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RESEARCH ARTICLE

REVISED Awareness and Acceptability of Prenatal Diagnosis of Sickle Cell Disease among Mothers of Affected Children in a Northern Nigerian Teaching Hospital

[version 3; peer review: 4 approved, 1 approved with reservations]

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Abstract

Background

Nigeria has the highest global prevalence of sickle cell disease (SCD), necessitating effective preventive measures to control the disease. Prenatal diagnosis (PND) is a key early intervention for SCD, yet there is a shortage of studies in Northern Nigeria focusing on mothers of children with SCD. These mothers not only carry the burden of the disease but also face the risk of having more affected children, making them vital stakeholders in managing and controlling SCD. This study assessed the awareness and acceptability of prenatal diagnosis PND for SCD among mothers of children with the disease.

Methods

A cross-sectional study was conducted involving 297 mothers of children with SCD attending the Paediatric Haematology clinic at Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. Data were collected via an interviewer-administered questionnaire addressing the characteristics of the children and mothers, as well as their awareness, attitudes, and acceptability of PND. SPSS version 23 was used for data analysis, with a p-value < 0.05 considered statistically

Open Peer Review

Approval Status ✓ ✓ ✓ ? ✓

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significant.

Results

Most participants (90.9%) were of Hausa ethnicity and 97.0% were of Islamic faith. A majority (77.8%) had less than tertiary education, and 57.9% lacked personal income. Nearly 41% had more than one child affected by SCD, and about one-fifth had lost a child to SCD complications. Only 22.2% of mothers had heard of PND, mostly from healthcare workers, and just 0.3% had undergone the procedure. After receiving information about PND, 93.3% were willing to accept it, though 45% of those who declined cited religious beliefs. Factors associated with PND acceptance included the mother's education and the child's SCD severity.

Conclusion

Awareness of PND among at-risk mothers is low, yet most expressed willingness to accept it. Educational level and disease severity were associated with PND acceptability.

Plain language summary

Nigeria has the highest number of people with sickle cell disease (SCD) in the world. To help prevent more children from being born with the disease, prenatal diagnosis (PND) allows parents to know whether their baby will have SCD before birth. However, there is little research in Northern Nigeria focusing on mothers who already have children with SCD. These mothers carry the heavy burden of caring for sick children and face the possibility of having more children with the disease. Understanding how much these mothers know about PND and whether they would be willing to use it is important for controlling the spread of SCD. In this study, 297 mothers of children with SCD attending a hospital in Zaria, Nigeria, were surveyed. The mothers answered questions about their children, personal background, and knowledge of and willingness to accept PND. The data were analyzed to identify factors that influenced awareness and acceptability of PND. The majority of the mothers were Hausa and Muslim, and most had low levels of education. Over half of the mothers had no personal income. Nearly 41% of the mothers had more than one child with SCD, and about 20% had lost a child due to the disease. Only 22.2% of the mothers had heard of PND, mostly from healthcare workers, and just 0.3% had undergone the procedure. After learning more about PND, 93.3% of the mothers said they would be willing to use it. However, religious belief was the main reason for refusal among those who declined. Mothers with higher education levels and those whose children had more severe disease manifestation were more likely to accept PND. In conclusion, awareness of PND among these mothers is low, but most are open to it once informed. Educational efforts could improve acceptance of PND in Northern Nigeria.

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Keywords
awareness, acceptability, prenatal diagnosis, mothers, sickle cell disease.

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REVISED **Amendments from Version 2**

The revised manuscript has been substantially strengthened in response to the reviewers' comments. Key findings are now more clearly presented, notably the high acceptability of prenatal diagnosis (PND) for sickle cell disease (93.3%) following the provision of information. Importantly, the manuscript now clarifies that among women who declined PND, religious beliefs rather than cost were the predominant reason, accounting for nearly half (45%) of non-acceptance. The discussion has been expanded to better contextualize these findings, including a more detailed examination of the influence of religious leaders in premarital counselling and their potential role in shaping informed reproductive decisions. In addition, the importance of health education targeted at younger populations as a long-term strategy for sickle cell disease control has been explicitly addressed.

Several methodological and presentation-related improvements were also made. Errors in Table 1 were corrected, haemoglobin was removed from Table 2, and percentages were added to Table 4 to improve clarity. The method used for genotype assessment (alkaline electrophoresis) has now been clearly stated in the study setting within the methods section. Minor editorial revisions were undertaken throughout the manuscript to enhance readability and consistency.

Further clarifications were provided in response to specific comments. The discussion on the role of cell-free DNA testing in prenatal diagnosis has been addressed. It has also been clarified that pregnancy status and maternal genotype were not assessed during data collection. The awareness level cited from Olatunya's study was corrected to 25%. Lastly, the data collection process has been clarified, noting that questionnaires were interviewer-administered by two trained research assistants, and that participants unaware of PND for sickle cell disease were verbally informed about its availability and methods prior to assessing acceptability.

