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Knowledge of Sickle Cell Disease and Preventive Practices among Couples in Abalama Community, Rivers State, Nigeria

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ABSTRACT

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Background: Sickle Cell Disease (SCD) remains a major public health challenge in Nigeria, despite sustained awareness campaigns on genotype testing and premarital counseling. Preventive practices such as premarital screening are often influenced by sociocultural beliefs, misconceptions, and inadequate health education, especially in semi-rural communities.

Objective: This study assessed the level of knowledge and preventive practices regarding SCD among couples in Abalama community, Rivers State, Nigeria, to identify existing gaps and inform community-based interventions.

Methods: A descriptive cross-sectional design was adopted. Using a multi-stage random sampling technique, 168 couples were selected from nine war canoe houses in Abalama. Data were collected using a validated self-structured questionnaire and analyzed using descriptive statistics (frequencies and percentages).

Results: Most respondents (94.1%) had heard of SCD and 95.2% were aware of genotype testing; however, misconceptions persisted, with 13.1% perceiving SCD as a lifelong sickness and 1.8% attributing it to spiritual causes. Although 72.6% of couples reported premarital genotype testing, nearly one-third (27.4%) did not test before marriage. Reasons for non-testing included the belief that testing was unnecessary (40%), lack of perceived risk (23.3%), religious objections (6.6%), and cultural prohibitions (3.3%). Educational attainment was high (81.5% tertiary), yet misconceptions and risk-prone attitudes persisted.

Conclusion: The study revealed high awareness but persistent knowledge–practice gaps in SCD prevention among couples in Abalama. Cultural and religious beliefs continue to influence marital and reproductive decisions despite medical awareness. Strengthening community-based education, integrating genetic counseling into primary healthcare, and engaging faith and traditional leaders are crucial for improving preventive practices and reducing the SCD burden in Nigeria.

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Keywords
Sickle Cell Disease, Knowledge, Preventive Practices, Premarital Screening, Genotype Testing, Nigeria, Abalama Community

1. Introduction

Sickle Cell Disease (SCD) is one of the most prevalent inherited hematological disorders globally, characterized by the production of abnormal hemoglobin S, which leads to sickling of red blood cells, chronic anemia, vaso-occlusive crises, and multi-organ complications (Distelmaier *et al*., 2020; Mulumba & Wilson, 2015). The disease poses a significant health burden in sub-Saharan Africa, with Nigeria bearing the highest prevalence—accounting for over 150,000 affected births annually, representing more than half of global cases (Adigwe *et al*., 2023; Grossi, 2023). Despite decades of public health awareness, sickle cell disease remains a major contributor to childhood morbidity and mortality in Nigeria, largely due to poor awareness, sociocultural misconceptions, and the limited uptake of premarital screening and genetic counseling services (Nwabuko *et al*., 2022; Dilli *et al*., 2024; Orukwowu, 2021).

Studies in various Nigerian settings have shown variable levels of awareness and understanding of SCD among different populations. For instance, Isah *et al*. (2019) reported high knowledge but poor practice of premarital genotype testing among lecturers in Sokoto, while Oluwole *et al*. (2022) observed that although most young adults in Lagos had heard about SCD, misconceptions about inheritance and prevention were widespread. Similarly, Gabriel and Matthew (2013) found that despite awareness of premarital counseling, many youths in Yaba, Lagos, did not consider genotype compatibility before marriage. These patterns reveal a persistent knowledge–practice gap that contributes to the continuing burden of SCD in Nigeria.

