Original Research Article

Assessment of Experience, Perception and Attitude Towards Premarital Sickle Cell Disease Screening Among Students Attending Federal College of Education, Kano, Nigeria

ABSTRACT

Background: Sickle cell disease is a condition in which an individual inherit two abnormal haemoglobin genes from both parents βs/βs (HbSS) resulting in pathological state which is attributed to the sickling phenomenon, vaso-occlusion crises, infection and other complications. About 5% of the world's population carries genes responsible for haemoglobinopathies and each year about 300 000 infants are born with major haemoglobin disorders including more than 200 000 cases of sickle-cell disease in Africa. Sickle cell disease is a very common disorder in Nigeria with birth rate of about 1 in 50 and about 150,000 children are born annually with sickle cell anaemia in Nigeria alone. The study aimed to explore the knowledge and attitude of students attending the Federal College of Education, Kano about premarital screening for sickle cell disease.

Methods: A descriptive, cross-sectional study was conducted using interviewer-administered structured questionnaire among 305 students. Descriptive statistics of frequency count and percentages were used to describe the demographic data, while the non-parametric statistics of chi-square set at *P*= 0.05 level of significance were used to test the hypotheses that there is no significant difference in the attitude towards premarital sickle cell screening between students of different demographic backgrounds studying different programmes at Federal College of Education, Kano.

Results: About 45.9% students ~~Most of respondents~~ had low knowledge of sickle cell disease and ~~also had~~ 40% negative attitude towards premarital sickle cell screening. ~~45.9% and 40% respectively~~. ~~From the study findings, t~~The predictors of knowledge are programme of study, religion and age, ~~that~~ recorded a significant relationship with ~~between~~ knowledge of premarital sickle cell screening ~~and the variables~~(~~at~~ *P* < ?0.05; while those predictors for attitude towards premarital sickle cell screening include religion, knowledge of sickle cell disease and marital status (~~at~~ *P* < 0.05) ~~level of significance~~.

Conclusion: The students have poor knowledge and attitude towards sickle cell disease and premarital screening. The importance of health education as a

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keystone is necessary in improving knowledge and attitude towards premarital screening for sickle cell disease.

Keywords: Attitude, Perception, Premarital, Screening, Sickle Cell Disease

1. INTRODUCTION

Pre-marital genetic screening health service targeted at individuals and families which try to enable people with a genetic disadvantage, and their families to live and reproduce as normally as possible. Genetic screening often assures access to relevant medical services (diagnostic, therapeutic, counseling, rehabilitative and preventive) and social support systems, and it helps people at risk to adapt to their unique situation by providing information to enable educated and voluntary choices in health and reproductive matters [1]. Pre-marital genetic screening can identify and modify behavioural, medical and other health risk factors known to impact pregnancy outcomes through prevention and management. It is capable of reducing the burden that birth defects and genetic disorders impose on most couples and people [2].

One of the biggest health challenges to the human race is sickle cell disorder [1]. It is a genetic disorder transmitted from parents to their offspring's. The disorder is associated with many challenges resulting from frequent hospitalization of the affected individual due to vaso-occlusion crises or other forms of complications. Despite major advances in our understanding of the molecular pathology, pathophysiology, and causes of the inheritable disorders, thousands of infants and children are dying through lack of appropriate preventive measures such as lack of premarital sickle cell screening by intending couples to know their haemoglobin genotype before marriage [3].

Some of the objectives of pre-marital genetic screening includes: early recognition of disorder for intervention that prevents or reverses the disease process; or to ensure optimal management of the patient, that is, appropriate referrals to specialists when symptoms are anticipated and, informed reproductive decisions or disease management [4]. It has been recommended that it is time to start ascertaining the compatibility of intending couples to make marriages work better, and on more realistic grounds by way of premarital screening and testing [1]. There is need to encourage the practice of premarital sickle cell screening. Prevention of sickle cell disorder and risk minimization through screening and carrier identification remains the only realistic approach to reduce the impact of the disease especially in an adult population. Tertiary institutions have large concentration of adult population and they form important sub groups of the population since they are at a relatively high level of education and in the manageable age group [5], thus the aim and target of the study.

