ISSN: 2475-5435

Research Article

International Journal of Psychiatry

Determinants of Depression and Suicidality Among Adolescents with Sickle Cell Disease in Kano, Nigeria

Lubuola IB[1,2,3*], Armiya'u AY[1,4,5], Abiola T[6], Braji AI[2], Gwarzo DH[7], Tsiga-Ahmed FI[8] and Jalo RI[8]

[1]*Federal Neuro-Psychiatry Hospital, Kaduna, Nigeria*

[2]*Department of Community Medicine, Bayero University Kano, Nigeria*

[3]*Specialist Dementia & Frailty Pathway, Maldon, Essex, United Kingdom*

[4]*Department of Psychiatry, College of Medical Sciences, Abubakar Tafawa Balewa University, Bauchi, Nigeria*

[5]*Department of Psychiatry, Federal University of Health Sciences, Bauchi, Nigeria*

[6]*Department of Behavioural Sciences, University of Ilorin Teaching Hospital, Ilorin, Nigeria*

[7]*Department of Haematology & Blood Transfusion, Bayero University and Aminu Kano Teaching Hospital, Kano, Nigeria*

[8]*Department of Community Medicine, Bayero University and Aminu Kano Teaching Hospital, Kano, Nigeria*

[*]Corresponding Author
Lubuola IB, Federal Neuro-Psychiatry Hospital, Kaduna, Nigeria.

Submitted: 2025, May 16; **Accepted:** 2025, Jun 09; **Published:** 2025, Jun 24

Citation: Lubuola, IB., Armiya'u, AY., Aboila, T., Braji, AI., Gwarzo, DH. et al. (2025). Determinants of Depression and Suicidality Among Adolescents with Sickle Cell Disease in Kano, Nigeria. *Int J Psychiatry, 10*(2), 01-10.

Abstract

Background: *Despite the reported high magnitude of depression and suicidality among adolescents with sickle cell disease (SCD), the evidence bases in Nigeria particularly Northern Nigeria is sparse. The study assessed the prevalence and determinants of depression and suicidality among adolescents attending sickle cell clinic of Murtala Muhammad Specialist Hospital, Kano.*

Methods: *A cross-sectional study was employed to select 280 eligible adolescents with SCD. They were assessed for depression and suicidality using the Patient Health Questionnaire (PHQ-9) and Suicide Behaviours Questionnaire (SBQ-R) and the data were analysed using IBM SPSS Version 24.0.*

Results: *Over one-fifth (n=67; 23.9%) of the participants reported features suggestive of depression, even though a few of the participants (n=10; 3.6%) reported suicidality. Male gender (p=0.04) and frequency of hospitalization (p=0.01) were significantly associated with depression, while early adolescence (p=0.01), frequency of hospitalization (p=0.03), years lived with SCD (p=0.03), having no anaemic crises (p=0.04) and multiple use of analgesics (p=0.01), were found to be associated with suicidality. Similarly, frequent hospitalisation in the preceding year was an independent predictor of depression (aOR= 0.31, p=0.01, 95% CI=0.13-0.76).*

Conclusion: *The magnitude of both depression and suicidality among adolescents with SCD is huge and appears to be grossly under reported. The use of validated simple screening tools such as PHQ-9 and SBQR should be incorporated into routine clinic follow up and healthcare providers should be trained in screening for depression and suicidality. Establishment of a multidisciplinary team including but not limited to haematologists, medical social workers and mental health specialists should be made a priority in all sickle cell clinics.*

Keywords: Prevalence, Determinants, Sickle Cell Disease, Adolescents, Kano

1.Introduction

Sickle cell disease (SCD) has been reported not only among black Africans including those in the diaspora but also among other races resident in malaria-endemic areas such as South Asia, Arabia and Mediterranean region [1-3]. It is an inherited disease that disrupts the life trajectory of the victim right from infancy and runs its course throughout the life of the victim. As a chronic condition, patients with SCD are predisposed to several life-threatening physical complications and psychosocial difficulties [1,4-6]. Improvements in the management of SCD in high-income countries have resulted in amelioration of some severe and critical complications [7-9]. However, in developing countries, half of the children with SCD die before their fifth birthday though life expectancy mirrors the situation in high-income countries during the 1970s [9,10]. Despite the limitations, the life expectancy of people living with SCD has also improved in developing countries with some long-term survivors [11]. With increase longevity, these patients now face long term complications which may further predispose them to serious psycho-social problems.

The ecological model of human development advocates that while environmental factors contribute independently and co-dependently to the risk of psychosocial problems including mental disorders, they also interact with personal factors [12]. In consonance with this model, many studies have highlighted that certain factors in growing children with SCD such as illness severity or the stage of disease are associated with psychosocial adjustment in those children [13]. Similar to other chronic diseases, psychiatric disorders are common among patients with SCD as a result of biological, psychological and social consequences of the illness [14,15]. The Biological factors may be related to recurrent infections and severe organ damage that could involve the brain as an end organ as well as influence of the medications used in the treatment, while psychosocial issues may border on disruptions of educational and family routines, stigma, recurrent pain, frequent hospitalisation, low self-esteem, hopelessness, social withdrawal and poor coping strategies among others [16,17].

