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Knowledge of Sickle Cell Trait, Perception of Premarital Genetic Counselling and Testing, and Their Influence on Future Marital Decisions among Youths in Oko, Oyo State

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ABSTRACT

Background: Sickle cell disease (SCD) remains a major public health challenge in Nigeria, with a high burden of morbidity and mortality. An estimated 150,000 newborns with SCD are born annually in Nigeria. Despite this burden, uptake of premarital genetic counselling and testing remains low, estimated at about 23% in a previous Nigerian study. This study assessed youths' knowledge of sickle cell trait (SCT), their perception of premarital genetic counselling and testing (PGCT), and the influence of these perceptions on future marital decisions in Oko Community, Oyo State.
Methods: A descriptive cross-sectional study was conducted among 400 unmarried youths selected using a multistage sampling technique. Data were collected using a pre-tested, semi-structured, interviewer-administered questionnaire. Data were summarized using descriptive statistics, while chi-square test and binary logistic regression were used to determine associations, with significance set at $p \leq 0.05$.
Results: Awareness of SCT was 147 (36.8%), while awareness of SCD was 272 (68.0%). Overall, good knowledge of SCT and SCD was observed in 125 (31.2%) respondents. A total of 348 (87.0%) demonstrated positive perception toward PGCT, while only 40 (10.0%) had ever undergone genotype testing. Marital relationship status was a significant determinant of future marriage decisions regarding SCT (AOR: 5.332, 95% CI: 2.581–11.018, $p < 0.001$).
Conclusion: The study revealed poor knowledge of SCT despite generally positive perceptions toward premarital testing. Bridging the gap between perception and practice through targeted health education and improved access to genetic testing is essential to reducing the burden of SCD

Keywords: Marriage Decisions, Premarital Genetic Counseling, Sickle Cell Trait, Youth

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INTRODUCTION

Sickle cell disease (SCD) is one of the most common inherited haemoglobin disorders globally and remains a major public health concern.[1,2] It is estimated that over 500,000 infants are born with SCD annually, with more than 80% of these births occurring in sub-Saharan Africa (SSA).[3] Sickle cell disease occurs when an individual inherits two abnormal β-globin genes, one from each parent, resulting in the production of abnormal haemoglobin known as haemoglobin S (HbS).[4] Although individuals with sickle cell trait (HbAS) are typically asymptomatic, they are carriers of the sickle cell gene. When both parents have the sickle cell trait (HbAS), each pregnancy has a 25% chance of resulting in a child with sickle cell disease (HbSS), a 50% chance of resulting in a child with sickle cell trait (HbAS), and a 25% chance of resulting in a child with normal haemoglobin (HbAA).[5,6] The polymerisation of deoxygenated haemoglobin S leads to red blood cell deformation, rigidity, and membrane damage.[4] These changes trigger a cascade of pathophysiological processes characterised by recurrent vaso-occlusion, chronic hemolysis, progressive ischaemia, and cumulative tissue injury, which underlie the diverse clinical manifestations and complications observed in sickle cell disease.[4] These include recurrent painful crises, acute chest syndrome, stroke, priapism, chronic organ damage, leg ulcers, renal impairment, among others.[4,7]

Sickle cell disease remains a major global health burden, with the highest prevalence in sub-Saharan Africa. Nigeria carries the largest national burden worldwide, accounting for a substantial proportion of global sickle cell births.[8] Estimates suggest that approximately 150,000 Nigerian children are born annually with sickle cell disease, representing a significant public health challenge.[8,9]

According to the United Nations (UN), youths are defined as individuals aged 15–24 years,[10] whereas Nigeria's national youth policy extends this range to 15–35 years.[11] Globally, the youth population is estimated at approximately 1.2 billion, accounting for about 16% of the world's population, and is projected to increase to 1.3 billion by 2030.[10] Nigeria has one of the largest youth populations globally, with young people constituting a substantial proportion of the national population, thereby underscoring the public health importance of youth-focused interventions.

Premarital genetic counselling and testing uptake in a Nigerian study among married couples was reported to be 23%, indicating that less than a quarter of respondents had undergone premarital genotype screening.[12] Premarital genotype screening has been identified as one of the most practical strategies for reducing the health, social, and economic burden of sickle cell disease in low- and middle-income countries.[13] Despite this, studies have consistently reported inadequate knowledge and persistent misconceptions about sickle cell disease and its inheritance patterns within many communities, contributing to the sustained high prevalence of the condition.[13,14]Although many young adults are aware of sickle cell disease, they often lack adequate understanding of its hereditary implications.[15–17] Furthermore, emotional attachment and sociocultural factors may influence marital decisions, leading some individuals to engage in relationships that increase the risk of having affected offspring.[18]

Given the substantial burden of sickle cell disease in Nigeria and the critical role of reproductive decision-making among youths, assessing knowledge of sickle cell trait, perceptions of premarital genetic testing, and their influence on future marital decisions is essential, particularly within rural communities where access to genetic education and counselling may be limited.

