KNOWLEDGE OF SICKLE CELL DISEASE AND WILLINGNESS TO UNDERGO GENOTYPE SCREENING AMONG CORPS MEMBERS IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE

BY

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DEDICATION

This work is dedicated to the Lord Jesus Christ, my maker, who gave me the strength, grace and the sense of direction to go through the master's programme.
I also dedicate it, to those who are carriers of Sickle cell disease. God the healer will not forsake you. Lastly, to the memory of my late aunt, Agunloye Oluwafunmilayo Victoria, who slept in the Lord in the year 2011 as a result of Sickle cell crisis and pregnancy complications. Your memory lingers on.

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ABSTRACT

Sickle cell disease (SCD) is an inherited blood disorder caused by abnormal haemoglobin. The disease limits the oxygenating role of haemoglobin, which is the oxygen carrying pigment of the red blood cell, resulting in the damaging or the sickle shape of the red blood cell. Nigeria stands out as the most sickle cell endemic country owing to its population. Lack of awareness, knowledge and poor attitude are the reasons behind the prevalence of SCD in Nigeria. This study looks into the knowledge of young people on SCD and the implications of gender in their health seeking behaviour such as genotype screening. The main objective of this study is to investigate the knowledge of Sickle Cell Disease (SCD) and willingness to undergo genotype screening, among Corps members.

The study design was a descriptive cross-sectional study, and a sample of 355 respondents was selected. A stratified random sampling technique was adopted for this study, and both qualitative and quantitative instruments were used for data collection. The opinions from the qualitative analysis (FGD) were analyzed thematically and triangulated with the quantitative result while Statistical Package for Social Sciences (SPSS) version 20 was used for quantitative data entry. Frequency, charts, tables, Pearson Chi-square and binary logistic regression analysis were used to analyze the data. Adequate ethical principles were also observed for this study.

There were more female (54.6%) than male (45.4%) and their mean age was 24.41±2.163. Almost all (96.3%) of the respondents have heard about SCD and majority (89.5%) are aware of genotype screening. Less than half of the respondents (45.5%) could state the difference between genotype and blood group, while more than half (53.0%), cannot support a family member who does not have the disease to marry a carrier of SCD. Slightly over 10% of the respondents, mainly the male respondents have never had genotype screening, but majority (72.1%) are willing to repeat genotype test. Statistical association was found between gender, discipline, and respondents' level of knowledge. Only gender was associated with willingness at $p<0.005$ even after further analysis (OR = 4.126, 95%CI = 1.446 – 11.776).

The results of both qualitative and quantitative studies were able to establish the notion and ambiguity young people have in relation to differentiating between heamoglobin genotype and blood group, as well as poor attitude towards carriers of SCD. Also, the result shows that some Corps members have never had genotype screening. Therefore health education, genetic counseling and genotype screening should be included in the programmes of Corps members at the orientation camps.

Keywords: SCD, Youth corps members, Knowledge, Genotype Screening, Willingness

Word count: 429

CERTIFICATION

I certify that this work was carried out by Oluwaseyi Anuoluwapo ADEGBITE in the Department of Health Promotion and Education, University of Ibadan under my supervision.

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LIST OF ABBREVIATIONS

BCC	-	Behavioural Change Communication
CDS	-	Community Development Service
CLO	-	Corp Liaison Officer
FMOH	-	Federal Ministry of Health
GBD	-	Global Burden of Disease
Hb	-	Haemoglobin
HBM	-	Health Belief Model
HCV	-	Hepatitis C Virus
IBNLGA	-	Ibadan North Local Government Area
IEC	-	Information, Education and Communication
LGA	-	Local Government Areas
LGI	-	Local Government Inspector
MHF	-	Men's Health Forum
NDHS	-	National Demographic and Health Survey
NYSC	-	National Youth Service Corps
RA	-	Research Assistant
SCA	-	Sickle Cell Anaemia
SCC	-	Sickle Cell Crises
SCD	-	Sickle Cell Disease
SCT	-	Sickle Cell Trait
UCH	-	University College Hospital
VOC	-	Vaso-Occlusive Crisis
WHO	-	World Health Organization

Definition of Terms

- **Sickle Cell Disease (SCD):** Sickle cell disease (SCD) is an inherited blood disorder caused by abnormal haemoglobin, thereby limiting the oxygenating role of haemoglobin, which is the oxygen carrying pigment of the red blood cell, resulting in the damaging or the sickle shape of the red blood cells ((Creary, Williamson and Kulkami 2007; Alagbe, Susu and Dosunmu, 2013).
- **Knowledge:** Information or awareness gained through experience or education (Oxford English Mini Dictionary, 2008), page 309.
- **Willingness:** It is the readiness or eagerness to do something (Oxford English Mini Dictionary, 2008), page 637.
- **Genotype Screening:** This is a type of genetic screening exercise where the genotype of individuals can be examined to inform them about their genetic predisposition to diseases such as Sickle cell disease (Oyedele, Emmanuel, Gaji and Ahure, 2015).
- **Youth Corps members:** These are the youths who are currently serving the country. They do serve the country after they have completed their tertiary education. They come from different universities, polytechnics and ethnic groups in Nigeria, and they are posted to different parts of the country for social responsibilities.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The history of Sickle Cell Disease (SCD) can be traced back to the works of Herrick in 1910. Herrick coined the now familiar term "sickle cell" (Serjeant, 2001). The sickle-shaped red blood cells described by Herrick caused several complications, including chronic anaemia, jaundice, vaso-occlusive pain episodes, ischemic organ damage, infections, small stature, and delayed puberty (Serjeant, 2001).

Sickle cell disease (SCD) is an inherited blood disorder caused by abnormal haemoglobin (Creary, Williamson and Kulkami, 2007), the disease limits the oxygenating role of haemoglobin, which is the oxygen carrying pigment of the red blood cell, resulting in the damaging or the sickle shape of the red blood cells (Alagbe, Susu and Dosunmu, 2013). The condition causing people who have SCD to experience short life span compared with healthy general population, however many of them now survive beyond the fourth decade (Chijioke and Kolo, 2009).

Africa is one of the continents affected by SCD. As Moronkola and Fadairo (2009) averred that sickle cell disease has been a prevalent disorder in Africa for many generations, so also the WHO reports (World Health Organization, 2006) show that sickle cell disease was a well-known disorder in West Africa and that the West African natives had several local names for this disease before it was discovered in America (Ejodame, 2009).

Edwards, Scales and Loughlin (2005) stated that sickle cell disease is the most common genetic disorder amongst black people and one of the major chronic non-communicable diseases (NCDs) affecting children. It poses a significant psychosocial burden, not only on people who are carriers of the disease, but also on the caregivers and their families. Studies such as Tunde-Ayinmode (2011) and Afolayan and Jolayemi (2011) established the resultant social and physical effects of families with people with SCD ranging from family conflicts, divorce, stigma and psychological trauma.

It has been reported that, screening for the general populace is of great importance in public health, because carriers of SCD are asymptomatic and often unaware that they carry the gene (Eboh and Van den Akker, 1994). Asymptomatic carriers only inherited one abnormal gene which may not present health threat unto them, so they do not bother to know their status, because they seldom have complications from the disorder. These healthy carriers are between 20% and 30% in Nigeria (Omoti, 2005). Studies by Bazuaye and Olayemi (2009), Siddiqui, Schunk, Batista, Adames, Ayala, Stix, Rodriguez, McCord and Green (2011), Olatona, Odeyemi, Onajole and Asuzu, (2012) and Ilesanmi (2013) have reported that there is need for emphasis on health education of the populace on SCD, strengthening awareness and preventive measures and that more efforts should be channelled toward reducing the prevalence of SCD in our society.

A lot of studies carried out in Nigeria on SCD (Bazuaye *et al.*, 2009; Siddiqui *et al.*; 2009; Olatona *et al.*, 2012; Durotoye *et al.*, 2013; Ilesanmi, 2013), have recommended more awareness activities. Also, the Federal Government of Nigeria showed concern in the struggle to abate the burden SCD, by commissioning the Multi-million Naira Ultra-Modern National Sickle Cell Centre, opposite Lagos University Teaching Hospital (LUTH), Idiaraba Lagos, in the year 2002. The National guideline for the control and management of Sickle Cell Disease was put in place in the year 2014 in order to provide uniformity and standardized procedure in the control and management of SCD in all health facilities across the country.

In addition, six sickle cell centres (Federal Medical Centres in Abaliki, Ebonyi State, Birnin-Kebbi, Kebbi State, Ebute-Metta, Lagos State, Gombe, Gombe State, Nasarawa State and Yenagoa, Bayelsa State) were empowered by the Federal Ministry of Health (FMOH) in collaboration with Millennium Development Goal (MDG) office in 2011 and 2012 to run clinical services and programmes for the management and control of SCD (National guideline for the control and management of SCD, 2014).

1.2 Statement of the Problem

The burden of Sickle cell disease is enormous. It affects virtually 100 million people worldwide, out of whom over 300,000 children are born annually with SCD. Over 70% of the births occur in Sub-Saharan Africa and majority of children born with SCD die before the age of 5 years. Sickle cell disease causes over 50% of deaths in those with the most severe form of the disease (National Guideline for the Control and Management of Sickle Cell Disease, 2014).

In Africa, Nigeria stands out as the most sickle cell endemic country owing to its population (Anie, Egunjobi and Akinyanju, 2010). The country has an estimated annual infant death of 100,000, that is 8% of total annual infant mortality), the above proportion gives the basis for sickle cell disease to be named among the ten (10) priority non-communicable diseases (NCDs) that contribute to child morbidity and mortality (National Guideline for the Control and Management of Sickle Cell Disease, 2014). Moreover, an estimate of about 2.3% of the Nigerian population suffers from sickle cell disorder and about 25% of Nigerians are healthy carriers of the abnormal hemoglobin gene (Afolayan and Jolayemi, 2011).

Awareness of Sickle cell disease as far as Africa is concerned is low, compared to what is obtained in the western world and about 75% of the patients live in Africa (SCORE report, 2011). Bazuaye and Olayemi, (2009) stated that one cannot do away with the fact that in Nigeria before the mid-nineteenth century believed in the myth of the Abikus (Yorubas) and Ogbanjes in Ibo land, South West and South Eastern parts of Nigeria respectively. The Abiku and the Ogbaje both refer to the names that were given to children who die in their childhood. The influence of genetic factors seems to be given little or no importance.

Ignorance of the knowledge of SCD and nonchalant attitude have subjected many to overlook the relevance of genotype testing (Iwierebor, 2015). Studies such as, Ohaeri, Shokunbi, Akindale and Dare, (1995), Uwakwe, Kofie and Shokunbi, (2001) also buttressed that religious beliefs including prayer, faith in God and physician, and a hopeful approach to health difficulties in Nigeria play positive part in coping. Despite the effects of SCD in the country, people are still unaware of the need to engage in the screening or testing.

Studies by Bazuaye and Olayemi (2009), Siddiqui, Schunk and Batista (2011) and Ejodame (2009) have shown that lack of awareness, ignorance, beliefs and myths are the peculiar problems facing Africa on the endemic nature of SCD. Julie Coker, a former Television presenter who lost a child to SCD, stated in an interview in a National media, The Nigerian Voice (2010), that lack of awareness or less information is a great basis for continuous birth of children with SCDs and that for some time there was nothing like genotype testing before marriage, probably due to ignorance, lack of technology, globalization and less education.

The perception and attitude of National Youth Corps Members toward those who have the SCD are important, because social exclusion is a peculiar problem facing people living with SCD. Studies of Tunde-Ayinmode (2011) and Ilesanmi (2013) observed that people with Sickle cell disorder face challenges such as stigmatization and discrimination in schools, within families, on the job as well as in the society at large, thereby hindering them from getting prompt and quality health care. Sickle cell has a profound impact, not just on the patient, but on the whole family, which include several resources such as money, energy, relationship ties and time (Tunde-Ayinmode, 2011; Durotoye, 2013).

Studies ought to fill knowledge gaps or explore areas where people may be lacking in understanding such as, basic description of SCD, difference between genotype screening and blood group, availability of health education and genetic counselling sessions before or after the test have been carried out, as well as to assess effect and functioning of the various governmental and non-governmental sickle cell centres.

This study focuses on the knowledge of National Youth Corps Members on SCD and willingness to undergo genotype screening. The Corps members are in the reproductive age, and it has been found that if such people are made aware of their status before they contemplate having children they could make an informed choice not to go ahead with a pregnancy if at risk of having an affected child thus reducing the prevalence of the disease (Oludare and Ogili, 2013). Also, Whitehead, Brown and Layton (2010), reported that most of the crises faced by children with SCD

could have been prevented or better managed if their parents had knowledge of newborn screening. This justifies the need for the knowledge of SCD among the population of young people contemplating marriage and reproduction.

1.3 Justification

Sickle cell disease can be prevented when a man and woman have the understanding of the manner of inheriting the disease. The knowledge of the inheritance pattern and healthy practices, such as genotype testing, marrying the right genetic partners, neonatal screening are parts of the benefits of health education and public awareness for the prevention of SCD. This study is being conducted to investigate the gap in knowledge of SCD among young people and to assess their willingness to undergo genotype screening, especially among the Youth Corps members, who are in the reproductive age according to NDHS, (2013) and might be contemplating marriage and reproduction during or soon after the National Youth Service Programme.

The result of this study might be helpful for planning intervention strategies targeted on improving the knowledge of Corps members on SCD across gender. Moreover, this study will assess their attitude as well as misconception towards genotype screening and blood group as observed in the previous studies of young people by Bazuaye and Olayemi (2009) and Durotoye *et al*. (2013).

1.4 Broad Objective of The Study

The main objective of this study is to investigate the level of knowledge of Corps members on Sickle Cell Disease (SCD) and their willingness to undergo genotype screening, from a gender perspective.

1.5 Specific Objectives of The Study

The specific objective of this study is to;

1. Assess the level of awareness of sickle cell disease among the respondents.
2. Assess the level of knowledge of sickle cell disease among the respondents.
3. Determine the respondents' attitude towards sickle cell disease.
4. Assess the willingness of the respondents to undergo genotype screening.

1.6 Research Questions

1. What is the level of awareness of sickle cell disease among the respondents?
2. What is the level of knowledge of sickle cell disease among the respondents?
3. What is the attitude towards sickle cell disease among respondents?
4. What is the willingness of the respondents to undergo genotype screening?

1.7 Hypotheses

The study hypothesized that:

- There is no association between the level of knowledge and age, (H_01).
- There is no association between the level of knowledge and gender, (H_02).
- There is no association between the level of knowledge and discipline (H_03).
- There is no association between level of knowledge and the attitude of the respondents (H_04).
- There is no significant association between level of willingness and, gender (H_05).
- There is no association between the level of knowledge of SCD and willingness to undergo genotype screening (H_06).
- There is no association between the attitude of respondents and their willingness to undergo genotype screening (H_07).

CHAPTER TWO
LITERATURE REVIEW

2.1 General Overview of Sickle Cell Disease

The first report of Sickle cell anaemia was mentioned, unarguably, between 1904 and 1907 during the blood testing of a dental student in Chicago by Dr. J.B. Herrick, 1910 (Serjeant, 2001). Although, the disorder had afflicted Africans before then, as they lacked the understanding of what it was, but more understanding came when the association between sickle cell anaemia and abnormal haemoglobin was first noted in 1945 in which abnormality was found within the haemoglobin molecule.

Sickle cell disease (SCD) is an inherited blood disorder caused by abnormal haemoglobin (Creary, Williamson, and Kulkarni 2007). The haemoglobin is the oxygen carrying pigment of the red blood cell. Sickle cell disease limits the oxygenating role of haemoglobin, which, results in the damaging or the "sickling" of the red blood cells (Barakat, Schwartz, Simon, and Radcliffe 2008).

Primarily SCD was thought to be familial or run in a family, until it was established later that sickle cell anaemia is an autosomal recessive inheritable disease. Sickle cell disease is associated with the sickling of the red blood cell as a result of low oxygen and that the genetic basis of the disease is the substitution of valine for glutamic acid in the position 6 of the globin chains on the chromosomes of the haemoglobin (Serjeant, 2001; Clarke and Higgins, 2002; Obeagu, Ogbuagbor, Ikechukwu and Chude, 2014).

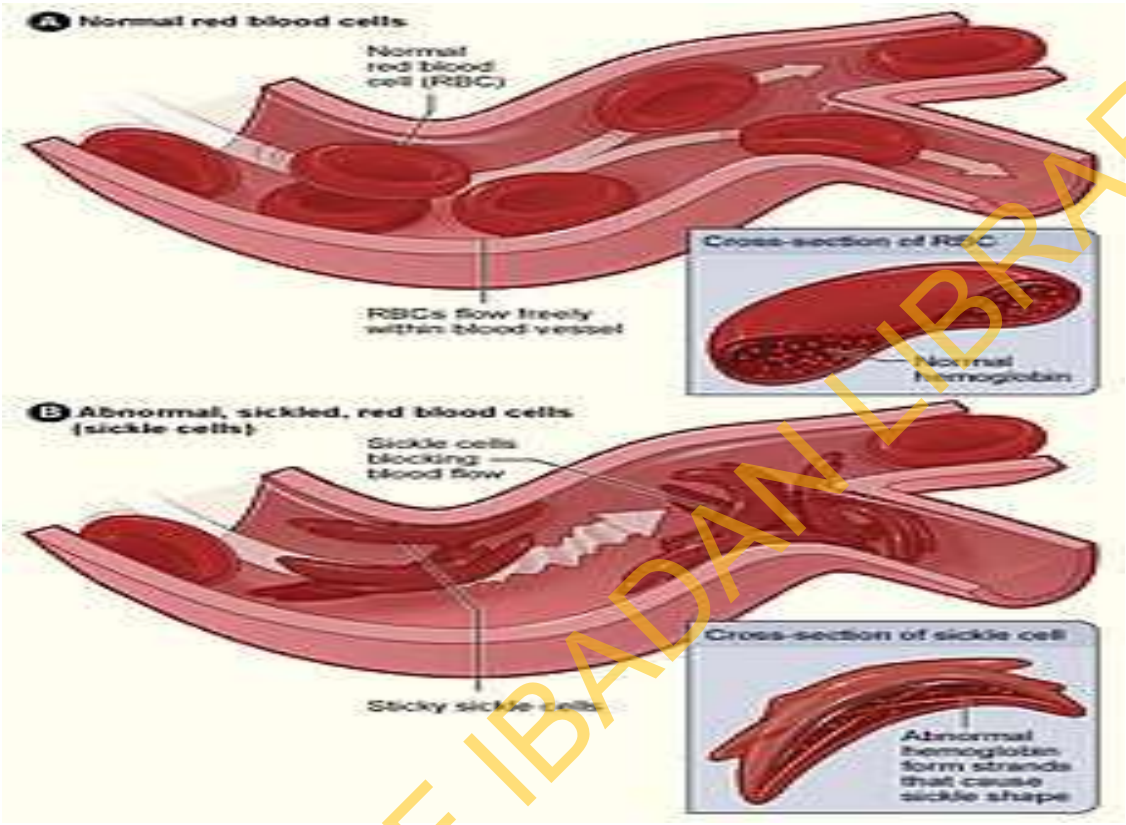
The red blood cell shows a distinguishing shape whenever the haemoglobin polymerizes, becomes distorted and assumes rigid, sickle-like shape (Akre, Sukhsohale, Kubde, Agrawal, Khamgaokar, Chaudhary and Dhoble, 2013) see Figure 2.1. Sickle cell haemoglobin can be separated from the normal haemoglobin using gel electrophoresis.

The term disease is applied because pathological conditions (disease causing circumstances), leading to severe complications and even death can occur if two defective heamoglobin genotypes are inherited by a person. Sickle cell disease is also referred to as Sickle cell Anaemia (SCA). (Antwi-Baffour, Adarkwah-Yiardom,

Kyeremeh, Adjei, Abdulai and Ayeh-Kumi, 2014). However, sickle cell trait refers to the inheritance of one abnormal and a normal heamoglobin genotype (Okwi, 2009). There are several forms of sickle cell diseases known as heamoglobinopathies (Hb). These include, HbSS (commonly referred to as Sickle Cell Anaemia i.e. SCA), HbS+C, Hbα and Hbβ^{+} (Alpha and Beta Thalassaemia) and several others; Heamoglobin C, HbSC (cells from homozygous CC are refractory to parasite growth), Heamoglobin E, HbE, Thalassaemia, HbSα-thal and Hbβ- thal (α- and β-thalassaemia), Glucose-6-phosphate dehydrogenase (G-6_PD) deficiency and Heamoglobin F, HbF (foetal haemoglobin).

The β Thalassaemia and SCA are the most severe autosomal recessive disorders affecting haemoglobin, a crucial component of the red blood cell. These two disorders commonly affect people with origins in malarial endemic parts of the world, such as Africa, Asia, and Middle East. Carriers of the sickle cell aneamia and thalassaemia genes are said to have protection against malaria, but paradoxically those with the disorder are more susceptible to this parasitical condition and death from cerebral malaria being one of the most severe complications (Serjeant, 2001; Lucas and Gilles, 2007; Obeagu, *et al*., 2014). The National guideline for the control and management of Sickle cell disease (2014) stated that only three out of all the forms of heamoglobin are peculiar in Nigeria, that is, HbSS, HbSC and HbSβ-thal.

Figure 2.1: Diagram Showing both Normal and Abnormal Red Blood Cells



Source: www.amedeo.com/medicine/ane.htm

2.2 Determinants and Prevalence of Sickle Cell Disease

Ignorance and lack of awareness of SCD are some of the socio-cultural factors associated with the disease (Bazuaye and Olayemi, 2009; Siddiqui, *et al*., 2011). Sickle cell disease affects people whose ancestors lived in tropical and sub-tropical sub-Saharan regions where malaria is common (Obeagu *et al.*, 2014). Ohene-Frempong (2014), in his presentation at the 41st annual convention of the Sickle Cell Disease Association of America made mention of the following classification of the origins of Sickle cell disease; *Major Origins (2000 – 100BC)* - West Africa: Benin, Cameroon, Senegal, Central Africa: Bantu, India/ Arab, *Early Migration (1000 – 200BC)* - North Africa, Mediterranean, Middle East, *Later Migration (1500 - 1900)* - Americas, Europe and lastly, *Modern Migration* – Global. One can say migration,

Mosquitoes or malaria endemic and socio-cultural factors are major determinants of Sickle cell disease.

Globally, about 5% of the world's population carries genes responsible for haemoglobinpathies (See table 2.1), out of which over 300,000 infants are born with major haemoglobin disorders including more than 200,000 cases of sickle cell anaemia in Africa every year (Olubiyi *et a.l*, 2013). Sickle cell anaemia contributes equivalently to 5% of under-five deaths in the continent of Africa. More than 9% of such deaths occur in the West Africa and up to 16% of under-five deaths in individual in West African countries (WHO, 2006).

Siddiqui *et al.*, (2011) provided an overview of sickle cell disease in America. They stated that SCD in American affects 1 in 350 sbirths. Latinos have the second highest incidence among US populations, with 1:1,100 affected births in the eastern USA. In New York City (NYC), sickle trait affects 1 in 12 African Americans and 1 in 35 Latino births. Of approximately 200 newborns diagnosed with sickle cell disease in NY in 2008, 36 (8%) were Hispanic. In NYC, Latinos constitute one fourth of the population, with Dominicans constituting the largest group of foreign-born. Additionally, ten percent of the population in Jamaica are affected by SCD (Biljana, Serette and Tin Min, 2008).

Statistics revealed that there are approximately between 100 and 200 pregnancies in women with SCD per year in the United Kingdom (UK). It was also stated that out of the estimated 300, 000 children born with SCD worldwide, over 300 infants with the disease are born in the UK. However, between 12,000 and 15,000 individuals are affected (Howard and Oteng-Ntim, 2011).

In Africa, there was widespread of SCD because of slave trade and migrations, it is now found even more widely. Nonetheless, the prevalence is highest in tropical Africa (see Table 2.1) as the most prevalent genetic disease (WHO, 2010; National Guideline for the Control and Management of Sickle Cell Disease, 2014). WHO (2010) documented that the S gene concerns the population of at least 40 countries in the Region, and in about 23 countries of west and central Africa the prevalence of SCT varies between 20% and 30%; it is as high as 45% in some secluded areas in

western Uganda. The median survival of SCD carriers in Africa is less than five years; about 50%–80% of the estimated 400 000 infants born yearly with SCD in Africa die before the age of five years.