Any further responses from the reviewers can be found at the end of the article

Introduction

Sickle cell disease (SCD) is the most common hemoglobinopathy in sub-Saharan Africa (SSA) with Nigeria having the highest prevalence globally[1,2]. The World Health Organisation (WHO) has identified SCD as a public health burden due to its high morbidity and mortality rates. In SSA, most affected children die before their fifth birthday, and survivors face recurrent episodes of anemia, blood transfusions, crises, and repeated hospital admissions. These not only cause physical ill-health but also lead to significant psychosocial trauma for affected individuals and their families, creating a substantial socio-economic burden on families, society, and the country[3]. Therefore, preventing SCD is essential to reduce its overall burden.

Early diagnosis of SCD is a key strategy in controlling the disease, as it allows for the timely implementation of appropriate and acceptable measures. Screening for SCD can occur at various stages of life, with prenatal diagnosis (PND) being one of the earliest available options. PND is performed during early pregnancy for couples at risk of having children with SCD. This diagnosis can be conducted using invasive tests, such as chorionic villus sampling or amniocentesis, and more recently, a non-invasive technique has been developed. The non-invasive prenatal test screens for fetal SCD using cell-free fetal DNA from maternal plasma, eliminating the risk of miscarriage associated with invasive tests[3]. This method also allows for earlier screening than conventional invasive tests. A recent systematic review indicates that non-invasive prenatal testing (NIPT) has strong potential as a dependable screening tool for identifying fetuses at risk of SCD; however, additional validation studies are needed to establish its diagnostic accuracy and clinical usefulness[4].

There is a scarcity of centres offering PND in Nigeria, and its acceptability is often influenced by religious beliefs[5]. The benefits of PND include early detection of abnormalities in the fetus, allowing a couple time to prepare psychologically, socially, and financially for the birth of an affected child if they choose to continue the pregnancy. It also provides the option to terminate the pregnancy if the birth of an affected child is not desired, in situations where pregnancy termination is acceptable and permissible. Additionally, PND can relieve anxiety early in pregnancy if the disease is excluded.

Although some studies have been conducted on the knowledge and acceptability of PND of SCD in the general population, there is a lack of research in Northern Nigeria focusing on mothers of children with SCD. These mothers are already carrying the burden of the disease, are at risk of having another affected child, and are important stakeholders in SCD control. This study aims to assess the awareness and acceptability of PND of SCD among mothers of children with SCD.

Methods

Study setting

The study was conducted in the Paediatric Haematology clinic of Ahmadu Bello University Teaching Hospital, Zaria, which operates weekly on Wednesdays. The clinic sees an average of 50 children with SCD each week. The diagnosis of haemoglobin genotype in the hospital is done by alkaline electrophoresis.

Study design

This was a cross-sectional descriptive study.

Study population

The study population included mothers of children with SCD who were attending the clinic.

Inclusion criteria

All consenting mothers of at least one child living with sickle cell disease were included in the study.

Exclusion criteria

Exclusion criteria were menopausal mothers, mothers who had undergone bilateral tubal ligation, and mothers whose current spouse had an Hb genotype of AA.

Sample size determination

Using a prevalence of awareness of 0.25% among mothers of affected children as reported by Olatunya[6], where n = sample size; Z = standard normal variate (1.96 at P<0.05); p = percentage of awareness of prenatal diagnosis (25%); q = 1-p (0.75), d = absolute precision (0.05), a minimum sample size of 288 was obtained. However, 297 women were recruited for the study.

Sampling technique
A non-probability sampling method was used to sequentially recruit eligible mothers of affected children from the clinic as they presented to access care until the desired sample size was achieved.

Study protocol
Every eligible participant completed a structured interviewer-administered questionnaire, after obtaining informed verbal consent, to gather data on socio-demographic characteristics, awareness, attitude, and acceptability of prenatal diagnosis for SCD. None of the eligible participants declined participation. The data collected was pseudo-anonymized. Recruitment took place from March to August 2023.

Data analysis
Data were analysed using the Statistical Package for Social Sciences (IBM SPSS statistics) version 23[6]. The level of significance was set at <0.05. Frequencies and percentages were used to describe categorical data, and Chi-square/Fisher's exact test was used to test for associations between variables.

Ethics and consent
Ethical approval (ABUTHZ/HREC/H32/2022) was obtained from the Health Research Ethics Committee of ABUTH, Zaria, on 14 September 2022. Participants were provided with adequate information, and informed verbal consent was obtained from all the study participants before the questionnaires were administered. Verbal consent was used because it has been established in a national document that Kaduna state (where the study was conducted) has a low literacy level, with only 18% of the female population reported to have attained secondary or higher education (National Health Demographic Survey, 2018). The study also posed a no-minimal risk to the participants and the information collected was de-identified. The scope of the study and process involved was discussed with each participant. The participant was allowed the opportunity to ask questions and her concerns addressed if any before giving consent. The questionnaires were de-identified, and confidentiality was strictly maintained. Collected hard copy data was securely stored, and only the principal investigator had access to the input data on a computer.