METHODOLOGY

Description of study area: The study was conducted in Oko, a rural settlement in Oyo state, Nigeria. Oko community is the headquarters of Surulere LCDA in Oyo State and has an estimated population of approximately 25,000 in 2022.[19] It is predominantly inhabited by the Yoruba ethnic group, along with other Nigerian and West African residents. The population is largely Christian and Muslim. Agriculture remains the main occupation, complemented by artisan trades, civil service, and private sector employment. Health services are provided through facilities such as the Oko Model Primary Health Centre, Oko Health Clinic, and several community health posts, which deliver basic healthcare and support public health initiatives.

Study design: This community-based study utilised a descriptive cross-sectional study from December 2025 to January 2026.

Study population: Those included in this study were unmarried youths between the ages of 15 and 24 years.

Inclusion criteria: Youths who gave their assent/consent and have resided in Oko community, Oyo state, for at least 6 months

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Exclusion criteria: Youths who were adjudged to be unable to give valid responses to our questions due to a profound illness were excluded from the study.

Sample size determination: The minimum sample size for the study was calculated using Leslie Kish's formula for a population of more than 10,000. A standard normal deviate at 95% confidence limit was taken as 1.96. Based on findings from a Nigerian study, 75.77%[15] of their respondents had good knowledge of premarital genetic screening for sickle cell disease. The margin of error was set at 5%. A 10% non-response rate was assumed and appropriate corrections were made. Hence, a minimum sample size of 420 was estimated but 400 youths participated in the study given a response rate of 95.2%.

Sampling technique: Multi-stage sampling technique was used to recruit respondents. **Stage one:** Oko community was purposively selected as one of the major rural communities in Oyo State. **Stage two:** The list of streets in the Oko community was obtained from the village representative, and simple random sampling technique by balloting was used to select three streets (Aserawo Street, Bale-Oba Street, and Ebila-Temidire Street). **Stage three:** A list of all households in each selected street was generated, and systematic random sampling was used to select houses from which eligible respondents were selected. **Stage four:** In each selected house, unmarried youths were randomly selected by balloting and interviewed until the sample size was achieved. In cases where no eligible youth was found in a selected house, the next house was selected for replacement.

Research instruments and data collection method: A semi-structured interviewer-administered questionnaire was used for data collection. This questionnaire was developed after reviewing similar previous studies on our subject area.[14,18] The questionnaire was divided into the following sections: Socio-demographic characteristics, Knowledge of Sickle cell trait and disease, Perceptions of youths toward premarital genetic counselling and testing, Marriage Decisions and Factors influencing premarital genetic counselling. The questionnaire was translated into the Yoruba language for the benefit of respondents who may prefer to answer in their native language. Back translation to the English language was done through the efforts of a linguistic expert. Group members carried out data collection through face-to-face interviews to accommodate varying levels of literacy among participants and ensure accurate responses. To ensure content validity, the instrument was reviewed by three experts in public health.

Data was collected by a group of thirteen (13) 600-level Bowen University medical students undergoing their community medicine posting. They were trained in the techniques for data collection and questionnaire administration by the principal investigator. The questionnaire was administered under supervision.

Pre-testing: The questionnaire was pre-tested among forty-two youths (aged 15-24 years) i.e. 10% of our sample size, in Ejigbo, which shares boundaries with Oko. This community has similar characteristics to our study site. This exercise helped us to strengthen the internal validity of our instrument and to know if the questions were appropriately phrased to elicit desired responses.

Measurement of variables

Respondents' knowledge on sickle cell trait and disease: Knowledge was assessed using a composite score derived from seven items covering key aspects of knowledge regarding sickle cell trait definition, sickle cell trait cause, sickle cell trait genotype, sickle cell trait characteristics, sickle cell disease definition, sickle cell disease genotype and knowledge on necessity of premarital genetic testing. A correct response to each statement attracted 1 point, while an incorrect statement attracted 0 point. Scores of the respondents were summed up, rated over 14, and converted to percentages. Those who scored at least 50% were rated as having good knowledge of Sickle cell trait and disease, while those with lower scores were classified as having poor knowledge of Sickle cell trait and disease.