Globally, the importance of premarital and preconception genetic screening has been emphasized as a key strategy to reduce SCD incidence (Al-Farsi *et al*., 2014; Serjeant *et al*., 2017; Ouali *et al*., 2016). In sub-Saharan Africa, and particularly in Nigeria, efforts to institutionalize such preventive measures have been hindered by social, religious, and ethical concerns. Ezugwu *et al*. (2019) noted ethical dilemmas arising when churches deny marriage to couples with incompatible genotypes, raising questions about individual rights and communal responsibilities. Preventive behaviours among couples are shaped by family influence, education, and awareness, similar to patterns described in other preventive health contexts (Orukwowu, 2022). Adesola *et al*. (2025) further revealed that even when couples are aware of their incompatible genotypes, emotional and cultural factors often override medical advice during marital decisions. Health education and awareness campaigns have been shown to improve preventive practices such as genotype testing and premarital counseling (Orukwowu *et al*., 2025). These findings highlight the complex interplay between biomedical knowledge, social norms, and behavioral choices in the prevention of SCD.

Cultural perceptions and stigmatization also shape how communities approach sickle cell prevention. Bolanle *et al.* (2013) documented stigmatizing attitudes toward individuals with SCD among Nigerian students, while Boadu and Addoah (2018) reported misconceptions among Ghanaian university students regarding the genetic basis of the disease. Moreover, Ezenwosu *et al*. (2021) observed that even among adolescents in southeastern Nigeria, a significant proportion lacked knowledge of their own genotype, underscoring the need for early education. These findings align with Smith and Brownell (2018), who argued that improving health literacy and addressing stigma are critical to promoting preventive behaviors. Education, therefore, plays a pivotal role in health outcomes, as Zajacova and Lawrence (2018) emphasized in their contextual model linking educational attainment to improved health behaviors and decision-making.

The Nigerian health system has made progress in promoting genotype awareness through mass campaigns and public health initiatives, yet gaps remain at the community level, especially in rural and riverine areas where health infrastructure is limited (Adigwe, 2022; Adewoyin *et al*., 2015; Orukwowu, 2023). Abalama, a riverine community in Asari-Toru Local Government Area of Rivers State, typifies such settings where health information dissemination is often informal and where cultural beliefs coexist with modern medical practices. Despite widespread awareness campaigns, little is known about how much couples in these communities understand SCD and how effectively they apply preventive measures such as premarital screening and genetic counseling.

Given that SCD is entirely preventable through informed marital and reproductive decisions (Benenson *et al*., 2018; Westin *et al*., 2022), assessing the knowledge and preventive practices of couples is crucial. Understanding local perspectives will inform targeted interventions, guide health education programs, and strengthen community-level prevention strategies (Orukwowu *et al*., 2025). Therefore, this study seeks to assess the knowledge and preventive practices regarding Sickle Cell Disease among couples in Abalama community, Rivers State, Nigeria, with the aim of identifying existing knowledge gaps and proposing culturally sensitive approaches to enhance genetic counseling, screening, and public health education.

1.1 Objectives of the Study

The main objective of this study was to assess the knowledge and preventive practices regarding Sickle Cell Disease (SCD) among couples in Abalama community, Rivers State, Nigeria.

The specific objectives were to:

1. Assess the level of awareness and knowledge of Sickle Cell Disease among couples in Abalama community.
2. Determine the preventive practices (such as premarital genotype testing and counseling) adopted by couples in the community.
3. Identify the cultural, religious, and personal factors influencing the uptake of preventive practices against Sickle Cell Disease.
4. Examine the relationship between educational status and knowledge or preventive practices regarding SCD among couples.

1.2 Research Questions

1. What is the level of awareness and knowledge of Sickle Cell Disease among couples in Abalama community?
2. What preventive practices against Sickle Cell Disease are commonly adopted by couples in the study area?
3. What factors influence couples’ decisions regarding premarital genotype testing and counseling?
4. How does educational attainment relate to couples’ knowledge and preventive practices concerning Sickle Cell Disease?

2. Methodology

2.1 Research Design

This study adopted a cross-sectional descriptive design to assess the level of knowledge and preventive practices regarding sickle cell disease among couples residing in Abalama community, located within Asari-Toru Local Government Area (LGA) of Rivers State, Nigeria. The design enabled the collection of data from a defined population at a single point in time to determine awareness, understanding, and preventive behaviors related to sickle cell disease.