It has been estimated that Nigeria has twenty-four percent **(**24%) of the adult populations who are carrier of the mutant gene and the prevalence of sickle cell anaemia is about 20 per 1000 births, meaning that in Nigerian alone about 150,000 children are born annually with sickle cell anaemia (WHO, 2006). The S gene is between 25 and 30% in Nigeria (see table 2.1 below), with an estimate of 2-3million people being affected (Omoti, 2005; Obeagu, *et al.*, 2014).

Recent study (see Table 2.2) puts the estimated prevalence of Sickle Cell Disease (SCD) among children under 5 years of age in Nigeria at 29.8% (Piel, Hay, Gupta, Weatherall and Williams, 2013). Thus the management of sickle cell disease is therefore a major public health concern (Olubiyi, Umar, Ajiboye , Olubiyi, Abioye, 2013). Reports have shown that, Nigeria has the largest burden of sickle cell disorder in Africa, with 40 million people with the traits of the disease (Akinyanju, 2009).

Table 2.1: Estimated Newborns with AS and SCD-SS 2010

Region	**AS**	**SS**	**%**
Global	5,476,407	312,302	100
Americas	386,430	12,802	4.6
Arab-India	1,147,477	46,826	16.9
Eurasia	256,163	493	3.0
South-east Asia	2,535	21	0.0
Sub- Sahara Africa	3,580,207	235,681	75.5

Source: Piel *et al.*, 2013.

Table 2.2: Newborns with SCD Increasing Globally (2010-2050 Estimated Newborns with SCD-SS)

Country	2010		2050		2010 – 2050
	SS	%	SS	%	% Change
Global	305,773 100	100	100 404,190	100	+32.2
Nigeria	91,011	29.8	140,837	34.8	+54.7
India	44,425	14.5	33,890	8.4	-23.7
Congo	39,743	13.0	44,663	11.1	+12.4
USA	2,842	0.93	3,379	0.83	+18.9
Ghana	5,815	1.90	6,855	1.70	+17.9

Source: Piel *et al.*, 2013.

2.3 Mode of Transmission and Inheritance of Sickle Cell Disease (Genetics)

Sickle cell disease occurs when a man, heterozygote carrier (AS) and a woman, heterozygote carrier (AS) or of the homozygote SS (SCA) conceived children together (Okwi, 2009). Okwi further explained that, sickle cell anaemia is an autosomal recessive inherited haemoglobin disorder which is due to acquisition of two abnormal genes, one from each parent. These sickle cell traits occur when a gene for sickle cell haemoglobin is inherited from one parent and a gene for either haemoglobin A, C, D, E alpha or beta/ thalassemia is inherited from the other parent (Lucas and Gilles, 2008; Okwi, 2009).

The resultant birth from a male and a female carrier of sickle cell trait (SCT) has been found to produce children with 25% chance of having SCD, 25% normal haemoglobin and 50% carrier of the trait for SCD. The sexual relation between heterozygote (AS) and homozygote (SS) parents has been shown to produce 50% chance of having children with the disease and 50% carrier of the SCD.

Parents who have normal haemoglobin (AA) and defective homozygote (SS) have 100% chance of having carriers of SCD trait. Finally, there is 50% chance of having children with normal haemoglobin and 50% carriers of the SCD trait when parents who have normal heamoglobin and carrier of the trait reproduce. The union between

two defective homozygotes is very rare (Okwi, 2009). If it occurs then it would have 100% chance to bring into being children with SCD.

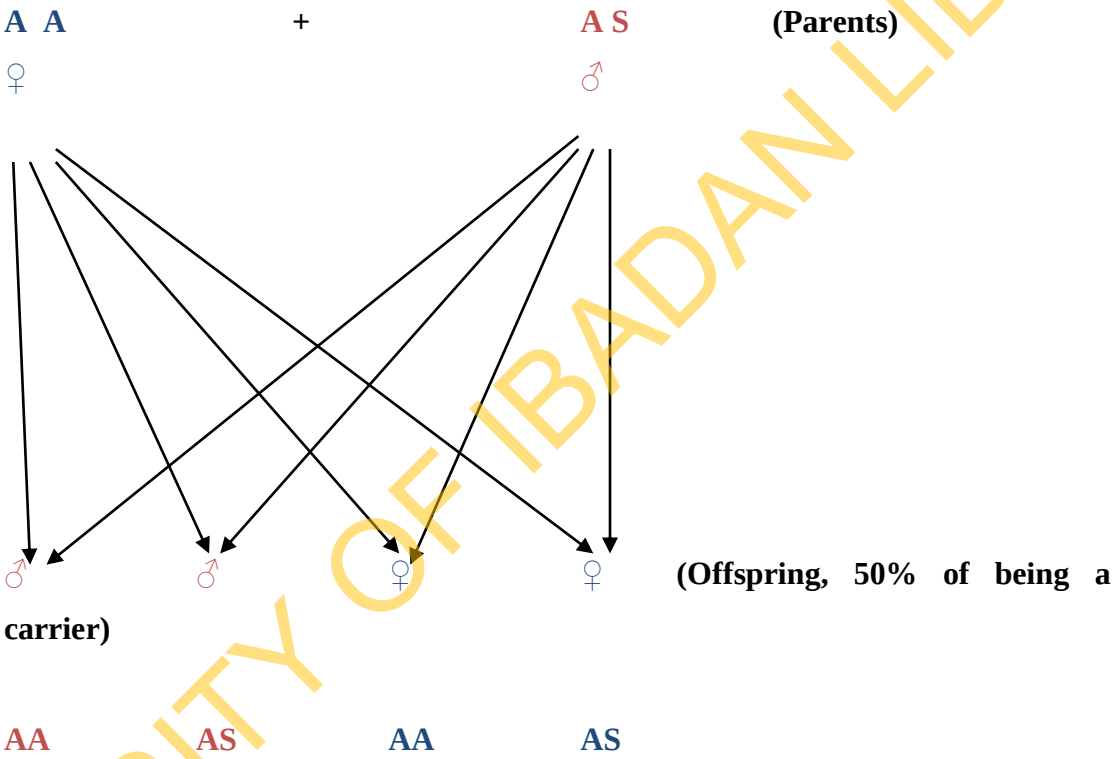
The inheritance pattern is shown in Figure 2.2.

Figure 2.2: Inheritance pattern

Keys

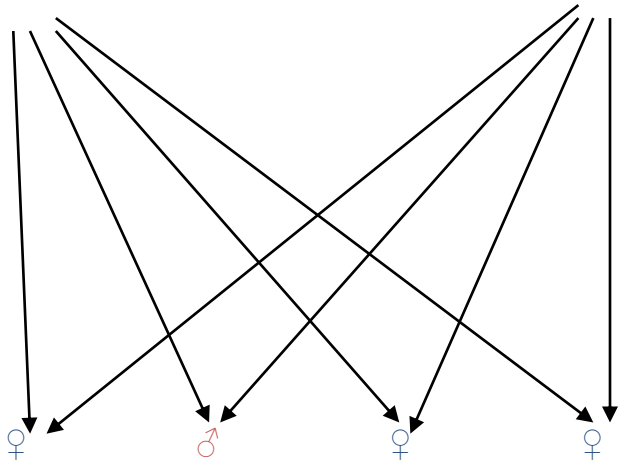
♀ - a man or a boy,

♂ - a woman or a girl



A S + A S (Parents)

♀ ♂



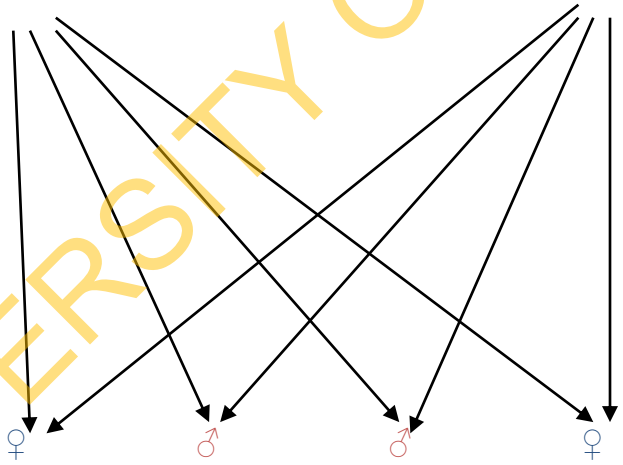
♀ ♂ ♀ ♀

(Offspring, 25% of being a carrier)

AA AS AS SS

S S + A C (Parents)

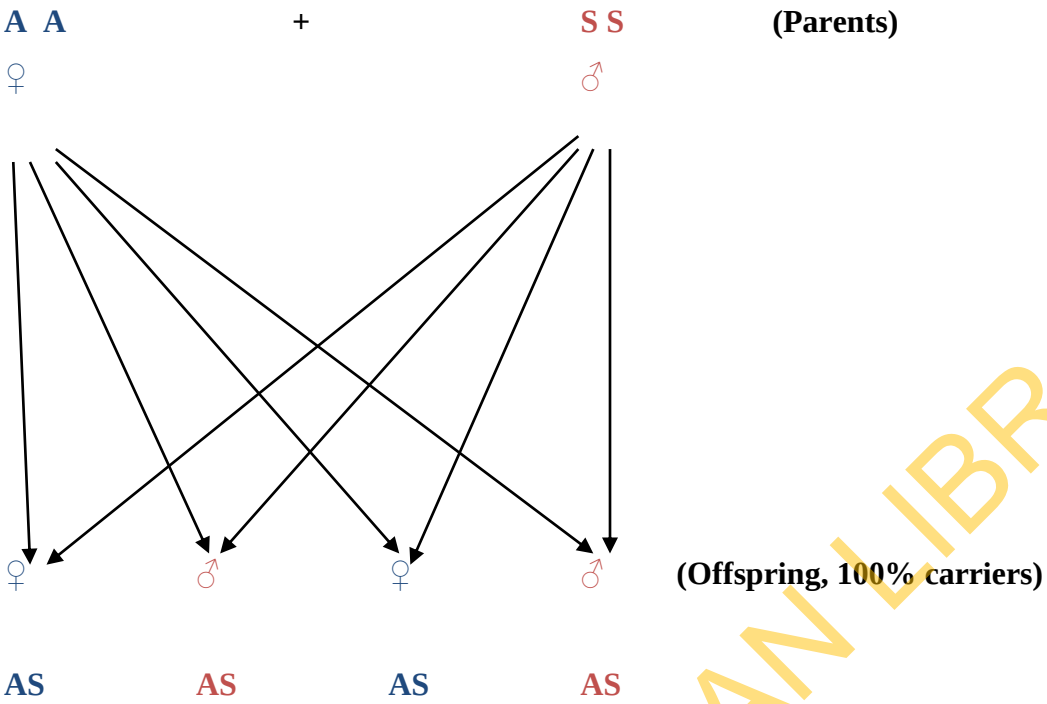
♀ ♂



♀ ♂ ♂ ♀

AS SC AS SC

(Offspring, 25% of being a carrier, and 25% of being homozygous carrier)

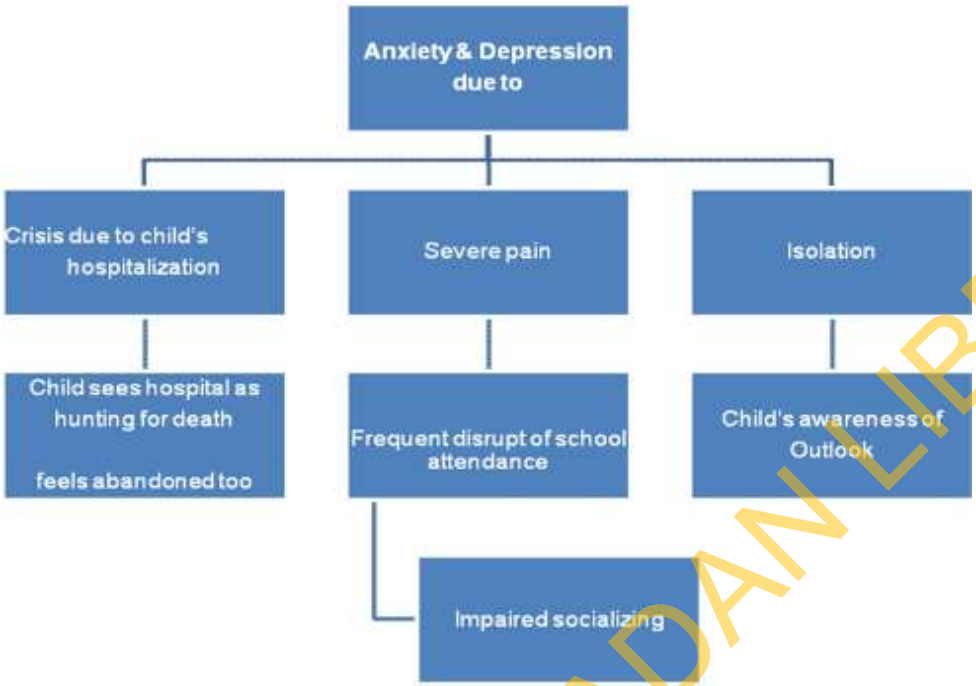


2.4 Health Consequences and Implications of Sickle Cell Disease

Sickle cell disease has implications on the physical and psycho-social health of the carriers, their families as well as the nation at large. Ilesanmi (2013) stated that, children who suffer SCD are often smaller and thinner than their healthy peers. They might feel less intellectually competent and agitated because they often miss school and suffer academic consequences. When children with SCD turn to adolescent years, they often suffer low self esteem which can yield social withdrawal and depression.

Sickle cell disease is also characterised by stigmatization. Those who have the disease are often stigmatized as a result of the effect of the disease on their physical outlook (Afolayan and Jolayemi, 2011). Biljana *et al*., (2008), reported that separation of child and parent (i.e. family separation) due to hospital admission is the first real crisis. Children feared that they are being abandoned by their parents, an overview of this is provided in (Figure 2.3). Hence, SCD has psychological and social demands as in other non- communicable chronic diseases. According to the global ranking of the burden of diseases (GBD), depressive disorders and heart related diseases are leading on the ladder of non communicable disease. These diseases have relationship with SCD (GBD, 2004, Afolayan and Jolayemi, 2011).

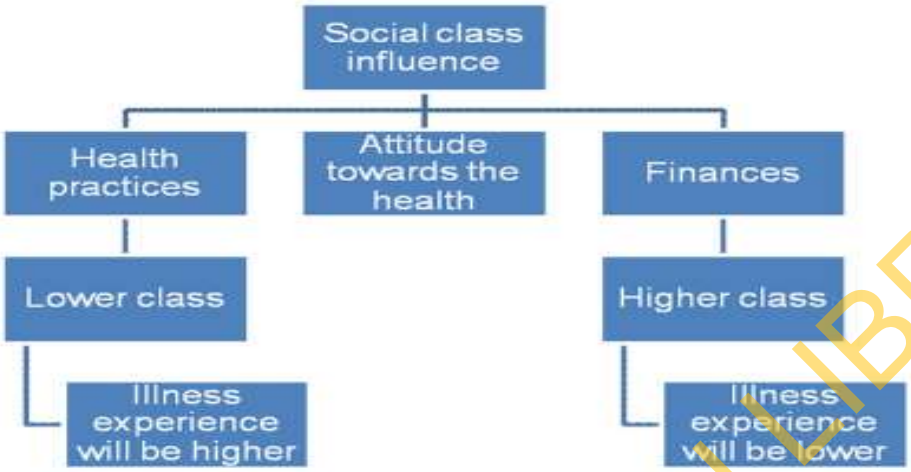
Figure 2.3: Psychological aspect of illness (SCD)



Source; Biljana, *et al.*., (2008)

Another consequent aspect of SCD is the quality of life in chronic illnesses, that is, maintenance of mental stability. This area is crucial for the carriers of SCD and their families. Psychological support will help the carrier and the family to adjust better to the situation and to develop positive thinking. The social class to which carriers of the disease and their family belong is very crucial, the figure below (Figure 2.4) shows that the higher or influential the class to which carriers of the disease belongs with their family, the lesser the illness experience because, financial resources could be more available to them compared with a family from the lower class. Also the social class can influence their level of exposure and enlightenment, which in turn has a significant contribution to health seeking practices. Therefore social class or financial stability can reduce or increase illness experience (Akodu, Disu and Njokanma, 2015).

Figure 2.4: Socio-economic aspect of illness (SCD)



Source; Biljana, *et al.*, (2008)

2.5 Complications of Sickle Cell Disease

Since sickling of the red blood cell is an abnormal occurrence and a disorder of the gene, it is usually accompanied by health challenges which can range between mild, moderate to severe or acute to chronic complications. Some of these complications are caused or elevated by infection (bacterial, viral and parasitic). The people who are carriers of SCD are also at risk for acquiring hepatitis C Virus (HCV) infection through transfusion of blood and urinary tract infection, UTI (Antwi-Baffour *et al*., 2014; Chukwu, Okafor and Ikemefuna, 2011). The following are a number of the complications of SCD documented by Bloom (1995), Serette, *et al.*, (2008), Okwi, (2009) and Anie, Egunjobi and Akniyanju (2010).

1. Gall stones: Gall stones occur in about 30 to 50 percent of children with SCD as a result of high bilirubin excretion due to haemolysis. The children may be symptomatic or asymptomatic. The removal of the gallbladder is recommended when symptoms such as nausea, vomiting, chronic right upper quadrant pain and fullness after meals start appearing.

2. Stroke in Children: This is a severe and sudden complication of SCD, which could occur with painful episode or an infection. It is caused by cerebral infarction or the blockage of oxygen supply to the brain by sickled cells. It occurs between the ages of three and ten years old, in six to 12 percent of children with SCD. Repeat strokes can occur in at least 60 percent of children who have ever suffered a stroke.

3. Jaundice: This is peculiar to almost everyone who has sickle cell disease. It is a mild complication whereby, the eyes may appear yellow or jaundiced. This is due to accommodation of waste product (called bilirubin), from the increased RBC haemolysis associated with SCD.

4. Acute chest syndrome (ACS): It results from the infections in the lungs cavity by bacterial organism. It is a serious complication similar to pneumonia. ACS has been reported in about 50% of sickle cell disease patients (Osbourne, 2011).

5. Sickle Cell Crisis (pain episodes): It is one of the signs and symptoms of SCD associated with pain and or shortage of blood (anaemia). The type of crises include vaso-occlusive crisis, caused by the obstruction of the vessels in the different parts of the body. The sequestration crisis results from the trapping of red blood cells in the spleen or liver. Lastly, the aplastic crisis, which is the acute reduction of red cell production in the marrow caused by parvovirus B19.

6. Priapism (painful abnormal penile erection): This is a persistent, unwanted erection of the penis that is often extremely painful. Specific causes are unknown. There is no way to predict who will develop priapism and impotence. Those who are experiencing repeated episodes are encouraged to avoid long periods of bladder distension, extended sexual activities and dehydration.

7. Depression: This is a situation whereby someone is unhappy or in a low morale for a period of time. Owing to the burden and resources that could be involved in the care and management of persons with SCD, the literature identified depression to affect persons with SCD and or their caregivers as well (Adegoke and Kuteyi, 2012).

The complications of SCD are not limited to the above, leg ulcers, Abnormal renal function (leading to rhabdomyolysis) and bone marrow failure include the rare pathological conditions which require early and proper management.

2.6 Gender and Sickle Cell Disease Complications

Gender is a socially constructed term referring to roles, behaviours, activities, and attributes that a given society considers appropriate for men and women, thus, it is culturally bound but historically persistent and encompasses physiology (Smith, 2006). Gender has implications in health seeking behaviours (Gough and Robertson, 2010). This was realised even in the programme carried out by Thomas (2012) between 2010 and 2012 for the sickle cell society of the United Kingdom (UK), to increase awareness on SCD. It was reported that fifty- percent (50%) of the fathers-to-be whose partners carry the sickle cell gene were not accepting the invitation to be tested.

Afolayan and Jolayemi (2011), found out from their study on parental attitude towards children with SCD that fathers are not as caring as the mothers, irrespective of the diagnosis or prognosis of their children. The health perception and differences between men and women (see Table 2.3) have been traced to their health behaviours and beliefs. Men compared to women are more reserved in issues pertaining to health care services and utilization (Bogle, 2013). Also, men are less likely to visit a general health practitioner than women (European Commission, 2011).

The significance of gender cannot be overemphasized in the various health concerns. Likewise, it is an aspect that is weighty for health research. More literature have been coming up on gender, but few have been on health specific problems such as SCD. Some complications of sickle cell disease affect specific gender, for instance, priapism, which affect the male as well as increased episodes of crisis during menstrual period in the female. Another importance of gender in SCD and its management is the onset of pregnancy and delivery.

Women with SCD are known to have high-risk pregnancies, mainly because of foetal risks. Pregnancy creates intense demands on a woman's body, and the normal physiologic changes of pregnancy and common complications like anaemia can easily

make the sickling of red blood cells worse. If blood vessels become blocked by sickled cells, body tissues may be deprived of oxygen and die. Even minor areas of damage in the placenta may reduce the amount of oxygen and nutrients available for the baby's growth in the womb (Ilesanmi, 2013). Ilesanmi, 2013, reported the following pregnancy related complications which may arise for the mothers;

- **Infections and thromboembolic events:** SCD complicates 0.1% of pregnancies but accounts for 1% of all maternal deaths (Villers, Jamison, De Castro and James, 2008). Not only women with SCD but also women with SCT. Women with SCT are known to be at higher risk of urinary tract infections during pregnancy and perhaps other infections such as pneumonia. They have double the risk of blood clots, further increasing the risk of thromboembolic events associated with pregnancy itself.
- **Cesarean Deliveries:** Women with SCD also have higher rates of cesarean deliveries.
- **Gall bladder problems, including gallstones:** Acute chest syndrome such as heart enlargement and heart failure from anaemia; Bone pain crisis worsen from the 2nd half of pregnancy to puerperium; Malaria; Increased number of blood transfusions.
- **Acute Sequestration Crisis:** Sudden massive blood cell destruction leading to acute anaemia; and Pseudotoxaemia (PET). The occurrence of PET during a crisis refers to raised blood pressure with feet and face swelling, which may lead to convulsions Pregnancy-related complications that can affect the baby include pre-eclampsia, eclampsia, preterm labour/birth, placental abruption, foetal growth restriction, miscarriage (0-30%), a low-birth-weight baby i.e. <2.5 kg; Still birth or Intra-Uterine Growth Restriction (malnutrition) affecting baby.

2.7 Methods of Diagnosing or Screening for Sickle Cell Disease

There are many ways of testing if an individual carries one or two abnormal gene or not, depending on the available resources. The following tests will reveal the presence of sickle haemoglobin; Haemoglobin electrophoresis, Solubility test, Sickling test, Blood film, Isoelectric Focusing (IEF), High performance liquid chromatography (HPLC) and so on.

2.8 Management of Complications of Sickle Cell Disease

If an individual's heamoglobin genotype testing reveals abnormality, early medical management must be sought. Pain from vaso-occlusive crises is the most common clinical problem experienced by patients with SCD, and often necessitates emergency visits to hospitals (Prabhakar, 2009). Drug therapy such as hydroxyuria, continues to be the primary form of treatment for acute and chronic SCD pain (Osbourne, 2011). Some other ways of managing SCD; Transfusion, Therapy Bone Marrow Transplantation, curative method, not readily available or generally acceptable and may be associated with several complications (Omoti, 2005, Obeagu *et al*., 2014), Experimental Treatment (Gene Therapy), Newborn Screening, Genetic Counselling, Patient and physician relationship or trust.

2.9 Methods of Preventing Sickle Cell Disease

Akinyanju (2009) stated that creation or strengthening of national sickle-cell disease control programmes within the framework of national programmes for prevention and control of non-communicable diseases is necessary in affected countries. Essential areas of work should cover; advocacy, prevention and counselling, early detection and treatment, data collection, surveillance and research as well as, community education and partnerships to boost knowledge and awareness.

Importantly, the preventive measure is that a man and a woman who have one defective haemoglobin genotype each and have the intention of procreating should seek genetic counselling services or avoid procreation. This is because the both of them are likely to give birth to a child who is a carrier of the disease (Okwi, 2009).

2.10 Access to Genotype Screening

Genotype screening is a process of determining the difference in genetic make-up of an individual through the examination of the DNA sequence, using biological assays and comparing it to a reference sequence (Chinawa, Manyike, Aronu, Obu and Chinawa, 2015). The haemoglobin (Hb) genotype testing helps to determine variant Hb. This particular testing or screening is important in establishing the presence of haemoglobinopathies (defective Hb) in an individual. Genotype screening can be performed at prenatal, natal and postnatal stages (Nwafor and Banigo, 2001). However, access to the genotype screening is limited by a number of factors such as lack of routine Hb screening programme, cost and ignorance. Inability to access early

Hb screening most especially, in resource limited areas have been reported to contribute to high mortality in carriers of SCD (Abdurahaman, Isaac,Erhaboh, Sanusi, Udomah, Ezimah, Mainasar, Wase, Uko, Adia, Iwueke, Ikhuenbor, Aghedo, Igbineweka and Balarabe, 2013).