Results
A total of 297 mothers of children with SCD were recruited. The majority of the mothers (90.9%) were of Hausa ethnicity, 97.0% were of Islamic faith, 77.8% had below tertiary education, and 57.9% had no source of personal income. About one-third of the mothers were grandmultiparous women (≥5 deliveries). Additionally, 40.7% had more than one child affected by SCD, and about one-fifth had experienced the loss of at least one child due to SCD-related complications. Further details are provided in Table 1.

Two-thirds of the affected children were aged five years or younger. The predominant hemoglobin genotype among the children was Hb SS (99%). Approximately half of the children experienced at least one crisis per month. In the past year, 55.2% of the children were hospitalized, and 44.4% received blood transfusions due to SCD-related complications. Detailed characteristics of the affected children attending the SCD clinic are provided in Table 2.

Only 22.2% of the mothers (66 out of 297) had ever heard of PND for SCD. The most common source of information about PND was healthcare workers, while the least common source was electronic media. This is illustrated in Figure 1.

Table 1. Socio-demographic characteristics of mothers of children with SCD.

Characteristic	Frequency (%)	Characteristic	Frequency (%)
Tribe		**Religion**	
Hausa	270 (90.9)	Islam	288 (97.0)
Non-Hausa	27 (9.1)	Christianity	9 (3.0)
Educational level		**Parity**	
Below tertiary	231 (77.8)	<5	186 (62.6)
Tertiary*	66 (22.2)	≥5	111 (37.4)
Residence		**No. of children with SCD**	
Rural	79 (26.6)	1	176 (59.3)
Semi-urban/urban	218 (73.4)	≥1	121 (40.7)
Personal source of income		**No. of sickle cell related deaths**	
Yes	125 (42.1)	0	235 (79.1)
No	172 (57.9)	≥1	62 (20.9)

*Tertiary: additional education beyond secondary level such as diplomas, degrees, postgraduate.

Table 2. Characteristics of the affected children attending the SCD clinic.

Characteristic	Frequency (%)
Age (years)	
≤5	197 (66.3)
>5	100 (33.7)
Genotype	
SS	294 (99.0)
SC	3 (1.0)
Average crisis per month	
0	146 (49.2)
≥1	151 (50.8)
SCD-related blood transfusion in the last one year	
0	165 (55.6)
≥1	132 (44.4)
SCD-related hospital admission in the last one year	
0	133 (44.8)
≥1	164 (55.2)

The majority of the mothers (44 out of 66) were unaware of the methods that can be used for PND. Among those who were aware, chorionic villus sampling or amniocentesis was the most commonly known method (14 out of 66). Only 13.6% (9 out of 66) of the mothers knew more than one method of PND. These findings are depicted in Figure 2.

Only one mother (0.3%) had ever undergone a form of PND of SCD. However, when informed about PND of SCD, 93.3% of the mothers expressed willingness to accept the test. Among those who were not willing to accept PND, 45% were willing to accept the fate of having another child with SCD. These findings are detailed in Table 3.

Mother's educational level, having a child experiencing at least one crisis per month, and receiving at least one blood transfusion or hospital admission in the past year were significantly

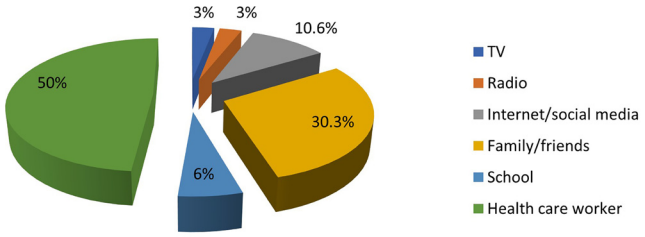


Figure 1. Sources of information about PND for SCD among mothers of affected children. The colours represent the different sources of information about PND.