One significant mental health problem common to people with SCD is depression, a disorder of huge public health significance [18]. Depression is the most common mood disorder among sickle cell disease patients, characterised by changes in mood, anhedonia, and low energy [19,20]. Other symptoms include; impaired cognition, suicidal ideation with marked hopelessness, catastrophic or fatalistic thinking, and negative automatic thoughts [21]. According to a review of literature, depression may be as prevalent in SCD in developed nations as it is in developing nations, with prevalence rates ranging from 18% to 44% [22-27]. Another common psychiatric morbidity among those with SCD is suicidality, recognised by the World Health Organization (WHO) as a critical public health challenge [28]. Suicidality can be defined as a spectrum of suicidal behaviours conceptualised on a continuum, ranging from suicidal ideation to suicidal attempts and completed suicide [29]. Recent WHO report showed that over 800,000 people die yearly by suicide making it the tenth leading cause of death globally and the second most common cause of death in young persons aged 15-19years [30,31]. Similarly, suicidality is a common occurrence among those with depression, chronic illnesses and chronic severe pain [32]. Studies have reported suicidality as one of the causes of death among patients with sickle cell disease generally with even higher magnitude among adolescent patients since suicide is the second leading cause of death among adolescents regardless of their illness status [31-33]. Suicide among SCD patients may be due to the severity of pain they experience, the economic burden of treatment, stigmatisation and poor psychosocial support [6,32].

Africa is known to have the largest burden of SCD with Nigeria being the most affected country [34,35]. Psychosocial adjustment is important in chronic medical conditions bearing in mind that health is incomplete without mental health [36]. Unfortunately, most healthcare workers fail to recognise depression easily and as such patients are often left untreated, thereby leading to poorer quality of life. In low-and middle-income countries, there is a sub-optimal ratio of mental health services to child and adolescent mental health needs [37-39].

It is particularly important to examine depression and suicidality as well as their determinants among adolescents with SCD; this assessment will increase the knowledge base of the practitioners on early identification and prompt management. Similarly, it will guide policymakers in developing comprehensive promotional, preventive, curative and rehabilitative measures towards mitigating the impact of SCD. Ultimately, the affected adolescents and their caregivers will benefit immensely from the interventions that studies of this nature will portend towards alleviating the often-neglected psychosocial sufferings. Therefore, the study aimed to assess the prevalence and determinants of depression and suicidality among adolescents with sickle cell disease in Kano, Nigeria

2. Methodology

2.1 Study Site

The study was conducted at Murtala Muhammad Specialist Hospital (MMSH) which is a state government-owned tertiary hospital located in Kano Municipal Local Government Area of Kano state. The hospital was commissioned in 1926 and initially called Premier Hospital. It became a specialist hospital in 1987 and currently has a bed capacity of 615 with over 20 clinical departments offering health care services and serves as a referral centre for the state and neighbouring states.

At Murtala Muhammed Specialist Hospital, SCD patients receive a range of clinical services that are preventive, promotive, curative and rehabilitative. There is a dedicated SCD clinic that is managed by specialists including haematologists and the clinic has an average weekly patients' attendance of up to one-hundred and twenty.

2.2 Study Design and Population

A cross-sectional design was used, and adolescent sickle cell disease patients aged 10-19 years, who were in their steady state; absence of an acute illness (pain crisis, fever, acute chest, or other

SCD-related complication) or transfusion in the preceding 4 weeks were enrolled.

2.3. Sample Size Determination

Sample size for the study was estimated using the formula for a single proportion. The sample size of 280 for the study was estimated using a prevalence of depression (20%) among adolescents with SCD,52 95% confidence level, a 5% margin of error and 10% non-response.

2.4 Sampling Technique

A systematic sampling technique was used to select participants; sample size (280) and sampling frame (monthly patients' attendance at the SCD Clinic which was 480) were used to determine the sampling fraction. The reciprocal of the sampling fraction yielded a sampling interval of 2; hence every second patient attending the clinic was interviewed.

2.5 Measurement of Variables

The dependent variables in this study were depression and suicidality. Patient Health Questionnaire (PHQ-9) was used to measure depression. Participants were asked how much each symptom had bothered them over the past 2 weeks, with response options of "not at all", "several days", "more than half the days", and "nearly every day", scored as 0, 1, 2, and 3, respectively. Assessment of depression was made in those that had a total score of 10 or more, while those that scored below 10 were regarded as not depressed.

Suicidality was measured and determined using and Suicide Behaviours Questionnaire (SBQ-R) which consists of 4 questions phrased to enquire about different aspects of suicidal behaviours. The first item is scored on a Likert scale 1(never) to 4a (I have attempted to kill myself but did not want to die) and 4b (I have attempted to kill myself, and really hoped to die). Question 2 is measured on a Likert scale of 1(never) to 5(very often), while question 3 is rated on a scale of 1(No) to 3a (Yes, more than once, but did not really want to die) and 3b (Yes, more than once, and really wanted to do it). The last question is rated on a 7-point Likert scale; 0(Never) to 6(Very likely). Those that scored 7 and above were considered suicidal while those that scored below 7 were recorded as non-suicidal.