Akodu, Disu and Njokanma (2015) reported that the average cost of Hb genotype testing is seven dollars in the recent time. This amount may be overwhelming to the average Nigerians who lived on less than a dollar per day. Akodu *et al*., 2015 also reported that the findings of their study on the patterns and factors associated with haemoglobin genotype testing among children in a teaching hospital in Lagos, showed that majority of the respondents never confirmed their haemoglobin genotype status before the survey, while upper socio-economic stratum was associated with younger age at Hb genotype determination. It can be concluded that access to genotype screening is limited and not very affordable, though the Federal Government designated certain sickle cell centre for services that include genotype testing (National guideline for the control and management of SCD, 2014).

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2.11 Genotype Screening Practices among young people

In a study carried out by Durotoye, Salaudeen, Babatunde, Bosah and Ajayi (2013) to examine the level of knowledge and perception of senior secondary school students on SCD and those that know their haemoglobin genotype, it was discovered only 26.6% of the respondents have good knowledge of heamoglobin genotype and Slightly above half (52%) knew their haemoglobin genotypes. A similar result was obtained from study of Oyedele, Emmanuel, Gaji and Ahure, (2015), to investigate the awareness and acceptance of premarital genotype screening among youths in a Nigeria community, where 52.7% of the respondents have been screened for their genotype. These findings are improvement on the outcome of the study by Bazuaye an Olayemi, (2009), to assess the knowledge and attitude of senior secondary school students in Benin City, in which only 32% of the respondents knew their genotype.

This later result was probably due to more awareness and information. Iweriebor, (2015) concluded based on the result of the article reviewed by her that young people

have limited knowledge, negative attitude and practices of premarital or prenatal genetic testing, which include haemoglobin genotype screening as a result of lack of knowledge, non-accessibility and non-availability of the genetic testing equipment. Olubiyi, Umar, Ajiboye , Olubiyi, Abioye, (2013), discovered that almost all (90.3%) of the respondents knows their genotype. Although this was a university based study, high result is likely to be obtained, because most tertiary institutions demand that students carry out certain blood testing like the haemoglobin genotype testing during the university registration exercise.

2.12 Awareness and Knowledge of young people relating to Sickle cell disease

The contributing factors to the common challenges to sickle awareness are; low education and health literacy levels, high rates of poverty, limited access to insured health benefits and health information, as well as language and a perception that sickle cell is an "African" disease amongst the Latino (Siddiqui *et al.*, 2011). Study conducted by Omolase, Omolase and Agborubebe (2010) to determine the awareness of sickle cell disease among youth corps member in Owo, South-west Nigeria showed that most of the respondents (97.4%) were aware of sickle cell disease, 30.1% knew through the aid of lectures and seminars, and that 69% were aware of their haemoglobin genotype.

The finding from the study conducted by Durotoye *et al.*, (2013), on the level of knowledge of secondary school students in Ilorin metropolis on SCD and haemoglobin genotype, revealed that there were there were more females 54.4% than males 45.5%. About 79.5% of the respondents have heard about SCD, but only 26.6% of them have good knowledge on SCD and haemoglobin genotype. It was stated that 23.2% gave blood group as their genotype. Also, those who knew their haemoglobin genotype before the study had good knowledge score (p-value = 0.035) and that females had better knowledge score. However, they recommended the need for continuous awareness programmes on SCD especially for males. They mentioned as well that government should make a concerted effort to make genotype testing compulsory part of pre-secondary school entrance requirements.

From the descriptive study carried out by Bazuaye and Olayemi, (2009) in six private Schools in the urban centre of Benin City Edo State, Nigeria with a sample size of

920 senior secondary students. The results showed that Male to female ratio was 39.1% and 60.9%. Less than half of the students 32% claimed to know their Hb genotype while 55% have no idea and 12.9% have a wrong idea of claiming their blood group to be Hb genotype. As low as 18% of respondents have correct idea about SS disease, 48% had wrong idea while 34% had no idea. 36% had some/correct idea of the need for premarital Hb genotype screening while 54% had wrong idea and 10% had no idea. They concluded that there is poor knowledge amongst senior secondary school students in Nigeria about sickle cell disease and education of the citizen which should start as early as at the level of secondary school.

The work of Osbourne, (2011) on SCD awareness amongst college students with females (69.3%) outnumbering the males (30.2%), disclosed the fact that the students have good knowledge on SCD, where approximately 92.7% of the participants were able to identify sickle cell disease as being an inherited blood disorder. Eighty-one percent of the participants knew that sickle cell disease evolved from Africa. Interestingly, 84.9% of the participants were able to identify the clinical manifestation of sickle cell disease. Out of the total number of participants, 94.2% correctly identified that no cure for sickle cell disease exists along with 91.1% of the students correctly identifying populations most at risk of developing sickle cell disease.
Only 78.8% of the students could identify that sickle cell anaemia is a medical condition in which the red blood cells develop an unusual shape, and 89.2% identified the appropriate time to test for sickle cell disease. On the other hand, only 17% of the participants were able to identify the number of new births born with sickle cell disease and 43.6% of the participants were able to identify the appropriate steps to take for women of childbearing age diagnosed with sickle cell disease. Osbourne, (2011) observed that studies had focused on the biological genetics of this disease, but not much research has specifically addressed the awareness of this disease in all populations. Further studies are needed to address the effectiveness of intervening media campaigns to increase sickle cell awareness.

The study conducted by Olubiyi *et al.*, (2013), to determine the knowledge and attitude of 93 undergraduates of Ekiti State University towards sickle cell disease and genetic counselling before marriage. There were more females 58 (62.4%) compared to Male 35 (37.6%). The importance of the study was to detect the carrier genes that

might affect the health of future offspring and reduce the number of people suffering from sickle cell disease and to sensitize health workers on improving people's knowledge about genetic counselling. Ninety three respondents were adopted for the study. The findings revealed that majority 97.8% of the respondents had high knowledge about sickle cell disease, 90.3% knows their genotype, 77.4% believes that sickle cell disease can be eradicated through premarital genetic counselling and 94.6% had positive attitude towards genetic counselling before marriage. The conclusion was that, the high knowledge about sickle cell disease as translated into positive attitude towards genetic counselling before marriage; hence, creating more enlightenment through health education, seminars and media will go a long way in helping to eradicate sickle cell disease in the country.

The initiative by Iyamide Thomas between 2010 and 2012, through the Sickle Cell Society, the United Kingdom, to raise awareness highlighted three reasons for doing so, these are; low awareness on SCD among Africans and the Caribbean, little or no knowledge on how the disease can be inherited as well as lots of myths and stigma. It was also discovered that 50% of fathers-to-be whose partners carry the gene did not accept their invitation to be tested, 74% were said to know before that a blood test exist for sickle cell, 53% of the respondents do not know their status and 90% were of same opinion that screening be offered to both men and women before they contemplate having a family.

Olatona *et al.,* (2012) carried out a study to determine the effect of health education programme on the knowledge and attitudes to sickle cell disease and its screening among unmarried NYSC members in Lagos State. It was a quasi-experimental study. Multistage sampling technique was used to determine 239 respondents in the intervention and 212 in the control groups. It was mentioned that the females were more than 50% for both groups. Baseline information was obtained, after which health education programme was provided on sickle cell disease and screening. Genotype screening was offered free of charge for willing participants in the intervention group. Post intervention data was collected using the same questionnaire three months later.

At baseline, the proportion of the respondents who had good level of knowledge was low (25%). The post-intervention result showed that knowledge of sickle cell disease

increased (64.1%) with health education. The researchers believed that health education of youth corps members was significantly effective in improving their level of knowledge and recommended that sustained health education through school curriculum, mass media and health institutions is relevant to influence new graduates to have better knowledge and attitudes towards sickle cell disease. This will enable them to make informed decisions about pro-creation later in life.

2.13 Attitude of young people towards sickle cell disease

Responses from the study of Bazuaye and Olayemi, 2009, revealed that, 18% of the students will show wrong attitude towards patients with Hb SS while 66.9% will show good attitude and 15.1% have no idea. While over half of the students, claimed that they will exhibit good attitude towards patients with the disease. About 18% will stigmatize and show wrong attitude to patients with SCD. They affirmed that such attitude is very worrisome as people with SCD are called several names, treated as patients with communicable disease and some may become psychologically depressed, with some level of stigmatization. There is need for some legislation about premarital screening of Hb phenotype. This finding was similar to that of Durotoye *et al.*, (2013), where it was recorded that attitude of the respondents was poor. As many as 51.0% will not be willing to accept sickler as a friend and majority 90.3% will not be willing to marry SCD patient.

2.14 Summary of Literature review

The majority of the literature reviewed in the course of this study, which included the studies conducted in the last five years and recently have been centred on young people in secondary schools and the universities. There were few published studies focusing on the knowledge and practices pertaining to haemoglobin genotype of youth corps members. This study harnessed the fact that majority of the respondents in the previous studies were within the reproductive age, that is, 13 years and above as well as the notion that most of them would have learnt a particular thing about SCD. Nevertheless, this study exploits the NYSC platform and members as the respondents whom their knowledge were assessed on areas such as, inheritance pattern of SCD, management, prevention, attitude and willingness to undergo genotype screening. The information from this study will contribute to the existing body of literature for potential intervention strategy.

2.15 CONCEPTUAL FRAMEWORK

2.15.1 Health Belief Model

The Health Belief Model (HBM) is a tool that scientists use to try and predict health behaviours. The model was originally developed in the 1950s by Rosenstock and updated in the 1980s by Becker (Basavanthapa, 2008). The model is interactive as it is based on three dimensions; Individual's readiness to comply with recommended action based on perceived threat, the motivating and enabling forces that determine what an individual will do and lastly, the compliance behaviours executed. It is based on the theory that a person's willingness to change their health behaviours is primarily due to the following factors, summarised in (Figure 2.5).

The HBM is the most suitable for this study because all the tenets of the model can explain and predict the health behaviours of Corps members in relation to their knowledge of SCD, their susceptibility to being a carrier of the disease, the severity and benefits of intervention, they are likely to have good attitude and act by undergoing genotype screening or testing having considered the modifying factors such as age, gender, level of education and so on. The tenets of this model have been used in predicting likely questions which can aid in answering the objectives of this study.

Perceived Susceptibility: refers to a individual's perception that a health problem is personally relevant or that a diagnosis of illness is accurate. In this case, the youth corps members may have little information or may not perceive themselves as being at risk. They will adhere and practice preventive measures if they have the knowledge that they might be susceptible, because they do not know their genotype status.

Perceived severity: This explains that action will not occur unless the individual perceives the severity to be high enough to have serious untreated or social complications. If every Corps member understands the consequences of sickle cell crises to include that two carriers of the trait, if married are likely to give birth to a child with Sickle Cell Anaemia, repeated infections, retarded growth, absence from school, repeated hospitalization, and that they will need to spend so much money. The Corps members are likely to make responsible decisions.

Perceived benefits: refers Corp members' belief that a given treatment or procedure will cure the illness or help to prevent it. The benefits of practicing preventive

measures such as going for genotype screening, so that people will know their status and will be able to make informed decisions as a result of the status .

Perceived Constraints: refers to the complexity, duration, and accessibility of the treatment or the screening. There are barriers that can hinder Corps members from practicing preventive measures; lack of information, finance, and access to screening facilities, myths and misconceptions, are part of these barriers.

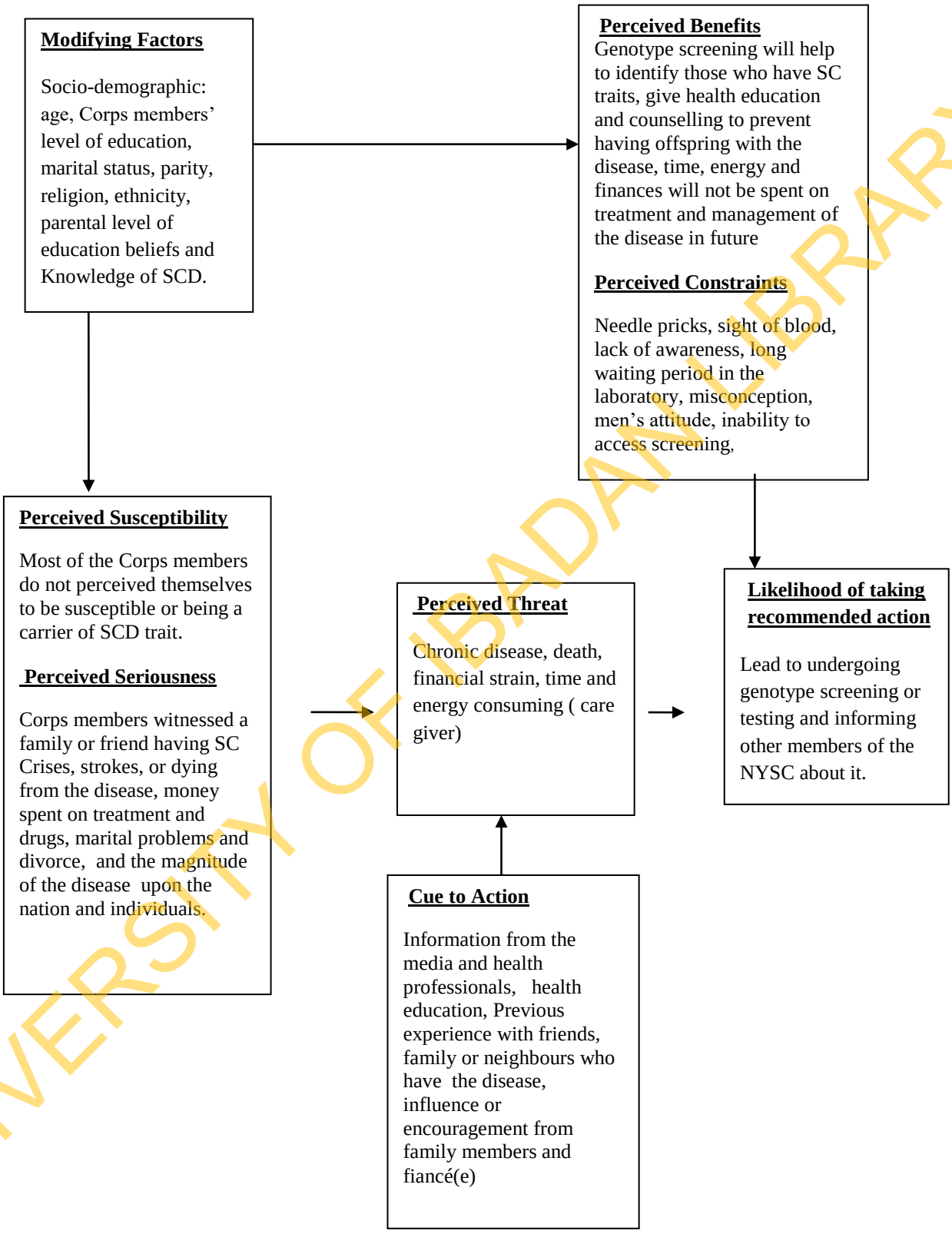
Cue to action: denotes the factors that activate one's inner drive to change or make someone ready to change. There are external events that prompt a desire to make a health change for example posters about sickle cell, presentation on Television/radio set about the benefit of practicing preventive measures. A visit by Sickle Cell Association, the factors that would give encouragements to Corps members, enhance positive attitude towards prevention of sickle cell disease through screening and preventive measures.

Self-efficacy: beliefs are cognitions that determine whether health behaviour change will be initiated, how much effort will be expended and how long it will be sustained in the face of obstacles and failures. Self-efficacy influences the effort one puts to change risk behaviour and the persistence to continue striving despite barriers and setbacks that may undermine motivation. The confidence that Corp members have after weighing the severity and the benefit will drive them to practice preventive measures. These measures include; them going to check their genotype, going for genetic counseling.

Predicted relationship

The HBM assumes that people are more likely to change their behaviour if, they know what the behaviour is (awareness) and how to perform it (knowledge and willingness), also if they feel they are in control of the behaviour and have the relevant skills, they observe the behaviour being practiced by people they consider to be role models and finally, if the behaviour is reinforced and encouraged (Hamulandabala, 2012).

Figure: 2.5 Application of the Health Belief Model on SCD



Reference: Adapted from, Hamulandabala, (2012).

CHAPTER THREE
METHODOLOGY

The methodology of research deals with the research design, study setting, target population, sampling technique and sample size determination, the instrumentation and the procedure for data collection, analysis and ethical consideration.

3.1 Study Design

The study design was a descriptive cross-sectional study, designed to investigate National Youth Service Corps members' knowledge on sickle cell disease and their willingness to undergo genotype screening.

3.2 The Study Area

The study was carried out in Oyo State, one of the six states in the Southwest geo-political zones in Nigeria. The study area is Ibadan North Local Government Area (IBNLGA) which has its secretariat situated at Agodi, Gate. Ibadan North Local Government Area covers an area of 27 square kilometres and it shares boundaries with other Local governments i.e., Akinyele Local Government Area in the north, Dugbe/Onireke in the North-west, bounded in the North-East by Iwo road, in the South –West by Oluyole Estate and South-East Local Government by Mapo Hall.

The study area has a population of 306,795 inhabitants, according to the 2006 population census. The inhabitants of IBNLGA are mainly the Yoruba-speaking people. A large number of the adult population are in the private businesses, mainly trading and artisans. Some of the general population, who are workers in the civil service, live predominantly around Bodija Estate, Agbowo, Sango, Mokola, the University of Ibadan and the Polytechnic of thirty-three Local Government Areas.

There are two major tertiary institutions in IBNLGA, that the University and Polytechnic of Ibadan, It has several secondary schools and primary schools (private and government owned). Also the University College hospital, a primary health centre and other private health facilities can be found in the study area. Social amenities and recreational centres are situated in this Local government as well. The IBNLGA is one of 11 zones in Oyo State. Each zone has eleven National Youth Service Corps (NYSC) Inspectorates.

The study area was chosen purposively, and reasons for focusing on IBNLGA inspectorate are because it has one of the largest social and economic facilities in Oyo State, as well as tangible population according to the statistics of NYSC posting in that inspectorate (see Table 3.1). It is located near the Oyo state NYSC headquarters. Corp members usually prefer the area for the economic and social conveniences. The large population was suitable for sampling the respondents and is recommended for huge population based study.

3.3 Study Population

The study population is consisted of male and female Corpers who were currently carrying out their primary assignment in Ibadan North Local Government Area of Oyo State, through the NYSC scheme.

3.4 Inclusion Criteria / Exclusion Criteria

Non- youth Corps members and youth corps members who were not serving in IBNLGA were excluded from the study. Only the youth corps members in batches A and C were included in this study.

3.5 Sample Size Determination

The sample size for this research was calculated using the formula by Kish and Lisle, (1965), that is; $n= Z^2pq /d^2$

n = sample size collected or minimum sample size

D= degree of accuracy set at 0.05 (precision set at 5%)

Z= standard normal deviation set at 1.96 normal interval (95% confident interval)

P = the proportion of the target population estimated to have a particular phenomenon of interest in the study. The significant value of p for this study is 30%, according to what was estimated for the prevalence of Sickle Cell trait in West Africa and Nigeria (WHO/AFR/RC/60/8, 2010; Anie, et al., 2010).

Q= proportions that does not have the characteristics being investigated (q= 1-p), q= 1-0.3=0.7

Therefore, the sample size $N= (1.96)^2\times0.7\times0.5/ (0.05\times0.05)$

$n= 3.8416\times0.7\times0.5/0.0025$

n = 0.807/0.0025

n = 322.8

Approximately, 323

A non-response rate of 10% of 322.8, that is, 322.8 x10% = 32.3 approximately 32. Therefore, 32 will be added to sample size calculated to make the sample size 355 in order to address any possible case of incomplete response or attrition.

3.6 Sampling Technique

A stratified random sampling technique was adopted for this study. Two stages were involved in the sampling of the respondents. In the first stage, the Corps members were stratified according to gender. The sampling frame, that is, the list of all the Corps members posted to IBNLGA to carry out their primary assignments, was obtained through permission from the Ibadan NYSC zonal coordinator's office. Corps members in batches A and C only were available during the collection of data. The sampling frame is shown below in Table 3.1.

Table 3.1: N.Y.S.C Ibadan North Zone Corps Disposition

	MALE	FEMALE	TOTAL
BATCH A	314	332	646
BATCH C	260	363	623
GRAND TOTAL	574	695	1269

Source: N.Y.S.C. Zonal Office, Oyo State

At the second stage, proportionate sampling method was used to select sample from each stratum (male or female), according to their population (see Table 3.2). Thereafter, the respondents were randomly selected from among the total population until the required sample size was reached. The calculation is shown below.

n_1 = Total number of Male Corps Members (314 + 260) = 574

n_2 = Total number of Female Corps Members (332 + 363) = 695

Let N represents the total number of Corps members in IBNLGA (batches A and C) = 1,269

n = Study population = 355

Table 3.2: Proportional Allocation for Each Stratum

Stratum	Calculation	Size
Male (n_1 = 574)	574/1269 × 355 = 160.6	161
Female (n_2 = 695)	695/1269 × 355 = 194.4	194
Total (N = 1,269)		n= 355

The study involved only Corps members in batches A and C who were available at that time.

3.7 Instruments For Data Collection

Both qualitative and quantitative instruments were used for data collection. Some of the questions on both instruments were obtained from the literature and through the professional views of the supervisor.

Focus Group Discussion (FGD) guide (qualitative instrument) was designed to elicit information from the corps members in an interview or discussion manner. The FGD guide had two sections. The first section was the introduction part, while the questions for the discussion formed the second part, and these questions were discussed in themes. There were some questions on the quantitative instrument formulated from the important notes gathered from the FGD such as Special CDS (Awareness section), difference between genotype and blood group (Knowledge section), question 44 (Attitude section) as well as question 54b and 54c (willingness) see Appendix 2.

The quantitative instrument was self-administered and semi-structured questionnaire. The questionnaire contained five sections, namely; the socio-demographic information, awareness of respondents on SCD, knowledge of Corps members on SCD, attitude of respondents towards SCD, lastly, willingness of Corps member to undergo genotype screening. A coding guide was drafted together with the questionnaire.

The questionnaire was written in English language, which is the language of communication of the Corps members who were expected to have gone through different stages of education. Research assistants were adequately trained with the

questionnaire to understand the content as well as to handle likely challenges that may be faced by any of the respondents in relation to comprehension.

3.7.1 Validity of the instrument

The draft of the questionnaire was developed through consultation of relevant literature, review by experienced researchers to ensure face and content validity. Comments from supervisor were used to further fine-tune the instrument. The step taken to ascertain the validity of the study instrument before the commencement of the study was that the instrument was pre-tested among Corps members in Ibadan South-West Local Government Area which shared similar characteristics with Ibadan North Local Government. Necessary corrections were effected based on the analysis of the pre-test. Some of the questions (question 50b and 50c) were formally open-ended, but were changed to close-ended to facilitate appropriate responses.

3.7.2 Reliability of the instrument

The questionnaires used in pre-testing were coded and analysed using Cronbach's Alpha correlation coefficient Statistical Package for Social Sciences (SPSS) version 20. Alpha (Cronbach's) is a model of internal consistency, based on the average inter-item correlation. According to this approach, a result showing correlation coefficient equal or greater than 0.05 is said to be reliable. The data was entered into SPSS and analysed, the Cronbach alpha technique gave a reliability of 0.70.

3.8 Data Collection Procedure

Qualitative data: The FGD involved three heterogeneous groups (female and married, male and single, female and single). Each group had six participants, except for the male and single corps members' group which had eight discussants. All the participants had same characteristics (gender and marital relationship status). The FGDs were conducted with the help of two research Assistants. One of the research assistants acted as the time keeper while the other recorded the important points during the discussion. The researcher moderated the discussion. The FGD guide was used to discuss the themes of the discussion after their consent had been obtained adequately. Certain points from the FGD were noted in order to coin out a number of questions as well as a few options allotted to some questions in the quantitative instrument.