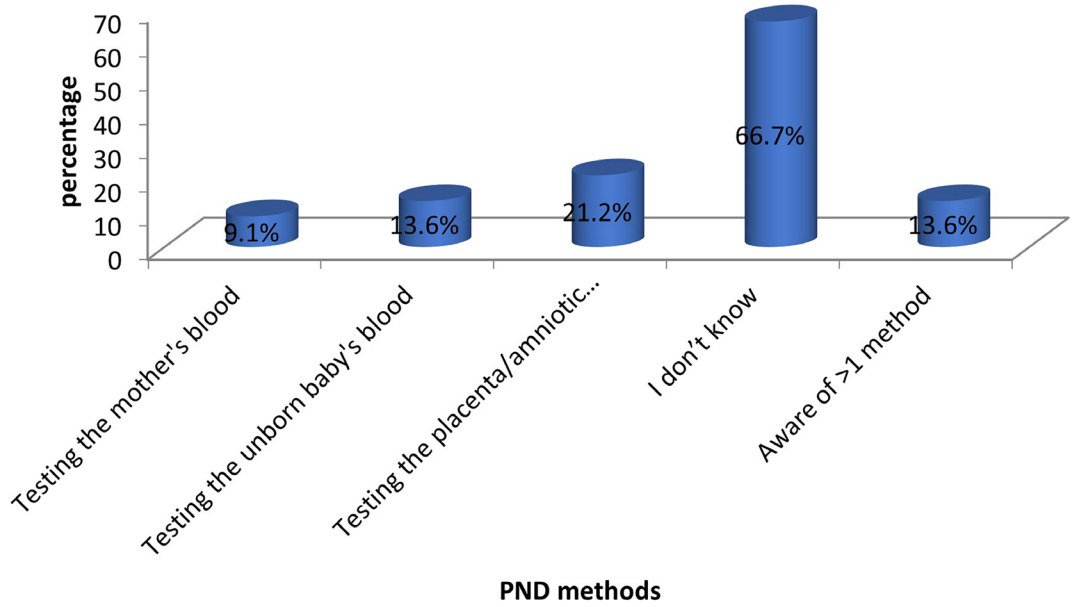


Figure 2. Awareness of PND methods among mothers of children with SCD. The bars represent the methods of SCD PND known to the participants.

Table 3. Acceptability of PND for SCD among mothers.

Variable	Frequency (%) n=297
Ever had PND for SCD	
Yes	1 (0.3)
No	298 (99.7)
Willingness to accept PND in the future	**n=297**
Yes	277 (93.3)
No	20 (6.7)
Reasons for unwillingness to accept PND in the future	**n=20**
I will accept my fate	9 (45.0)
No reason stated	11 (55.0)

associated with willingness to accept PND for SCD ($p<0.05$). These associations are presented in Table 4.

Discussion

The global number of people with SCD has increased by 41.4% over the past 21 years[7]. The birth prevalence of SCD among children under one-year-old is reported to be highest in Africa, ranging from 643 to 2800 per 100,000, with particularly high mortality rates[8]. This highlights the urgent need for effective SCD control measures in SSA to reduce associated morbidity and mortality. PND is one of the reproductive options available to couples at high risk of transmitting a serious genetic disorder. Awareness and utilization of PND have increased in developed countries, where it is routinely offered as part of informed reproductive choices, but remains low in Africa, which carries the highest burden of the disease[9].

This study found a low level of awareness of PND for SCD, which aligns with findings by Olatunya *et al*. in Southwestern Nigeria[10]. Similarly, Munung *et al.* in a multi-country study of

Table 4. Factors associated with the willingness to accept PND for SCD in future pregnancies.

	Frequency (%) n=297		
Factor	**Will accept PND**	**Will not accept PND**	**p-value**
Educational level			
Tertiary	57 (19.1)	9 (3.03)	**0.011**
Below tertiary	220 (74.1)	11 (3.7)	
Personal source of income			
Yes	116 (39.1)	9 (3.0)	0.785
No	161 (54.2)	11 (3.7)	
Place of residence			
Semi-urban/urban	202 (68.0)	16 (5.4)	0.489
Rural	75 (25.3)	4 (1.3)	
No. of SCD-related death			
≥1	57 (19.1)	5 (1.7)	0.638
0	220 (74.1)	15 (5.1)	
Average crisis per month			
≥1	147 (49.5)	4 (1.3)	**0.005**
0	130 (43.8)	16 (5.4)	
SCD-related blood transfusion in the last one year			
≥1	128 (43.1)	4 (1.3)	**0.034**
0	149 (50.2)	16 (5.4)	

	Frequency (%) n=297		
Factor	**Will accept PND**	**Will not accept PND**	**p-value**
SCD-related hospital admission in the last one year			
≥1	161 (54.2)	3 (1.0)	**0.000**
0	116 (39.1)	17 (5.7)	
No. of children affected with SCD			
≥2	167 (56.2)	9 (3.0)	0.158
1	110 (37.0)	11 (3.7)	

people directly affected by SCD, reported a low level of awareness of PND[11]. This low level of awareness mirrors the general awareness of prenatal diagnosis for other genetic conditions in various study populations, such as pregnant women[12–14]. In northern Nigeria, Aliyu *et al.* reported a similar awareness level of PND for SCD among pregnant women[15]. The widespread poor awareness of PND for genetic disorders could be attributed to a lack of facilities and expertise for PND in Nigeria and the reluctance of some healthcare workers to recommend PND for SCD. A study among physicians found that nearly two-thirds would not recommend PND for at-risk couples[10]. This also highlights the low uptake of PND for SCD in this study, with only one mother having undergone PND in a previous pregnancy, as reported in a similar study in Nigeria[14]. In contrast, Okechukwu *et al.* found higher awareness of PND (52.2%) among parents of SCD children in South-South Nigeria[16].