3. Statistical Analysis

Data collected were cleaned, entered, and analysed using the IBM SPSS version 24.0 Quantitative socio-demographic and clinical variables such as age, monthly family income, age at diagnosis, duration of illness, and number of hospitalisations were calculated and presented using mean, standard deviation or median and range depending on the distribution of the data. While frequencies, percentages and charts were used to summarise and present qualitative socio-demographic and clinical variables: gender, religion, ethnicity, educational status, parent's marital status, previous history of mental illness, prevalence of depression and suicidality.

Chi-square test and Fisher's exact test (where appropriate) were used to test the association between the independent variables and each of the dependent variables (depression and suicidality). All independent variables that were either significant on Chi-square analysis or with $p< 0.10$ were entered into a binary logistic regression model to determine the predictors of depression and suicidality. A p-value of less than 0.05 was regarded as statistically significant in all tests.

4. Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of Kano State Ministry of Health (SHREC/2021/2739). Depending on the participant's age, consent was obtained from either the patients or their parents/guardians and where appropriate assent was also obtained from the participants before the questionnaires were administered.

5. Results

The age of the participants ranged from 10 to 19 years with a mean age (±SD) of 14.94±2.95 years. The participants were almost equally distributed regarding their adolescent age groups; early adolescence, 10-13 years (n=99, 33.2%), middle adolescence, 14-16 years (n=86, 30.7%) and late adolescence, 17-19years (n=101, 36.1%). Almost two-thirds of the adolescents were females (n=208, 74.3%) and more than half of them had secondary level of education (n=159, 56.8%). Majority of their mothers were married (n=220, 78.6%) who also served as their primary caregivers (n=215, 76.8%) in a largely monogamous family setting (n=177, 63.2%) with over two-thirds (n=192, 68.6%) having a monthly family income of N30,000 and above. (Table 1).

Characteristics	Frequency (n=280)	Percentage (%)
Age group (Years)		
10-13	93	33.2
14-16	86	30.7
17-19	101	36.1
Mean ±SD	14.94±3.0	
Gender		
Male	72	25.7
Female	208	74.3
Ethnicity		
Hausa/Fulani	239	85.4
Others	41	14.6
Religion		
Islam	246	87.9
Christianity	34	12.1
Educational level		
Primary	121	43.2
Secondary	159	56.8

Residence		
Urban	97	34.6
Rural	183	65.4
Mother's marital status		
Married	220	78.6
Previously married	60	23.2
Primary care giver		
Mother	215	76.8
Others*	65	23.2
Family type		
Monogamy	177	63.2
Polygamy	103	36.8
Monthly Household income (Naira)		
<30,000	88	31.4
≥30,000	192	68.6
Median (Range)	50,000(10,000-300,000)	

Others=Father, Grandmother, Sister.

Table 1: Socio-Demographic Characteristics of the Participants

Of the 280 adolescents assessed, 241 (86.1%) were diagnosed within the first 2 years of life and up to 177(63.2%) were treated with hydroxyurea (Table 2). Over one-fifth (n=67; 23.9%) were found to have experienced symptoms suggestive of depression while ten (3.6%) of the adolescents reported having experienced suicidality (Table 3). Furthermore, 4 out of 67 participants with depression were suicidal while only 6 out of 270 of those without depression experienced suicidality, however, there was no statistically significant association between depression and suicidality (p=0.40).

Characteristics	Frequency n=280	Percentage (%)
Age at diagnosis(months)		
1-24	241	86.1
>24	39	13.9
Frequency of hospitalization		
0	114	40.7
1	41	14.6
2	96	34.3
3	29	10.4
Median (Range) in days	1(0-10)	
Vaso-occlusive crisis		
0	122	43.6
1	81	28.9
2	69	24.6
3	8	2.9
Anaemic crisis		
0	133	47.5
1	104	37.1
2	42	15.0
3	1	0.4
Frequency of analgesics use		
0	28	10
1	51	18
2	77	27.5
3	124	44.3
Use of hydroxyurea		
Yes	177	63.2
No	103	36.8
Family history of mental illness		
Yes	170	60.7
No	110	39.3
Previous history of mental illness	38	13.6
Yes	242	86.4
No		
Complications linked to SCD		
Yes	70	25
No	210	75
Perceived social support		
Yes	233	83.2
No	47	16.8
Adherence to prophylactic medication		76.1
Yes	213	23.9
No	67	
Hb genotype		
Hb SS	236	84.3
Hb Sc	44	15.7

Table 2: Clinical Characteristics of the Participants

Depression	Frequency, n=280	Percentage (%)
Yes	67	23.9
No	213	76.1
Suicidality		
Yes	10	3.6
No	270	96.4