2.2 Study Setting

The study was conducted in Abalama, a riverine community in Asari-Toru LGA, Rivers State, Nigeria. Asari-Toru is located in the southeastern part of Rivers State and comprises 17 communities predominantly inhabited by the Kalabari ethnic group. The LGA is known for its rich cultural heritage, economic diversity, and natural resources, covering an estimated area of 113 km² with a projected population of 308,800 as of March 2016.

Abalama shares boundaries with Degema LGA to the north, Ogbia LGA to the south, and the Atlantic Ocean to the west. The inhabitants engage primarily in fishing, agriculture, and the oil and gas industry. The community is notable for its agricultural products such as cassava, plantain, and yam, reflecting the larger economic activities of the Asari-Toru region. The social structure, influenced by traditional Kalabari institutions, provided a suitable setting for studying couples’ knowledge and practices related to sickle cell disease prevention.

2.3 Target Population

The target population consisted of approximately 250 couples residing within Abalama community, specifically those living in traditional war canoe houses. These households represent the core social units within the Kalabari community.

2.4 Sample Size Determination

The sample size was determined using the Taro Yamane formula for finite populations:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

- n = sample size
- N = population size (250)
- e = margin of error (0.05)

$$n = \frac{250}{1 + 250(0.05)^2} = 153$$

An additional 10% attrition rate (15.3) was added to account for non-response, yielding a final sample size of 168 couples.

2.5 Sampling Technique

A **multi-stage sampling technique** was employed:

- **Stage 1:** A list of the nine (9) war canoe houses in Abalama was compiled.
- **Stage 2:** A **simple random sampling** technique was used to select **three (3)** war canoe houses from the list.
- **Stage 3:** Within the selected war canoe houses, approximately **250 households** containing married couples were listed.
- **Stage 4:** A **proportionate sampling technique** was applied to determine the number of couples to be selected from each war canoe house.
- **Stage 5:** A **simple random sampling** method was again used to select the final **168 couples** proportionally distributed as shown I Table 1:

Table 1: Sampling site of respondents

War canoe House	Frequency	Calculated. Proportion
Seleyi	99×168/250	67
Akubo	70×168/250	47
Bala polo	81×168/250	54
		Total = 168

2.6 Instrument for Data Collection

Data were collected using a **self-structured questionnaire** developed by the researcher based on literature review and expert input. The instrument ensured respondent anonymity to promote confidentiality and accurate responses.

It consisted of **five sections (A–E)** as follows:

- **Section A:** Demographic characteristics (5 items)
- **Section B:** Knowledge of sickle cell disease (3 items)
- **Section C:** Preventive practices (5 items)
- **Section D:** Information sources (2 items)
- **Section E:** Attitudinal and behavioral aspects (2 items).

  In total, the questionnaire comprised **17 items**.

2.7 Validity of the Instrument

Content validity was established through expert review. The draft questionnaire was submitted to the researcher's supervisor and subject experts, who assessed the relevance, clarity, and adequacy of the items. Their feedback and suggested modifications were incorporated, ensuring that the instrument appropriately measured the study objectives.

2.8 Reliability of the Instrument

Reliability of the questionnaire was tested using the test–retest method. Twenty (20) couples from Buguma community (a neighboring community within Asari-Toru LGA) participated in the pilot test. Responses obtained were correlated using the Pearson Product Moment Correlation Coefficient, yielding a reliability coefficient of r = 0.68, which confirmed acceptable instrument stability.

2.9 Method of Data Collection

A total of 168 questionnaires were distributed by the researcher with the assistance of trained field aides. The questionnaires were self-administered, with clarifications provided when necessary. All instruments were retrieved within a two-week period.