In this study, the internet and social media were not major sources of information about PND for SCD. In the digital era, this emphasizes the need for organisations responsible for SCD control to utilise these media to disseminate accurate and easily understandable information.

Following information on PND for SCD provided to participants in this study, the majority expressed a willingness to accept PND, consistent with reports by Ampumah *et al.* from Ghana and Wonkam *et al.* from Cameroon[17,18]. However, Olatunya *et al.* and Okechukwu reported lower acceptability rates in similar populations[16]. This could be due to differences in the intrinsic characteristics of the study populations. In the study by Olatunya, 97% of participants had only one affected child, whereas more than half of the mothers in this study had more than one affected child. Additionally, mothers in this study had experienced SCD-related deaths five times more frequently than participants in Okechukwu's study. Caring for a person with SCD carries a significant psychological, financial, and physical burden[19]. This burden is even greater when more than one child in a family is affected by SCD, which may influence mothers' attitudes toward the acceptability of PND for SCD. Aliyu *et al.* reported a lower level of acceptability among pregnant women, which may be attributed to differences in study populations, as their study involved a general antenatal population, unlike the more selectively recruited participants in the present study[15].

In this study, nearly half of the mothers who were unwilling to accept PND cited a willingness to accept the risk of having another affected child. Acceptance of one's fate is closely associated with religious belief, similar to findings from southern Nigeria[16]. Religion is a strong factor in the decision-making process for prenatal screening[20]. This study found that severe manifestations of the disease evident by frequent crises, blood transfusions, and hospital admissions were associated with willingness to accept PND. The psychosocial burden faced by these mothers of affected children does not exist in other studied populations, such as healthcare providers or students[21]. Cultural, religious, and personal concerns about pregnancy termination are factors associated with willingness to accept PND for SCD[11,20]. Ampumah *et al.* in Ghana reported that parents of children living with SCD were more likely to use PND results to prepare for the birth of the child, and deciding to accept PND did not necessarily mean using that information to terminate the pregnancy[17]. Munung *et al.* in Ghana found a lower preference for PND as a SCD control measure largely due to its complex decision-making process and higher risk of stigmatization which are influenced by religious and cultural aspects attached to the termination of an affected pregnancy that can follow a PND[11]. In a resource-poor country where the resources to establish widespread PND is lacking; a populace whom cultural and religious beliefs influence their decision making; a restrictive abortion law and high burden of SCD-related morbidity and mortality, there is need to strengthen other less expensive control measures in the countries like premating/premarital counseling and testing and newborn screening. In the Nigerian setting, awareness and acceptance of premarital screening for SCD are already relatively high[22], and studies have shown that many African individuals hold positive attitudes toward genetic counselling[23]. Evidence from a multi-African country study by Munung *et al.* further suggests that adolescents may be an ideal target group for early sickle cell trait screening, given their openness to receiving genetic information before marriage decisions are made[11]. This indicates a valuable opportunity to expand low-cost control measures. In contexts where religious leaders play a central role in guiding social and marital decisions, their involvement could significantly enhance the uptake and acceptability of other control measures like premarital screening. Engaging community faith structures—for example, offering voluntary carrier testing through local mosques or

churches—may be culturally appropriate and effective. Religious leaders often hold strong influence and have been shown to express supportive attitudes toward premarital SCD screening, and they could play a constructive role in communicating the health implications of two carriers marrying[24]. A study in northwestern Nigeria reported that providing health education to Islamic clerics increased their knowledge on SCD and willingness to advocate premarital counselling to intending couples[25]. Cell-free fetal DNA testing in maternal serum is currently unavailable in Kaduna, and only a few centres offer the service nationwide, at prohibitively high costs.

Educational level was the only socio-demographic variable of mothers associated with willingness to accept PND, similar to findings by Mattei *et al.* in a recent systematic review[26]. Other studies have also reported that educational level is generally associated with willingness to accept PND, not just for SCD[27,28].

This study derives its strengths from the use of a large sample size; use of a relevant target population of women with a strong stake in control measures of SCD like PND; provides valuable insights into public health strategies and interventions in the control of SCD in a country with the highest burden of SCD and thus could inform future research and policy. The high level of acceptability observed is likely to enhance the uptake of this control measure. Meaningful involvement of religious leaders who have received accurate and comprehensive education on sickle cell disease within the national control programme is also likely to improve community perceptions and attitudes toward the full range of SCD control strategies.