Healthy manpower is vital to national development. Nigeria is a developing country yearning for development. The health and wellbeing of students from tertiary institutions as potential manpower of the nation should be of great concern. Therefore, this study was designed to find out the knowledge and attitude of students of Federal College Education, Kano, towards pre-marital genetic screening.

2. MATERIAL AND METHODS

2.1 Respondents recruitment and Sample collection

The instrument used for data collection was a self-administered structured questionnaire, which was validated by pre-test and post-test validations. Questions were drawn strictly based on the stated objectives and literatures reviewed on premarital sickle cell screening. Both male and female students of various age groups that are both married and unmarried who were readily present at the time of the study and voluntarily gave their consent to participate in the study were recruited. Non-students at Federal College Education, Kano were excluded from the study. Following reception of students' consent (Appendix I) and ethical clearance (Appendix II) from appropriate authorities, a total number of 305 venous blood samples were aseptically collected in anticoagulated sodium heparin universal container from both sexes of students of various age groups offering different programmes such as preliminary National Certificate of Education (Pre-NCE), National Certificate of Education (NCE), Bachelor of Education (B. Ed) and Postgraduate Diploma in Education (PGDE) at Federal College Education, Kano. A sample size of 305 adult students (married and unmarried students) was used. Sample size was determined based on the prevalence reported from initial study [6] carried out around the country using equation:

$$n = \frac{Z^2 pq}{d^2}$$

Where;
n = Minimum number of samples required (sample size)
Z = Standard normal deviate at 95% confidence interval = 1.96
p = Prevalence from initial studies = 72.7% = 0.727 Omuemu *et al*., [6].
d = degree of confidence at = 0.05
q = 1-p = 1 - 0.727 = 0.273

$$n = \frac{1.96^2 \times 0.727 \times 0.273}{0.05^2} = \frac{3.8416 \times 0.19871}{0.0025} = 304.97 \approx 305$$

Therefore, minimum sample size for the study is 305.

The corresponding blood samples were transported and analyzed at Hematology laboratory, Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria for haemoglobin genes genotyping using the methods of Bello *et al* [7]. The anticoagulant blood was centrifuged at 2500rpm. The supernatant plasma was discarded, and packed cells were washed with saline. Finally, the red cells were hemolyzed by adding equal volume of distilled water. A volume of 2ml toluene and one drop of 3% potassium cyanide were mixed together. The buffer was poured into the electrophoresis chamber, with two electrodes socked in the buffer. The cellulose acetate paper was re-socked in the buffer and left to soak for 20minutes. Excess buffer was removed by keeping the plate between absorbent papers.

A volume of 0.5ml of the haemolysate samples test and control were applied approximately 3cm away from the cathode using applicator stick. The cellulose

acetate membrane plate was placed in the electrophoretic chamber, which was connected to the power supply. The electrophoresis was allowed to run for 20 minutes at approximately 35□C. The power supply was disconnected, and the result was read [8].

2.2 Method of data analysis

The quantitative raw data were collated and tallied. Descriptive statistics including frequencies, percentages, were used to present the data. Chi-square was used to test the hypotheses at 95% confidence interval 0.05 levels of significant. All the statistical analyses were performed using statistical package for social sciences (SPSS), version 18.

A four-point rating scale Likert scale that ranged from strongly agree= 1, Agree= 2, disagree= 3, to strongly disagree= 4, was used to measure attitude. The positive items were rated 4 and 3. Whereas all the negatively worded items were reverse scored, in that score of 4 is rated 1, and 3 is rated 2 etc. Individual mean score was used to find the total mean score for the entire student. A Positive attitude is indicated by a mean score above 2.5 and this showed that the participants agree and strongly agree to the correct answers, while a mean scores of 2.5 and below shows that the respondents disagree and strongly disagree to the correct answers.