Quantitative data: The researcher and five research assistants who had been trained with the content of the questionnaire were involved in quantitative data collection. The data was collected in two weeks on two different days (Wednesday and Thursday). The research assistants were assigned to the different locations where the corpers held meetings within the IBNLGA Secretariat on each day. Data was collected twice in a week, for two weeks. In the first week, five research assistants distributed the questionnaires and in the second week, four research assistants were involved in the data collection.

The quantitative instrument (questionnaire) was distributed randomly to the consented male and female Corps members. Data collected was verified onsite for errors; the tape recorder was played to check if the information from the discussions was recorded, while the responses on the questionnaires were checked. Data was safely guarded and stored for use thereafter.

3.9 Data Management and Analysis

Qualitative data analysis: The recorded FGD was played again to ascertain that it was well saved. It was transferred from the tape recorder to the computer system for better audio presentation. The voice notes were played over several times for clarity after which, each was transcribed on the paper. Similar opinions from the participants were collected as well as varying views. The opinions were then analyzed thematically, using content analysis and triangulated with the quantitative result. Each opinion was put in italics form, including the speaker's means of identity for easy comprehension and identification.

Quantitative data analysis: Serial number was assigned to the questionnaires. Each of the questionnaires was carefully checked to ensure correctness of response. Coding guide was developed and used for coding the responses as well as the mark allotted to each question, (see Appendix 6). A mark was assigned to every correct response. The overall mark or point for each respondent was used to calculate the levels of knowledge, attitude and willingness respectively. Knowledge, attitude and willingness questions were assigned a scale, in order to categorize each according to specific levels.

Statistical Package for Social Sciences (SPSS) version 20 was used for data entry, cleaning and analysis from which descriptive statistics were obtained. Gender opinions were analyzed for gender sensitive variables under socio-demographic information, attitude and willingness sections using univariate analysis only (see Tables under result chapter in section two). The levels of knowledge, attitude and willingness were analyzed based on the number of questions allotted to measure each section. The results of two questions (questions 17 and 18), see (Appendix 6) in the awareness section were discussed under the knowledge aspect, because they were assessing knowledge more than awareness. These two results (Figure 4.4.4) were not included to calculate the knowledge level.

Bivariate analysis, that is, Chi-square test was employed to describe associations between non-categorical variables like age, sex, discipline and categorical variables such as, the level of knowledge, the willingness category as well as, between categorical variables as stated in the hypotheses, at 5% level of significance. Logistic regression was used also to further elicit the significance (odds ratio) of the associations when the null hypotheses were rejected. Binary logistic regression (multivariate analysis) was used to analyze dependent variables such as level of knowledge, willingness of Corps members to undergo genotype screening against independent variables like age, sex, marital status, religion and discipline.

3.10 Ethical Considerations

Ethical approval was obtained from the Ministry of Health, Oyo State Research Ethical Review Committee. Permission was also taken from the Oyo State NYSC headquarters. Also from the Local Government Inspectors (LGIs) in charge of the Corps members, as regards, Ibadan North Local Government Area of Oyo State, before approaching the Corps members for the study. The study also took into consideration, ethical principles such as, Informed consent, statement of confidentiality, beneficence and non-Maleficence. The respondents were assured that anonymity and confidentiality would be maintained on the information provided by them for the study.

The study was risk free without any invasive procedure or interventional activity. Permission was sought from the Corps members before tape recorder was used for the

FGD. Serial number was used only to identify respondents on questionnaires. Data was strictly safeguarded from third party, while information sharing was within researcher and research assistants only. The findings of this study will be made available to the National Youth Service Corp Inspectorate, Ibadan North Local Government. The information will help corps members to understand their Sickle cell knowledge profile and also improve on the care and posting provided to the Corp members who may be carriers of SCD, as well as encourage haemoglobin genotype screening.

CHAPTER FOUR
RESULTS

This chapter outlined the results of this study in two sections. Section one contains the qualitative result that is, thematic analysis of the Focus Group Discussion (FGD) while the other section includes the qualitative results (univariate, bivariate and multivariate analysis).

4.1 Section One: Qualitative Analysis

The opinions of participants during the focus group discussion are highlighted in this section thematically. There were three heterogeneous groups (married female corps members - FMC, male and single corps members -MSC, female and single corps members – FSC). The main issues discussed here are; Participants' awareness on SCD, knowledge of participants on SCD, attitude of participants towards SCD, genotype screening and willingness to undergo genotype screening. The participants willingly contributed to the discussion at one point or the other but there were instances where they were randomly called up to participate in the discussion.

4.1.1 Awareness of Participants on SCD

Awareness of Sickle cell disease

Virtually all the participants in the three focused groups unanimously agreed that they have heard about Sickle cell disease. Though, one of the female and single participants could not say if she has heard about SCD until others began to speak, then she agreed that she was aware about SCD. The following statement represents the general remark.

"yes, have heard about it"

The importance of religion on respondents' awareness of Sickle cell disease

The participants, who were Christians across each group, mentioned that Churches have contributed to the awareness on SCD through pre-marital seminars and counselling usually organised for the youth, as well as intending couples. It was also

mentioned that these seminars have encouraged genotype screening. Below is the opinion that is similar to all their responses.

> *"....they say it in the church, they say it everywhere, if you are AS, don't get married to AS, so it's everywhere, so the religion, our religion too, also support that we shouldn't, AS should not marry AS".....*FMC2

The participants who were Muslims (one MSC and a FMC) opined that, it is the duty of the intending couple, to know their genetic compatibilities, so the Imam or mosque has little role to play in relation to SCD awareness, just as one of them stated,

> *"Have never been to a marriage like that. They don't really ask".*
> After further probing, he stated *"i don't really think so! That should be the affairs of the couple before taking that one [*marriage decisions*] to the mosque. The mosque did not have the right to ask them, it's just the right of the couple to know before coming for marriage*".....MSC6

4.1.2 Knowledge of participants on SCD

Opinions of Participants on Sickle cell disease

The majority of the participants in the three focused groups shared similar opinions about Sickle cell disease. They were of the view that SCD is inherited from the parents. The following are some of the opinions stated by a member from each group.

> *" I think the disease is as a result of emh, the parents, both parents, may be, not knowing or knowing their.....is it blood or genotype, or is it blood group, and still go ahead, like for example, someone, a man who is AS, still go ahead to get married to a woman who is AS, there is probability that they will give birth to children that is SS, shey you understand, so i think to prevent it, if a man finds out, he's AS, he should go for a lady who is AA".....* MSC2

"It's like a combination of two AS patients, like if a parent is AS and another is AS, and they come together, they give birth to SS and it's a delicate disease....." *FSC2*

"Same thing the people have told you, it's like a deadly disease".....FMC1

Impact of education on knowledge of Sickle cell disease and genotype screening

The impact of education was reported to have aided the knowledge of the corps members on either sickle cell disease or genotype screening. Both male and female participants agreed that the schools where they have attended, especially the tertiary institution had influence on their knowledge. The following are some remarks,

"Yes that one, biology. They thought us in genetics then! And they used to give us some exercise to cross, AS marry SS, SS....." MSC3

"Most Institutions ask for it now"...FSC6 When more clarification was required on this response, she said, "*that is, the institutions demanding for the test. For example, if you are going into a university, they are going to check your genotype, for them to know. For example, before you.....they will know what kind of medication to give you and how you are going to be managed....."* FSC6

Impact of parents on knowledge of haemoglobin genotype screening

Many single male and female participants agreed that their parents aided their genotype screening especially when they were young. Others were silent on the matter. The statements of those who spoke were brief, unlike amongst the married corps members, who alleged that their parents were concerned about their intending husband's genotype at the point of marriage, likewise a married female participant stated below.

".....Immediately you are meeting a guy, your parents would be asking you, first of all, have you done HIV test, have you checked you people's genotype to know if you are carrier, or having the same genotype, so that if you know it.

Instead of going through a relationship at the end of the day you break it, at the end of the day ..."FMC4

Signs and symptoms of Sickle cell disease

Only few participants from each group stated the signs and symptoms of SCD. The following are their opinions

*"Pale eye colour, kind of yellowish, they have this,...They are mostly skinny when you see them"...*MSC5

*"...they used to have this kind of green or yellow ...their eyeball is not normal,.. .*FMC6

Two married female participants and a male participant had similar responses as above, other did not utter a word.

Laboratory test for diagnosing SCD

Almost all the participants in the focused groups could not state the particular laboratory test, until they were probed about the importance of genotype screening. However, less than three participants responded across the groups. Below are some of their opinions.

*"There is always a time to go for it".....*MFC1

"Seriously, it's always confusing, I don't know the difference between blood group and genotype, let me just say".....MSC1

A member of the male group, offered some clarifications to the second speaker. In his words, he stated,

*"I think blood group is the, the A+, and all sort, while genotype is the AS and AA and the likes".....*MSC2

"Genotype screening I think is, when, emh, may be, it's what i don't know, well".....FSC1

A particular female participant said,

"Genotype screening is more or less like a test that is being undergo for both parties to be sure if they are compatible or not, so that, they know the advisory steps to take, and if they not compatible, they know what next to do"...FSC2

Management and prevention of Sickle cell disease

In relation to the management of SCD, majority of the participants across the groups had little or nothing to say about this. Although, the participants reported that sickle cell disease can be prevented only if a man and a woman who both have genotype AS would not marry each other in order to avoid the birth of a child who may have SCD. The following were some of the opinions expressed by the few participants toward the management of SCD.

"*Okay, am talking about the cure now, bone marrow transplant...bone marrow transplant, something like that*".....MSC3

"I will say, to manage a sickle cell patient, it will depend more on the facilities available, then the resources they have at hand, maybe getting to the doctor, then the person and the willingness to actually participate, you know, some people are not looking forward to the anticipation, if the person is actually looking to fight through it, and the person has the support of the parents, may be a reliable doctor, a consultant, they can use often".....FSC5

".....another way, emh, i heard from the news, emh, a radio program, that you can prevent it, they said if a woman is pregnant, you will go for a test, then..., there's this test they do, have forgotten the name of the test they will do. They will, they will check if the genotype of the emh, child to see. They will sha view it, then they will identify if the child is going to come up with an SS blood, you understand! They will now terminate that pregnancy".....FMC4

4.1.3 Genotype screening

The ideal time for genotype screening

Diverse opinions were expressed by participants across the groups, but the majority of the married participants were of same view that, an individual should go for genotype screening before he or she gets married. Although two of them said, there is nothing wrong with having the knowledge of one's genotype as early as adolescence. The male discussants mentioned, childhood, time of marriage as well as illness period. These views were similar to that of the single and female participants. The subsequent statements were expressed.

> *" well, people this day, most people believe , it's only when they want to get married, that's when they should go for genotype test, there's nothing stopping anyone from knowing your genotype, right from time"*. She pointed at one of them in the group and she continued"
> "*she got to know her genotype when she was in secondary school"*.....FMC3

> *"I said when you fall sick, when you fall sick, there are some certain drugs that your genotype would react to, so, they need to know your genotype or maybe there is need for blood transfusion, when you fall sick, ...*"MSC1

> *"I think there's really no ideal time a child should know his genotype. Like me, i knew my genotype since, so it was not really a problem for me. I think it's very important for an individual to know their genotype. It doesn't have to be when you want to get married, when you want to go to school, to a company (employment purpose), it's very important. Parents should enlighten their children about their genotype, it's very important"*.....FSC5

Views about having the knowledge of one's haemoglobin genotype before marriage

In the course of the discussion, each of the participants who indicated that, they were single or not yet married, were asked if they were in a relationship. All the single female participants indicated that they were in a relationship. Few participants from the male single group were not in any relationship. All those who stated that they

were in a relationship, knew their genotype groups and that of their partners whom they were in a relationship with. The married female corps members were probed if they had known their genotype before marriage. Only one of them mentioned that it was after she got married that she did the genotype testing. Nevertheless, they mentioned that it's important that people have the knowledge of their genotype status, before marriage.

> *"Well, it's very very.....it's okay, amh, probably because, to avoid some things you wouldn't like, some unforeseeable circumstance in the future, like giving birth to a sickle cell..emh, kid and all that, at least, you would have to save yourself some stress, financial, you know. Money and some mental problems or psychological strategies".....*MSC4

> *"I think it's important that you know your genotype, cos it will be unfair for the child you give birth to, if the child is AS* (meant SS) *, especially, when the child knows you could have prevented the situation. So people gets married out of love".....*FSC5

> *"There is nothing bad in it, it's just for you to know your status [abi], to know whoever you are going to choose to marry".....FMC6*

Barriers to the adoption of genotype screening

There were unanimous opinions and few other contrary views across the three focused groups. The participants suggested *ignorance, illiteracy, faith, fear and nonchalant or care free attitude*. A married female corps member mentioned *time*, while a male and single corps member stated that, *lack of access to medical facilities*, especially in the village, yet, another member of that group said that, *not knowing the difference between all the blood testing* could be a factor. Below are some of the responses.

> *"You know, some of them used to mistook or mistake, whatever! Genotype for HIV testing, I must confess, some believe that, if i go for my genotype, there's probability that, I will be told my HIV status ..."*MSC1

Not all the participants believed that the cost of the screening has any implication on people's willingness to undergo haemoglobin genotype screening.

> *"Cost is a problem, i think so"*.....FMC1

> *"Federal government should finance it naa, the cost of the doing a screening should be subsidized, HIV should be free, sickle cell, genotype testing should be free*.....MSC1

> *"Exactly"*.....MSC3 (approving the opinion of discussant 1)

While probing the competencies of the laboratory, a married corps member commented that,

> *"There are some hospitals, that don't have this accurate machine. Like, when i was in my clinic o, some people would say, i did the test, i have AA, i did it here, i have AS, i don't even know which one i have here*....." MFC6

Gender influence on genotype screening

The participants were probed on the notion that, men are usually reluctant in seeking health services which may include genotype screening or testing, a particular male participant felt that the statement was not totally true, there was mixed reaction, while a member of the married female group agreed to the statement.

> *"Guys don't like going for the test, they will be like, am perfect, it's you that has the problem. Even when a lady isn't getting to conceive, they will be like, 'lo yera e wo'* meaning *'go and check yourself', that me am okay, it may even be the guy that has the problem...."*FMC3

> *"It's relative, no, no, no. That cannot be generalized, that question cannot be generalized, I must confess, it's a thing, it's what, it's has to do with choice, if I want it, I want it, if I don't want it, I don't want it...."*MSC1

*"I think a woman, women are more conscious about it, men are more relaxed, so..."*MSC2

*"Since 2006, have never bothered myself to go and test myself, it's not as if it's painful or something, it does not even occur to me".....*MSC3 (he was referring to the first time he did the test, while he just got into the university)

4.1.4 Attitude of the participants towards marriage and adoption of a carrier of SCD

The disposition of the participants, married (female) and single (male and female) was diverse toward marrying or adopting a carrier of SCD. Though, similar views were expressed across the three groups in relation to the above discussion. Majority admitted that, they cannot marry someone who has SCD, or raise or help adopt a child with SCD.

None of the married female participants or single female participants agreed to help adopt or raise a child who has SCD or marries a person whose genotype group is HbSS, assuming their genotype is HbAA. The perspective was a contrary view with the male and single corps members on raising or help raise a child with sickle cell disease.

*"I can't o".....*FSC4 (on the marriage aspect)

*"No, I can't, cos, if i have a child that is SS, that's wickedness, i think, am being evil. Cos I count parents that give birth to SS as evil, cos at the end of the day, children cannot even do what they want in life, most of them, only few of them live long. Most of them die at their young ages, early stages in life".....*FSC5

He requested for clarification, "Is it like charity?" He continued after

*"why not, if i have the means to do that, i will, it's a matter of taking care of a sickle cell patient right?".....*MSC1

*"If I have the money".....*MSC4 (there was a little argument over this from other members of the group, just as with the married female group.)

The married female participants were deliberately asked, if they can raise or help raise a child that has SCD, because of their marital status, Most of them said 'NO', but a contrary opinion was expressed. Generally, it was noted that they were sceptical about caring for a child with SCD.

> *"It's somebody [the person]that gave birth to a child that can take care of that kind of child, not somebody that did not give birth to it".....*MFC3

> *"If there's money, i can o. If my husband have money, and i know that there's money.....*MFC4 (while she was talking, the other members of the group started murmuring and questioning what she was saying, one of them said *"it's not only about having money o, your time, it's not about money, it entails a lot of things"*.)

A particular married female participant was further probed to know, if she could care for her close relative (brother in-law) whom she mentioned that, he is a carrier of SCD and do not live with her. She stated,

> *"Eh! I can, by buying something, may be when the guy or the boy is in the hospital*, she stated further, "*how will i do it, with my own marital problem?".* MFC6

4.1.5 Means of promoting awareness on SCD and its screening among corps members

The participants across the groups alleged that, they can help in disseminating information about genotype screening, by informing people about its importance, as well as recommend them for the screening.

> *"Social media, social media, very important".....*MSC4

> *"That's corps members" ...*MSC2 asked for clarification. Then he stated *"we'll tell them in our PPA, when we get to our place of primary assignment".*

"Sure i can, if you're meeting with people, maybe am meeting people for the first time, you can just chip it in the conversation, just to make them to know" FSC5

"You tell them, tell them about it, and tell them the risk ahead. You know, some people, even though, you counsel them, tell them the risks, ahead, they will still do it, except, there is no need. Like my husband told his friend in the office, at the end of the day, they still went ahead with it. After all the counsel my husband did.....FMC2

There was a common agreement on public awareness as a means of promoting information about SCD. The single and married female groups unanimously agreed that the cost of genotype screening be reduced. The suggestions of the participants are stated below.

"Just the price, you want to reduce it for them...." MFC6

"There should be public awareness, you people in medical line, you should do radio jingle, let us know, do campaign, health campaign, let there be health campaign and there should be sickle cell....." MSC1

When the participants were probed for special CDS as a means of making awareness, only few of respondents, especially the males, had more idea about it. They stated that corps members in the medical special CDS used to organize enlightenment program.

"Those are the corpers-doctor naa, i think they have a CDS, a medical group".....MSC3

"People in the medical line"....MSC2 (concluded for discussant 3)

4.1.6 Willingness to go for or repeat the genotype screening/test

All the single male participants agreed that they can repeat the test. It was a contrary opinion amongst the married participants. Although, they stated that they have had Hb genotype testing and genotype result does not change in an individual. Therefore

they cannot repeat the test. But two of them added that they can repeat the test, if it were to be on NYSC camp, and at a cheap rate. Majority of the unmarried female corps members were not willingness to do the screening, for the same reason as the married ones.

"Genotype doesn't change, at all!"....MFC3

"Why not, cos am sure of myself, i know am AA, but just for confirmation".....FSC2

"I don't believe mine, i don't believe am AS, so have been looking forward for.....before the month end sha, i will go for ...." MSC3 (probably referring to a confirmation test)

4.2 Section two: Quantitative Results

This study had assessed the knowledge of National Youth Corps members on SCD as well as their willingness to undergo genotype screening. The quantitative results of this study have major implications for health planning, and these are discussed in this section. These will offer recommendations to address the gap in knowledge. The following were examined: socio-demographic information, level of awareness, attitude of respondents towards SCD and genotype screening, the willingness of respondents towards genotype screening as well as statistical associations between variables. Furthermore, some of the qualitative findings are discussed in relation to the quantitative findings.

4.2.1 Socio-demographic Characteristics

Table 4.1 shows the result obtained for the socio-demographics of the respondents. The total number of respondents was 355 and the mean age was 24.41±2.163, age ranges between 18 and 30 years. There were more female (54.6%) than male (45.4%) respondents. Only 28 (7.9%) respondents were married, out of whom four (2.5%) were male and 24(12.4%) others were female see (Figures 4.2). Out of the 28 married respondents, 18 (9.3%) of them who are females, have had children, while five male respondents have had at least a child (see Figure 4.3). Majority of the respondents are Yoruba (81.4%). Eighty-three percent of the respondents are Christians. In addition, majority (84.5%) had Bachelor's degree qualification. The respondents are from 21 states in Nigeria (see Appendix 4). Their discipline is shown in Figure 4.1, (more details can be seen in appendix 4).

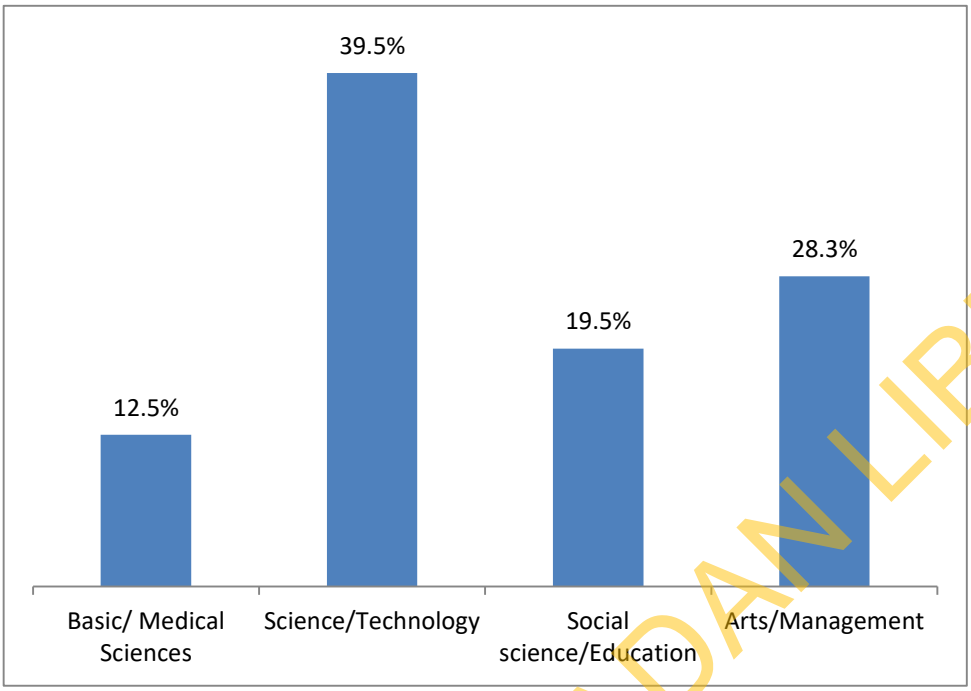
Table 4.1: Socio-demographic characteristics of the respondents (N=355)

Socio-demographic Characteristics	Frequency (n)	Percentage(%)
Age (N=355)		
18-22	62	17.5
23-26	234	65.9
27-30	59	16.6
Mean Age - 24.41±2.163		
Sex (N=355)		
Male	161	45.4
Female	194	54.6
Marital status (n=355)		
Married	28	7.9
Single	327	92.1
Do you have children (n=354) +		
Yes	23	6.5
No	331	93.2
Religion (N=355)		
Christianity	292	82.3
Islam	60	16.9
Others*	3	0.8
Ethnicity (n=354) +		
Yoruba	289	81.4
Ibo	31	8.7
Hausa	9	2.5
Others**	25	7.1
Academic Qualification (n=353) +		
Higher National Diploma	53	14.9
Bachelor's Degree	300	84.5

Others*: Traditional, Eckanckar. Others**: Idoma, Urhobo, Edo, Tiv, Estako, Delta-Ika, Ibibio, Igala, Berom, Ijaw, Isoko, Calabar, Uzianie, Ebira.

+ Non- responses were excluded from the study.

Figure 4.1: Discipline of Corps members



Note:

Basic/Medical science = Clinical science, Pharmacy and basic medical sciences.

Science/Technology =Natural sciences, Vertinary medicine, Technology and Agriculture.

Social science/Education = Environmental science, Social science and Education.

Arts/Management = Management sciences, Arts and Law.