Perceived perceptions toward premarital genetic counselling and testing: This was assessed using seven affirmatively phrased questions on a 5-point Likert scale ranging from Strongly Agreed (attracting 5-points) to strongly disagreed attracting 1-point. Each respondent's scores were summed up and rated over 100%. Those who scored at least 50% were adjudged as having positive perceptions toward premarital genetic counselling and testing, while those who scored less than 50% were categorised as having negative perceptions towards premarital genetic counselling and testing.

Data management: Each completed questionnaire was edited daily in the field before entering the data analysis software. Data analysis was performed using International Business Machines Corporation (IBM) Statistical Product and Service Solution (SPSS) version 26. Categorical data were summarised using percentages

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and presented using tables, bar charts, and pie charts. Also, continuous data were summarised using mean and standard deviation (SD). At the bivariate level, the chi-squared test was used to compare the relationships between categorical variables. Factors that were significant at the bivariate analysis level were modelled in multivariate logistic regression analysis using stepwise regression modeling approach to reveal the predictors of future marriage decisions regarding Sickle Cell Trait. The level of statistical significance was set at $P \leq 0.05$

Ethical consideration: Ethical approval for the study was obtained from the Bowen University Teaching Hospital Research Ethics Committee, Ogbomoso, Nigeria with approval No. BUTH/REC-27458), before the commencement of the study. Permission to conduct the project was obtained from the Oko community leaders. Assent was taken from respondents below 18years while informed consent was taken from each participant after adequate explanation of the objectives and the benefits of the study. Participation was entirely voluntary, and participants were allowed to opt out at any stage of the study. The responses from the study participants were kept strictly confidential; the questionnaires were made anonymous through coding rather than the use of names. The data was entered into computers, which were only accessible to the principal and co-investigators.

RESULTS

A total of four hundred and twenty questionnaires were administered to youths in Oko community, Surulere Local Government Area of Oyo State, Nigeria. Four hundred questionnaires out of 420 administered were properly filled, retrieved and analysed, giving a response rate of 95.2%.

Almost half of the respondents, 194 (48.5%), were between 15 and 17 years old, with a mean age ± standard deviation of 18.2 ± 2.7 years. More than half, 226 (56.5%), were females, and 246 (61.5%) identified as Christians. The Yoruba ethnic group was predominant, 367 (91.8%), and most respondents, 326 (81.5%), had secondary education. The majority, 304 (76.0%), were students, and 202 (50.5%) earned ≤ ₦20,000 monthly. Most respondents, 352 (88.0%), were not engaged.

The majority, 286 (71.5%), had no knowledge of their genotype, and among those who knew their genotype (n = 114), 82 (71.9%) reported having an AA genotype and 32 (28.1%) reported an AS genotype. Only 33 (8.2%) of respondents reported a family history of Sickle Cell Disease (SCD), with 21 (63.6%) of these having an immediate family member affected. (Table 1)

Table 1: Socio-demographic information and medical characteristics of the respondents

Variables	Frequency (N = 400)	Percent (%)
Age as at last birthday (in years)		
15 – 17 (*Mid-Adolescence*)	194	48.5
18 – 19 (*Late Adolescence*)	101	25.3
20 – 24 (*Young Adults*)	105	26.2
Mean age ± SD = 18.2 ± 2.7		
Gender		
Female	226	56.5
Male	174	43.5
Religion		
Christianity	246	61.5
Islam	150	37.5
Traditionalist	4	1.0
Ethnicity		
Yoruba	367	91.8
Igbo	15	3.7
Hausa / Fulani	14	3.5
Others (*Benue, Afizere, Edo*)	4	1.0
Highest educational level		
No formal education	3	0.8
Primary education	4	1.0
Secondary education	326	81.5
Tertiary education	56	14.0
Postgraduate	11	2.7
Occupation		
Students	304	76.0
Self-employed	35	8.7
Out of school / awaiting admission	19	4.8
Artisan / Skilled trade	19	4.8
Civil servant	8	2.0
Farmer / Agricultural worker	8	2.0
Private employed	7	1.7
Monthly income		
None	104	26.0
≤ ₦20,000	202	50.5
₦20,001 – ₦50,000	50	12.5
> ₦50,000	44	11.0
Mean ± SD = ₦24,003.80 ± ₦61,256.26		
Marital relationship status		
Not engaged	352	88.0
Engaged	48	12.0
Genotype Knowledge		
No	286	71.5
Yes	114	28.5

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Self-reported Genotype	**n = 114**	
AA+	82	71.9
AS+	32	28.1
Family history of SCD+		
No	367	91.8
Yes	33	8.2
Relationship to SCD affected	**n = 33**	
Immediate family	21	63.6
Extended family	12	36.4