A knowledge scoring system was developed for the knowledge items of the questionnaire. ‘‘Do not know’’ answers were treated as incorrect and given a score of ‘‘0’’, whereas each correct answer was given a score of ‘‘1’’. The total knowledge score was calculated and ranged from 0 to 27. The knowledge score was classified as low knowledge, <13.5 and high knowledge >13.5 score. Knowledge was assessed using the mean score of 13.5 from items in items of knowledge of the questionnaire. Scores above 13.5 were considered good knowledge while scores of 13.5 and below were regarded as low knowledge.

3. RESULTS

A total of 305 respondents data were collected for the study from students at the Federal College Education, Kano. A frequency distribution recorded 59.0% females and 41.0 males. Respondents aged between 21 to 25years recorded high frequency of 32.5%, while the least frequency 4.9% was recorded by students aged 46 years and above. Religious background recorded predominant percentage of Muslims (Islamic Religion), which constitutes 68.9% of the respondents, with 31.1% Christians (Table1).

Less than half of the total 124 respondents 40.7% were assessed with positive attitudes towards premarital sickle cell screening through graded scale questionnaire, while the rest showed negative attitude towards premarital sickle cell screening.

Table 2 shows the relationship between attitude and knowledge level of premarital sickle cell screening and gender of respondents. Higher percentage of female

students having more knowledge and attitude greater than that of the male students was recorded.

Table 1. Demographic Characteristics of the students (n=305) attending the institute

	Demographic Variables	Frequency	Percentage (%)
	Male	125	41.0
Gender	Female	180	59.0
Age	16 – 20	70	23.0
	21 – 25	100	32.8
	26 – 34	50	16.4
	35 – 40	45	14.8
	41 – 45	25	8.2
	46 and Above	15	4.9
Marital Status	Unmarried	100	32.8
	Married	150	49.2
	Divorced	25	8.2
	Widowed	30	9.8
Religion	Islam	210	68.9
	Christianity	95	31.1
Programme of Studies	Pre-NCE	70	23.0
	NCE	95	31.1
	B. Ed	90	29.5
	PGDE	50	16.4
Knowledge Assessment	High Level Knowledge	140	45.9
	Low Level Knowledge	165	54.1
Attitude	Positive Attitude	124	40.7
	Negative Attitude	181	59.3

Pre-NCE= Preliminary National Certificate of Education; NCE= National Certificate of Education; B. Ed= Bachelor of Education; PGDE= Postgraduate Diploma in Education

Table 2. Attitude and Knowledge Level of Premarital Sickle Cell Screening and Gender of Students

	Knowledge Assessment		
Gender	High Level	Low Level	Total
Male	53	72	125
Female	87	93	180
Total	**140**	**165**	**305**
	Attitude Assessment		
Gender	Positive Attitude	Negative Attitude	Total
Male	49	76	125
Female	75	105	180

Total	**124**	**181**	**305**

Table 3. Attitude and Knowledge Level of Premarital Sickle Cell Screening and Marital Status of Students

	Knowledge Assessment		
Marital Status	High Level	Low Level	Total
Unmarried	41	59	100
Married	80	70	150
Divorced	9	16	25
Widowed	10	20	30
Total	**140**	**165**	**305**
Marital Status	Attitude Assessment		
	Positive Attitude	Negative Attitude	Total
Unmarried	27	73	100
Married	74	76	150
Divorced	13	12	25
Widowed	10	20	30
Total	**124**	**181**	**305**

Married and Unmarried respondents shows high level of knowledge 53.3% and 41.0% respectively as regard to Divorced and Widowed Marital status group with prevalence of 36.0% and 33.3%. Attitude of the respondents is in disparity with knowledge assessment as Divorced marital status group showed highest positive attitude 52.0% followed by the married and widowed individuals 49.3% and 33.3% respectively, the least being Unmarried marital status group 27.0% (Table 3).