2.10 Method of Data Analysis

Collected data were coded, cleaned, and analyzed using the Statistical Package for the Social Sciences (SPSS) version [specify version if known]. Descriptive statistics such as frequencies and percentages were used to summarize respondents' socio-demographic characteristics, knowledge levels, and preventive practices. Results were presented in tables and charts for clarity.

2.11 Ethical Considerations

Ethical approval was obtained from the Project Committee of the Department of Nursing. An official letter of introduction and permission to conduct the study was obtained from the Head of Department and presented to the Community Chief of Abalama, who granted approval. Participants were informed about the study objectives, their right to withdraw at any time, and confidentiality of their responses. Informed consent was obtained from each participant before questionnaire administration.

3. Results

3.1 Demographic data of the respondents

Table 2 displays the demographic data of the respondents. It reveals that 63.1% of the participants were female, while 36.9% were male. The age distribution shows that 60.1% fell between the ages of 20 and 25, 16.1% were aged 26-30, 5.4% were in the 31-34 age range, 8.3% were aged 35-40, and 10.1% were over 40 years old. Regarding religious affiliation, 96.4% identified as Christian, 2.4% as Muslim, and 1.2% as Traditionalist. Educational status showed that 4.2% had completed primary education, 13.7% had completed secondary education, and 81.5% had tertiary education. In terms of occupation, 54.9% were involved in business, 25.6% were civil servants, and 9.5% were engaged in fishing.

3.2 Respondents' knowledge of sickle cell disease

Table 3 presents the respondents' knowledge of sickle cell disease. It indicates that 5.9% of participants were unaware of sickle cell disease, while 94.1% were familiar with it. Among those surveyed, 13.1% perceived sickle cell disease as a condition in which the person remains sick all through his/her life till death, 84.5% recognized it as a genetic disease transmitted from parents to children, and 1.8% viewed it as a spiritual condition in which individual is constantly drained of his/her blood by demons. Regarding genotype testing, 4.8% had not heard of it, while 95.2% were aware of its existence. Of those aware, 72% believed it was to know one's blood groups, 26.2% to test for abnormal red blood cells, and 0.6% to test for the percentage of blood in the body. Before marriage, 17.9% did not undergo genotype testing, whereas 72.6% did, with 72.1% testing AA, 25.4% AS, and 1.6% SS. Reasons cited for not testing before marriage included 23.3% not feeling the need since they do not have the disease, 40% did not think it was necessary, 3.3% culture forbids blood testing, and 6.6% religious objections.

Table 2: Socio-demographics of Respondents (n = 168)

Variables	Frequency (n)	Percentage (%)
Gender		
Female	106	63.1
Male	62	36.9
Age (Years)		
20 – 25	101	60.1
26 – 30	27	16.1
31 – 34	9	5.4
35 – 40	14	8.3
Above 40	17	10.1
Religion		
Christian	162	96.4
Islam	4	2.4
Traditionalist	2	1.2
Educational Status		
Primary	7	4.2
Secondary	23	13.7
Tertiary	137	81.5
Occupation		
Business	92	54.8
Civil servant	43	25.6
Farming	16	9.5

Table 3: Knowledge of Sickle Cell Disease by the Respondents (n = 168)

Variables	Frequency (n)	Percentage (%)
Have you heard of sickle cell disease before?		
Yes	158	94.1
No	10	5.9
What does it mean?		
A genetic disease transmitted from parents to children	142	84.5
A condition in which the person remains sick all through life till death	22	13.1
A spiritual condition in which blood is drained by demons	3	1.8
Have you heard of genotype test?		
Yes	160	95.2
No	8	4.8
Why is the test done?		
To know blood group	121	72.0
To test for abnormal red blood cells	44	26.2
To test for percentage of blood in the body	1	0.6
Before getting married, did you and your spouse do a genotype test?		
Yes	122	72.6
No	30	17.9
If yes, what is your genotype? (n = 122)		
AA	88	72.1
AS	31	25.4
SS	2	1.6
If no, what are your reasons? (n = 30)		
It is not necessary	12	40.0
I don't have any disease, so no need	7	23.3
My religion is against it	2	6.6
My culture forbids blood test	1	3.3