Limitations of this study include the use of a convenience sampling method as it does not randomly select mothers from the target population; reliance on self-reported data where the respondents may not truly reveal their beliefs and attitudes and being a single-centred study where the respondents were Muslims and of Hausa ethnicity which could limit diversity of perspectives represented in this study.

Conclusion

Only one-fifth of at-risk mothers were aware of PND as a control measure for SCD, and actual use of PND was very low. Most mothers expressed a willingness to accept PND and religious belief was the main reason for declining PND. Mother's educational status and the severity of the child's disease were associated with a willingness to accept PND.

Data availability statement

The data underlying this article are openly available in the Figshare repository under a CC BY 4.0. The dataset can be accessed via the following DOI 10.6084/m9.figshare.27195288[6].

Data are available under the terms of the CC BY 4.0

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Open Peer Review

Current Peer Review Status: ✔ ✔ ✔ ? ✔

Version 3

Reviewer Report 24 January 2026

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✔ **Lori C Jordan**
Vanderbilt University Medical Center, Nashville, Tennessee, USA

I have no additional comments. Thank you.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: sickle cell disease - neurological complications

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 08 January 2026

https://doi.org/10.21956/openreseurope.23958.r65982

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✔ **Miguel Brito**
Lisbon School of Health Technology, Lisbon, Portugal

The manuscript “Awareness and Acceptability of Prenatal Diagnosis of Sickle Cell Disease among Mothers of Affected Children in a Northern Nigerian Teaching Hospital” aims to evaluate the awareness and acceptability of PND for SCD among mothers of children with SCD. It is indeed a fascinating and important area of research. It is a well-written manuscript, well-organised, and

contains important information. The sample size is acceptable, and in general it is a good methodology.
Minor points:
In the Introduction, the authors refer to “The non-invasive prenatal test screens for fetal SCD using cell-free fetal DNA from maternal plasma, eliminating the risk of miscarriage associated with invasive tests3,4. This method also allows for earlier screening than conventional invasive tests.” However, it should be mentioned that this is not yet a diagnostic validated method, or al least mention if it was already validated.
There is no information if any of the mothers is an SCD patient, and if any of the mothers is pregnant, since if the authors have that information, they should mention it, and analyse if the awareness and acceptability of PND is different on that specific group.
In sample size determination, the authors refer that in Olatunya's paper the prevalence of awareness was 0,25%, however, I believe they want o mention 25% (not 0,25%, or at least 0,25 in 1 to zero).In the manuscript, the awareness was about 22,2%. The sample size is well determined, since they used the 25% in the calculation.
The authors mention that “*Information on PND for SCD*” was given, and after that, the majority of the mothers accepted the PND idea. What information was given? Is there a document or a brochure shown to the patients? Was it always the same person to give the information? The authors mention that education is very low in that region, so the understanding of the new concepts could be different.
The “Ethics and consent” paragraph is repeated in methodology and in the end of the manuscript

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: SCD genetics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 12 Jan 2026

Rabi'at Muhammad Aliyu

Thank you for the comments.

1. The comment on cell-free DNA testing in PND has been addressed.
2. The study did not seek the pregnancy status or genotype of the mothers during data collection.
3. The awareness level quoted from Olatunya's study has been corrected to 25%.
4. The questionnaires were interviewer-administered by two trained research assistants. Any participant who was not aware of PND for SCD was verbally provided with information on the existence of the procedure and the various methods that can be employed.

Competing Interests: No competing interests were disclosed.

Reviewer Report 07 January 2026

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Ravindra Kumar
ICMR-National Institute of Research in Tribal Health, Jabalpur, India

The manuscript is well written. However, certain corrections are needed.
In table 1, the percentage in Islam is 97.0 not 97,0

In table 2, hemglobin genotype may be replaced as genotype. The method used to assess the genotype is not mentioned in the manuscript.
In Table 4, the percentage is not mentioned.

In discussion, how this information will help in policy making and increase in PND services should be discussed

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Hemoglobinopathies, Public Health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 12 Jan 2026

Rabi'at Muhammad Aliyu

Thank you for the comments.

1. In Table 1, a correction to 97.0 was effected.
2. In Table 2, haemoglobin has been removed.
3. The method of assessing genotype is by alkaline electrophoresis and has been included in the study setting of methods
4. The percentages have been added in Table 4
5. Discussion about study findings and policy-making has been enriched

Competing Interests: No competing interests were disclosed.

Reviewer Report 07 January 2026

https://doi.org/10.21956/openreseurope.23958.r65788

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Lori C Jordan
Vanderbilt University Medical Center, Nashville, Tennessee, USA

This is an excellent paper, and I appreciated the author's clarifications. I recommend adding the information below to the manuscript rather than just responding to my comment

The authors responded:
Tertiary education in this study referred to an educational level higher than secondary school
But, they did not add this to the manuscript. Many readers will not understand this terminology. It's not standard country to country. Recommend adding either as a foot note to the table or a sentence in the results.