A prevalence of 45.9% was observed for high knowledge about premarital sickle cell screening, respondents in the study based on age, showed that age group 35 – 40 were observed to have the highest prevalence of 66.7% followed by 41 – 45 and 21 – 25 age groups having 60.0% and 49.0% prevalence respectively. The lowest prevalence 31.4% was observed in the age group 16 – 20, age groups of 26 – 34 and 46 and above had a prevalence of 38.0% and 33.3% respectively (Table 4). Table 4 shows the attitude of the respondents towards premarital sickle cell screening with reference to age. Age groups 46 and Above and 35 – 40 shows high attitude of the respondents 66.7% and 53.3% respectively compared to age groups 16 – 20 and 21 – 25 with lowest attitudes 31.4% and 39.0% respectively.

Table 4. Attitude and Knowledge Level of Premarital Sickle Cell Screening and Age of Students

	Knowledge Assessment		
Age	High Level Knowledge	Low Level Knowledge	Total
16 – 20	22	48	70

21 – 25	49	51	100
26 – 34	19	31	50
35 – 40	30	15	45
41 – 45	15	10	25
46 and Above	5	10	15
Total	**140**	**165**	**305**

	Attitude Assessment		
Age	Positive Attitude	Negative Attitude	Total
16 – 20	22	48	70
21 – 25	39	61	100
26 – 34	19	31	50
35 – 40	24	21	45
41 – 45	10	15	25
46 and Above	10	5	15
Total	**124**	**181**	**305**

The results of table 5 shows that Pre-NCE students has the least knowledge about the topic followed by NCE students 35.8% while PGDE and B. Ed students shows higher prevalence about knowledge of premarital sickle cell screening 70.0% and 50.0% respectively. The attitude of the respondents shows that PGDE students are the only group with positive attitude 50.0% towards premarital sickle cell screening while all the other group of students in other programme of studies have negative attitude toward premarital sickle cell screening as follows NCE (45.3%), Pre-NCE (30.0%), and B. Ed (38.9%) with statistical significance (*P* = 0.109), Therefore, there is no significant difference in positive attitude towards premarital sickle cell screening between students of different programmes at Federal College of Education, Kano (Table 5).

Table 5. Relationship between Attitude and Knowledge Level of Premarital Sickle Cell Screening and Programme of Studies of Respondents

	Knowledge Assessment			
Programme of studies	High Level	Low Level	Total	χ^2
	26	44	70	
NCE	34	61	95	
B. Ed	45	45	90	0.109
PGDE	35	15	50	
Total	**140**	**165**	**305**	

Programme of studies	Attitude Assessment		
	Positive Attitude	Negative Attitude	Total
Pre-NCE	21	49	70

NCE	43	52	95
B. Ed	35	55	90
PGDE	25	25	50
Total	**124**	**181**	**305**

P ≤ .05 is statistically significant, Pre-NCE= Preliminary National Certificate of Education; NCE= National Certificate of Education; B. Ed= Bachelor of Education; PGDE= Postgraduate Diploma in Education

Knowledge assessment of premarital sickle cell screening shows that most of the respondents that are Muslims (Islamic Religion) have low knowledge (31.4%) while majority (77.9%) of the Christians (Christianity religion) have high knowledge (Table 6). Respondents with Christianity religion shows majority 68.4% of them with positive attitude towards Premarital Sickle Cell screening and the respondents with Islamic religion have negative attitude 28.1% towards premarital sickle cell screening having statistical significance of *P* = 0.00, which indicates the rejection of the null hypothesis (H2) and accepting the alternate, therefore there is significant difference in the attitude towards premarital sickle cell screening due to religion among students of Federal College of Education, Kano (Table 6).

Table 6. Relationship between Attitude and Knowledge Level of Premarital Sickle Cell Screening and Religion of Respondents

Religion	Knowledge Assessment			χ^2
	High Level	Low Level	Total	
Islam	66	144	210	0.00
Christianity	74	21	95	
Total	**140**	**165**	**305**	
Religion	Attitude			
	Positive Attitude	Negative Attitude	Total	
Islam	59	151	210	
Christianity	65	30	95	0.00
Total	**124**	**181**	**305**	

P ≤ .05 is statistically significant

The relationship between knowledge of premarital sickle cell screening and attitude shows that majority 60.0% of the students who have high knowledge on premarital sickle cell screening also shows positive attitude towards it, likewise majority 75.8% of the students with negative attitude are seen to have low knowledge on the subject matter, giving a statistical significance of *P* = 0.00, indicating the rejection of the null hypothesis (therefore is significant difference between knowledge of premarital sickle cell screening and attitude towards premarital screening (Table 7).