+AA - Haemoglobin AA genotype, AS – Haemoglobin AS genotype (Sickle cell trait), SCD – Sickle Cell Disease

More than one-third, 147 (36.8%) of respondents were aware of sickle cell trait, while more than two-thirds, 272 (68.0%) were aware of sickle cell disease. The majority, 261 (65.3%) did not know the definition of sickle cell trait, and 208 (52.0%) did not know its cause. Respondents demonstrated limited understanding of the sickle cell trait genotype and characteristics. Among those aware of sickle cell disease (n = 272), 166 (61.0%) correctly defined it as a blood disease inherited from parents. Two hundred and sixty-one (65.3%) correctly identified HbSS as a genotype associated with sickle cell disease. The majority, 335 (83.8%), believed that premarital genetic testing is necessary before marriage. The overall knowledge of sickle cell trait and disease among the respondents showed that 125 (31.2%) of the respondents had good knowledge of sickle cell trait and disease (Table 2)

Table 2: Knowledge of sickle cell trait and disease among respondents

Variables	Frequency (N = 400)	Percent (%)
Sickle cell trait awareness		
No	253	63.2
Yes	147	36.8
Sickle cell trait definition		
I don't know	261	65.3
The blood composition of an individual	69	17.2
An inherited blood disorder	53	13.3
The look/physical appearance of an individual	17	4.2
Sickle cell trait cause		
I don't know	208	52.0
Inherited from parents with specific genotypes	128	32.0
Occurs due to improper blood transfusion	42	10.5
Punishment from the gods	22	5.5
Sickle cell trait genotype		
HbSS	156	39.0
HbAS	125	31.3
HbAA	88	22.0
I don't know	16	4.0
HbSC	15	3.7
Sickle cell trait characteristics**		
Always ill	219	54.8
They cannot live a normal life	114	28.5
Can have a child with sickle cell disease	102	25.5
They are generally healthy	65	16.3
I don't know	19	4.8
Sickle cell disease awareness		
Yes	272	68.0
No	128	32.0
Sickle cell disease definition**	**n = 272**	
It is a blood disease inherited from parents	166	61.0
It is a disease characterised by recurrent sicknesses	115	42.3
It is a disease caused by a mismatched blood transfusion	46	16.9
It is a preventable disease	33	12.1
Sickle cell disease genotype**		
HbSS	261	65.3
HbAA	72	18.0
HbAS	57	14.2
HbSC	53	13.2
I don't know	5	1.3
Premarital genetic testing is necessary before marriage		
Yes	335	83.8
No	65	16.2
Overall knowledge of Sickle cell trait and disease		
Good	125	31.2
Poor	275	68.8

***: Multiple responses allowed and percentages may exceed 100%*
HbSS and HbSC- sickle cell disease Haemoglobin, HbAA- Normal Haemoglobin, HbAS- Sickle cell trait Haemoglobin,

The primary sources of information on sickle cell disease and sickle cell trait among respondents were schools, cited by 196 (49.0%) participants, followed by hospitals

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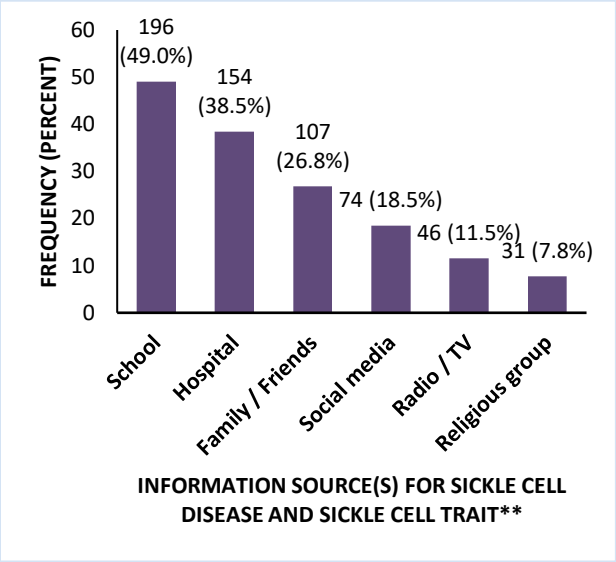
with 154 (38.5%), and family/friends with 107 (26.8%). Social media and traditional media (radio/television) played a lesser role, being reported by 74 (18.5%) and 46 (11.5%) respondents, respectively. (Figure 1)



