and who needs multidisciplinary care. However, actuarial tools must be designed ethically. They should improve access to care and not exclude children from services or insurance coverage because they are classified as high-risk.

For Nigeria, the financial challenge is practical. Families often pay out of pocket for transport, laboratory tests, bedding, laundry and consultations. State health insurance schemes and tertiary hospital social welfare units should consider low-cost benefit packages for paediatric chronic illness that include psychosocial screening, continence counselling, basic renal assessment when indicated and referral support. Faith-based hospitals, Islamic medical associations, zakat foundations and community groups can contribute, but they should work with formal health systems rather than create fragmented parallel care.

Limitations

This study was hospital-based and may not represent children and adolescents with HIV/AIDS or SCD who do not attend tertiary clinics. Its cross-sectional design limits causal inference. The study also relied partly on self- and caregiver-report, which may be affected by recall bias and shame. Some source tables showed denominator inconsistencies, particularly in selected association rows. These should be corrected from the raw dataset before final submission. The absence of a general population control group also limits estimation of excess risk attributable to chronic illness.

Conclusion

Enuresis, especially nocturnal enuresis, is common among children and adolescents living with HIV/AIDS and SCD attending specialist clinics in Maiduguri. The burden is higher among those with SCD, consistent with disease-specific renal and sleep-related mechanisms. Among the SCD group, disease awareness appears protective, suggesting that developmentally appropriate psychoeducation and family communication may improve coping and possibly reduce symptom burden.

The study is clinically important because enuresis affects dignity, sleep, school participation, self-esteem and family relationships. It should therefore be treated as part of comprehensive paediatric chronic illness care. A Nigerian response should combine biomedical assessment, psychosocial screening, caregiver education, school support, non-stigmatising Islamic psychoeducation where acceptable, and careful referral pathways. The goal is not only to reduce bedwetting but to protect the child's dignity, emotional health and long-term development.

Policy and research recommendations

To optimise clinical care and academic rigor, paediatric HIV and sickle cell disease (SCD) clinics in Nigeria should systematically integrate routine enuresis and psychosocial screening into their standard follow-up templates. Tertiary hospitals must take the lead in developing brief, culturally sensitive caregiver education scripts that clearly discourage punishment, shame, and public

disclosure of the condition. Within SCD clinics, nocturnal enuresis should be formally included in renal and psychosocial morbidity reviews-particularly for children experiencing frequent admissions or poor school functioning-while antiretroviral therapy (ART) clinics should comprehensively screen enuretic children for adherence stress, disclosure distress, anxiety, depression, and family functioning. To ensure structural sustainability, state health insurance schemes should expand coverage to include integrated paediatric chronic illness packages that incorporate mental health and continence counseling, complemented by faith-based organizations that support stigma reduction and practical family assistance while strictly respecting consent, confidentiality, and Nigeria's religious diversity. Finally, future research in this domain should transition to longitudinal and community-based designs featuring non-chronic-illness comparison groups alongside validated risk-stratification tools for enuresis, while the current raw dataset must be re-audited before final publication to correct any denominator inconsistencies in selected association tables and firmly confirm all inferential statistics.

Acknowledgement

The authors acknowledge the children, adolescents, caregivers and clinic teams whose participation and clinical care made the source study possible.

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Funding: Nil

Conflicts of Interest: Nil