Table 7. Relationship between knowledge of premarital sickle cell screening and Attitude towards premarital sickle cell screening

Knowledge Assessment		Attitude			X^2
		Positive Attitude	Negative Attitude	Total	
High Knowledge	Level	84	56	140	0.00
Low Knowledge	Level	40	125	165	
Total		**124**	**181**	**305**	

P ≤ .05 is statistically significant

4. DISCUSSION

This study was conducted with the aim of assessing the knowledge and attitude of the student of Federal College of Education, Kano regarding premarital screening for sickle cell disease. Total number of respondents are 305 for the study of which majority are females and Muslims. The respondents cut across various socio-demographic characteristics with their age ranging from 16-46 and above years. Majority of the respondents are between 21years and 25years. The fact that a reasonable number of the respondents are single makes the study most appropriate for the study group because the respondents need to be aware of the importance of premarital sickle cell screening before they get married (Table 1).

Majority of the respondents have low knowledge about sickle cell anaemia and is consistent with the position of Isah [9] where about 65.7% of the population have poor knowledge about premarital sickle cell screening in Sokoto, Nigeria among school of nursing students and inconsistent with that of Arulogun [10]. Most of the respondents who have heard of genetic disease knew the cause. However, a reasonable proportion demonstrated a poor knowledge about the cause of genetic diseases. This indicates the need for enlightenment about the causes of genetic diseases. Most of the students demonstrated poor knowledge on premarital sickle cell screening. However, reasonable proportions of the students have higher levels of knowledge on premarital sickle cell screening. Similarly, lower level of awareness of genotype was reported from studies among youths in selected areas in Lagos, Nigeria [3], which contrasted with findings reported from studies among undergraduate students in Yobe State, Nigeria [11].

The result of this study showed that there is significant difference in the knowledge of premarital sickle cell screening due to gender among students of Federal College of Education, Kano. This is reflected in Table 2 of the study showing higher

percentage of female students having more knowledge and attitude greater than that of the male students. This result is in contrast with the findings of Schmidt [12] which showed that males scored higher on knowledge and were more susceptible to fear of diseases than their female counterparts. Conversely in line with, Al-Aama *et al*. [13] reported in a study on knowledge regarding the national premarital screening program among university students in Western Saudi Arabia, they found out that females have more knowledge than males. Sobhy *et al.* [4] submit that there is a positive correlation between knowledge and attitude, hence, this study and similar studies like that of Abd-Al-Azeem *et al*. [5] demonstrated that females were more oriented and more knowledgeable with important health issues related to pre-marital genetic screening than males which they said later reflected on their better attitude. Al-Aama [13] in a study on attitudes towards mandatory national premarital screening for hereditary hemolytic disorders discovers that women also had better knowledge and stronger attitudes toward the implementation of screening with a significantly higher number of female respondents believing that the pre-marital screening should be mandatory, and that marriage should not be allowed between two carriers of the same disorder.

More than 50% of the Postgraduate Diploma in Education (PGDE) and Bachelor of Education (B. Ed) students had good knowledge of sickle cell disease, and the premarital screening for the disease with a significance P <0.05 due to their programmes of study (Table 5). This is comparable to the 78.9% recorded among undergraduate students in Benin, south-south Nigeria as stated by Omuemu *et al*. [6] and the 80% recorded among youths in Yaba, a suburb of Lagos, Nigeria by Oludare [14]. It is however higher than the levels recorded in various communities in the Middle East [15]. The high level of knowledge of these groups of the students in our study can be attributed to their high educational status. It can also be attributed to the higher prevalence of sickle cell disease in Nigeria, and the fact that the students are older, married and were already exposed to premarital screening, in course of their getting married.