Table 3: Prevalence of Depression and Suicidality Among Adolescents with SCD

Table 4 shows that almost all the participants admitted up to three times into the hospital in the preceding year were discovered to have depression compared to those who were not admitted (p=0.01) and male adolescents were at higher risk of developing depression compared to their female counterparts (31.9% vs 21.2%, p=0.04). Other clinical characteristics of the participants were not found to be significantly associated with depression. Eight out of 106 participants without hospitalisation in the preceding 12 months were suicidal compared to 2 out of 39 participants admitted once in the preceding year (p=0.003). Furthermore, having no history of anaemic crisis (p=0.04) and not being prescribed with analgesia (p=0.003) in the preceding 12 months were significantly associated with suicidality. Other clinical characteristics were not significantly associated with suicidality (Table 5). Hospitalisation in the preceding year was independently associated with depression. Specifically, there was a lower likelihood (aOR=0.28, 95% CI:0.11-0.70) of depression among those with no admission in the preceding year and so also for those admitted only once (aOR=0.31, 95% CI:0.13-0.76), when compared to those who were hospitalized thrice in the preceding 12 months (Table 6).

Characteristics	Depression %		
	Yes (n=67)	No (n=213)	p-value
Age at diagnosis (months)			
1-24	61(25.3)	180(74.7)	0.18
>24	6(15.4)	33(84.6)	
Frequency of hospitalization			
0	24(21.1)	90(78.9)	0.01*
1	11(26.8)	30(73.2)	
2	18(18.7)	78(81.3)	
3	14(48.3)	15(51.7)	
Duration lived with SCD (years)			
4-12	26(23.6)	84(76.4)	0.93
≥13	41(24.1)	129(75.9)	
Vaso-occlusive crisis			
0	28(23.0)	94(77)	
1	15(18.5)	66(81.5)	0.29
2	22(31.9)	47(68.1)	
3	2(25)	6(75)	
Anaemic crisis			
0	32(24.1)	101(75.9)	
1	24(23.1)	80(76.9)	0.92
2	11(26.2)	31(73.8)	
3	0(0)	1(100)	
Frequency of analgesics use			
0	5(17.9)	23(82.1)	
1	16(31.4)	35(68.6)	0.41
2	20(26.0)	57(74.0)	
3	26(21.0)	98(79.0)	
Use of hydroxyurea			
Yes	24(23.3)	79(76.7)	0.85
No	43(24.3)	134(75.7)	
Family history of mental illness			
Yes	24(21.8)	86(78.2)	0.51
No	43(25.3)	127(74.7)	
Gender			
Male	23(31.9)	49(68.1)	0.04*
Female	44(21.2)	164(78.8)	
Complications linked to SCD			
Yes	52(24.8)	158(75.2)	0.57
No	15(21.4)	55(78.6)	
Perceived social support			
Yes	9(19.1)	38(80.9)	0.40
No	58(24.9)	175(75.1)	
Adherence to medication			
Yes	19(28.4)	48(71.6)	0.33
No	48(22.5)	165(77.5)	
Hb genotype			
Hb SS	59(25)	177(75)	0.33
Hb Sc	8(18.2)	36(81.8)	

*Statistically significant at p<0.05.

Table 4: Determinants of Depression Among Adolescents with SCD

Characteristics	Suicidality % Yes n=10	No n=270	p-value
Age group (years)			
10-13	9(9.7)	84(90.3)	<0.001*
14-16	0(0)	86(100)	
17-19	1(1.0)	100(99.0)	
Frequency of Hospitalization			
0	8(7.0)	106(93.0)	
1	2(4.9)	39(95.1)	0.03*
2	0(0.0)	96(100)	
3	0(0.0)	29(100)	
Duration lived with SCD(Years)			
4-12	9(3.7)	101(91.8)	0.003*
≥13	1(0.6)	169(99.4)	
Vaso-occlusive crisis			
0	8(6.6)	114(93.4)	0.10
1	2(2.5)	79(97.5)	
2	0(0.0)	69(100)	
3	0(100)	8(100)	
Anaemic crisis			
0	9(6.8)	124(93.2)	0.04*
1	1(1.0)	103(99.0)	
2	0(0.0)	100(42)	
3	0(0.0)	1(100)	
Frequency of Analgesics use			
0	4(14.3)	24(85.7)	
1	1(2.0)	50(98.0)	0.01*
2	1(1.3)	76(98.7)	
3	4(3.2)	120(96.8)	
Use of Hydroxyurea			
Yes	5(4.9)	98(95.1)	0.58
No	5(2.8)	172(97.2)	
Family history of Mental Illness			
Yes	5(4.5)	105(95.5)	0.71
No	5(2.9)	165(97.1)	
Previous history of Mental Illness			
Yes	10(4.1)	232(95.9)	0.42
No	0(0.0)	38(100)	
Complications linked to SCD			
Yes	10(4.8)	200(95.2)	0.14
No	0(0.0)	70(100.0)	
Perceived Social support			
Yes	1(2.1)	46(97.9)	0.88
No	9(3.9)	224(96.1)	
Adherence to Medication			
Yes	3(4.5)	64(95.5)	0.65
No	7(3.3)	206(96.7)	
Hb Genotype			
Hb SS	8(3.4)	228(96.6)	0.71
Hb Sc	2(4.5)	42(95.5)	

* Statistically significant at p<0.05.