Figure 4.2: Marital status according to gender (N = 355)

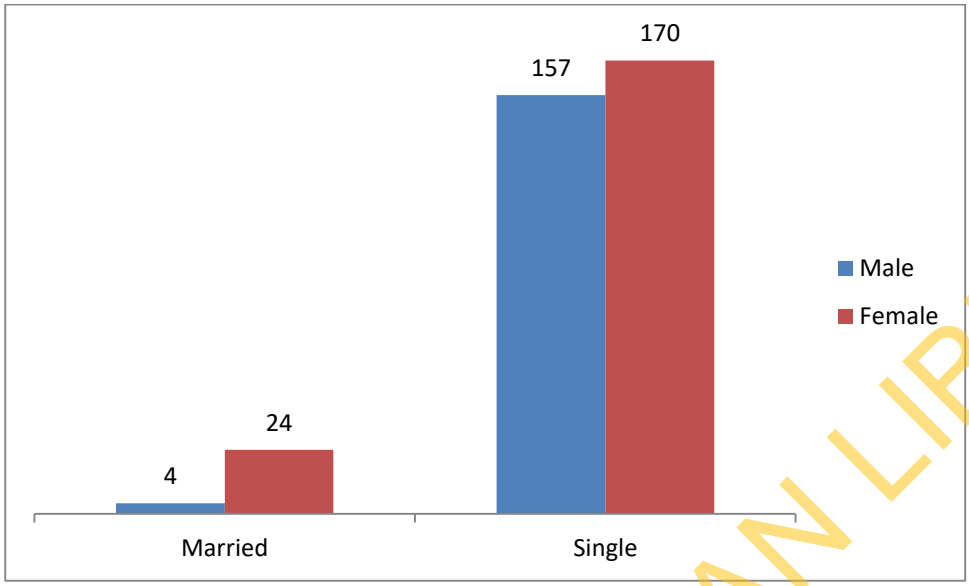
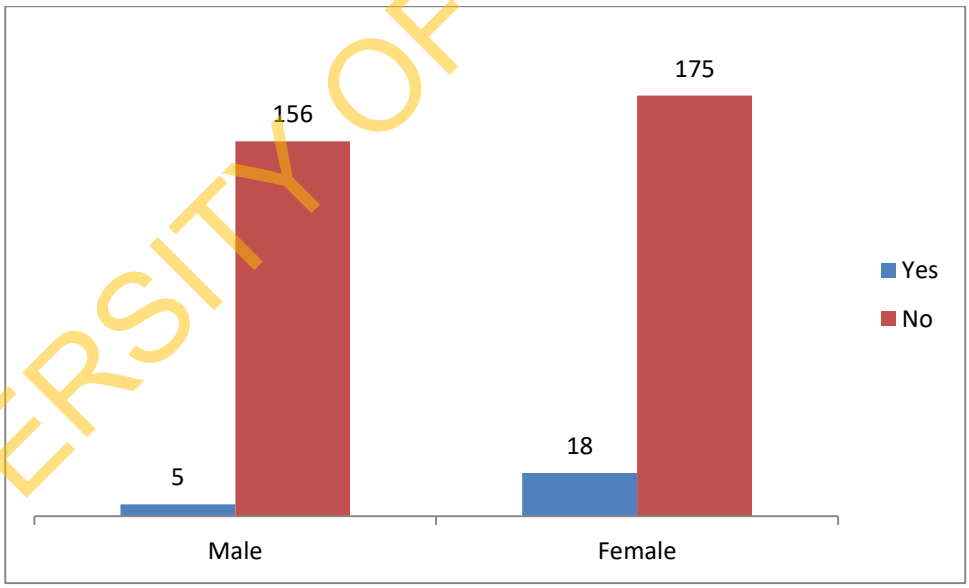


Figure 4.3: Parity or gender of respondents who have had a child (n =354)



4.3 Awareness of Corps members on Sickle Cell Disease

The results of the respondents for the awareness section are shown in (Table 4.2). Almost all (96.3%) of the respondents have heard about SCD, and this corroborates the report of the FGD. About half (50.4%) of the respondents became aware of SCD at childhood or when they were in primary school, this view is contrary to the account obtained in the FGD where participants were aware of SCD as a result of certain classes in the secondary school. The school (51.0%) and television (42.5%) were the major sources of information on SCD (see Figure 4.4), the former is in line with the report of the FGD.

Less than half (44.5%) of the respondents were able to describe SCD as anaemia, hereditary or consequent disease (see Table 4.2.1) and further details in (Appendix 5). Majority (89.5%) are aware of genotype screening. The prevalence of SCD in the families of the respondents was 10.1%. Also many respondents (62.3%) are familiar with other people who have the disease. Slightly more than half (52.7%) of the respondents lacked the knowledge of the cure for SCD. Figure 4.5, shows that blood transfusion (2.8%) and medication (2.3%) were mostly stated by those (12.4%) respondents who agreed that SCD has a cure.

Table 4.2: Awareness of Corps members on SCD (N= 355)

Awareness of Respondents	Frequency (n)	Percentage (%)
Have heard about SCD (n= 354)		
Yes	342	96.3
No	12	3.4
When did you get to know (n= 347)		
Primary school/childhood	179	50.4
Secondary school/adolescence	151	42.5
University/ recently	17	4.8
SCD is genetic (n=341)		
Yes	289	81.4
No	62	17.6
Do you know someone who have SCD (N=355)		
Yes	221	62.3
No	134	37.7
Does someone have SCD in your family (N=355)		
Yes	36	10.1
No	319	89.9
Is there a cure for SCD (n=341)		
Yes	44	12.4
No	307	86.5

Table 4.2.1: Description of SCD

Description of SCD (n= 158)	Frequency (n)	Percentage (%)
Blood Disease/Chronic /bone marrow /deadly/killer disease	52	32.9
Hereditary form of anemia/deficiency in the blood.	13	8.2
Abnormal formation of RBC into sickle / banana shape.	30	19.0
Person with SS genotype/ gene trait of SS	16	10.1
Genetic/metabolic disorder/dysfunction	21	13.3
Hereditary disease	7	4.4
Consequent disease/ occurs when a child inherits two defective genes from the parents e.g. SS,SC, CC.	19	12.0

Figure 4.4: **Source of information about SCD (N= 355)**

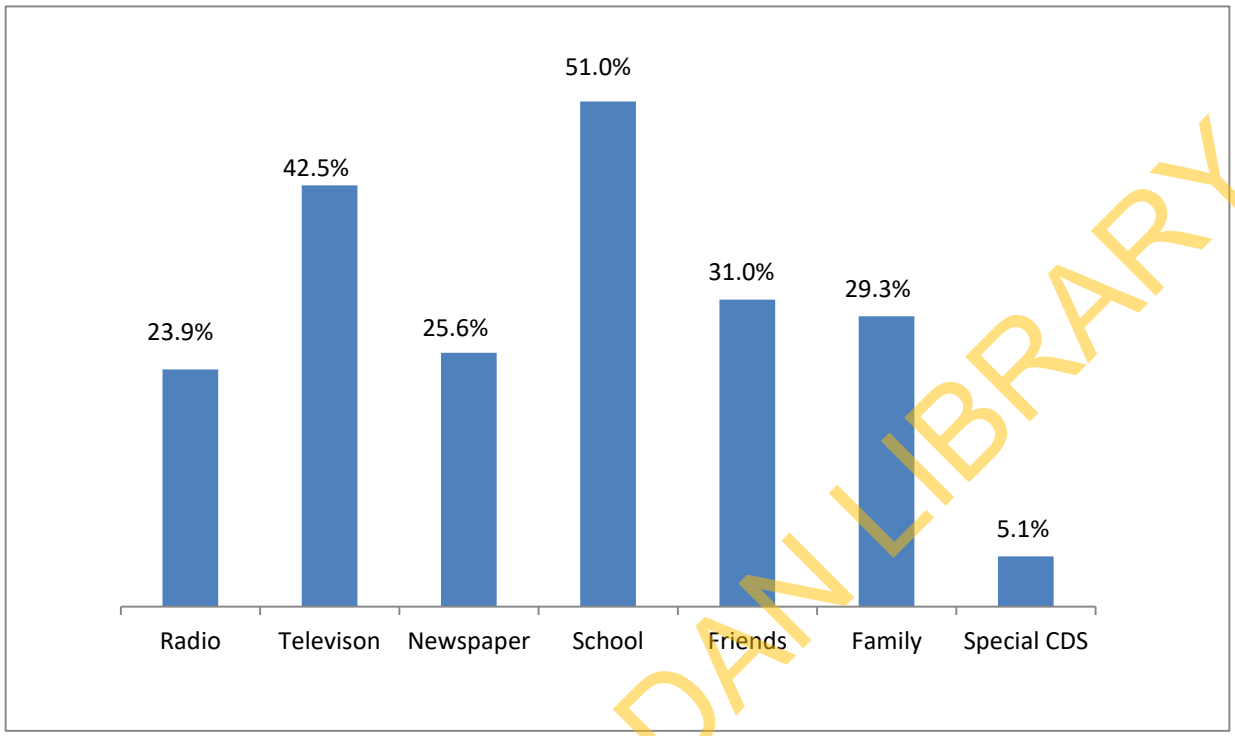
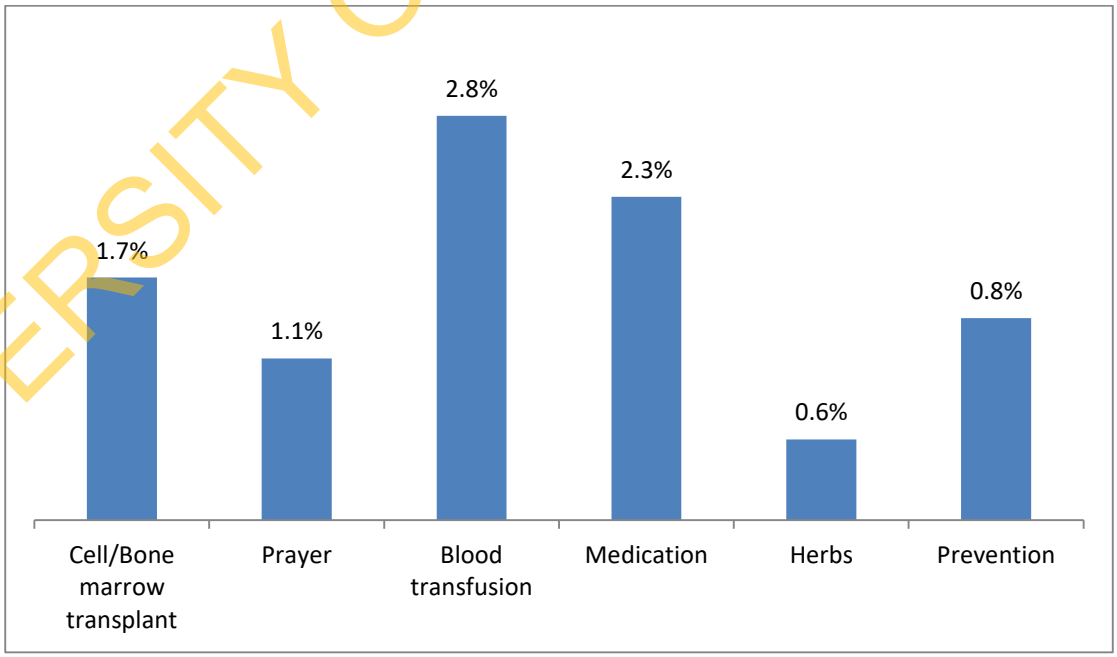


Figure 4.5: Cure for SCD, (n=35)



4.4 Knowledge of Sickle Cell Disease among Corps Member

Fourteen questions were used to assess the level of knowledge of the respondents. Two hundred respondents (56.3%) agreed that HbSS is a form of SCD and many (65.1%) reported bone pain and paleness of the eye (55.2%) as signs and symptoms of SCD (see Figure 4.6). The later result agrees with the account of few FGD participants. Majority (82.3%) agreed that SCD is not contagious or infectious while two-hundred and six (73.8%) respondents reported that genotype screening can be used to diagnose a person who has SCD. Majority (89.3%) admitted that genotype screening requires blood in a standard laboratory (71.3%).

Many (61.1%) reported birth or childhood as the ideal time, when one can go for genotype screening, in similarity to the period reported in the FGD by few participants. The majority (77.7%) of the respondents also reported haemoglobin type SS as one of the genotype groups in a multiple choice question. Over a quarter (38.3%) of the respondents agreed that genotype would not inform them about their blood groups and less than 44.5% could state the difference between genotype and blood group (see table 4.4.1.). This result supported the qualitative report in which about half of the participants in the three focused groups could not describe genotype screening, while few were also confused about the difference between genotype and blood group.

Three hundred and thirteen (88.2%) respondents agreed that if a man and a woman who are both carriers of the Sickle cell trait get married, they are likely to have a child with the disease. Less than half (41.1%) reported that the estimated life expectancy of a carrier of SCD as 35years. Seventy two percent of the respondents responded that SCD can be managed through medical check-up. A female and single discussant in the FGD gave a view in that line. Vitamin B-complex and Folic acid were mostly reported as the medications of a carrier of SCD, that is (36.6%) and (35.8%) respectively in a multiple choice question. Almost all (92.1%) responded that happiness is a consequence of preventing SCD. The level of knowledge of the corps members on SCD is 60.1% (see Table 4.4b).

Lastly, majority (81.4%) reported that SCD is genetic, however over half (56.1%) of the respondents agreed that it is hereditary. The report that over half of the respondents agreed that SCD is hereditary, supports the responses in the FGD, where between 2 and 3 respondents from each group described SCD in respect to heredity.

Table 4.4: Knowledge of Corps members on SCD (N = 355)

Level of knowledge	Frequency (n)	Percentage (%)
A form of SCD is (n= 247)		
HbSS	200	56.3
HaSA	18	5.1
Hbαα	17	4.8
HbAA	12	3.4
SCD is contagious and infectious (N= 355)		
No	294	82.3
Yes	61	17.2
Genotype screening diagnoses (N= 333)		
Sickle cell disease	262	73.8
Blood group/Rhesus factor	63	17.7
Arthritis	7	2.0
Blood poisoning	1	0.3
Genotype screening involves(n= 339)		
Blood	317	89.3
Urine	12	3.4
Water	9	2.5
Saliva	1	0.3
Genotype screening can be done in (n= 349)		
Standard Laboratories	253	71.3
General / Teaching Hospitals	62	17.5
School	20	5.6
Churches and Mosques	14	3.9
The ideal time for genotype screening (n= 333)		
Birth/Childhood	217	61.1
Before Marriage	73	20.6
Adolescence	42	11.8
After Marriage	1	0.3
Genotype informs you about blood group (N= 328)		
Yes	192	54.5
No	160	45.5
If a man and a woman both have the SCD trait marry, likely to have a child with the disease (n= 354)		
Yes	313	88.2
No	22	6.2
Don't know	19	5.4

Table 4.4b: Knowledge of Corps members on SCD (Cont'd)

	n	%
Estimated life expectancy for SCD (n= 279)		
90years	3	0.8
70years	20	5.6
40years	109	30.7
35years	147	41.4
How can SCD be managed (n= 330)		
Medical check-up	257	72.4
Immunization	39	11.0
Radiotherapy	29	8.2
Others*	5	1.5
The drugs of a carrier of SCD		
Coughlin (N= 355)		
Yes	24	6.8
Vit. B-Complex (N= 355)		
Yes	130	36.6
Nevaraprine (N= 355)		
Yes	50	14.1
Folic Acid (N= 355)		
Yes	127	35.8
Paludrine (N= 355)		
Yes	29	8.2
Piritin (N= 355)		
Yes	22	6.2
The consequences of not preventing SCD		
Having SCD in the family **(n= 354)**		
Yes	208	58.6
Psychological stress (N= 355)		
Yes	167	47.0
No	188	53.0
Happiness (N= 355)		
Yes	28	7.9
Level of knowledge		
Poor Knowledge	140	39.4
Good Knowledge	215	60.6

Others*: Hydration/Good nutrition, going for programs, medication/ drugs.

Table 4.4.1: Description of the difference between genotype and blood group

Difference between genotype and blood group (n = 132)	Frequency (n)	Percentage (%)
Same	3	0.8
Not same	11	3.1
Genotype deals with gene, while blood group deals with blood classification/ type/Classification.	33	9.3
Genotype shows the nature of RBC; AA, SS, blood group shows of group the blood belongs to i.e. AB, O+, A+.	54	15.2
Cell formation/ type of blood and cell arrangement.	2	0.6
Can't explain it/ Not Sure	8	2.3
Genotype; combination of the dominant and recessive genes inherited from the parents, blood group is the antigen and antibodies present o the RBC	5	1.4
Genotype is the inherited blood types and blood group is antigenic type of the individual.	6	1.7
Blood group determines blood compatibility/ transfusion, genotype does not.	7	2.0
Genotype shows heamoglobin types, blood group shows the donor/recipient factors of the blood.	3	0.8

Figure 4.6: Signs and symptoms of SCD (N= 355)

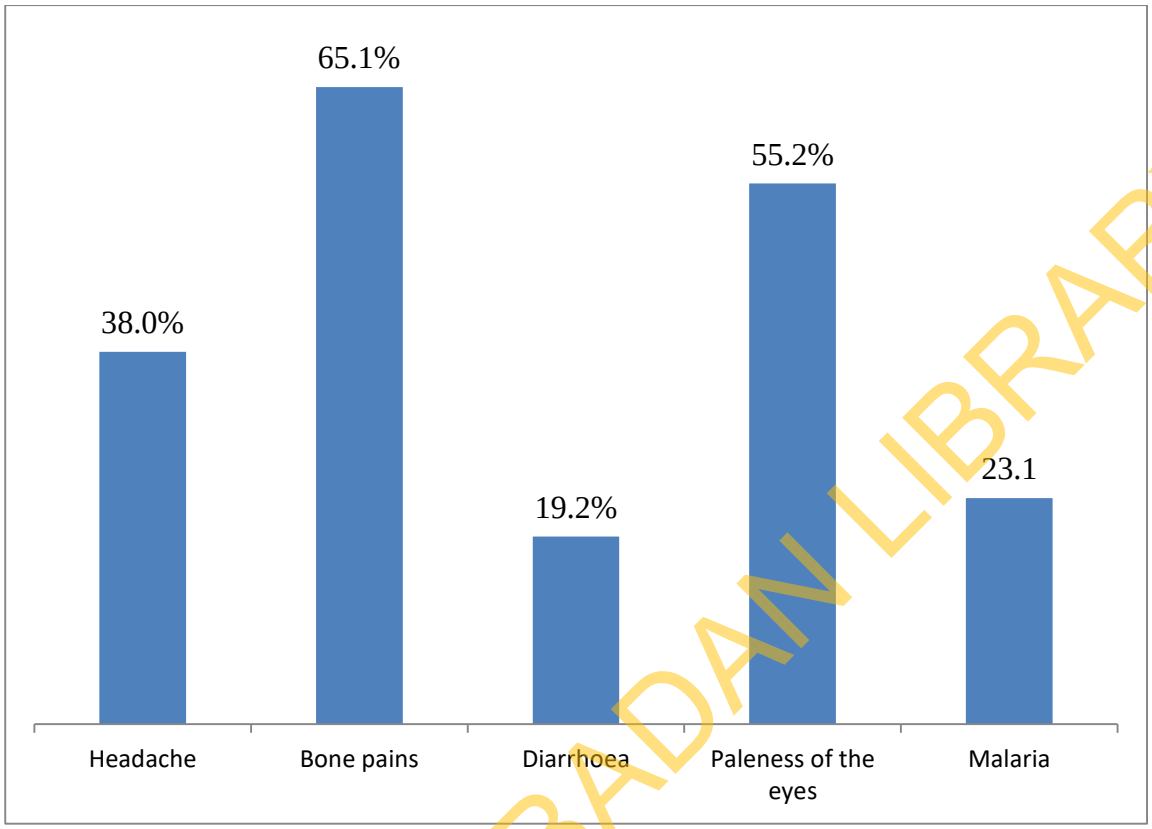


Figure 4.7: Typical genotype groups (N= 355)

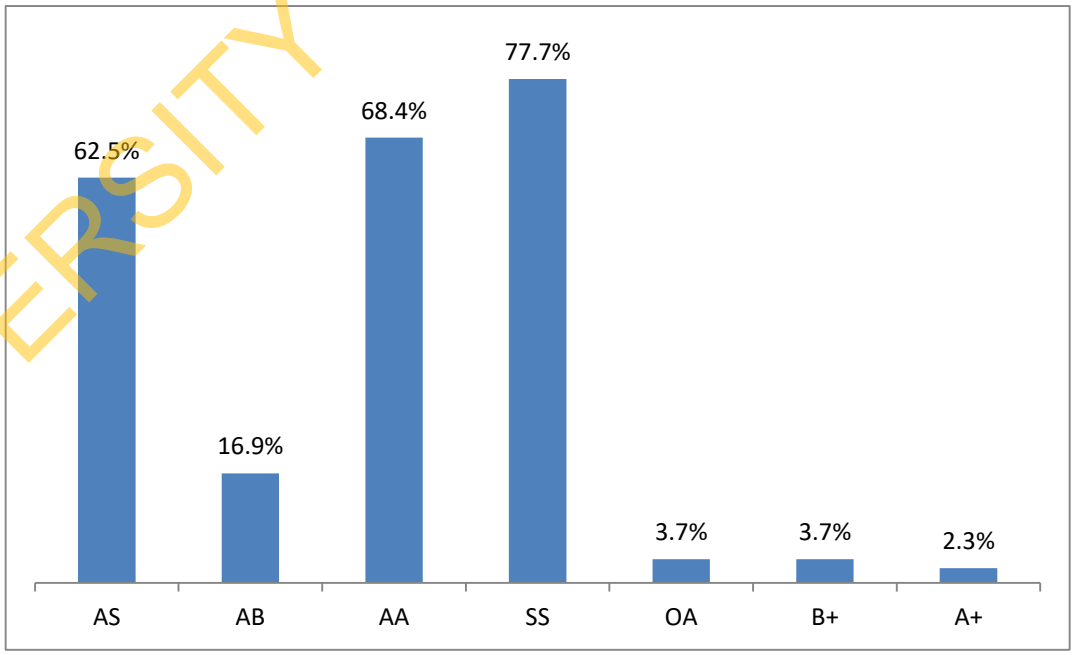
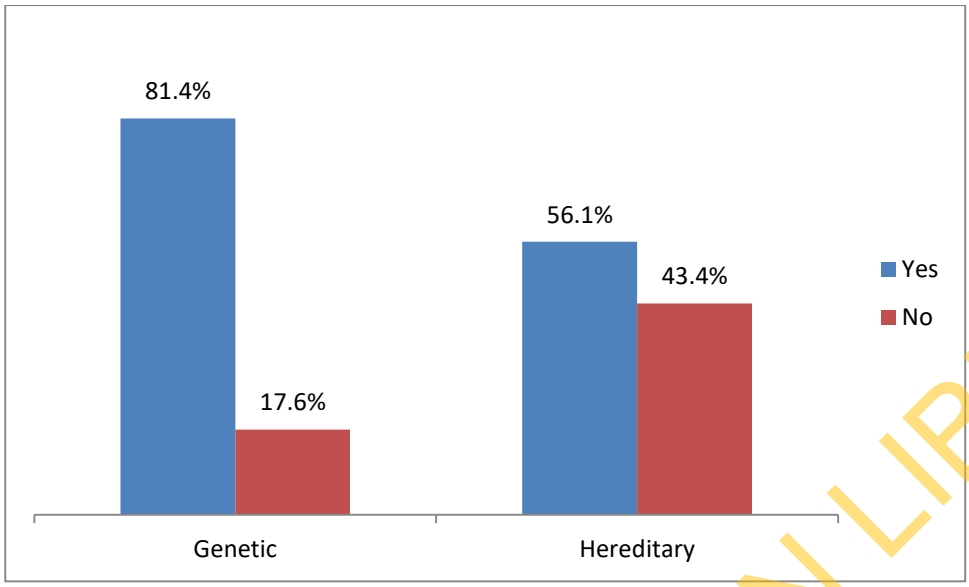


Figure 4.8: Sickle cell disease is genetic or hereditary (n= 341, 343)



4.4.1 Hypotheses

Three variables (age, gender and discipline) were assessed for significant association with the level of knowledge of respondents on SCD.

4.4.2: Association between level of knowledge and age (Hypothesis 1)

Respondents' level of knowledge of SCD (dependent variable) was cross tabulated with age (independent variable) using Chi-square statistics. The Pearson chi-square was used to cross tabulate the statistical association between the level of knowledge (good or poor) and age, as shown in Table 4.4.2.

The age group (23-26years) represents the group with highest number of respondents (143) who have good knowledge on SCD compared to (40) respondents in age group (18-22years) or (32) respondents in age group (27-30years) who have good knowledge on SCD.

Table 4.4.2, also showed that the level of knowledge of SCD is not associated with age (X^2= 1.424, P–value = 0.491), the null hypothesis was accepted.

Table 4.4.2: Association between level of knowledge and age (Hypothesis 1)

Variable	Knowledge of Corps members on SCD				
	Good knowledge n(%)	Poor knowledge n(%)	Total n	X^2	p-value
Age					
18-22	40(64.5)	22(35.5)	62	1.424	0.491
23-26	143(61.1)	91(38.9)	234		
27-30	32(54.2)	27(45.8)	59		
Total	215(60.6)	140(39.4)	355		

4.4.3: Association between level of knowledge and gender (Hypothesis 2)

Respondents' level of knowledge of SCD (dependent variable) was cross tabulated with gender (independent variable) using Chi-square statistics. The Pearson chi-square was used to cross tabulate the statistical association between the level of knowledge (good or poor) and gender (male or female) of respondents in Table 4.4.3. One hundred and twenty six (126) female respondents have good knowledge of SCD compared to the (89) males respondents who had good knowledge of SCD. Statistical association was found between the level of knowledge and gender (X^2=3.444, P-value = 0.040), therefore null hypothesis was rejected.