According to Al-Aama *et al*. [13] and Abioye *et al*. [3], the effectiveness of carrier screening programmes depends largely on the awareness of the target population. This is consistent with the current study because the analysis of the relationship between knowledge and attitude of pre-marital genotype screening, which shows that knowledge is a strong determinant of attitude of premarital genotype screening P <0.05 (at 95% significant level). This implies that the respondents ought to be aware of the importance of genotype screening for them to be screened (Table 7).

5. CONCLUSION

The students have poor knowledge of sickle cell disease and premarital screening, though a reasonable number of the students have good attitude towards premarital screening. This is probably due to lack of knowledge of premarital sickle cell screening before getting married, insufficient standard facilities for haemoglobin genes genotyping in primary healthcare institutions, and lack of knowledge of the consequences of not doing premarital sickle cell screening. The need for health

education is necessary as a keystone in improving knowledge and attitude towards premarital screening for sickle cell disease.

5.1 Recommendations

Health education about sickle cell disease shall be intensified in the schools and also shall be made available for the community. The premarital screening services should be made available for student and people in the community and shall be made affordable. Also, media shall be used as a way creating community awareness since only very few of the respondents knew sickle cell disease. Government and religious leaders should educate youths on the importance of premarital genotype screening and institute strict policies as criterion before marriages are conducted. More haemoglobin genes genotype screening facilities should be provided at primary healthcare centers for easy accessibility.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

REFERENCES

1. WHO, (2008). Sickle cell anaemia and other haemoglobin disorders. World Health Organization. Factsheet. Retrieved 29/8/2008 from http://www.who.intel media-centre/factsheet/print.html.
2. Gharaibe, H. & Mater, F.K., (). Young Adults Knowledge and attitude to Premarital Testing. Journal of Maternal and Child Health. Irbid. Egypt, 2009; 56 (4): 450 – 500.
3. Abioye-Kuteyi E.A., Oyegbade O., Bello I., Osakwe C. Sickle Cell Knowledge, premarital screening and marital decisions among Local Government Workers in Ile-Ife, Nigeria. African Journal of Primary Health Care and Family Medicine, 2009; 1(1): 1-9. doi: 10.4102/phcfm.v1i1.22
4. Sobhy, S.I. Shoeib, F.M. and Zaki, N.H. Assessment and upgrading of Alexandria University nursing students' knowledge and attitude about genetic counseling. Journal of Egypt Public Health Association, 2001, 76(3-4), 205-222.
5. Abd-Al-Azeem S. T., Elsayed E. T., El-Sherbiny N. A. and Ahmed, L. A. Promotion of knowledge and attitude towards premarital care: An interventional study among medical student in Fayoum University. Retrieved June 10th, 2011 from http://www.academicjournals.org/jphe.