For example, the first paragraph of the results says: Further details are provided in Table 1. Could Add after this sentence: Tertiary education refers to an educational level higher than secondary school and was achieved by 22.2% of mothers participating in this study.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: sickle cell disease - neurological complications

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 06 January 2026

https://doi.org/10.21956/openreseurope.23958.r65979

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Aisha Galandanci
[1] Global Pediatric Medicine, St Jude Children's Research Hospital, Memphis, TN, USA
[2] Hematology, Aminu Kano Teaching Hospital (Ringgold ID: 376586), Kano, Kano, Nigeria

This study is particularly significant, especially as Nigeria bears the highest global burden of SCD. While the findings provide valuable insights into barriers to PND uptake, the absence of a discussion on the cost of PND relative to the mother's income is a notable limitation. In low-resource settings, out-of-pocket costs are often a major factor influencing healthcare decisions. It would be useful to explore whether lack of affordability or cost awareness may have contributed to the low acceptability rates observed.
The study could also benefit from addressing the limited autonomy many women experience in reproductive decision-making, particularly those with less formal education. In many Nigerian households, such decisions are made by husbands or extended family members, which may explain the reluctance to accept PND even when it is available.
In the discussion, the authors rightly note that in a resource-poor country where widespread access to PND is limited, and where cultural, religious, and legal factors influence decision-making, there is an urgent need to strengthen other cost-effective control measures such as premarital counseling, carrier testing, and newborn screening. Building on this, the manuscript could consider emphasizing collaboration with religious leaders to provide culturally sensitive education

on SCD and Islamic perspectives on PND. Religious institutions such as mosques could play an important role in increasing awareness and trust. Similarly, expanding SCD education and screening awareness to universities and public institutions may help reach younger individuals before marriage or childbearing.
Finally, minor editorial revisions are recommended to improve clarity including removing redundant content (e.g., the repeated ethics section) and ensuring consistency in abbreviation usage (e.g., defining SCD once). These adjustments would enhance the manuscript's overall impact and readability.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: 1)Hemoglobinopathies, particularly Sickle Cell Disease (SCD), Epidemiology and disease burden, Newborn screening (NBS) for SCD, prevention strategies and genetic counseling, community health education and awareness,2) Quantitative and qualitative research methods, caregiver experiences and health-seeking behavior, sociocultural and religious influences on health decisions,

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 12 Jan 2026

Rabi'at Muhammad Aliyu

Thank you for the insightful comments.

1. The study found a high rate of acceptability (93.3%) after receiving information about prenatal diagnosis. Nearly half (45%) of the women who were not willing to accept prenatal diagnosis cited religious beliefs as the reason, rather than the cost
2. The role of religious leaders in offering premarital counselling has been expanded

and referenced.
3. The role of health educating younger individuals in the control of SCD has been addressed.
4. The minor editorial revisions have been done.

Competing Interests: No competing interests were disclosed.

Version 1

Reviewer Report 25 November 2025

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Vincenzo Voi
University of Turin, Turin, Italy

Peer Review Report – Open Research Europe
Title
Awareness and Acceptability of Prenatal Diagnosis of Sickle Cell Disease among Mothers of Affected Children in a Northern Nigerian Teaching Hospital
General Assessment
The manuscript addresses a highly relevant topic in the field of sickle cell disease (SCD) prevention. The study is clearly structured and uses a sample directly relevant to the research question.
Some methodological and interpretative aspects require clarification:
Methods – Points Requiring Revision
Referenced text: "After obtaining informed verbal consent, every eligible participant completed a structured interviewer-administered questionnaire…"
Suggested revision: I agree with my previous colleague. The manuscript should report the number of mothers who declined participation. If none declined, authors should explicitly state this.
Moreover, clarification is needed on the total number of children with SCD routinely followed at the clinic to contextualize the recruitment proportion.
Results – Clarifications Needed
Referenced text: "About one-third of the mothers were grandmultiparous…"
Suggested revision: Define clearly what threshold the authors used for 'grand multiparous'. Literature definitions vary (≥5 deliveries is common).
Define the operational threshold used in this study to classify grand multiparity. In the narrative text, however, the authors describe the mothers as "about one-third grand multiparous" with a "median parity of 3," which seems inconsistent with the ≥5 threshold reported in the table.

If the intended definition is ≥5 deliveries, adjust the text to align with the tables. If the authors used a different definition, modify the table labels accordingly.