Most respondents showed a willingness to consider genetic factors in marriage, with 307 (76.8%) disagreeing with or strongly disagreeing that faith should override genotype, and 215 (53.8%) rejecting the notion that having a child with sickle cell disease was a matter of fate. Most respondents agreed or strongly agreed that knowing their genotype was important before getting married, 327 (81.8%), and would discuss their genotype with their partner, 290 (72.5%). More than half 203 (50.8%) of respondents agreed or strongly agreed to end their marital relationship if both were at risk of passing on SCD to their progeny. A significant proportion, 264 (66.1%), agreed or strongly agreed that the government should mandate premarital genetic counseling and testing, with a similar trend for religious institutions, 272 (68.1%). The majority of the respondents, 348 (87.0%), exhibited a positive attitude towards premarital genetic counselling and testing. (Table 3)

Table 3: Respondents' perceptions toward premarital genetic counselling and testing (n = 400)

	Responses – Frequency (%)				
Variables	**1**	**2**	**3**	**4**	**5**
Faith overrides genotype; I can marry anybody	210 (52.5)	97 (24.3)	36 (9.0)	29 (7.2)	28 (7.0)
Having a child with sickle cell disease is a matter of fate, as life is unpredictable	119 (29.8)	96 (24.0)	91 (22.8)	37 (9.3)	57 (14.2)
I will discuss the genotype with my partner	40 (10.0)	22 (5.5)	48 (12.0)	150 (37.5)	140 (35.0)
Knowing my genotype is important before getting married	25 (6.3)	12 (3.0)	36 (9.0)	143 (35.8)	184 (46.0)
I will end the relationship if we are both at risk of passing on SCD	67 (16.8)	39 (9.8)	91 (22.8)	92 (23.0)	111 (27.8)
The government should mandate premarital genetic counseling and testing before marriage.	43 (10.8)	53 (13.3)	40 (10.0)	135 (33.8)	129 (32.3)
Religious institutions should mandate premarital genetic counseling and testing before marriage.	38 (9.5)	45 (11.3)	45 (11.3)	133 (33.3)	139 (34.8)
OVERALL PERCEPTION OF RESPONDENTS TOWARDS PREMARITAL GENETIC COUNSELLING AND TESTING					
Positive	348 (87.0%)				
Negative	52 (13.0%)				

Strongly agree – 5, Agree – 4, Not sure / Neutral – 3, Disagree – 2, Strongly disagree – 1

Over three-quarters of respondents, 330 (82.5%), were unwilling to marry a partner with sickle cell trait. Only 40 (10.0%) had undergone premarital counselling/testing, with most citing partner request 28 (70.0%) as the reason. Key influences on premarital counselling/testing decisions included self: 294 (73.5%), parents/family 162 (40.5%), and health workers 73 (18.3%). Respondents suggested that free/cheaper tests 199 (49.8%), school programmes 181 (45.3%), and health talks 172 (43.0%) could promote premarital testing and informed marriage choices. Therefore, nearly half of the respondents,

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180 (45.0%), indicated that premarital genetic testing would influence their decision to avoid high-risk matches (AS+AS). (Table 4)

Table 4: Perceived factors influencing premarital genetic counselling/testing among respondents

Variables	Frequency (N = 400)	Percent (%)
Willingness to marry a sickle cell trait partner		
No	330	82.5
Yes	70	17.5
Ever undergone premarital counseling/testing		
No	360	90.0
Yes	40	10.0
Premarital Genetic Testing's influence on partner choice		
Avoid high-risk matches (AS+AS)	180	45.0
Not sure	144	36.0
Depends on love	76	19.0
Reason(s) for premarital counseling/testing	**n = 40**	
On partner request	28	70.0
Has sickle cell trait	6	15.0
Just to know the status	5	12.5
Religious leader requests	1	2.5
Influence(s) on premarital counseling/testing decision**		
Self	294	73.5
Parents/Family	162	40.5
Health worker	73	18.3
Religious leader	42	10.5
Friends	23	5.8
Community leader	17	4.3
Things that can promote premarital testing and help young people make informed marriage choices**		
Free / cheaper tests	199	49.8
School programmes	181	45.3
Health talks	172	43.0
Religious premarital counseling	99	24.8
Media campaigns	76	19.0
Social media campaigns	1	0.3

***: Multiple responses allowed and percentages may exceed 100%*

Socio-demographic factors influencing respondents' future marriage decisions regarding sickle cell trait showed significant associations with age ($p = 0.016$), educational level ($p = 0.004$), monthly income ($p = 0.017$), and marital status ($p < 0.001$). The medical factors, knowledge about sickle cell trait (SCT) and sickle cell disease (SCD), and perception towards premarital genetic counselling were also evaluated for their association with these marital decisions. Consequently, significant associations were found between willingness to marry a sickle cell trait partner and both genotype knowledge ($p = 0.003$) and overall knowledge about SCT and SCD ($p = 0.004$). However, participants' perception towards premarital genetic counselling and testing was not statistically significant ($p = 0.104$) (Table 5)

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Table 5: Socio-demographic factors and some other variables associated with future marriage decisions regarding sickle cell trait among respondents.