6. Omuemu V.O., Obarisiagbon O.E., Ogboghodo E.O. Awareness and acceptability of premarital screening of sickle cell disease among undergraduate students of the University of Benin, Benin City, Edo State. Journal of Medicine and Biomedical Research; 2013. 12 (1): 91 – 104.
7. Bello N., Dawakin Kudu A.T., Adetokun A.B., Taura D.W., Jobbi Y.D., Umar M., Yusuf I. Characterization and antimicrobial susceptibility profile of bacteraemia causing pathogens isolated from febrile children with and without sickle cell disease in Kano, Nigeria. Mediterr J Hematol Infect Dis, 2018, 10(1): 1-9, DOI: http://dx.doi.org/10.4084/MJHID.2018.016
8. Ochei, J., Kolhatkar, A. Miscellaneous investigation in Haematology. Medical Laboratory science, theory and practical data Mc Graw-Hill publishing company limited India, 2008; 314-330.
9. Isah B.A., Musa Y., Mohammed U.K., Ibrahim M.T.O., Awosan K.J., Yunusa E.U. Knowledge and Attitude Regarding Premarital Screening for Sickle Cell Disease among Students of State School of Nursing Sokoto. Annals of International Journal of Medicine and Dentistry, 2016; 2(3):29-34.
10. Arulogun O.S., Adefioye O.A. Attitude towards mandatory premarital HIV testing among unmarried youths in Ibadan Northwest Local Government Area, Nigeria. African Journal of Reproductive Health, 2010: 1-7. Retrieved June 10th, 2011 from www.ajol.info/index.php/ajrh/article/view
11. Animasahun B.A., Akitoye C.O., Njokanma O.F. Sickle Cell Anaemia: Awareness Among Health Professionals and Medical Students at the Lagos University Teaching Hospital, Lagos. African Journal of Reproductive Health, 2009; 19(4):195-199.
12. Samavat A. and Model I.B. Iranian National Screening Programme. BMJ, 2004; 329: 1134 – 1137.
13. Al-Aama, J., Al-Nabulsi, B., Alyousef, M., Asiri, N. and Al-Blewi, S. Knowledge Regarding The National Premarital Screening Program Among University Students in Western Saudi Arabia. Saudi Medical Journal, 2008; 11: 1649-53.
14. Oludare G.O. and Ogil M.C. Knowledge, Attitude and Practice of Premarital Counseling for Sickle Cell Disease Among Youth in Yaba, Nigeria. African Journal of Reproductive Health, 2013; 17(4): 175 – 182.
15. Umoh, S.H. and Akinola, T.O. Nigerian University Students' Awareness of Sickle Cell Anaemia. Ilorin Journal of Education, 1994; 14(1): 1-4.
15. Ferguson, T.J. Attitude Accessibility as a Moderator of Attitude: Behaviour Relation. Journal of Personality and Social Psychology, 2010; 51 (5) 505 – 514.

APPENDIX I

FEDERAL COLLEGE OF EDUCATION, KANO

CERTIFICATE OF CONSENT

PATIENT/PATIENT'S PARENT OR GUARDIAN

I have been asked to give consent for myself to participate in this research study which will involve collection of blood sample in the completion of the research study. I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily for myself to participate as a participant in this study.

Parent' s age_____ Sex_____

Signature of Patient _____

Date _____

STATEMENT BY THE WITNESS

I have witnessed the accurate reading of the consent form to the parent of the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness_____ AND Thumb print of participant

Signature of witness _____

Date _____

STATEMENT BY THE RESEARCHER/PERSON TAKING CONSENT

I have accurately read out the information sheet to the parent of the potential participant, and to the best of my ability made sure that the person understands that the following will be done:

1. **Samples (blood samples) will be collected by an experienced examiner.**
2. **The samples will be analyzed in the laboratory for screening sickle cell disease.**
3. **The findings may be documented for public enlightenment and medical intervention by the concerned authorities.**

My names are HUSSAINI M. A. (2015/PGDEE/5110), Division of Microbiology, Department Science Laboratory Technology, Zaria, Kaduna state, Nigeria. I am currently carrying out a research titled Knowledge and Attitude towards Premarital Sickle Cell Disease Screening among Students Attending Federal College of Education, Kano, Nigeria. I confirm that sufficient information, including about risk and benefits, to make an informed decision have been fully explained to the participant. I confirm that the patient/parent/patient' s guardian was given an opportunity to ask questions about the study, and all the questions asked by him/her have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

APPENDIX II

FEDERAL COLLEGE OF EDUCATION, KANO

Directorate of Continuing Education
Federal College of Education,
Kano.
21st June, 2017

Hussaini M.A.
Federal College of Education,
Kano.

Ethical approval

Sequel to the submission of the research proposal to the Advisory Committee on research of Department of Continuing Education, Research and Development on a research study titled: **Knowledge, Perception and Attitude Towards Premarital Sickle Cell Screening Among Students Attending Federal College of Education, Kano, Nigeria.** The committee after a long considerations and consultations has satisfied with the research.

The ethical committee thereby grants ethical approval for the study.

Dr. Adamu D.

Director Research