Table 5: Determinants of Suicidality among Adolescents with SCD

Characteristics	Crude Odd Ratio (95% Ci)	p-value	Adjusted Odd Ratio (95% CI)	p-value
Age Group (years)				
10-13	0.91(0.45-1.85)	0.80	0.93(0.44-1.96)	0.85
14-16	1.84(0.95-3.56)	0.07	1.39(0.68-2.86)	0.37
17-19	Reference		Reference	
Gender				
Male	1.75(0.96-3.18)	0.06	1.66(0.87-3.17)	0.13
Female	Reference		Reference	
Frequency of Hospitalisation				
0	0.29(0.12-0.67)	0.004	0.28(0.11-0.70)	0.01*
1	0.39 (0.10-0.60)	0.002	0.31(0.13-0.76)	0.01*
2	0.25 (0.14-1.07)	0.68	0.48(0.17-1.36)	0.17
3	Reference		Reference	

* Statistically significant at p<0.05.

Table 6: Predictors of Depression Among Adolescents with Sickle Cell Disease

6. Discussion

The results showed that over one-fifth of the participants had a diagnosis of a depressive episode. Previous studies among adolescents living with SCD have been reported to show increased depressive symptoms in comparison with healthy non-SCD peers and counterparts [19, 40-42]. The finding is probably explained by the fact that these are patients being managed for a chronic disease with potentially life-threatening complications. The prevalence of depression in this study however seems lower than what was observed in some studies that evaluated depression in patients with SCD in Nigeria and other African countries [43-46]. This difference may not be unconnected to methodological differences such as the use of non-validated instruments and non-probability sampling technique as well as the cut-off points of the instruments used. A difference in the cut-off point might cause estimation variance in the rates of depression. Another reason for this difference could be attributed to the age of the study respondents as this study focused solely on adolescents whereas, many studies have evaluated depression in either child younger than ten years or adults living with SCD [45]. The observed prevalence of depression in this study calls for deliberate interventions targeted at screening this group of patients for depression.

This study found almost four out of a hundred participants experienced suicidality. This may appear insignificant; however, a single case of suicidality is quite devastating to the relatives of the victim, especially for a completed suicide. The relatives may have to deal with survivors' guilt which is a common occurrence. The observation in this study is in consonance with a similar study conducted in South-western Nigeria that reported prevalence of suicidal ideation and attempt of 8% and 2% respectively [40]. While these may seem to mirror a report from the United States where suicide secondary to depression has been reported to be the second leading cause of death amongst adolescents within this similar age group [47]. Suicidality among the adolescents appears to be considerably high regardless of any background physical illness. Nonetheless, what may be striking in this study population is the predominance of Muslims and suicide is strongly condemned in Islam with a grave punishment prescribed for perpetrators as stated in the Holy Book. In addition, the belief in destiny may have increased the level of resilience of the sufferers, hence minimizing the rate of suicidality. Biologically, the patients in this index study were recruited in the outpatient department and they seemed to be in steady state which perhaps might reduce the possible biopsychosocial precipitants of suicidality.

This study found male adolescents to be particularly at higher risk of developing depression compared to their female counterparts. This finding is not in keeping with studies which either did not find any relationship between gender and depression or reported female gender to be a determinant of depression [37,48]. The study that reported depression to be associated with female gender was conducted among an adult population which may not be generalizable to the adolescent population. Most studies did not find any association between gender and depression, and this could espouse that depression is common among the adolescents with SCD regardless of their gender [24,41,48]. The observation of more males being depressed compared to females may be due to other factors rather than gender. Again, the study found that the frequency of hospital admission is a determinant of depression among adolescents with sickle cell disease. This observation is in keeping with previous studies that reported frequent hospital admissions to be associated with depression [25,41,49]. Frequent hospital admissions may be a manifestation of severity of the disease and increased frequency of acute episodes which could be a predisposing factor to depression. A more severe illness with possible associated vaso-occlusive crisis may involve the brain particularly the emotional centres of the brain leading to depression [48]. Beyond this, the psychosocial impact of disrupted routines, unfulfilled life goals, social isolation, increase financial burden, over dependence on family members and stigmatization which could occur secondary to frequent hospital admissions may portend a high risk of depression. Furthermore, repeated hospital admissions may be due chronic complications of SCD such as sickle cell nephropathy, pulmonary hypertension, priapism among others, which are on their own merit psychologically traumatising.