4. Discussion

The present study assessed the knowledge and preventive practices regarding sickle cell disease (SCD) among couples in Abalama community, Rivers State. The findings revealed that while awareness of SCD (94.1%) and genotype testing (95.2%) were relatively high among respondents, preventive practices such as premarital genotype testing were suboptimal—only about 72.6% of couples had undergone genotype testing before marriage. This apparent gap between knowledge and preventive behavior mirrors trends documented across Nigeria and other sub-Saharan African settings (Adesola *et al.*, 2025; Isah *et al.*, 2019; Oluwole *et al.*, 2022).

Awareness and Knowledge of SCD

High awareness levels observed in this study align with previous research. Isah *et al.* (2019) found near-universal awareness (99.3%) of SCD among lecturers in Sokoto, while Adigwe (2022) reported that over 92% of unmarried adults in Abuja had heard about SCD. However, as in Abalama, such awareness often coexists with misconceptions about the disease. In the present study, 13.1% of respondents wrongly believed that SCD means being perpetually ill until death, and 1.8% attributed it to spiritual causes. Similar misconceptions were reported by Adigwe (2022), who noted that some participants believed infections could cause SCD, and by Oluwole *et al.* (2022), who highlighted widespread misunderstandings of genetic inheritance patterns among Lagos youths. These findings underscore a recurring issue: awareness without comprehension does not necessarily translate into preventive action.

This pattern also reflects the "knowledge–practice gap" highlighted by Dilli *et al.* (2024) in their meta-analysis of African premarital screening practices. Despite growing awareness across the continent, the pooled uptake of premarital genotype screening was only 47.8%. The Abalama findings, therefore, demonstrate that while community-based awareness may be high, the depth and accuracy of genetic literacy remain insufficient, especially in semi-rural communities.

Preventive Practices and Premarital Screening

The uptake of premarital genotype testing in Abalama (72.6%) is relatively higher than reported in several earlier studies. For example, Isah *et al.* (2019) observed that only 47.6% of educated university lecturers in Sokoto underwent premarital genotype testing, and Oluwole *et al.* (2022) found similarly low rates among unmarried urban youths. The comparatively higher rate in Abalama could reflect the cumulative impact of public health campaigns and church-based premarital testing initiatives in southern Nigeria. However, nearly one-third of the respondents (27.4%) did not test before marriage, citing reasons such as "it is not necessary" or "I don't have any disease," while a few mentioned cultural and religious objections. This finding echoes the mixed-motive decisions reported by Adesola *et al.* (2025), where couples knowingly married partners with incompatible genotypes due to emotional attachment, faith, or sociocultural pressure.

In Abalama, where traditional and Christian influences coexist, religious and cultural values evidently still shape health-related behavior. Ezugwu *et al.* (2019) described similar ethical tensions in southeastern Nigeria, where some churches refused to wed genotype-incompatible couples, while others prioritized faith over medical advice. The Abalama data suggest that although education and awareness have improved, cultural relativism still mediates preventive decision-making—a challenge also identified in Adesola *et al*. (2025).

Educational Status and Health Behavior

A striking finding in this study was that over 80% of respondents had tertiary education, yet misconceptions and risky attitudes persisted. This aligns with findings by Gabriel and Matthew (2013), who observed that even among educated youths in Yaba, genotype compatibility was often neglected during marriage decisions despite 80% having knowledge and 86% a positive attitude toward premarital counseling. Similarly, Adesola *et al*. (2025) found that educational level improved awareness but did not always change behavior, as emotional and religious factors frequently outweighed biomedical considerations. This suggests that education alone may be insufficient to ensure preventive action unless accompanied by sustained, culturally sensitive counseling.

The correlation between education and improved knowledge, however, remains consistent across studies. Zajacova and Lawrence (2018) argued that higher education enhances health literacy and decision-making by improving comprehension of medical information. The Abalama findings partly support this—most respondents understood that SCD is genetic—but lingering misconceptions highlight the need for interactive, community-based education rather than passive information dissemination.

Sociocultural Context and Public Health Implications

Abalama's riverine setting, characterized by limited health infrastructure and traditional institutions, typifies communities where informal communication networks influence health behavior. Despite widespread awareness campaigns, misinformation persists, reinforcing findings by Adewoyin *et al*. (2015) and Nwabuko *et al*. (2022) that rural and semi-urban Nigerians often rely on social or religious sources for health information rather than medical professionals. The persistence of spiritual explanations for SCD among a minority of respondents indicates that supernatural causation beliefs still compete with scientific understanding, potentially undermining genotype screening uptake.

Moreover, cultural fatalism—expressed through attitudes such as "God will take control" or "it is not necessary to test"—mirrors findings from Adesola *et al*. (2025), who reported that 20% of couples relied on faith despite genotype incompatibility. Such reliance underscores the critical need for faith-based interventions and strategic collaboration with community and religious leaders to promote genetic counseling, as recommended in both Adesola *et al.* (2025) and Dilli *et al*. (2024).

Comparative Perspective and Future Implications

Across the reviewed studies, a consistent trend emerges: awareness of SCD in Nigeria is high, but the translation of knowledge into preventive practice remains inadequate. While the Abalama study demonstrates relatively better screening rates, the persistence of misconceptions and cultural influences indicates that behavioral change communication remains the weakest link in SCD prevention. Adesola *et al*. (2025) and Dilli *et al*. (2024) advocate for an integrated public health strategy—combining community education, premarital genetic counseling, and religious engagement—to bridge the gap between awareness and action.

Furthermore, consistent with global recommendations (Serjeant *et al*., 2017; Ouali *et al*., 2016), Nigeria's preventive strategy must evolve beyond awareness campaigns to include policy-backed mandatory premarital screening and context-sensitive genetic counseling services. In resource-limited, culturally complex settings like Abalama, targeted interventions that respect traditional norms while promoting scientific literacy could significantly enhance preventive outcomes.

In conclusion, the findings from Abalama contribute to the growing evidence that while Nigerians increasingly recognize the importance of SCD prevention, socio-cultural beliefs, religious faith, and emotional factors continue to impede full adoption of preventive practices. Compared to urban and institutional populations studied by Isah *et al*. (2019) and Oluwole *et al*. (2022), the Abalama community demonstrates commendable awareness yet reflects the enduring challenge of aligning knowledge with informed marital decisions. Strengthening community health education, integrating genetic counseling into primary healthcare, and engaging faith leaders will be pivotal to reducing SCD incidence in Nigeria.

5. Conclusion

This study assessed the knowledge and preventive practices regarding Sickle Cell Disease (SCD) among couples in Abalama community, Rivers State, Nigeria. The findings revealed that while awareness of SCD and genotype testing was generally high, misconceptions and poor preventive behaviors persist. Although over two-thirds of couples had undergone premarital genotype testing, a considerable proportion did not, often due to cultural beliefs, religious objections, or the misconception that testing was unnecessary. These findings underscore a persistent knowledge–practice gap that continues to undermine SCD prevention in Nigeria.

The study highlights the need for comprehensive health education programs that go beyond awareness creation to focus on correcting misconceptions, promoting informed decision-making, and addressing cultural and religious barriers. Community-based interventions that actively involve healthcare providers, faith leaders, and traditional institutions are recommended to enhance acceptance of premarital genotype screening and genetic counseling. Furthermore, integrating SCD prevention strategies into primary healthcare services and school health programs will strengthen early education and foster sustainable behavioral change.

Ultimately, bridging the gap between knowledge and practice through culturally sensitive and evidence-based public health initiatives is essential for reducing the incidence of SCD and improving reproductive health outcomes in riverine and rural Nigerian communities.