	Willingness to marry a sickle cell trait partner.				
Variables	**No n = 330 (82.5%)**	**Yes n = 70 (17.5%)**	Chi-square (χ^2)	df	P-value
Age as of last birthday (in years)			**8.301**	**2**	**0.016***
15 – 17 (*Mid-Adolescence*)	166 (85.6)	28 (14.4)			
18 – 19 (*Late Adolescence*)	87 (86.1)	14 (13.9)			
≥ 20 (*Young Adults*)	77 (73.3)	28 (26.7)			
Gender			**0.839**	**1**	**0.360**
Female	183 (81.0)	43 (19.0)			
Male	147 (84.5)	27 (15.5)			
Religion			**2.269⁺**	**2**	**0.322**
Christianity	203 (82.5)	43 (17.5)			
Islam	125 (83.3)	25 (16.7)			
Traditionalist	2 (50.0)	2 (50.0)			
Ethnicity			**2.664⁺**	**3**	**0.446**
Yoruba	306 (83.4)	61 (16.6)			
Igbo	11 (78.6)	3 (21.4)			
Hausa / Fulani	10 (66.7)	5 (33.3)			
Others (*Benue, Afizere, Edo*)	3 (75.0)	1 (25.0)			
Highest educational level			**8.503**	**1**	**0.004***
Basic education	283 (85.0)	50 (15.0)			
Higher education	47 (70.1)	20 (29.9)			
Occupation			**1.399⁺**	**3**	**0.706**
Students / Unemployed	270 (83.6)	53 (16.4)			
Self-Employed/Entrepreneurs	42 (77.8)	12 (22.2)			
Employed (Formal Sector)	12 (80.0)	3 (20.0)			
Primary Industry / Informal Workers	6 (75.0)	2 (25.0)			
Monthly income			**10.161**	**3**	**0.017***
None	91 (87.5)	13 (12.5)			
≤ ₦20,000	171 (84.7)	31 (15.3)			
₦20,001 – ₦50,000	38 (76.0)	12 (24.0)			
> ₦50,000	30 (68.2)	14 (31.8)			
Marital relationship status			**22.065**	**1**	**< 0.001***
Engaged	28 (58.3)	20 (41.7)			
Not engaged	302 (85.8)	50 (14.2)			
Genotype Knowledge			8.583	**1**	**0.003***
Yes	84 (73.7)	30 (26.3)			
No	246 (86.0)	40 (14.0)			
Overall knowledge about SCT and SCD			**8.263**	**1**	**0.004***
Good	93 (74.4)	32 (25.6)			
Poor	237 (86.2)	38 (13.8)			
Perceived perception towards premarital genetic counselling/testing			2.641	**1**	**0.104**
Positive	248 (84.4)	46 (15.6)			
Negative	82 (77.4)	24 (22.6)			

*⁺: Likelihood ratio *: Statistically significant at p < 0.05 Students/Unemployed: Students, and Out of school / awaiting admission. Self-Employed/Entrepreneurs: Self-employed, and Artisan / Skilled trade Employed (Formal Sector): Private employed, and Civil servant. Primary Industry/Informal Workers: Farmer / Agricultural worker.*

The logistic regression analysis revealed that marital relationship status was a significant predictor of future marriage decisions regarding Sickle Cell Trait among respondents. Unengaged respondents had significantly higher odds of

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reporting unwillingness to marry a partner with sickle cell trait. (AOR: 5.332, 95% CI: 2.581 – 11.018, p < 0.001). (Table 6)

Table 6: The explanatory predictors of future marriage decisions regarding Sickle Cell Trait among respondents

Predictor factors	Adjusted Odds Ratio	95% Confidence Interval	p-value
Age as of last birthday (in years)			
15 – 17 (*Mid-Adolescence*)	0.832	0.334 – 2.076	**0.694**
18 – 19 (*Late Adolescence*)	1.371	0.545 – 3.446	**0.503**
≥ 20 (*Young Adults*) (*Reference category*)			
Highest educational level			
Basic education	1.480	0.558 – 3.924	**0.431**
Higher education (*Reference category*)			
Monthly income			
None	1.846	0.614 – 5.548	**0.275**
≤ ₦20,000	1.075	0.372 – 3.112	**0.893**
₦20,001 – ₦50,000	0.886	0.310 – 2.537	**0.822**
> ₦50,000 (*Reference category*)			
Marital relationship status			
Engaged (*Reference category*)			
Not engaged	5.332	2.581 – 11.018	**< 0.001***
Genotype knowledge			
Yes (*Reference category*)			
No	1.694	0.850 – 3.376	**0.134**
Overall knowledge about SCT and SCD			
Good (*Reference category*)			
Poor	1.543	0.838 – 2.841	**0.164**