Age was found to be associated with suicidality especially in the early adolescent age group. Generally, there is a paucity of studies focusing on determinants of suicidality and a few were comparative studies and participants were matched for their ages [40,43,44,50, 51]. While this finding may be new, the possible explanation is the psychological and social burdens of severe illness which may be more overwhelming among the early adolescent's group. More so, their resilience is not as well developed compared to middle and late adolescents [52]. This period of life heralds the commencement of social exploration, identity determination, relationship seeking, and these may not be satisfactorily me~}+>t due to the burdens of the illness. Consequently, such a marked negative trajectory in early life may predispose to suicidality. The study surprisingly found having no history of hospital admission, no history of being prescribed with analgesics or history of no anaemic crisis in the past, to be associated with suicidality. These clinical findings are worthy of note because not much research work has been conducted particularly exploring the clinical factors associated with suicidality among adolescents with SCD. These observed determinants point to the fact that suicidality among people with SCD goes beyond severity of illness and may have a strong tie with psychosocial implications of the illness. It is not surprising that most chronic illnesses including SCD have inherent psychosocial components that may precipitate, predispose or perpetuate mental health conditions including suicidality. Healthcare personnel should be vigilant and screen for suicidality regardless of the severity of SCD, especially among those recently diagnosed.

On the other hand, this study found that previous hospitalisation is an independent predictor for depression. This finding is expectedly in tune with previous studies conducted in a similar study group [25,41,49,50]. This discovery may be partially explained by biopsychosocial implications. It is known that SCD, given its pathophysiological process, may directly affect sections of the brain, such as the cortical and subcortical regions, with the

potential to cause depression. There is also a baseline anxiety often associated with repeated crises which could be largely anticipatory; anxiety of this nature may increase the likelihood of depression. Furthermore, repeated hospital admissions disrupt life goal achievement even at the level of adolescence when personality, identity, social exploration, interpersonal effectiveness, and adventurousness amongst others is being negotiated through. Healthcare providers at all levels should be super-vigilant and have a strategy for depression screening among adolescents with previous hospitalisations and a robust cohort study and mixed method research in this field could allow for proper evaluation of depression and suicidality as well as objectively determining the risk factors for the mental health conditions.

7. Conclusion

The magnitude of both depression and suicidality among adolescents with SCD is huge and appears to be grossly under reported. The use of validated simple screening tools such as PHQ-9 and SBQR should be incorporated into routine clinic follow up and healthcare providers should be trained in screening for depression and suicidality. Establishment of a multidisciplinary team including but not limited to haematologists, medical social workers and mental health specialists should be made a priority in all sickle cell clinics.

Author's contribution: All the authors contributed in concept, design, definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing and manuscript review.

Data availability: The authors have the data of this research work and are willing to give it where necessary for research purposes.

Conflicts of interest: There are no conflicts of interest

References

1. Serjeant, G. R. (2010). One hundred years of sickle cell disease. *British journal of haematology, 151*(5), 425-429.
2. Serjeant, G. (2001). *The Politics of Sickle Cell and Thalassaemia. BMJ, 323*(7315), 757.
3. Weatherall, D. J., & Clegg, J. B. (2001). Inherited haemoglobin disorders: an increasing global health problem. *Bulletin of the World Health Organization, 79*(8), 704-712.
4. Dick, M. C. (2008). Standards for the management of sickle cell disease in children. *Archives of Disease in Childhood-Education and Practice, 93*(6), 169-176.
5. Jenerette, C., Funk, M., & Murdaugh, C. (2005). Sickle cell disease: a stigmatizing condition that may lead to depression. *Issues in Mental Health Nursing, 26*(10), 1081-1101.
6. Ohaeri, J. U., Shokunbi, W. A., Akinlade, K. S., & Dare, L. O. (1995). The psychosocial problems of sickle cell disease sufferers and their methods of coping. *Social Science & Medicine, 40*(7), 955-960.
7. Claster, S., & Vichinsky, E. P. (2003). Managing sickle cell disease. *Bmj, 327*(7424), 1151-1155.
8. Dyson, S. M., Abuateya, H., Atkin, K., Culley, L., Dyson, S. E., Rowley, D., & members of the Sickle Cell and Education (SCED) Group. (2010). Reported school experiences of young people living with sickle cell disorder in England. *British Educational Research Journal, 36*(1), 125-142.
9. Serjeant, G. R. (2005). *Mortality from sickle cell disease in Africa. Bmj, 330*(7489), 432-433.
10. World Health Organization. Report by the Secretariat of the Fifty-ninth World Health Assembly A59/9 2006.
11. Platt, O. S., Brambilla, D. J., Rosse, W. F., Milner, P. F., Castro, O., Steinberg, M. H., & Klug, P. P. (1994). Mortality in sickle cell disease--life expectancy and risk factors for early death. *New England Journal of Medicine, 330*(23), 1639-1644.
12. Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Harvard university press.
13. Key, J. D., Brown, R. T., Marsh, L. D., Spratt, E. G., & Recknor, J. C. (2001). Depressive symptoms in adolescents with a chronic illness. *Children's Health Care, 30*(4), 283-292.
14. Wallen, G. R., Minniti, C. P., Krumlauf, M., Eckes, E., Allen, D., Oguhebe, A., ... & Taylor VI, J. G. (2014). Sleep disturbance, depression and pain in adults with sickle cell disease. *BMC psychiatry, 14,* 1-8.
15. Asnani, M. R., Fraser, R., Lewis, N. A., & Reid, M. E. (2010). Depression and loneliness in Jamaicans with sickle cell disease. *BMC psychiatry, 10,* 1-7.
16. Adewoyin, A. S. (2015). Management of sickle cell disease: a review for physician education in Nigeria (sub-saharan Africa). *Anemia, 2015*(1), 791498.
17. Forgeron, P. A., King, S., Stinson, J. N., McGrath, P. J., MacDonald, A. J., & Chambers, C. T. (2010). Social functioning and peer relationships in children and adolescents with chronic pain: A systematic review. *Pain Research and Management, 15*(1), 27-41.
18. Levenson, J. L., McClish, D. K., Dahman, B. A., Bovbjerg, V. E., Citero, V. D. A., Penberthy, L. T., ... & Smith, W. R. (2008). Depression and anxiety in adults with sickle cell disease: the PiSCES project. *Biopsychosocial Science and Medicine, 70*(2), 192-196.
19. Iloeje, S. O. (1991). Psychiatric morbidity among children with sickle-cell disease. *Developmental Medicine & Child Neurology, 33*(12), 1087-1094.
20. Edwards, C. L., Scales, M. T., Loughlin, C., Bennett, G. G., Harris-Peterson, S., Castro, L. M. D., ... & Killough, A. (2005). A brief review of the pathophysiology, associated pain, and psychosocial issues in sickle cell disease. *International journal of behavioral medicine, 12,* 171-179.
21. Belsher, G., Wilkes, T. C. R., & Rush, A. J. (1995). An open, multisite pilot study of cognitive therapy for depressed adolescents. *The Journal of Psychotherapy Practice and Research, 4*(1), 52.
22. Alao, A. O., & Cooley, E. (2001). Depression and sickle cell disease. *Harvard Review of Psychiatry, 9*(4), 169-177.
23. Alao, A. O., Dewan, M. J., Jindal, S., & Effron, M. (2003).