References

Adesola, A. A., Lawal, J. S., Akoki, D. M., Oyedokun, A. O., Agboola, O. E., Babawale, A. A., & Brown, B. J. (2025). *Determinants of marital decision despite sickle cell status awareness: A mixed method study.* BMC Public Health, 25(1), 1824. https://doi.org/10.1186/s12889-025-23066-8

Adewoyin, A. S., Alagbe, A. E., Adedokun, B. O., & Idubor, N. T. (2015). *Knowledge, attitude and control practices of sickle cell disease among youth corps members in Benin City, Nigeria.* Annals of Ibadan Postgraduate Medicine, 13(2), 100–107.

Adigwe, O. P. (2022). *Knowledge and awareness of sickle cell disease: A cross-sectional study amongst unmarried adults in Nigeria's capital city.* Journal of Community Genetics, 13(6), 579–585. https://doi.org/10.1007/s12687-022-00607-x

Adigwe, O. P., Onoja, S. O., & Onavbavba, G. (2023). *A critical review of sickle cell disease burden and challenges in sub-Saharan Africa.* Journal of Blood Medicine, 14, 367–376. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10239624/

Al-Farsi, O. A., Al-Farsi, Y. M., Gupta, I., Ouhtit, A., Al-Farsi, K. S., & Al-Adawi, S. (2014). *A study on knowledge, attitude, and practice towards premarital carrier screening among adults attending primary healthcare centers in a region in Oman.* BMC Public Health, 14, 380. https://doi.org/10.1186/1471-2458-14-380

Benenson, I., Porter, S., & Vitale, T. (2018). *Sickle cell trait: What every nurse practitioner should know.* Journal of Nurse Practitioners. https://doi.org/10.1016/j.nurpra.2018.07.020

Boadu, I., & Addoah, T. (2018). *Knowledge, beliefs and attitude towards sickle cell disease among university students.* Journal of Community Medicine and Health Education, 8(1), 1000593. https://doi.org/10.4172/2161-0711.1000593

Bolanle, O., Rotimi, C., & Cornelius, A. (2013). *Stigmatizing attitude towards peers with sickle cell disease among secondary school students in Nigeria.* International Journal of Child, Youth & Family Studies, 4, 391–402.

Dilli, P. P., Obeagu, E., Tamale, A., Ajugwo, A., Pius, T., & Makeri, D. (2024). *Update on the practice of premarital screening for sickle cell traits in Africa: A systematic review and meta-analysis.* BMC Public Health, 24(1), 1467. https://doi.org/10.1186/s12889-024-19001-y

Distelmaier, L., Dührsen, U., & Dickerhoff, R. (2020). *Sickle cell disease.* Internist. https://doi.org/10.1007/s00108-020-00822-z

Ezenwosu, O. U., Chukwu, B. F., Ezenwosu, I. L., Ikefuna, A. N., Emodi, I. J., & Ezeanolue, E. E. (2021). *Knowledge and awareness of individual sickle cell genotype among adolescents in a unity school in Southeast Nigeria: A cross-sectional study.* International Journal of Adolescent Medicine and Health, 33(6), 395–400. https://doi.org/10.1515/ijamh-2018-0188

Ezugwu, E. C., Osamor, P. E., & Wendler, D. (2019). *Ethical issues in denial of church wedding based on couple's hemoglobin genotype in Enugu, Southeastern Nigeria.* BMC Medical Ethics, 20(1), 37. https://doi.org/10.1186/s12910-019-0376-8

Gabriel, O. O., & Matthew, C. O. (2013). *Knowledge, attitude and practice of premarital counselling for sickle cell disease among youth in Yaba, Nigeria.* African Journal of Reproductive Health, 17(4), 175–182.