Table 4.4.3: Association between level of knowledge and gender (Hypothesis 2)

Variable	Knowledge of Corps members on SCD				
	Good knowledge n(%)	Poor knowledge n(%)	Total n	X^2	p-value
Sex					
Male	89(55.3)	72(44.7)	161	3.444	0.040
Female	126(64.9)	68(35.1)	194		
Total	215(60.6)	140(39.4)	355		

4.4.4.: Association between the level of knowledge and discipline (Hypothesis 3)

Respondents' level of knowledge of SCD (dependent variable) was cross tabulated with discipline (independent variable) using Chi-square statistics. The Pearson chi-square was used to cross tabulate the statistical association between the level of knowledge (good or poor) and age, as shown in (Table 4.4.4).

Finally, Forty (40) respondents whose discipline was basic or medical science have good knowledge of SCD compared to (79) respondents from science or technology related backgrounds or compared to (43) respondents who were from social science or education discipline or 53 respondents of the arts or management discipline, who all have good knowledge of SCD. Statistical association was found with discipline (X^2 = 31.718, P-value = 0.000) because their p-values were less than 0.005. Therefore, the null hypotheses were rejected for these variables.

Table 4.4.4: Association between the level of knowledge and discipline (Hypothesis 3)

Variable	Knowledge of Corps members on SCD				
	Good knowledge n(%)	Poor knowledge n(%)	Total N	X^2	p-value
Discipline					
Basic/Medical Science	40(90.9)	4(9.1)	44	31.718	<0.001
Science/Technology	79(68.7)	36(31.3)	115		
Social sci./Education	43(46.2)	50(53.8)	93		
Arts/Management	53(51.5)	50(48.5)	103		
Total	215(60.6)	140(39.4)	355		

4.4.5: Logistics Regression Analysis

Logistic regression was used to further analyze the significance of associations identified for the variables which had statistical associations under hypothesis testing. Binary Logistic regression analysis was used to test for the significance or Odds ratio.

4.4.5.1: Logistics Regression Analysis of level of knowledge and gender as well as discipline.

The following results were deduced from Table 4.4.5.1 to establish the Odds ratio (OR) and 95 percent confidence interval (95% CI) for the associations that were statistically significant.

The regression analysis shows that the eighty-nine (55.3%) male respondents were about two times more likely to have good knowledge of SCD compared with the 126 (64.9%) female respondents who also had good knowledge of SCD ($P<0.05$, OR = 1.784, 95%CI = 1.128-2.820).

Secondly, forty (90.9%) respondents who had basic or medical science background were 9 times more likely to have good knowledge on SCD compared to the fifty-three (51.5%) respondents in Arts or management who also have good knowledge on SCD ($P<0.005$, OR = 9.434, 95%CI = 3.146-28.286). Seventy-nine (68.7%) respondents from the Science or technology discipline were 2 times more likely to have good knowledge of SCD compared to the 53 (51.5%) respondents in the arts or management discipline. ($P< 0.05$, OR = 2.070 95%CI = 1.192-3.595). The respondents 43 (46.2%) in Social science or Education discipline were 1.2 times less likely to have good knowledge of SCD compared to the referenced respondents (53) from Arts or Management discipline ($P>0.05$, OR = 0.811, 95%CI= 0.463-1.423), the relationship here is not statistically significant.

Table 4.4.5.1: Logistics Regression Analysis of level of knowledge, gender and discipline of respondents

Variable	Knowledge of Corps members on SCD				
	Good knowledge n(%)	Poor knowledge n(%)	Total **N= 355**	**OR (95% CI)**	p-value
Gender					
Male	89(55.3)	72(44.7)	161	1.784 (1.128-2.820)	**0.013**
Female*	126(64.9)	68(35.1)	194	1.000	
Discipline					
Basic/Medical Science	40(90.9)	4(9.1)	44	9.434 (3.146-28.286)	**0.000**
Science/Technology	79(68.7)	36(31.3)	115	2.070 (1.192-3.595)	**0.010**
Social sci./Education	43(46.2)	50(53.8)	93	0.811 (0.463-1.423)	0.466
Arts/Management*	53(51.5)	50(48.5)	103	1.000	

*(reference variable)

4.5: Attitude of corps members towards SCD

Thirteen questions were used to analyze the level of attitude of the respondents towards SCD. Almost all (91.5%) reported that SCD is a disease of the poor and sinners and many (66.5%) disagreed that SCD is not deadly. This is in line with the opinion of a male discussant during the FGD that SCD is deadly. Also, majority (86.5%) disagreed about the notion that people do not make friend with a carrier of the disease.

Three hundred and eight (86.8%) respondents admitted that a person who has SCD should be shown concern towards tasks that may be rigorous, while majority (77.7%) were not in support of the statement that people who give birth to SCD children are selfish and evil, however the report of other respondents (10.4%) who do not agree with the statement corroborates the opinion of a female and single discussant in the FGD. Furthermore, nearly all (94.6%) did not agree that men do not need to do genotype screening, though more male (3.7%) than female (1.5%) agreed to the statement. The opinion of at least one discussant from each group in the qualitative study was in agreement with the gender report.

Almost all (95.8%) disagreed that only women have to do genotype screening, more female (2.6%) than male (1.9%) accepted this. Table 4.5.1 shows the analysis of gender sensitive statements. Nearly all (93.8%) did not agree that a man and a woman who are into intimate relationship should not undergo genotype screening. More male (6.2%) than female (3.6%) agreed with the above statement. As much as (85.4%) do support marriage of carriers of Sickle cell traits even if they have the financial capabilities, but more male than female that is 11.8% versus 5.4% supported the above account.

Additionally, majority (79.4%) of the respondents would not marry someone with SCD by faith but more female (12.4%) than male (10.6%) are willing to do so. Slightly more than half of the respondents (53.0%) cannot support a family member who does not have the disease to marry a carrier of SCD. Majority (80.3%) disagreed with the traditional notion that people who have SCD are Abikus and Ogbanjes. More than half (68.2%) also disagreed that SCD is not more severe in men than in women. However, the analysis shows that level of attitude was good (88.5%).

Table 4.5: Attitude of Corps members towards SCD (N=355)

Statement	Agree n(%)	Disagree n(%)	Undecided n(%)	Total N
SCD is a disease of the poor and sinners	16(4.5)	325(91.5)	13(3.7)	354
SCD is not deadly	75(21.1)	236(66.5)	43(12.1)	354
People do not make friend with someone who has SCD	31(8.7)	307(86.5)	17(4.8)	355
A person who has SCD should be shown some concern towards tasks/work	308(86.8)	34(9.6)	11(3.1)	353
People who give birth to SCD children are selfish and evil	37(10.4)	276(77.7)	40(11.3)	353
Men do not need to do genotype screening	9(2.5)	336(94.6)	7(2.0)	352
A man and a woman who are into intimate relationship do not need genotype screening	17(4.8)	333(93.8)	5(1.4)	355
Only women do genotype screening	8(2.3)	340(95.8)	7(2.0)	355
A man and a woman who have SCD traits can marry if they have financial capabilities	30(8.5)	303(85.4)	22(6.2)	355
With faith I can marry someone who has SCD	41(11.5)	282(79.4)	30(8.5)	353
I can support a family member who is not a carrier to marry a carrier of SCD	126(35.5)	188(53.0)	41(11.5)	355
People who have SCD are the Abikus and the Ogbanjes	42(11.8)	285(80.3)	27(7.6)	354
SCD is not more severe in men than in women	43(12.1)	242(68.2)	70(19.7)	355

Level of attitude	**Frequency**	**Percentage**
Bad attitude	41	11.5
Good attitude	314	88.5

Table 4.5.1: Gender analysis of specific variables (attitude)

Statement	Agree n (%)	Disagree n(%)	Undecided n(%)
Men do not need to do genotype screening			
Male (n = 159)	6(3.7)	149(92.5)	4(2.5)
Female (n = 193)	3(1.5)	187(96.4)	3(1.5)
A man and a woman who are into intimate relationship do not need genotype screening			
Male (n = 161)	10(6.2)	149(2.5)	2(1.2)
Female (n = 194)	7(3.6)	184(94.8)	3(1.5)
Only women do genotype screening			
Male (n = 161)	3(1.9)	154(95.7)	4(2.5)
Female (n = 194)	5(2.6)	186(95.9)	3(1.5)
A man and a woman who have SCD traits can marry if they have financial capabilities			
Male (n = 161)	19(11.8)	129(80.1)	13(8.1)
Female (n = 194)	11(5.4)	174(89.7)	9(4.6)
With faith I can marry someone who has SCD			
Male (n = 159)	17(10.6)	126(78.3)	16(9.9)
Female (n = 194)	24(12.4)	156(80.4)	14(7.2)

4.5.1: The association between attitude and level of knowledge (Hypothesis 4)

Respondents' level of attitude (dependent variable) was cross-tabulated with level of knowledge of SCD (independent variable), using Pearson chi-square statistic analysis. The result showed that there is no statistical association between the level of knowledge and attitudinal level of the respondents. Though, there were 193(89.3%) respondents who had good attitude toward SCD and good knowledge of SCD, compared with 121(86.4%) respondents who had good attitude towards SCD but poor knowledge of the SCD, shown in (Table 4.5.2). The P-value is greater than 0.05, therefore the null hypothesis was accepted for this association.

Table 4.5.2: The association between attitude and level of knowledge (Hypothesis 4)

Variable	Level of Attitude of Respondents					
	Good Attitude n(%)	Bad Attitude n(%)	Total N	X^2	df	p-value
Level of Knowledge						
Poor Knowledge	121(86.4)	19(13.6)	140	0.925	1	**0.213**
Good Knowledge	193(89.8)	22(10.2)	215			
Total	314(88.5)	41(11.5)	355			

4.6: Willingness of Corps members to undergo genotype screening

In this section, twelve questions were used to analyze the level of willingness of respondents towards genotype screening. Table 4.6 shows that forty-six (13.0%) respondents from the total population have never had genotype screening. of which the number of male respondents (32) was more than twice the number of female respondents (12) who had never been screened for haemoglobin genotypes. Slightly above three quarters (79.4%) of the respondents reported interest in genotype screening, that is, more female (82%) than male (76.4%) majorly to confirm their genotype status (54.1%). Table 4.6.1 has details on the gender results. The respondents who admitted that they cannot undergo the screening reported several reasons, of which (13.5%) reported that they already know their status. The report is in line with the statements of the majority (4) of the married female participants in the FGD.

In addition, majority (72.1%) are willing to repeat genotype screening. Almost all (90.4%) have confidence in the test result and nearly all (94.9%) can recommend the screening to friends and family, which supports the report obtained from at least 4 participants in the focus groups, in relation to creating awareness. Two hundred and ninety respondents (83.1%) agreed that genotype screening fosters marital bliss in the future and almost all (91.8%) supported genotype screening for infants and young children. Although less than half (46.5%) can adopt or raise a child who has SCD. The FGD also recorded this account, where almost all, 5 married female discussants were not willing to raise or help adopt a child who has SCD. Majority (85.9%) would recommend genotype screening at National Youth Service Camps. Almost all (91.0%) will support the awareness activities. Lastly, the level of willingness of respondents towards genotype screening is 93.0%.

Table 4.6: Willingness of Corps members to undergo genotype screening (N= 355)

Willingness towards genotype screening	Frequency (n)	Percentage (%)
Prevalence of genotype screening		
Yes	309	87.0
No	46	12.9
Can do genotype screening (N= 355)		
Yes	282	79.4
No	73	20.6
Why genotype screening can be done (n= 295)		
Confirmation of my status	192	54.1
Knowledge	52	14.6
Marital relationship reasons	51	14.4
Why genotype screening cannot be done (n= 338)		
I already know my status	48	13.5
Fear of needle prick	16	4.5
Cost of the test	4	1.1
My result may get mixed up	2	0.6
Willing to repeat genotype screening (n= 354)		
Yes	256	72.1
No	98	27.7
Have confidence in the genotype test result (n= 355)		
Yes	321	90.4
No	34	9.6
Can recommend genotype screening to my friends and family (n= 353)		
Yes	335	94.9
No	18	5.1
Think genotype screening fosters marital bliss in the future (n= 353)		
Yes	295	83.6
No	58	26.4

Table 4.6b: Willingness of Corps members to undergo genotype screening

Supports genotype screening for infants and young children (n= 354)	**Frequency (n)**	**Percentage (%)**
Yes	326	92.1
No	28	7.9
Can adopt/raise a child with SCD (N= 355)		
Yes	165	46.5
No	190	53.5
Would recommend genotype screening in the NYSC camps (N= 355)		
Yes	305	85.9
No	50	14.1
Can support the awareness activities on SCD and genotype Screening (N= 355)		
Yes	323	91.0
No	32	9.0
Level of willingness		
	Frequency	**Percentage**
Willing	330	93.0
Not willing	25	7.0

Table 4.6.1: Gender analysis of specific variables (willingness)

	MALE		FEMALE	
	N	**%**	**N**	**%**
Willingness towards genotype screening				
Ever had a genotype screening				
Yes	127	78.9	182	93.8
No	34	21.1	12	6.2
Total	161	100.0	194	100.0
Can do genotype screening				
Yes	123	76.4	159	82.0
No	38	23.6	35	18.0
Total	161	100.0	194	100.0
Can adopt/raise a child with SCD				
Yes	78	48.4	87	44.8
No	83	51.6	107	55.2
Total	161	100.0	194	100.0

4.6.1: Association between the level of willingness and gender (Hypothesis 5)

Respondents' level of willingness to undergo genotype screening was cross tabulated with their gender using the Pearson chi-square analysis. From (Table 4.6.2), there are 142 male respondents who were willing to undergo genotype screening compared with 188 female respondents who are also willing to uptake genotype screening. The Pearson Chi-square shows that gender (X^2 = 10.193, P-value = 0.001) is associated with willingness or non-willingness undergo genotype screening, because the p-value was statistical significant or less than 0.005. Therefore, the Null hypothesis was rejected.

Table 4.6.2: Association between the level of willingness and gender (Hypothesis 5)

	Willingness of Corps member to undergo genotype screening					
Variable	Willing n(%)	Non- willing n(%)	Total **N= 355**	X^2	df	p-value
Gender						
Male	142(88.2)	19(11.8)	161	10.208	1	0.001
Female	188(96.9)	6(3.1)	194			
Total	330(93.0)	25(7.0)	355			

4.6.2.1: Logistics Regression Analysis of willingness and gender

Table 4.6.2.1 showed that gender remained statistically significant in the association with willingness of the respondents to go for genotype screening. The result showed that the 142(88.2%) male respondents were 4 times more likely to be willing to undergo genotype screening compared to 188 (96.9%) female respondents who were also willing to go for genotype screening (p< 0.05, OR = 4.126, 95%CI = 1.446-11.776).

Table 4.6.2.1: Logistics Regression Analysis of willingness and gender

	Willingness of Corps member to undergo genotype screening				
Variable	Willing n(%)	Non- willing n(%)	Total **N= 355**	**OR (95% CI)**	p-value
Gender					
Male	142(88.2)	19(11.8)	161	4.126 (1.446 - 11.776)	**0.008**
Female*	188(96.9)	6(3.1)	194	1.000	

* (reference variable)

4.6.3: The association between level of knowledge and willingness to undergo genotype screening (Hypothesis 6)

The Pearson chi-square analysis was used to assess the relationship between the level of knowledge (independent variable) and willingness to undergo genotype screening (dependent variable). There are 122(87.1%) respondents who have poor knowledge and were willing to undergo genotype screening, compared to 208(96.7%) respondents who have good knowledge and were also willing to undergo genotype screening. The result of the analysis (see Table 4.6.3) showed that there is a statistical association ($p<0.005$), and the null hypothesis was rejected.

Table 4.6.3: The association between level of knowledge and willingness to undergo genotype screening (Hypothesis 6)

	Willingness of Corps member to undergo genotype screening					
Variable **Level of Knowledge**	Willing N (%)	Non-willing N (%)	Total N = 355	X^2	df	p-value
Poor Knowledge	122(87.1)	18(12.9)	140	11.940	1	**0.001**
Good Knowledge	208(96.7)	7(3.3)	215			
Total	330(93.0)	25(7.0)	355			

4.6.3.1: Logistics Regression Analysis of level of knowledge and willingness to undergo genotype screening

Table 4.6.3.1 showed that the level of knowledge remained significantly associated with the willingness of the respondents to go for genotype screening after further analysis with Binary logistic regression analysis. One hundred and twenty-two respondents who had poor knowledge are four times less likely to seek genotype screening compared to the 208 respondents who had good knowledge and are willing to undergo genotype screening (P<0.005, OR = 0.239, 95%CI = 0.093-0.614).

Table 4.6.3.1: Logistics Regression Analysis of level of knowledge and willingness to undergo genotype screening

	Willingness of Corps member to undergo genotype screening				
Variable	Willing (n)	Non- willing (n)	Total **(N)**	**OR (95% CI)**	p-value
Level of Knowledge					
Poor Knowledge	122(87.1)	18(12.9)	140	0.239 (0.093-0.614)	0.003
Good Knowledge*	208(96.7)	7(3.3)	215	1.000	

* (reference variable)

4.6.4: The association between level of willingness and attitude of respondents (Hypothesis 7)

Respondents' level of willingness (dependent variable) to undergo genotype screening was cross tabulated with attitude (independent variable) using the Pearson chi-square analysis. From (Table 4.6.4), There are 30 respondents who had bad attitude and are willing to undergo genotype screening, compared to 300 respondents who have good attitude and are willing to undergo genotype screening. The Pearson Chi-square shows that the level of attitude is associated with willingness or non-willingness to go for genotype screening, because the p-value was statistical significant or less than 0.005, (X^2 = 27.723, P-value = <0.001). Therefore, the Null hypothesis was rejected.

Table 4.6.4: The association between level of willingness and attitude of respondents (Hypothesis 7)

Variable	Willing N (%)	Non-willing N (%)	Total N = 355	X^2	df	p-value
Attitudinal Level						
Bad Attitude	30(71.2)	11(26.8)	41	27.723	1	<0.001
Good Attitude*	300(95.5)	14(4.5)	314			
Total	330(93.0)	25(7.0)	355			

4.6.4.1: Logistics Regression Analysis of the association between level of willingness and attitude of respondents

Table 4.6.4.1 showed that the association between the level of willingness to undergo genotype screening and attitude towards SCD remained statistically significant with Binary logistic analysis. Thirty respondents who had bad attitude are four times less likely to be willing seek genotype screening compared to the three hundred respondents who had good attitude and are willing to undergo genotype screening (P<0.001, OR = 0.132, 95%CI = 0.053-0.328).

Table 4.6.4.1: Logistics Regression Analysis of level of willingness and attitude of respondents

Variable	**Willingness of Corps member to undergo genotype screening**				
	Willing (n)	Non-willing (n)	Total **(N)**	**OR (95% CI)**	p-value
Level of Attitude					
Bad Attitude	30(71.2)	11(26.8)	41	0.132 (0.053-0.328)	<0.001
Good Attitude*	300(95.5)	14(4.5)	314	1.000	

* (reference variable)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Discussion

5.1 Socio-demographic characteristics

The study findings revealed that the age range of the respondents falls within the recognizable age range for the youth, which is age 15 to 35 years, according to the African Youth Charter, (2006). The age range also falls within the reproductive age (15-45years) in Nigeria (National Demographic and Health Survey, 2013). The NDHS, (2013) reported that fertility is high among women between age 25 and 29 years. Majority of the respondents are within the fertility period, consequently the age of the respondent might have the potential for increasing children with SCD, if careful decisions are not made towards the choice of marital partner, that is, if respondents fail to carry out genetic testing such as genotype testing and genetic counselling to identify their partner's genetic compatibility, before contemplating marriage or procreation. This age range is in line with what was reported in a similar study conducted by Olatona *et al*., (2012).

Many of the respondents were female, because they hold the highest population number in the study area. This study also showed that only few among the respondents were married, and the married male respondents are of least population. The reason for that could be due to more years being spent in schooling, compared to a population where education is not given full recognition. The inability to hold a FGD with the male respondents who were married can be attributed to the fact that only few male respondents were married from the sampled population, this report corroborated the quantitative finding where only four male respondents were married. Likewise, the account is in line with the report that the Nigerian men do not marry early (Culture grams, 2014). Majority who were married have had at least a child. The predominant religion of the respondents is Christianity, since the majority of the respondents are from the Southern parts of Nigeria, where majority practice Christianity.

Majority of the respondents represented the three main tribes in Nigeria (Yoruba, Ibo and Hausa), although, there were other minor ethnic groups. The diversity of ethnicity

observed in this study is expected, so as to reflect the main goal of the National youth service, which is to foster ethnic integration in Nigeria (NYSC Act, 1993). The diversity in ethnicity is a plus to this study, because the information obtained from this study encompasses the views of the respondents from different family backgrounds and geographical locality. Furthermore, majority of the respondents are from the Yoruba ethnic group and the reason could be that, a lot of graduates in many zones, apart from the northern states usually avoid being posted to the northern parts of the country or they look for a way of getting back to the southern parts of Nigeria, in order to avoid the insurgence ravaging some parts of northern Nigeria.

5.2 Level of awareness of Corps members on Sickle cell disease

The study showed that almost all the respondents have heard about SCD. This finding corroborates the responses obtained in the Focus Group Discussion (FGD), during which a male participant mentioned that he learnt about SCD and the inheritance pattern in a Biology class in the Secondary school. It can be inferred that the secondary school provides a lots of opportunities for adolescents and young people to learn about health issues, and it provides a platform for them to form good behaviours toward healthy living. This justifies the importance of teaching health related issues including SCD in all secondary schools. This finding compares favourably with the result of a study conducted by Omolase *et al*., (2010), in which virtually all the Corps members have heard about SCD.

It is worth noting that less than half of the respondents were able to describe SCD even though almost all reported that they have heard about SCD. Similar information was elicited in the FGD, and at least one of the participants was able to describe SCD. Earlier study carried out by Olatona *et al*., (2012) reported similar trend towards knowledge of SCD from the baseline information. However, the result does conform to the study of Osbourne, (2011) in which the respondents knew well about SCD. The above result is an indication that evidence based awareness and education is needed.

This study also showed that the level of awareness on genotype screening among the respondents was high. The FGD provided information to support this result, through the account of one of the single and female participant, who reported that genotype screening was required as part of the registration criteria in most universities. In view

of this finding, further studies are necessary to check and establish the relevance of genotype screening to the health and educational registration exercise in all the tertiary institutions in Nigeria.

Another important finding from this study is that, it reported the prevalence of SCD amongst the respondents' immediate relatives that is, 10.1%, while it was as high as 63.3% amongst non-acquaintances. This report is a reflection of the high and increasing prevalence rate of SCD in Nigeria, where ten (10) persons in a population of one thousand (1000) are carriers of the homozygous defective haemoglobin (Oyedele, *et al*., 2015).

The results of this study, also showed that majority of the respondents reported that there is no cure for SCD disease. This account compares favourably with reports from previous literature such as (Anie *et al*., 2010; Obadina, Soyingbe and Rosiji, 2013; Obeagu *et al*., 2014), unlike the study carried out by Olatona *et al*., (2014) who reported that SCD now has a cure. Nevertheless, the few respondents who reported that SCD has a cure had varied ideas. The respondents who identified prayers and herbs could believe in religious and cultural values. An earlier literature (Anie, *et al*., 2010) reported that beliefs influence cultural and religious values which in turn, influence health behaviours such as coping strategies.

5.3 Level of knowledge of the Corps members on Sickle cell disease

It is astonishing to know that slightly above half of the respondents could identify haemoglobin SS (HbSS) as a form of SCD. This result further supports the findings of Durotoye, *et al*., (2013) among young people, in which about a quarter of the respondents were identified to have good knowledge of haemoglobin genotype. It can be concluded that the knowledge is likely to increase with more awareness and education. This effect was identified by Olatona *et al.*, (2014) after the intervention study.