Psychopathology in sickle cell disease. *West African journal of medicine, 22*(4), 334-337.
24. Grant, M. M., Gil, K. M., Floyd, M. Y., & Abrams, M. (2000). Depression and functioning in relation to health care use in sickle cell disease. *Annals of Behavioral Medicine, 22*(2), 149-157.
25. Hasan, S. P., Hashmi, S., Alhassen, M., Lawson, W., & Castro, O. (2003). Depression in sickle cell disease. *Journal of the National Medical Association, 95*(7), 533.
26. Laurence, B., George, D., & Woods, D. (2006). Association between elevated depressive symptoms and clinical disease severity in African-American adults with sickle cell disease. *Journal of the national medical association, 98*(3), 365.
27. Wilson Schaeffer, J. J., Gil, K. M., Burchinal, M., Kramer, K. D., Nash, K. B., Orringer, E., & Strayhorn, D. (1999). Depression, disease severity, and sickle cell disease. *Journal of Behavioral Medicine, 22,* 115-126.
28. World Health Organization. (2012). Public health action for the prevention of suicide: a framework. In Public health action for the prevention of suicide: a framework.
29. Williams, R. P., Bauer, S. M., Kindler, J., Feucht, M., Friedrich, M. H., & Steiner, H. (2007). Suicidality, psychopathology, and gender in incarcerated adolescents in Austria. *J Clin Psychiatry, 68*(10), 1593-1600.
30. World Health Organisation (2018). Burden of sickle cell disease. Geneva.
31. Depression, W. H. O. (2017). Other common mental disorders: global health estimates. *Geneva: World Health Organization, 24*(1).
32. A pilot study on depression, suicidal ideations and attempts among sickle cell disease patients in two villages of Mahasamund District, Chhattisgarh. Kalibadi, Raipur: State Health Resource Centre; 2015.
33. Edwards, C. L., Green, M., Wellington, C. C., Muhammad, M., Wood, M., Feliu, M., ... & McNeil, J. (2009). Depression, suicidal ideation, and attempts in black patients with sickle cell disease. *Journal of the National Medical Association, 101*(11), 1090-1095.
34. Piel, F. B., Hay, S. I., Gupta, S., Weatherall, D. J., & Williams, T. N. (2013). Global burden of sickle cell anaemia in children under five, 2010–2050: modelling based on demographics, excess mortality, and interventions. *PLoS medicine, 10*(7), e1001484.
35. Piel, F. B., Patil, A. P., Howes, R. E., Nyangiri, O. A., Gething, P. W., Dewi, M., ... & Hay, S. I. (2013). Global epidemiology of sickle haemoglobin in neonates: a contemporary geostatistical model-based map and population estimates. *The Lancet, 381*(9861), 142-151.
36. Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M. R., & Rahman, A. (2007). No health without mental health. *The lancet, 370*(9590), 859-877.
37. Robertson, B., Omigbodun, O., & Gaddour, N. (2010). Child and adolescent psychiatry in Africa: luxury or necessity?: guest editorial. *African journal of psychiatry, 13*(5), 329-331.
38. Sale, S., & Gadanya, M. (2008). Prevalence and factors associated with depression in HIV/AIDS patients aged 15–25 years at Aminu Kano Teaching Hospital, Nigeria. *Journal of child and adolescent mental health, 20*(2), 95-99.
39. Amole, T. G., Yusuf, A. H., Salihu, A. S., & TsigaAhmed, F. I. (2020). Prevalence and predictors of depression among tuberculosis patients in Kano, North-West Nigeria. *Nigerian Journal of Medicine, 29*(3), 369-376.
40. John-Olabode, S., Awodele, I., & Oni, O. (2015). Adolescents with sickle cell anaemia: Experience in a private tertiary hospital serving a tertiary institution. *Nigerian Medical Journal, 56*(3), 204-207.
41. Chetcha Chemegni, B., Kamga Olen, J. P. O., Um Nyobe, L. J., Ntone Enyime, F., & Mbanya, D. (2018). Anxiety, depression and quality of life in adults with sickle cell disease. *Arch Med Vol*, (10).
42. Adeyemo, S., Adeosun, I. I., Ogun, O. C., Adewuya, A., David, A. N., Adegbohun, A. A., ... & Adeyemo, O. O. (2020). Depression and suicidality among adolescents living with human immunodeficiency virus in Lagos, Nigeria. *Child and Adolescent Psychiatry and Mental Health, 14,* 1-10.
43. Okechukwu, C. (2019). Psychosocial complications in sickle cell anaemia. *AHRJ, 2*, 1-7.
44. Lukoo, R. N., Ngiyulu, R. M., Mananga, G. L., Gini-Ehungu, J. L., Ekulu, P. M., Tshibassu, P. M., & Aloni, M. N. (2015). Depression in children suffering from sickle cell anemia. *Journal of Pediatric Hematology/Oncology, 37*(1), 20-24.
45. Ola, B. A., Yates, S. J., & Dyson, S. M. (2016). Living with sickle cell disease and depression in Lagos, Nigeria: A mixed methods study. *Social Science & Medicine, 161,* 27-36.
46. Udofia, O., & Oseikhuemen, A. E. (1996). Psychiatric morbidity in patients with sickle cell anaemia. *West African journal of medicine, 15*(4), 196-200.
47. Perou, R., Bitsko, R. H., Blumberg, S. J., Pastor, P., Ghandour, R. M., Gfroerer, J. C., ... & Centers for Disease Control and Prevention (CDC). (2013). Mental health surveillance among children—United States, 2005–2011. *MMWR suppl, 62*(2), 1-35.
48. Alhomoud, M. A., Gosadi, I. M., Hayfaa, A. W. (2018). Depression among sickle cell anaemia patients in Eastern Province of Saudi Arabia. *Saudi Journal of Medicine and Medical Sciences, 6*(1), 8-12.
49. Ani, C., & Hodes, M. (2012). Predictors of depressive symptoms in children with sickle cell disease. *Neuropsychiatrie de l'Enfance et de l'Adolescence, 60*(5), S133.
50. Bakare, M. O., Omigbodun, O. O., Kuteyi, O. B., Meremikwu, M. M., & Agomoh, A. O. (2008). Psychological complications of childhood chronic physical illness in Nigerian children and their mothers: the implication for developing pediatric liaison services. *Child and Adolescent Psychiatry and Mental Health, 2,* 1-9.
51. Taiwo, T., Atilola, O., Ani, C., & Ola, B. A. (2020). Effect of behavioural therapy on depression in adolescents with sickle cell disease. *Open Journal of Psychiatry, 10*(3), 127-140.
52. Fougere, A., Daffern, M., & Thomas, S. (2012). Toward an empirical conceptualisation of resilience in young adult

offenders. *Journal of Forensic Psychiatry & Psychology, 23*(5-6), 706-721.

53. Bella, T. T., Atilola, O., & Omigbodun, O. O. (2010). Children within the juvenile justice system in Nigeria: psychopathology and psychosocial needs. *Annals of Ibadan Postgraduate Medicine, 8*(1), 34-39.
54. Ayandele, O., Popoola, O. A., & Oladiji, T. O. (2020). Addictive use of smartphone, depression and anxiety among female undergraduates in Nigeria: a cross-sectional study. *Journal of health Research, 34*(5), 443-453.
55. Shakeri, J., Farnia, V., Abdoli, N., Akrami, M. R., Arman, F., & Shakeri, H. (2015). The risk of repetition of attempted suicide among Iranian women with psychiatric disorders as quantified by the suicide behaviors questionnaire. *Oman medical journal, 30*(3), 173.
56. Aloba, O., Ojeleye, O., & Aloba, T. (2017). The psychometric characteristics of the 4-item Suicidal Behaviors Questionnaire-Revised (SBQ-R) as a screening tool in a non-clinical sample of Nigerian university students. *Asian journal of psychiatry, 26,* 46-51.