**: Statistically significant at p < 0.05*

DISCUSSION

The study assessed knowledge of sickle cell trait, perception of premarital genetic counselling, and their influence on future marriage decisions among youths in Oko Community, Oyo State, Nigeria. The findings revealed that the majority of respondents were late adolescents and young adults, predominantly students, with most having attained secondary education. This age group represents a critical period during which beliefs and intentions regarding marriage are formed. However, despite the fact that more than 4 out of 5 respondents had a secondary level of education, knowledge of sickle cell trait was poor, suggesting that basic or secondary education alone may not be sufficient to ensure adequate genetic health literacy.

Genotype awareness was also low, with more than two-thirds of participants unaware of their genotype. This finding contrasts with a study among NYSC corps members in Benin City, Nigeria, where genotype awareness was considerably higher.[17] The difference may be partly explained by the higher educational attainment of participants in that study, most of whom had tertiary education, compared with respondents in the present study, where secondary education was the predominant level attained. Higher levels of education may enhance access to health information and increase awareness of genotype status.[18,20]

Poor knowledge of sickle cell trait was further reflected by respondents' inability to distinguish SCT from SCD and the persistence of misconceptions regarding the health implications of carrier status. This finding is consistent with a previous Nigerian study, which documented poor understanding of carrier status and genetic inheritance despite relatively high awareness of sickle cell disease.[18]

Although knowledge of sickle cell trait was poor, more than two-thirds of respondents were aware of sickle cell disease, and more than half of them were able to correctly identify it as an inherited blood disorder and recognise HbSS as the affected genotype. This pattern has been observed in another Nigerian study,[21] where public health campaigns and frequent clinical encounters with sickle cell disease patients have improved disease recognition, but not necessarily understanding of inheritance patterns.[21] Despite this awareness, gaps in

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knowledge regarding genetic transmission remain a major challenge to informed reproductive decision-making.

Schools and healthcare facilities were identified as the main sources of information on sickle cell conditions; however, knowledge of sickle cell trait remained poor. This paradox suggests that exposure to information alone is insufficient; possibly because key aspects such as inheritance patterns, genotype compatibility, and genetic implications may not be adequately emphasised or consistently reinforced within the available health education messages. Genetic education may therefore require restructuring to improve clarity and retention among youths. This report aligns with similar findings from the southwestern part of Nigeria, which highlighted the need for more structured and comprehensive genetic education at the community level.[22]

Perception towards premarital genetic counselling and testing was generally positive, with more than two-thirds of respondents agreeing that knowing one's genotype before marriage is important and supporting premarital screening as a preventive strategy against sickle cell disease. This finding is encouraging and aligns with a study conducted among undergraduate students in the southwestern part of Nigeria, which reported positive attitudes toward premarital genotype screening.[15]

Despite positive perceptions, actual uptake of premarital genetic counselling and testing was very low, with one out of ten respondents having ever undergone genotype testing, demonstrating a clear gap between knowledge, perception, and practice. This perception–practice gap has been previously reported and has been attributed to factors such as lack of awareness, perceived cost, limited access to testing facilities, and low perceived urgency among unmarried youths.[17] The finding suggests that positive perceptions alone may be insufficient to increase uptake where testing services are not readily accessible, affordable, or routinely integrated into youth-friendly health services.

Future marriage decisions appeared to be strongly influenced by sickle cell trait status; more than two-thirds of the respondents expressed unwillingness to marry a partner with sickle cell trait, primarily due to fear of having children with sickle cell disease. This finding is consistent with Adewoyin *et al*, who reported that avoidance of genetically incompatible unions is common once individuals become aware of inheritance risks.[17] However, marital decision-making was not solely driven by genetic risk. Emotional attachment, social expectations, and relationship commitment played a significant role, particularly among those already engaged. Individuals without committed relationships were more likely to avoid genetically incompatible unions due to greater autonomy and reduced emotional constraints, while those in relationships may prioritise relational stability over genetic considerations. Similar observations have been reported among couples at risk of hereditary blood disorders, where emotional attachment and social obligations influenced decisions to proceed with marriage despite genetic incompatibility.[23]

An interesting finding was the absence of a statistically significant association between positive perception of premarital genetic counselling and willingness to marry a partner with sickle cell trait. This suggests that positive perception toward genetic counselling do not necessarily translate into marriage decisions based on genotype compatibility. Marital choices are often influenced by multiple factors beyond health considerations, including emotional attachment, cultural expectations, religious beliefs, and family pressures. Consequently, individuals may endorse premarital screening as a public health measure while still making personal relationship decisions that do not strictly align with genetic risk avoidance.

Although gender was not significantly associated with willingness to marry a partner with sickle cell trait in this study, concerns regarding genetic compatibility appeared to be shared across both sexes within this population.

Strengths and limitations of the study

A major strength of this study is that it was conducted in a rural community, a setting in which relatively few studies have examined knowledge of sickle cell trait, perceptions of premarital genetic counselling, and genotype-related marital decision-making among youths. The findings, therefore, contribute important context-specific evidence that may inform the design of targeted interventions in underserved communities.

However, some limitations should be considered when interpreting the findings. The study relied on self-reported information, which is susceptible to recall bias and social desirability bias, particularly regarding attitudes toward premarital screening and intended marital choices. To minimise this, the questionnaire was administered anonymously, and respondents were assured of confidentiality. In addition, future marriage decisions were assessed based on stated intentions rather

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than actual behaviour, and such intentions may change when individuals encounter real-life relationships, family, cultural, or religious influences. Finally, because the study was conducted in a single rural community, the findings may not be generalisable to all youths in Nigeria, particularly those residing in urban areas or in communities with different sociocultural characteristics.

Implications of the findings of the study

The findings of this study have important implications for practice, policy, and future research. From a practice perspective, the poor knowledge of sickle cell trait despite schools and healthcare facilities being the main sources of information highlights the need to strengthen genetic health education in both settings. Educational and counselling programmes should go beyond general awareness of sickle cell disease to clearly address inheritance patterns, genotype compatibility, and the distinction between sickle cell trait and disease. Healthcare providers should also integrate genotype education into routine adolescent and youth health services.

From a policy perspective, the low uptake of genotype testing despite generally positive perceptions of premarital genetic counselling underscores the need to improve access to affordable and youth-friendly screening services. Integration of genotype testing into school health programmes, adolescent health initiatives, and community-based interventions may support earlier awareness and informed reproductive decision-making. Engagement with religious, traditional, and community leaders may further enhance acceptability.

The finding that positive perceptions did not translate into genotype-informed marital intentions suggests that emotional and sociocultural factors significantly influence decision-making. Therefore, interventions should combine genetic education with counselling approaches that address relationship dynamics, cultural expectations, and family influences.

CONCLUSION

In this study, awareness of sickle cell disease was generally high, but knowledge of sickle cell trait and personal genotype status was limited, with persistent misconceptions among respondents. Despite this, most participants demonstrated positive perceptions toward premarital genetic testing. However, uptake of genotype testing remained low, reflecting barriers such as inadequate information, limited access to testing services, and low perceived urgency among youths. Genotype awareness also influenced marital decisions, largely driven by concern about the risk of having children with sickle cell disease. Overall, the findings highlight the need for strengthened genetic education, improved accessibility to genotype testing, and targeted youth-focused interventions to bridge the gap between positive attitudes and actual preventive behaviour.

Declarations

Authors' contribution: Yetunde Toyin Olasinde, Ibukun Mary Akanbi and Ajibola Idowu conceived and designed the study. Yetunde Toyin Olasinde, Ibukun Mary Akanbi, Ayodele Olatayo Aremu, Ajibola Idowu, Ayokunmi Jesupelumi Elegbede, Elizabeth Ayomikun Oyefara, Oghenegaverere Eleazer Erivona, Princewill Obinna Ihiasota, Muzeenat Oyinkansola Imam, Chimzi David Onu-Boms, Ojochegbe Judith Usman, Mariam Olanike Yusuf, Omotayo Ayomide Pratt, Opemiposi Omowumi Adesola-Famade, Olufimihan Taiwo Abolade, Oluwatomiwa Theresa Labinjo and Chinonyelum Sylvia Ilomuanya analyzed and interpreted the data. Yetunde Toyin Olasinde, Ibukun Mary Akanbi, Oluwole Adeogun, Oluwafemi Olaide Adekoya and Ayokunmi Jesupelumi Elegbede drafted the manuscript. Yetunde Toyin Olasinde, Ibukun Mary Akanbi, Ayodele Olatayo Aremu, Adepeju Olatayo Adegoke, Oluwole Adeogun, and Oluwafemi Olaide Adekoya revised the manuscript to provide sound intellectual content. All the authors approved the final draft of the manuscript.

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