The finding from this study also revealed that majority of the respondents have the knowledge that SCD is not contagious or infectious, and it was widely held that SCD is a genetic disease, but just over a half of the respondents reported that the disease is hereditary. It can be deduced from this result that some of the respondents were

having problems linking SCD as a hereditary disease. The definition which some participants in the FGD stated for SCD covered the genetic and hereditary nature of the disease. Conceivably, the respondents did not pay attention to the details in the definition or the others who disagreed that SCD is not hereditary were those who do not know the difference between genetic and hereditary due to their academic and professional backgrounds.

Further details emerging from this study revealed that many respondents lacked the knowledge of the difference between haemoglobin genotype and blood group. This misconception may due to inadequate access to or ignorance about laboratories where the testing could be done. This observation is similar to the findings in earlier studies (Bazuaye and Olayemi, 2009; Durotoye *et a*l, 2013), on young people which reported that less than a quarter of the respondents claimed blood group as their genotype. This particular finding was buttressed by another finding in this study in which slightly over half agreed that genotype will inform an individual about his or her blood group. These findings showed the need for accurate health education towards addressing salient areas of health such as SCD as imperative in bridging the gap in knowledge (Olatona *et a*l., 2014).

Sixty percent of the respondents reported that childhood or birth period is the ideal time for which to undergo genotype screening or testing. The opinions of the FGD participants, in relation to this aspect were diverse. Most married female participants opined that genotype screening is ideal when people are due for marriage, very few single male and female participants agreed to this view, while all other participants across the groups mentioned childhood and adolescence. A previous study by Akodu, Diaku-Akinwumi and Njokanma (2013) supported early diagnosis, in order to prevent complications that may occur as well as to give health education to the parents on SCD. The study (Akodu *et al.*, 2013) however reported that the time for diagnosis may not be specific due to the lack of routine screening and varying age at manifestation of the disease in carriers.

In addition, it was observed from the findings of this study that majority of the respondents do not know the estimated life expectancy of SCD carrier. This result is not surprising, because a specific time range has not been ascertained for people in

Nigeria (Adegoke and Kuteyi, 2012). The WHO, (2006) reported ranging life expectancy for male and female as well as varying age among the people who have SCD in continents of the world. Nevertheless, earlier studies reported that people who have the disease are now living beyond the fourth decade (Chijioke and Kolo, 2009; Obeagu *et al.*, 2014).

The statistical hypothetical association between gender and knowledge was tested. This hypothesis was borne out of the notion that men are nonchalant towards health issues (Smith, 2006). This study had attempted to look at how gender may have influenced the knowledge of the respondents on SCD. The result showed that the association is statistically significant. Report from earlier study on young people (Durotoye, *et a*l., 2013) revealed that the female had good knowledge than the male. Therefore, this study further tested for the significant relationship between gender and knowledge. Finding shows that the male respondents were about two times more likely to have good knowledge of SCD compared to the female, though, there were more females than males, who had good knowledge of SCD. This finding agrees with that of Durotoye *et al*., (2013).

The findings of this study also showed that the null hypothesis was rejected for the association between the level of knowledge and the discipline of the respondents, because there was a statistical significant association between the two variables. The least number of the respondents who had poor knowledge is from the Basic or Medical science, this is expected to be, since most of them must have had an exposure to course or teachings which included SCD. The analysis further showed that the respondents from the basic medical discipline are nine times more likely to have good knowledge of SCD compared to respondents from the Arts or Management profession or discipline. This result justifies health education as a subject or course that should be revised in the curriculum of young people, so that they can have better understanding of health issues which call for attention and good decision making.

Furthermore, finding from this study revealed that the level of knowledge of the respondents was well above average statistically. Previous studies conducted by Olubiyi *et al*., (2013) observed similar trend, but the result contradicts the findings of

Olatona *et a*l.,(2013) in the baseline study, which reported good knowledge in a quarter of the respondents.

5.4Attitude of Corps members toward Sickle cell disease

The result of this study showed that the majority of the respondents have good attitude towards SCD. This could be accounted for, as a result of prior exposure to practices relating to SCD and its screening in schools and churches as observed from the FGD and the information retrieved from the quantitative study. Majority do not accept that SCD is a disease of the poor and sinners or agreed that those who have SCD were the Abikus or the Ogbanjes as it was believed in the earlier times as reported in a previous study (Bazuaye and Olayemi, 2009). This finding is similar to report of Olubiyi *et al.*, (2013). Although bad attitude was identified towards the perception of the corps members on few issues pertaining to SCD, in which over a quarter of the respondents held the notion that SCD was not a deadly disease. This opinion may have contributed to bad attitude in the respondents towards SCD and its screening. Literatures (Anie et al, 2010; Afolayan and Jolayemi, 2011; Olubiyi 2013) stated that SCD is a chronic disease with complications that have contributed to morbidity and mortality in those who have.

Also, findings showed that some respondents agreed that people who give birth to SCD children are selfish and evil. These respondents may have their reasons, but the major reason might be when the parents ignored the consequences inherent in two carriers of SCD traits to procreating, including the chances of having a child with SCD. Similar view was obtained in FGD. The study carried out by Afolayan and Jolayemi, (2011) reported that parents of the children with SCD regretted having such children for reasons such as nonchalant attitude and ill-dispositions to SCD and genotype screening, due to the interest and love for partners.

Additional to the result of the study, more male than female agreed that men do not need to do genotype screening, most likely because men had poor health seeking behaviour (Gough and Robertson, 2010) while more female than male, admitted that only women undergo genotype screening. This report probably suggested the influence of the population of the female respondents. Also, more female than male

agreed to marry a carrier of SCD by faith, a result that is indicative of religious beliefs (Annie *et a*l., 2010).

More than half of the respondents disagreed about supporting a family member who is not a carrier of the disease to marry a carrier of SCD. This attitude may be so, because the respondents were afraid of the health challenges of people who have SCD as reported by Annie *et al*., (2011) and supported by the opinions of the participants in the FGD. This fear most likely prevents the approval of people to supporting family members from marrying such people with SCD. Probably as well, the respondents may lack the understanding of the inheritance pattern. The studies of Okwi, (2009), Osbourne, (2011) dwell extensively on the inheritance pattern of SCD, in which it was revealed that that if a person who does not have the disease marries a carrier of SCD, the offspring would only possess sickle cell trait. A study conducted by Durotoye *et al.*, (2013) among young people also revealed similar perception, where half of the respondents either disagreed or strongly disagreed to accept friendship with colleagues who may have the disease. The attitude of the respondents is an indication that health education should be emphasized on the ways by which an individual can pass the disease to the offspring.

Moreover, the findings showed that the respondents' attitude towards SCD does not influence their knowledge about SCD. This implies that if the respondents have good point of view towards the disease, it does not guarantee them the knowledge of the disease. It is imperative for the respondents to have good attitude and knowledge for a fair behaviour to be formed for good quality of life and health seeking behaviour.

5.5 Willingness of the Corps members to undergo genotype screening

This study showed that some respondents have never had genotype screening. It could be possible, and the FGD corroborates this. Some participants reported that they supplied the information about their genotype status or group when it was required for registration process, though they know not their haemoglobin genotype status. This underscores the importance of conducting genotype screening exercise, by harnessing the national youth service programme as a platform where the youth Corps members can access genotype screening. A rationale for this is that, corps members are most likely to contemplate marriage or procreation sooner than in any other young people. Similar results were reported in the studies of Olatona *et al.*, (2012), Olubiyi *et al.*,

(2013) in which the respondents either do not know their status or have not had genotype screening.

It was shown in the result of this study that, more male than the female respondents have never had genotype screening. This result corroborates previous report by Gough and Robertson (2010) towards the notion that gender is likely to influence health seeking behaviour in men. Although majority of the respondents reported willingness to undergo genotype screening for ranging reasons, those who were not willing also indicated their reasons including cost, with the report that the respondents already know their status. So also were the opinions obtained in the FGD. The married female corps members especially responded that a person's genotype does not change. Olubiyi *et al.*, (2013) reported similar account, even though their focus was on genetic counselling.

The study result also showed that, majority have confidence in the test result and would be willing to repeat the test. The above responses may indicate good attitude and willingness to uptake the screening. These findings showed that the respondents are aware of the benefit of the screening in identifying the status of an individual's haemoglobin genotype. Also, the respondents agreed that the screening would foster marital peace in the future. This was revealed in literature of Anie *et al*., (2010), Adegoke and Kuteyi, (2012) on psycho-social aspects of SCD that having someone who has SCD in a family can disrupt the happiness in that home. Consequently, having a prior knowledge of one's genotype status, helps to make better decision in the choice of a marital partner, while the chance of having a child who has the disease is ruled out.

Interestingly, findings from this study showed less than half of the participants agreed to help adopt or raise a child with SCD. The FGD corroborates this finding in which majority of the participants, especially with the married and single female cannot do so. The reason for this may be attributed to the report that more than half disagreed about supporting a family member who is not a carrier of the disease to marry a carrier of SCD or stigmatization towards those who have SCD. Studies of Bazuaye and Olayemi, (2009), Anie *et al.*, (2010), Ani, Mayordomo Aranda, Kinanee, Ola and Kramer, (2012), have shown that stigmatization is attached to SCD. This is another

reason for need to give health education and genetic counselling to the Youth corps members.

Study findings also revealed that gender has influence on the willingness of the respondents to undergo genotype screening. Findings showed that the male respondents were very much willing to undergo genotype screening compared with the female respondents. This does not compare favourably with the report of Oludare and Ogili, (2013), in which gender was associated with health seeking behaviours, such as genetic counselling. However, it can be observed that more male respondents have never had genotype screening, so they might be more willing to undergo genotype screening.

Lastly, the statistical relationship between willingness of the respondents to undergo genotype screening as a result of their level of knowledge was positive. Those respondents who had poor knowledge are less likely to be willing to undergo genotype screening. This result justifies the importance of public enlightenment programmes on SCD so that the youth can show readiness for the screening to ascertain their risk of passing on the gene to offspring, if the right decisions are not made. This compares favourably with the report of Oludare and Ogili, (2013) in which knowledge of SCD was associated with practices towards SCD. Also the exposure and enlightenment due to the level of education of the respondents could have aided their willingness to undergo genotype testing, as report by Biljana et al., (2008) and Akodu *et al*., (2015), that socio-economic status can influences health seeking behaviours.

5.6 Conclusion

It can be concluded based on the findings of this study that there is a dearth in knowledge of the Corps members towards concepts like the difference between genotype and blood group, as well as the basic ideas about sickle cell disease on the inheritance pattern. It was observed that the corps members showed good attitude towards SCD but their non-acceptance of a carrier of the disease to become a member of their family either by marriage or adoption, needs to be addressed. Likewise the willingness of the corps members towards SCD and its screening was high though, more male than female corps members were revealed never to have had genotype

screening in a life time. Nevertheless, among the few respondents who have never had genotype testing, the male respondents more willing to go for the screening. Gender is a significant factor in this study and it should be considered for interventional purposes, especially for studies involving the youth and the unmarried. Furthermore, the knowledge of SCD has influence on the willingness to undergo genotype screening. Therefore, concerted effort and evidence based public awareness should be emphasized among the corps members during orientation programme.

5.7 Implications of the Study for Public Health Education and Promotion

The purpose of health education is to make people value health as worthwhile asset while health promotion is the process of helping people increase control over, and improve their health which is an everyday resource for life (Lucas and Gilles, 2008). It is imperative not only for health personnel but the general population to have good knowledge on health matters such as genetic diseases, screening and prevention. The study therefore, is important in the following areas;

Health education and Public awareness: The results from the study showed that less than half of the respondents lacked good understanding as regards; the description of SCD and the ability to differentiate between genotype and blood group. These outcome calls for educational approaches such as public awareness and health education in order ensure that everyone has basic knowledge of SCD, management and prevention. The school is a very good ground to be harnessed for awareness activities, the religious and market places are necessary and important to pass essential information on health because they hold the ability to capture large number of people. Also the special CDS should be upgraded to serve as means of promoting health education on SCD and other health problems in during the National youth service for the Nigerian youths.

Social approach/Advocacy: Advocacy is a key strategy in public health for achieving healthy policies and overcoming public health problems. This social approach should be reinforced in Nigeria in order to help increase awareness on SCD and genetic testing. Sickle cell disease prevalence is on the increase among children according to statistics (Piel *et al*, 2014), The Faith Based Organizations (FBOs) such as churches and mosques as well as institutions should endeavor to pursue the goal of alleviating

SCD burden in the society. The government and Non-Governmental Organizations (NGOs) should give the issue of SCD a top priority on their agenda by funding and promoting health programmes and services such as genetic counseling and genotype screening among young people in schools and youth gatherings like the NYSC. Existing health policy on SCD should be reviewed and strengthened, so that the prevalence of the disease can be reduced.

Training: Continuous training of health personnel is necessary as far as this study is concerned, because one of the barriers hindering respondents from differentiating between genotype and blood group was the lack of counseling before or after the blood test has been carried out. It is necessary in this case, to inform clients at laboratories about the importance of blood testing such as genotype for informed decision. Hence, health personnel should be re- educated as well.

Curriculum revision: The curriculum of children in schools and that of young people should be revised to emphasize health issues which have impact on their lives. For example genetics and genetic disease, should be highlighted even at the primary school level, because the results of this study showed that schools contributed to the increase in the level of awareness of the respondents about SCD.

Medical/ Preventive approach: Genotype screening services should be provided to Youth Corps members and the implication of the testing should be emphasized while doing so. The report obtained from this study has shown that haemoglobin genotype groups are usually requested from the Corps members for registration, while the testing may not have been carried out in the orientation camps. Therefore, the NYSC bodies should not assume that all Corps members know their genotypes since the account of this study also revealed that some Corps member have never had genotype screening.

5.8 Recommendations

The following are the inferences drawn from the conclusion of this study;

1. There is need to emphasize health education on SCD, this would be of great benefit to young people and the general populace in the future, especially when it comes to mankind decision making about sexual partners' compatility and reproduction.

2. The NYSC body must ensure that the Youth corps members provide authentic medical test results to their organization, because of those who may never have had the particular test. Therefore, the NYSC establishment can facilitate the medical screening for those who do not know their status.
3. Genetic health education should be given to people before testing or at collection of their genetic test results either individually or generally, so as to promote good knowledge of genetic diseases like SCD and help the Corps members to do away with bad attitude, misconception and myths about SCD.
4. The NYSC should encourage the medical special CDS (for medics) not only to render clinical services but they should organize health talks and symposium continuously, so that they can communicate with their colleagues and give them health education on issues such SCD.
5. The NYSC in collaboration with relevant health organizations and agencies should facilitate the promotion of free genotype screening for Corps members during their orientation programme.
6. The government, non-government and faith based organization should promote access to genotype screening by subsidizing the fee of the screening in public hospitals for young people.
7. The cost for both haemoglobin genotype and blood group screening could be merged, in order to disprove the misconception or enhance the knowledge of the difference between the two testing.
8. The researcher on behalf of the department to disseminate information and feedback on the findings of the study to NYSC body as well as NYSC members in Ibadan North Local Government Area, Oyo State.

5.9 Recommendations for further studies

This study recommends that further study should be conducted with a large sample size, which should include the Corps members across the geo-political zones in Nigeria, so that the information of such study can be well generalized on matters on SCD.

Further studies should be carried out among youth artisans who dwell in the rural communities in order to have a balanced idea from the learned and the unlearned youths about SCD.

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APPENDICES

Appendix 1

INFORMED CONSENT FORM

Dear Corps member,

My name is Oluwaseyi Adegbite, a postgraduate student of the department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. I want to carry out a study on "**knowledge of Sickle cell disease and willingness to undergo genotype screening among Corps members in Ibadan North Local Government Area, Oyo State".** The purpose of this study is to assess the knowledge of Corp members on sickle cell disorders and their willingness to undergo genotype screening. These findings from this study will help in the design of the intervention program towards the increasing awareness strategies and reduction of the prevalence of Sickle Cell disease transmission in our society.

Your identity, responses and opinion will be kept strictly confidential and will be used for the purpose of this research only. Please note that you do not have to write your name on this questionnaire, also try to give honest answers to the questions as much as your maximum cooperation will assist in making this research a success.

Your participation in this research is entirely voluntary and if you choose not to participate you will not be affected in any way.

DATE _____/_____/_____

SIGNATURE/THUMB PRINT _____

SERIAL NUMBER

_____

Appendix 2

KNOWLEDGE OF CORPS MEMBERS ON SICKLE CELL DISEASE AND THEIR WILLINGNESS TO UNDERGO GENOTYPE SCREENING IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE.

QUESTIONNAIRE

Dear Corps member,

My name is **OLUWASEYI ADEGBITE,** a postgraduate student of the department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. I want to carry out a study on "**knowledge of Sickle cell disease and willingness to undergo genotype screening among Corps members in Ibadan North Local Government Area, Oyo State".** The findings from this study will help in the design of an intervention program towards the increasing awareness strategies and reduction of the prevalence of Sickle cell disease in the society.

Your identity (name and batch number are not needed for the purpose of this data collection). Your responses and opinion will be kept strictly confidential and will be used only for the purpose of this research. Please endeavor to give honest answers to the questions in the questionnaire. Your maximum cooperation would make this research a success. Your participation in this research is entirely voluntary and if you choose not to participate you will not be affected in any way.

Would you want to participate in this study, Yes { } No { }

Thank You.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

NOTE: Please tick (√) boxes where applicable and write information where necessary

1. Sex: 1. Male 2. Female
2. Nationality _____
3. Age as at last birthday (in years)_____
4. Marital Status: 1. Single { } 2. Married { } 3. Widow(er) { } .Divorced { } 5. Cohabiting{ }
5. Do you have children/ have you given birth? 1. Yes { } 2.No { }

5b. If Yes, how many? _____

6. Religion: 1.Christianity { } 2. Islam { } 3.Traditional { }
Others (specify)_____

7. Ethnicity/ Tribe: 1.Yoruba{ } 2.Ibo{ } 3.Hausa{ } 4.Others
(specify)_____

8. State of Origin: _____

9. Academic Qualification: 1.Higher National Diploma { } 2.Bachelor's Degree { } 3.Others (specify)_____

10. What was your area of study/ specialization/ discipline _____

SECTION B: AWARENESS OF THE RESPONDENTS ON SCD

Kindly tick (√) the appropriate response

S/N	QUESTION	OPTIONS
11.	Have you heard about Sickle Cell Disease (SCD)?	Yes
		No
		Don't Know
12.	What informed you about SCD? **(tick one or more options that got you aware)**	Radio
		Television
		Newspaper
		School
		Friends
		Family
		Special CDS
13.	When did you get to know about SCD?	Primary sch./childhood**{ }** Secondary sch./adolescence**{ }** University/ recently **{ }**
14.	What is SCD?**.....**	

	QUESTION/STATEMENT	YES	NO	DON'T KNOW
15.	Are you aware of genotype screening/testing?			
16.	Do you know someone who has SCD?			

17.	Does someone have SCD in your family?			
18	Is there a cure for SCD?			
18b.	If Yes, what is it?**.....**			

SECTION C: KNOWLEDGE OF CORPS MEMBERS ON SCD

Kindly mark/tick (√) the most appropriate response

S/N	QUESTION/STATEMENT	OPTIONS
19.	A form of Sickle Cell Disease (SCD) is?	HaSA
		Hbαα
		HbSS
		HbAA
20.	Signs and symptoms of SCD; (**tick all the correct options in the boxes)** 1.Headache ☐ 2. Bone pains ☐ Diarrheoa ☐ 4. paleness of the eyes ☐ 5. Malaria ☐	
21.	Is SCD contagious and infectious?	Yes
		No
		Don't Know
22.	Genotype screening/testing can be used to diagnose or show if a person has?	Arthritis
		Sickle cell disease
		Blood group/Rhesus factor
		Blood poisoning
23.	Genotype screening/testing involves?	Water
		Blood
		Urine
		Saliva
24.	Genotype screening/testing can be done in the? **(please tick all the options that are best applicable)**	School
		Churches and Mosques
		Standard Laboratories
		General / Teaching Hospitals
25.	The ideal time for genotype screening/testing is at?	Birth/Childhood

		Adolescence
		Before Marriage
		After Marriage
26.	Which amongst all these shows a person's genotype? **(Tick all applicable options)** 1. AS ☐ 2. AB ☐ 3. AA ☐ 4. SS ☐ 5. OA ☐ 6. B+ ☐ 7. A+ ☐	
27.	Is genotype meant to inform you about your blood group?	Yes
		No
		Don't Know
28.	What is the difference between genotype and blood group?.....	
29.	If a man and a woman both have the Sickle Cell Disease (SCD) trait, are they **likely** to have a child with the disease if they should get married?	Yes
		No
		Don't know
30.	Life expectancy may differ for SCD carriers, but it has been estimated as?	90years
		70years
		40years
		35years
31.	How can SCD be managed?	Immunization
		Radiotherapy
		Medical check-up
		Others (Specify).....
32.	The drugs of a carrier of SCD are: **(Tick all options that are suitable)** 1.Coughlin ☐ 2. Vit. B-Complex ☐ 3. Nevaraprine ☐ 4. Folic Acid ☐ 5. Paludrine ☐ 6. Piritin ☐	
33.	The consequences of not preventing SCD are? **(Tick all suitable options)** 1. Having SCD in the family { } 2. Psychological stress { } 2. Happiness { } 4. Others (Specify)	
34.	Sickle cell disease is genetic.	

35.	Sickle cell disease is hereditary.

SECTION D: ATTITUDE OF CORPS MEMBERS TOWARD SCD

S/N	STATEMENT	AGREE	DISAGREE	UNDECIDED
36.	Sickle cell disease (SCD) is a disease of the poor and sinners.			
37.	SCD is not deadly.			
38.	People do not make friend with someone who has SCD.			
39.	A person who has SCD should be shown some concern with regards to tasks/work/activities.			
40.	People who give birth to SCD children are selfish and evil.			
41.	Men do not need to do genotype screening/testing.			
42.	A man and a woman who are in an intimate relationship do not need to do genotype screening/testing.			
43.	Only women should do genotype screening/testing.			
44.	A man and a woman who have the traits for SCD should go ahead and marry if they have the financial capabilities.			
45.	With faith, I can marry someone who has SCD.			
46.	I cannot support any family member who is not a carrier of the disease to get married to a carrier of SCD.			
47.	People who have SCD are the Abikus and the			

	Ogbanjes. They only live for a while and die suddenly.			
48.	Sickle cell is not more severe in men than in women.			

Kindly mark (√) the most appropriate response

SECTION E: WILLINGNESS OF CORPS MEMBERS TO UNDERGO GENOTYPE SCREENING.

Kindly mark the appropriate response

S/N	**QUESTION**	**YES**	**NO**	**DON'T KNOW**
49.	Have you ever had a genotype screening/testing?			
50.	Can you do genotype screening/testing?			
50b.	If Yes to question 54, what would make you do genotype screening/testing? **(Please tick one)**	Confirmation of my status		
		Knowledge		
		Marital relationship reasons		
		Others (Specify)**.....**		
50c.	If No to question 54, what would stop you from undergoing genotype screening/ testing? **(please tick one)**	Fear of needle prick		
		I already know my status		
		My result may get mixed up		
		Cost of the test		
		Others (Specify)**.....**		
	QUESTION	**YES**	**NO**	**DON'T KNOW**
51.	Are you willing to repeat genotype screening/testing, if you know your status already?			
52.	Do you have confidence in the genotype test result?			
53.	Can you recommend your friends and family for genotype screening/testing?			
54.	Do you think genotype screening/testing can foster			

	marital bliss in the future?			
55.	Do you support that genotype screening/testing be done for infants and young children for early counseling and follow-up?			
56.	Can you help adopt/raise a child with sickle cell anaemia?			
57.	Would you recommend that genotype screening/testing be carried out in the NYSC camps?			
58.	Can you support the awareness activities on Sickle Cell Disease and genotype screening/testing?			

Thank you for participating in this study!

Appendix 3

FOCUS GROUP DISCUSSION GUIDE
KNOWLEDGE OF CORP MEMBERS ON SICKLE CELL DISEASES AND THEIR WILLINGNESS TO UNDERGO GENOTYPE SCREENING IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE.

DATE OF INTERVIEW ----------
LOCATION OF INTERVIEW ----------
NAME OF INTERVIEWER ----------

INTRODUCTION

Good day respondents, I am Adegbite Oluwaseyi, a postgraduate student from the department of Health Promotion and Education (HPE), Faculty of Public Health, College of Medicine, University of Ibadan.

I am carrying out a study to determine the opinions of Corps members in Ibadan North Local Government Area about knowledge on Sickle Cell Disease (SCD) and their willingness to undergo genotype screening.