Referenced text: "Below tertiary vs tertiary"
Suggested revision: Specify what is included under 'tertiary education'. Indicate whether it reflects post-secondary, university-level, or vocational training.
Discussion – Conceptual Expansion Needed
Referenced text: "There is need to strengthen other less expensive control measures…"
Suggested revision: Expand this point. In regions where pregnancy termination is culturally or religiously restricted, premarital carrier screening and community-based education programs could play a critical role. Consider discussing the feasibility of partnerships with local religious and community leaders, who are often central figures in decision-making. Examples exist in other communities (e.g., faith-based premarital genetic counseling programs).
Discussion – Technical Clarification
Referenced text: discussion of non-invasive prenatal diagnosis.
Suggested revision: The authors should clarify whether cell-free fetal DNA testing for SCD is available in Kaduna or elsewhere in Nigeria, and whether cost or infrastructure barriers limit its use. This would give readers a realistic view of PND implementation challenges.
Minor Editorial Suggestions
Ensure consistency in numeration: the text reports 0.3% for undergoing PND, but 1/297 corresponds to ~0.34%—the number is correct but could be rounded more transparently.
Consider adding a short sentence on how missing data, if any, were handled.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Sickle Cell Disease expert.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 05 Dec 2025

Rabi'at Muhammad Aliyu

Thank you for your insightful comments. METHODS None of the eligible mothers declined participation. The clinic attends to an average of 50 children with SCD per week RESULT

1. Grandmultiparous women in this study referred to women who have had five or more deliveries, and the term is now used consistently.
2. Tertiary education in this study refers to additional education beyond secondary school and includes diplomas, degrees, postgraduate

DISCUSSION

1. Point on religious leaders involvement have been expanded.
2. Clarification on cell free fetal DNA has been provided

Competing Interests: No competing interests were disclosed.

Reviewer Report 08 October 2025

https://doi.org/10.21956/openreseurope.20230.r60590

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Lori C Jordan
Vanderbilt University Medical Center, Nashville, Tennessee, USA

This seems like an important topic and excellent subject for investigation.
I have a few questions organized by section:
Methods:
The authors state: “After obtaining informed verbal consent, every eligible participant completed a structured interviewer-administered questionnaire to gather data on socio-demographic characteristics, awareness, attitude, and acceptability of prenatal diagnosis
for SCD. The data collected was pseudo-anonymized. Recruitment took place from March to August 2023.”

1.How many mothers declined to participate? If none, would reword the sentence to read: every eligible participant completed a structured interviewer-administered
Questionnaire, after obtaining informed verbal consent, to gather data on socio-demographic characteristics…
2.How many children with SCD are followed in the Kaduna peds SCD clinics? One might think at least half of these children/families would have been approached within 6 months.

Results
Please define grand multip – from the manuscript I thought 3 pregnancies but from the table I

thought it might be 5 pregnancies.
Please define “tertiary” education. Do the authors mean beyond high school? Some college

Discussion
The authors mention “there is need to strengthen other less expensive control measures in the countries like premating/premarital counseling and testing and newborn screening” I agree! Could the authors say a bit more? Would it be acceptable to screen teens for SCD carrier status through a local mosque? Perhaps an Imam might communicate that it is best for 2 SCD carriers not to marry? Just thinking that if pregnancy termination isn’t acceptable – testing prior to marriage might be best. (I believe this has been done in Jewish populations through synagogues for different severe conditions like Tay Sachs.)

Is cell-free DNA testing available for diagnosis in Kaduna? Is this available at many/most facilities in Nigeria? Is testing affordable?

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: sickle cell disease - neurological complications

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 05 Dec 2025

Rabi'at Muhammad Aliyu

Thank you for your insightful comments. METHODS
1. It has been reworded. None of the eligible women declined participation in the study.

2. The Paediatric Haematology Clinic attends to an average of 50 children with sickle cell disease per week.

RESULTS

1. A grandmultipara referred in this study is a woman who has had five or more pregnancies that have been carried to at least 28 weeks of gestation.
2. Tertiary education in this study referred to an educational level higher than secondary school

DISCUSSION

1. The roles of premarital screening and religious leaders' involvement as control measures have been elaborated. In the Nigerian setting, awareness and acceptance of premarital screening for SCD are already relatively high,[21] and studies have shown that many African individuals hold positive attitudes toward genetic counselling.[22] Evidence from a multi-African country study by Munung et al. further suggests that adolescents may be an ideal target group for early sickle cell trait screening, given their openness to receiving genetic information before marriage decisions are made.[11] This indicates a valuable opportunity to expand low-cost control measures. In contexts where religious leaders play a central role in guiding social and marital decisions, their involvement could significantly enhance the uptake and acceptability of other control measures like premarital screening. Engaging community faith structures—for example, offering voluntary carrier testing through local mosques or churches—may be culturally appropriate and effective. Religious leaders often hold strong influence and have been shown to express supportive attitudes toward premarital SCD screening, and they could play a constructive role in communicating the health implications of two carriers marrying.[23]
2. Cell-free fetal DNA testing in maternal serum is currently unavailable in Kaduna, and only a few centres offer the service nationwide, at prohibitively high costs.

Competing Interests: No competing interests were disclosed.