Grossi, G. (2023). *Analysis of sickle cell disease policies and practices in Nigeria.* HCP Live. https://www.hcplive.com/view/analysis-sickle-cell-disease-policies-and-practices-in-nigeria

Isah, B. A., Danmadami, A. M., Bello, M. M., Njidda, G., Ibrahim, K. B., & Magode, S. D. (2019). *Knowledge of sickle cell disease; attitude and practice regarding premarital genotype counseling and testing among lecturers of Usmanu Danfodiyo University, Sokoto, Nigeria.* International Archives of Medicine and Medical Sciences, 1(3), 14–19.

Mulumba, L. L., & Wilson, L. (2015). *Sickle cell disease among children in Africa: An integrative literature review and global recommendations.* International Journal of African Nursing Sciences. https://doi.org/10.1016/j.ijans.2015.08.002

Nwabuko, O. C., Onwuchekwa, U., & Iheji, O. (2022). *An overview of sickle cell disease from the socio-demographic triangle: A Nigerian single-institution retrospective study.* Pan African Medical Journal, 41(161). https://www.panafrican-med-journal.com/content/article/41/161/full

Oluwole, E. O., Okoye, C. D., Ogunyemi, A. O., Olowoselu, O. F., & Oyedeji, O. A. (2022). *Knowledge, attitude and premarital screening practices for sickle cell disease among young unmarried adults in an urban community in Lagos, Nigeria.* Pan African Medical Journal, 42, 8. https://doi.org/10.11604/pamj.2022.42.8.27705

Orukwowu, U. (2021). Perceived effects of sex education in reducing unprotected sex among adolescents in Rivers State College of Health Science and Management Technology, Port Harcourt, Rivers State. *International Journal of Innovative Social & Science Education Research, 9*(4), 136–142.

Orukwowu, U. (2022). Roles of family in the prevention of HIV/AIDS among youths in Ikwerri Local Government Area, Rivers State. Roles of Family in the Prevention of HIV/AIDS Among Youths in Ikwerre Local Government Area, Rivers State. International Journal of Contemporary Academic Research, 3 (1)36-51.

Orukwowu, U. (2023). Awareness of tuberculosis transmission and prevention in Ahoada Town in Ahoada East Local Government Area of Rivers State. *International Journal of Innovative Healthcare Research, 11*(4), 127–133.

Orukwowu, U., Kue, J. B., & Mgbere, M. (2025). Perceptions of COVID-19 variants and treatment-related anxiety: a review with a focus on undergraduate students. *IPS Journal of Basic and Clinical Medicine, 2*(1), 34–43.

Orukwowu, U., Mgbere, M. & Kue, j. B. (2022). the perception and acceptance of in vitro fertilization amongst infertile couples attending fertility clinic in University of Port Harcourt Teaching Hospital Choba in Rivers State. IPS Journal of Basic and Clinical Medicine, 1(2): 1-8.

Orukwowu, U., Otobo, E. N., Simon-Uriah, P. A., Onwukwe, N. A., Mgbere, M., & Kue, J. B. (2025). Patterns of health service utilization and perception of needs and services in rural areas of Rivers State. *Medical and Health Sciences European, 9*(2), 80–93.

Ouali, F., *et al.* (2016). *Prenatal diagnosis of hemoglobinopathies in Tunisia: 18 years of experience.* International Journal of Laboratory Hematology. https://doi.org/10.1111/ijlh.12457

Serjeant, G. R., *et al.* (2017). *Voluntary premarital screening to prevent sickle cell disease in Jamaica: Does it work?* Journal of Community Genetics. https://doi.org/10.1007/s12687-017-0294-8

Smith, M., & Brownell, G. (2018). *Knowledge, beliefs, attitudes, and behaviors regarding sickle cell disease: Implications for prevention.* Social Work in Public Health. https://doi.org/10.1080/19371918.2018.1469064

Zajacova, A., & Lawrence, E. M. (2018). *The relationship between education and health: Reducing disparities through a contextual approach.* Annual Review of Public Health, 39, 273–289. https://doi.org/10.1146/annurev-publhealth-040617-014112

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