I would appreciate your co-operation in discussing the issues outlined below so that we can find a lasting solution to this issue. I also want you to allow me use the tape recorder so that i will be able to bring out all the important points you make which i may not be able to remember for record purposes. I want you to know that everyone has a right to his or her opinion, so there is no right or wrong answer.

I assure you that all statements made by you will not be used against you in anyway.

Thank you.

1. What do you understand by genetic disease?
2. What test can be carried out to show if one has a trait of SCD?
3. When is the ideal time for individuals to go for genotype screening?
4. The views about having the knowledge of your genotype before marriage?
5. What are the factors that hinder the adoption of genotype screening?
6. How can genotype screening be promoted among youth corps members?
7. Are you willing to go or repeat the genotype test?
8. How can you help in informing people about the importance of the genotype screening, as well as recommend them for the screening?

(Probe for their views about Sickle Cell Disease)

Appendix 4

Broad list of Discipline, State and Religion of the Corps members (All from the quantitative questionnaire)

Discipline	**n**	**%**
Business Administrative/ Management	73	20.6
Arts	22	6.2
Agricultural Sciences	18	5.1
Social Sciences	55	15.5
Law	5	1.4
Education	14	3.9
Technology/Engineering	30	8.5
Basic Medical Sciences	39	11.0
Vertinary Medicine	1	.3
Clinical Science	3	.8
Environmental Sciences	24	6.8
Pharmacy	2	.6
Sciences	66	18.6
State of Origin		
Kwara	18	5.1
Lagos	20	5.6
Osun	69	19.4
Ogun	87	24.5
Ondo	43	12.1
Ekiti	28	7.9
Oyo	14	3.9
Edo	11	3.1
Imo	10	2.8
Delta	11	3.1
Kogi	11	3.1
Abia	6	1.7
Akwa-Ibom	5	1.4

Kano	2	0.6
Anambra	5	1.4
Plateau	2	0.6
Enugu	2	0.6
Rivers	1	0.3
Bayelsa	1	0.3
Adamawa	1	0.3
Benue	4	1.1
Religion		
Christianity	292	82.3
Islam	60	16.9
Traditional	1	.3
Eckanckar	1	.3

Appendix 5

Highlight of other responses not shown on the result table

Respondent's description of SCD (Question 16)

1. A disease that makes the immune system susceptible to the slightest of sickness.
2. Blood type disease / a disease in the blood / blood cell disease
3. SCD is a disease that causes discomfort and it is chronic disease.
4. Anaemia genetic syndrome / also called anaemia.
5. Abnormal formation of RBC/ when the RBC are sickle / crescent in shape i.e. incomplete shape with an inability to hold enough oxygen.
6. A severe hereditary form of anaemia in which a mutated form of haemoglobin distorts the red blood cell into a crescent shape at low oxygen levels.
7. Terminal disease that can lead to untimely death.
8. A disease caused as a result of sickle cell in the blood / disease state in which a carrier posses a trait of sickle cell.
9. When a child is given birth to with SS genotype / a disease that is consequent of having SS genotype / a person with / posses SS genotype / a gene trait of SS.
10. Is hereditary blood disease that mainly affects people of African ancestry, but also occurs in the Mediterranean region and reaches high frequencies in parts of Saudi Arabia and India,
11. Don't know / don't really know.
12. Inherited disease that makes the red blood cell to be banana shaped.
13. This is the act of change of the position of health condition of the body by lacking mineral which must be present in the human body.
14. Situation whereby the haemoglobin which the oxygen carries is mutated.
15. A disease whose common/ obvious symptom is colouration of the eyes.
16. Disease that alters the form and shape of the white blood cells, changing the form to a sickle shape, makes the human body prone to frequent attack s known as 'crisis period' / Deformity in the shape of the white blood cells.
17. It's a kind of deficiency in a victim's blood vessel.
18. It is a disease that makes the blood not to flow well.

19. A genetic disease / genetic disease that occur as a result of both male and female genotype combining to form SS.
20. It is a killer disease that originates from sickle shape red blood cells.
21. Is genetic disorder of the chromosomal make up of an individual, leading to anomaly.
22. It is blood complication of having contingency or deficiency in the body system.
23. Event disease in human body which last longer than ever if care is not taken.
24. It is a disease that may result through the blood genotype or by hereditary.
25. It is a bone marrow disease.
26. Blood cellular disease that is transmittable from one's parenthood to children.
27. SCD is a situation in which human is immune compromise.
28. It is an anaemia and abnormal disease that involves suffering from wrong genotype from parent.
29. Is a metabolic disease which occurs as a result of mutation of the coded genes.
30. A sickle cell's blood circulatory system is in a C form, which means their blood doesn't flow in a circular form, while other genotypes (AA, AB...) who has a full blood circulatory system.
31. SCD is a group of disorders that affect haemoglobin, the molecule in the RBC that delivers oxygenated cells.

Respondent's responses to describe the difference between genotype and blood group (Question 34)

1. I don't know/Don't really know.
2. Not Sure/No Idea/Can't explain it
3. Genotype is used to know your genetic constituent / make-up of an individual, while blood group is used to know your blood state/ classification.
4. Blood group is a group the blood belongs to, while genotype is DNA.
5. Genes (genotype), Antigen in blood cell for blood group.
6. Carrier of genes (genotype) and blood transfusion group (blood group).
7. Genotype is the genotypic screening of one's blood, blood group is the class of blood you belong to e.g A+, O-.
8. Cell formation.

9. Genotype is a group to which one's gene belong and blood group denotes a group in which the body fluid/ blood belong.
10. Genotype is the genetic constitution of an individual or group as determined by the particular set of genes it possesses. Blood group is to determine the group of blood you belong.
11. Genotype consists of/ shows the nature of red blood cell, AA, AS, SS, blood group consists of / shows the group the blood belongs to i.e AB, O+, O-, A+, B+.
12. Genotype shows the blood group, blood group shows the rhesus factor.
13. Blood group is for the condition of the blood.
14. Genotype is inherited genes one inherits from one of the genes of his/ her parent, while blood group is the specific type of blood in your system.
15. Gene and blood.
16. It's confusing
17. Same
18. AS and OA
19. O+ and SS
20. Genotype deal with the genetic structure of human being while blood group deal with blood classification and hereditary.
21. Genotype is a test to verify one's genetic disorder, while blood group shows one's blood status.
22. Genotype means some testing of blood.
23. They are not the same.
24. Genotype refers to blood type/ class, while blood group refers to blood donation/ reception.
25. Genotype deals with gene and blood group deals with RBC.
26. The type of blood and cell arrangement.
27. Genotype is genotype and blood group is group of blood sample.

Appendix 6

CODING GUIDE

Knowledge of SCD and willingness to undergo genotype screening among Corps members in Ibadan North Local Government Area, Oyo State

QSTN.	VAR NAME	VARIABLE (QUESTIONS/STATEMENTS)	VARIABLE LABEL	CODE
Q1	SEX	Sex	Male	1
			Female	2
Q2	NAT	Nationality	Nigerian	1
			Others	2
Q3	AGE	Age		
Q4	MARST	Marital Status	Marital Status	1
			Married	2
			Widow(er)	3
			Divorced	4
			Cohabiting	5
Q5	CHLDRN	Do you have children?	Yes	1
			No	2
Q5b	NO	If Yes, how many?		
Q6	REL	Religion	Christianity	1
			Islam	2
			Traditional	3
			Eckanckar	4
Q7	TRB	Ethnicity/ Tribe	Yoruba	1
			Ibo	2
			Hausa	3
			Idoma	4
			Urhobo	5
			Edo	6
			Tiv	7
			Estako	8
			Delta-Ika	9
			Ibibio	10
			Igala	11
			Berom	12
			Ijaw	13
			Isoko	14
			Calabar	15
			Uzianie	16
			Ebira	17
Q8	STE	State of Origin	Edo	1
			Lagos	2
			Osun	3
			Ogun	4
			Kano	5
			Oyo	6

			Ondo	7
			Ekiti	8
			Benue	9
			Kwara	10
			Kano	11
			Delta	12
			Imo	13
			Kaduna	14
			Anambra	15
			Akwa-Ibom	16
			Kogi	17
			Plateau	18
			Enugu	19
			Abia	20
			Rivers	21
			Bayelsa	22
			Ebonyi	23
			Adamawa	24
Q9	QLF	Academic Qualification	Higher National Dip.	1
			Bachelor's Degree	2
Q10	CRSE	Discipline	Management	1
			Arts	2
			Agricultural Sciences	3
			Social Sciences	4
			Law	5
			Education	6
			Technology/Engineering	7
			Vertinary Medicine	8
			Medical Sciences	9
			Environmental Sciences	10
SECTION B				
Q**11**	HRD SCD	Heard about SCD	Yes	1
			No	2
			Don't Know	88
Q12	WT1	What informed you	Radio	↑ Yes 1 ↓
			Television	
			Newspaper	
			School	
			Friends	
			Family	
			Special CDS	↑ No 2 ↓
Q13	WHN	When did you get to know	Primary sch./childhood	1
			Secondary sch./adolescence	2
			University/ recently	3
Q14	SCD	What is SCD?		
		Disease/Blood Disease/Chronic disease/bone marrow disease/deadly/killer disease/disease of the body.		1

		Anaemia; Anaemia genetic syndrome/ hereditary form of anaemia/deficiency in the blood.	2
		Abnormal formation of RBC into sickle /crescent/ banana shape.	3
		Person with SS genotype/ gene trait of SS.	4
		Genetic disorder/disease/ dysfunction/ metabolic disease as a result of mutation of the coded genes.	5
		Hereditary disease	6
		Disease of the white blood cells.	7
		Consequence disease/ occurs when a child inherits two defective genes from the parents e.g SS,SC, CC.	8
		Can't explain it/ Not Sure	9
		Not applicable	77
		Don't know/No idea	88
		Non-Response/Missing value	99

Q15	**AWR1**	Aware of genotype screening	Yes / No		1 / 2 / 88
Q16	**SMNE**	Know someone who has SCD is hereditary SCD			
Q17	**FAM**	SCD in your family			
Q18	**CRE**	Cure for SCD			
Q18b	**CRE2**	If Yes	Bone marrow transplant		1
			Prayer		2
			Blood Transfusion		3
			Medication		4
	SECTION C				**Total Score**
Q19	**FORM**	A form of SCD	HaSA	1	1
			Hbαα	2	
			HbSS	3	
			HbAA	4	
Q20	**SS**	Signs and symptoms of SCD	Headache	Yes 1 / No 2	1
			Bone pains		
			Diarrhoea		
			Paleness of the eyes		
			Malaria		
Q21	**CONT**	SCD is contagious and infectious	Yes	2	1
			No	1	
			Don't Know	88	
Q22	**DGN2**	Genotype screening diagnoses	Arthritis	1	1
			Sickle cell disease	2	
			Blood group/Rhesus factor	3	
			Blood poisoning	4	
Q23	**WHT**	Genotype screening involves	Water	1	1
			Blood	2	
			Urine	3	
			Saliva	4	
Q24	**WHR**	Genotype screening	School	1	1

		can be done in	Churches and Mosques	2	
			Standard Laboratories	3	
			General / Teaching Hospitals	4	
Q25		The ideal time for genotype screening	Birth/Childhood	1	1
			Adolescence	2	
			Before Marriage	3	
			After Marriage	4	
Q26	**GNTP**	Person's genotype	AS	Yes 1 / No 2	1
			AB		
			AA		
			SS		
			OA		
			B+		
			A+		
Q27	**INFM**	Genotype informs you about blood group	Yes	1	1
			No	2	
			Don't Know	88	
Q28	**GB2**	Difference between genotype and blood group	Same	1	
			Not same	2	
			Genotype deals with gene, while blood group deals with blood classification/ type/Classification.	3	
			Genotype shows the nature of RBC, AA, AS, SS, blood group shows of group the blood belongs to i.e. AB, O+,A+.	4	
			Cell formation/ type of blood and cell arrangement.	5	
			Can't explain it/ Not Sure	6	
			Genotype; combination of the dominant and recessive genes inherited from the parents, blood group is the antigen and antibodies present o the RBC.	7	
			Don't know/No idea	88	
			Blood group determines blood compatibility, genotype does not.	8	
Q29	**MW**	If a man and a woman both have the SCD trait marry, **likely** to have a child with the disease	**Yes**	1	1
			No	2	
			Don't know	88	
Q30	**LFE**	Life expectancy for SCD	90years	1	1
			70years	2	
			40years	3	
			35years	4	
			Genotype test	5	
			Non-Response	99	

Q31	**MGT**	Management	Immunization	1	1
			Radiotherapy	2	
			Medical check-up	3	
			Blood Transfusion	4	
			Hydration/ Good Nutrition	5	
			Chemotherapy and physiotherapy	6	
			Going for programs	7	
			Medication/drugs	8	
			Genotype test	9	
Q32	**DRG**	Drugs/ medications of a carrier of SCD	Coughlin Vit. B-Complex Nevaraprine Folic Acid Paludrine Piritin	Yes 1	No 2	1
			Non-Response	99		
Q33	**CONQ**	The consequences of SCD	Having SCD in the family Psychological stress Happiness Death/Mortality rate rises Pain Finance	Yes 1	No 2	1
Q34	**GETC**	SCD is genetic				
Q35	**HER**	SCD is hereditary				
	Total					**16**

	SECTION D			**Total Score**
Q36.	**PS**	A disease of the poor and sinners.	Agree 1 ↕ Disagree 2	1
Q37.	**DDL**	SCD is not deadly		1
Q38.	**FRD**	People do not make friend with someone who has SCD.		1
Q39.	**WRK**	A person who has SCD and tasks/work.		1
Q40.	**SLF**	People who give birth to SCD children are selfish and evil.		1
Q41.	**MN**	Men do not need genotype screening		1
Q42.	**LOVS**	Intimate relationship does not need genotype screening.		1
Q43.	**WN**	Only women do genotype screening.		1
Q44.	**FIN**	SCD trait marry have financial capabilities.		1
Q45.	**FATH**	With faith can marry someone who has SCD.		1

Q46.	**SUP**	Support family member marry a carrier of SCD.	Undecided 3 ↓	1
Q47.	**AO**	People who have SCD are the Abikus and the Ogbanjes.		1
Q48.	**SEV**	Severe in men than in women.		1
	Total			**13**

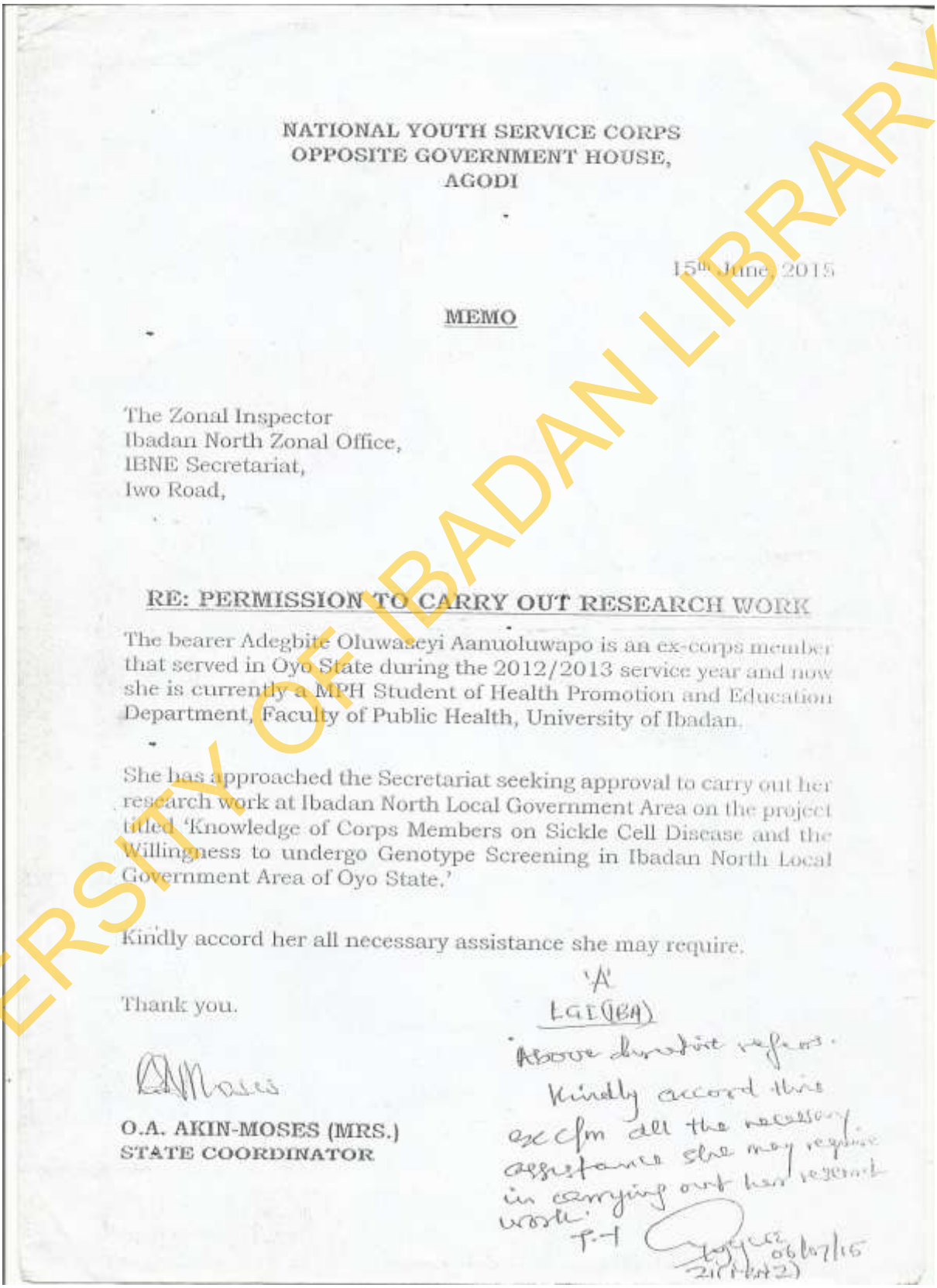
SECTION E

Q49.	**HAD**	Ever had a genotype screening	Yes 1 No 2 Don't know 88	1	1
Q50.	**DO**	Can do genotype screening/testing			1
Q50b.	**DO1**	If Yes to question 54	Confirmation of my status	1	1
			Knowledge	2	
			Marital relationship reasons	3	
			Employment	4	
Q50c.	**DO2**	If No to question 54	Fear of needle prick	1	1
			I already know my status	2	
			My result may get mixed up	3	
			Cost of the test	4	
Q51.	**WILL**	Will to repeat genotype screening	↑ Yes 1 No 2 Don't know 88 ↓		1
Q52.	**CONFD**	Confidence in the genotype test result			1
Q53.	**FAM**	Recommend your friends and family			1
Q54.	**MATB**	Genotype screening fosters marital bliss			1
Q55.	**IFNTS**	Genotype screening for infants and young children			1
Q56.	**CHLD**	Adopt/raise a child with SCD			1
Q57.	**NYSC**	Recommend genotype screening in the NYSC camps			1
Q58.	**AWNS**	Support the awareness activities			1
		Total			12

Not applicable – 77
Missing Value – 99

Appendix 7

Ethical Approval Letter from the NYSC Headquarters Office



NATIONAL YOUTH SERVICE CORPS
OPPOSITE GOVERNMENT HOUSE,
AGODI

15th June, 2015

MEMO

The Zonal Inspector
Ibadan North Zonal Office,
IBNE Secretariat,
Iwo Road,

RE: PERMISSION TO CARRY OUT RESEARCH WORK

The bearer Adegbite Oluwaseyi Aanuoluwapo is an ex-corps member that served in Oyo State during the 2012/2013 service year and now she is currently a MPH Student of Health Promotion and Education Department, Faculty of Public Health, University of Ibadan.

She has approached the Secretariat seeking approval to carry out her research work at Ibadan North Local Government Area on the project titled 'Knowledge of Corps Members on Sickle Cell Disease and the Willingness to undergo Genotype Screening in Ibadan North Local Government Area of Oyo State.'

Kindly accord her all necessary assistance she may require.

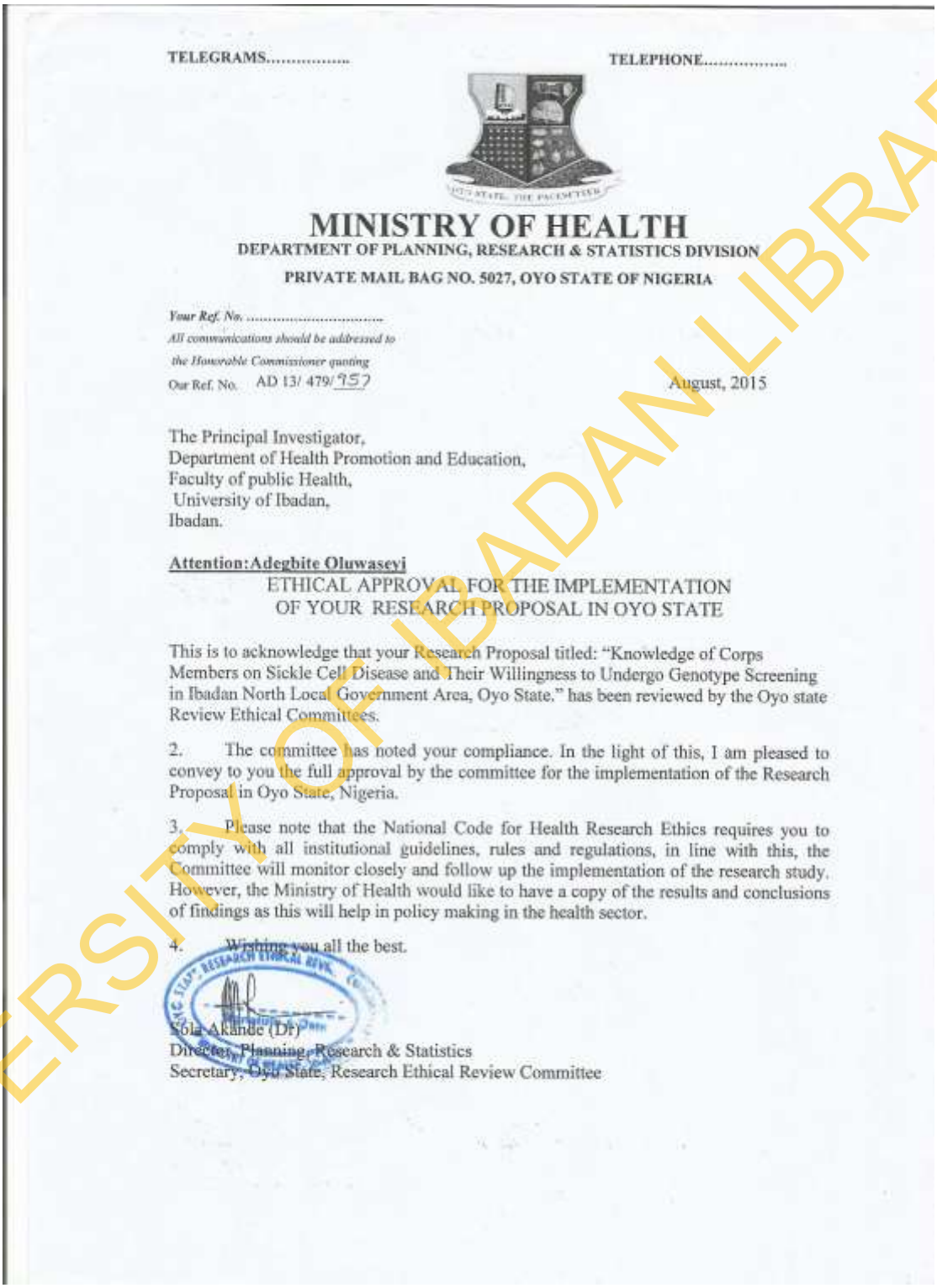
Thank you.

O.A. AKIN-MOSES (MRS.)
STATE COORDINATOR

LGE(IBA)
Above directive refers.
Kindly accord this exc cfm all the necessary assistance she may require in carrying out her research work.
T.T
06/07/15

Appendix 8

Ethical Approval from the Oyo State Ministry of Health



TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....
All communications should be addressed to the Honorable Commissioner quoting
Our Ref. No. AD 13/ 479/957 August, 2015

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of public Health,
University of Ibadan,
Ibadan.

Attention: Adegbite Oluwaseyi

ETHICAL APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Knowledge of Corps Members on Sickle Cell Disease and Their Willingness to Undergo Genotype Screening in Ibadan North Local Government Area, Oyo State." has been reviewed by the Oyo state Review Ethical Committees.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4. Wishing you all the best.

Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee