Assessment of the Knowledge and Uptake of Genotype Screening among Undergraduate Students of Lagos State University of Education, Ijanikin (Lasued)

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Abstract
Genotype screening plays a pivotal role in the prevention of hereditary disorders, notably sickle cell disease, particularly among adolescents. Early identification of genetic status facilitates informed health, reproductive, and marital decisions. This study investigated the level of knowledge and uptake of genotype screening among Undergraduate Students of Lagos State University of education. A descriptive cross-sectional study design was employed, utilizing a structured, researcher-developed questionnaire divided into five sections. Data were collected from 149 undergraduate students and analyzed using SPSS version 26. Results were presented using descriptive statistics, including tables, frequencies, and percentages. Findings indicated that 81.2% of respondents (n=121) were aware of genotype screening, with the school identified as the main source of information. However, 65.1% (n=97) erroneously equated genotype screening with blood group testing, reflecting notable misconceptions. The uptake of genotype screening, as reported by 77.2% of respondents, was largely influenced by factors such as family support, peer influence, and access to healthcare services. Chi-square analysis revealed no statistically significant association between age and knowledge level ($p > 0.05$), nor between awareness and familiarity with genotype screening ($p > 0.05$). The study recommends the integration of genotype education into the university curriculum. In addition, collaborative efforts among healthcare professionals, educators, and parents are essential to dispel misconceptions and enhance the uptake of genotype screening among the youths.

Keywords: Genotype screening, knowledge, uptake, adolescents, preventive health

Chapter One

1.0 Introduction

Background ofthe Study

Sickle Cell Disease (SCD) is a hereditary hemoglobinopathy of major public health concern, affecting millions worldwide. The condition arises when an individual inherits two abnormal hemoglobin genes (HbS), one from each parent. This genetic mutation involves the substitution of glutamic acid with valine at the sixth position of the β-globin chain, resulting in the production of structurally abnormal and functionally unstable hemoglobin. Under low oxygen conditions, red blood cells containing HbS become rigid and sickle-shaped, losing their elasticity and impairing normal circulation. These changes contribute to vaso-occlusive episodes, hemolytic anemia, and a wide array of acute and chronic complications.

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Globally, approximately 25 million individuals live with SCD, with sub-Saharan Africa accounting for nearly 75% of the global burden. The carrier rate of the sickle cell trait (HbAS) ranges from 5% to 40% in endemic regions. West Africa, in particular, bears a high prevalence of HbS, while other hemoglobin variants like HbC, HbE, HbSD, and HbSE are more common in parts of Asia and the Middle East. In sub-Saharan Africa, the disease significantly contributes to childhood morbidity and mortality, with many affected children succumbing early due to malaria, bacterial infections, and inadequate access to appropriate healthcare. Nigeria, with an estimated population of over 200 million, has the highest number of individuals living with SCD globally. It is estimated that around 150,000 infants are born annually with SCD in the country, accounting for nearly half of the global incidence. Despite increased public awareness initiatives, the prevalence and burden of SCD in Nigeria remain unacceptably high. Unlike developed countries where genotype screening is routinely incorporated into prenatal and antenatal care, many Nigerian women begin pregnancy without prior knowledge of their hemoglobin genotype. Furthermore, limitations in access to advanced technologies like Pre-Implantation Genetic Diagnosis (PGD), and restrictive abortion laws, pose additional challenges in preventing births affected by SCD. Genotype screening and genetic counselling are essential components of preventive healthcare. While premarital genotype screening remains voluntary in Nigeria, it has proven to be an effective strategy for reducing the incidence of SCD. Religious institutions, particularly churches, have played a significant role by mandating genotype testing for intending couples—thus contributing to the prevention of marriages between individuals who are both carriers of HbS or other abnormal hemoglobin variants. Beyond marriage planning, individuals may also seek genotype testing for school admission, medical assessments, travel requirements, or general health checks. Nonetheless, awareness does not always translate into action. Studies (e.g., Ezenwosu et al., 2021; Ngozi et al., 2023) have reported suboptimal awareness and uptake of genotype screening, particularly among antenatal women. Traditional and court marriages, which often do not mandate genotype testing, contribute to continued gaps in prevention efforts. Sickle cell vasculopathy, a systemic manifestation of SCD, results from the complex interaction of sickled red blood cells, activated leukocytes and platelets, endothelial dysfunction, and chronic inflammation. Advancements in medical care have extended the life expectancy of individuals with SCD, leading to the emergence of previously under-recognized complications, including ocular pathologies such as proliferative sickle retinopathy (PSR) and sickle maculopathy.

These complications may not be evident on routine ophthalmic examination and often require advanced imaging techniques such as Optical Coherence Tomography (OCT) and OCT-Angiography (OCT-A) for early detection (Omar et al., 2021). Among adolescents, particularly in resource-limited settings, knowledge about genotype and its implications for health, reproduction, and family planning is often inadequate. Educational interventions targeting students have been shown to improve knowledge and screening uptake (Adebayo et al., 2021), although socio-cultural influences, access to screening services, and integration of genotype education into school curricula remain critical determinants of behavior change (Adepoju et al., 2020). Assessing students' knowledge, attitudes, and behaviors regarding genotype screening is vital for informing school-based health

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education programs. Such efforts could enhance genetic counselling services and support long-term strategies aimed at reducing the burden of SCD through informed decision-making and preventive practices.

1.1 Statement of the Problem

Genotype screening serves as a vital preventive strategy for identifying individuals at risk of inheriting genetic disorders such as sickle cell disease (SCD). Despite its importance, there remains a significant knowledge and utilization gap, particularly among university students. This lack of awareness may lead to delayed diagnosis, poor health decision-making, and increased risk of complications associated with genetic disorders. Sickle cell disease, the most prevalent life-threatening genetic disorder globally, affects an estimated 312,000 newborns annually, with Nigeria accounting for nearly half of these cases. The prevalence of sickle cell anemia (HbSS) in Nigeria stands at approximately 20 per 1,000 live births, while about 25% of the population carries the sickle cell trait (HbAS). Given the scale of the burden, especially in Nigeria, early genotype screening and education are essential for reducing incidence and improving long-term health outcomes. While genotype screening is generally voluntary, it has increasingly been adopted as a requirement by religious institutions and some educational establishments, particularly during marriage counselling, employment processes, and school admissions. However, despite these initiatives, the uptake remains low among young people due to limited awareness, misconceptions, and a lack of structured educational interventions. Studies, such as those by Oyewole (2020) and Cegbeyi et al. (2021), have highlighted the persistent knowledge gap among students regarding genotype screening, which poses a continued risk for the spread of genetic conditions like SCD. Moreover, the importance of educating future healthcare professionals—starting from secondary school through to university—has been underscored as critical in addressing these public health challenges. This study was therefore undertaken to assess the level of knowledge and the extent of genotype screening uptake among undergraduate students of Lagos State University of education. It also aims to examine the relationship between awareness of sickle cell disease and the practice of genotype screening, thereby identifying potential areas for targeted educational interventions to promote preventive health behavior among adolescents and youths.

1.2 Objectivesof the Study

The primary aim of this study is to evaluate the level of knowledge and the extent of genotype screening uptake among the LASUED students.

The specific objectives are to:

1. Assess the level of awareness regarding genotype screening among the LASUED students.
2. Evaluate students' knowledge and understanding of genotype screening.
3. Identify the factors influencing the uptake of genotype screening among the students.
4. Propose strategies to promote and increase the uptake of genotype screening within the student population.

1.3 Research Questions

This study seeks to answer the following researchquestions:

1. What is the level of awareness of genotype screening among the LASUED students?
2. What is the current level of knowledge and understanding of genotype screening among these students?

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3. What factors influence the uptake of genotype screening among students at the school?
4. What strategies can be employed to promote and encourage the uptake of genotype screening among the LASUED students?

1.4 Research Hypotheses

To guide this study, the following hypotheses were formulated:

- **Null Hypothesis (H_0):** There is no significant relationship between students' age and their level of knowledge and understanding of genotype screening.
- **Alternative Hypothesis (H_1):** There is a significant relationship between the level of knowledge and the degree of familiarity with genotype screening among university students.

1.5 Significance of the Study

The primary aim of this study is to assess the uptake of genotype screening among the university students at Lagos State University of education (LASUED). The findings are expected to inform the development of early intervention strategies that promote timely screening and reduce the risks and complications associated with genetic disorders such as sickle cell disease. By highlighting gaps in knowledge and uptake, this research aims to support evidence-based policy formulation, contribute to reducing the stigma often associated with genetic conditions, and empower individuals—especially adolescents—to make informed health and reproductive decisions.

1.6 Scope of the Study

This study focuses on assessing the knowledge and uptake of genotype screening among LASUED students. The scope of the research is specifically limited to students in first year class within the institution.

1.7 Operational Definition of Terms

For the purpose of this study, the following terms are defined in context:

- **Knowledge:** The awareness, information, and understanding possessed by students regarding their genetic composition, particularly in relation to genotype screening and its implications for health, as assessed among the LASUED.
- **Uptake:** The degree to which students engage with, participate in, or make use of genotype screening services.
- **Genotype:** The specific genetic constitution of an individual, referring to the combination of alleles inherited from both parents, which determines traits such as sickle cell status.
- **Screening:** A systematic process of analyzing an individual's genetic material (DNA) to detect specific gene variants or mutations that may indicate a predisposition to hereditary conditions or other health-related genetic traits.
- **Students:** Individuals enrolled and actively participating in academic learning at LASUED.

Chapter Two
Literature Review

2.0 Conceptual Framework

Information plays a fundamental role in the development of individuals and nations alike. The level of information literacy within a population is a critical determinant of national growth, as it empowers individuals to make informed choices concerning their health, careers, and overall well-being. According to Masele (2021), information is a powerful tool that shapes personal and societal outcomes. It enables individuals to formulate strategies, make well-grounded decisions, and take purposeful actions. In this context, the dissemination and sharing of relevant information is not only a core human activity but also a driver of innovation and

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development. Information sharing fosters creativity and the generation of new ideas. As Neiva (2020) noted, innovative behavior involves not only the creation and promotion of novel ideas but also the implementation of new technologies, methods, and solutions. However, access to information alone is insufficient; individuals must be able to discern and utilize only the most relevant and actionable data for meaningful outcomes. In the realm of public health, genotype screening exemplifies the critical role of information in preventive care. Genotype screening programs aim to systematically identify asymptomatic individuals at risk for genetic conditions, offering early interventions, reproductive counselling, or treatment options. When properly designed, these programs can prevent unnecessary harm such as stigma or anxiety, and ensure more benefits than conventional care alone. The effectiveness of such programs depends on several factors: recruitment strategies, timing, test accuracy, availability of interventions, education, and ethical safeguards (National Human Genome Research Institute, 2021). Concerns have emerged about market-driven expansions of screening programs without sufficient evidence of their effectiveness or societal acceptance. Consequently, the decision to introduce or scale up population-based screening requires a careful balance of scientific evidence, ethical considerations, and public engagement. The broader implications—such as emotional burden, potential discrimination, loss of insurance, or employment challenges—highlight the necessity for societal debate and regulatory oversight. Technological advancements and a widening interpretation of health benefits have accelerated the development and availability of screening tests. However, each screening initiative must be evaluated independently, given its distinct ethical, medical, and societal implications. To guide this complexity, a structured decision-making framework is necessary for health professionals to support individuals and communities in making informed choices regarding genotype screening. Genetic screening continues to evolve rapidly. With over 500 known genes linked to various inherited disorders, the affordability and accessibility of next-generation sequencing have significantly expanded the clinical use of genetic testing. However, its application at the individual level still requires clear guidelines and careful consideration. Carrier screening, for example, is designed to identify individuals or couples at risk of passing genetic disorders to their offspring, allowing them to make informed reproductive decisions aligned with their values. Newborn screening represents another major public health strategy, enabling early detection and treatment of genetic conditions. Decisions about which disorders to include in screening are not based solely on clinical criteria but also take into account public health priorities and economic considerations.

Key factors include the severity of the disease, understanding of its progression, the availability of effective interventions, and the health system's capacity for follow-up care. Although traditionally based on biochemical markers, technological innovations now allow for the integration of genotype-based methods into newborn screening programs—introducing both technical and ethical challenges. In sub-Saharan Africa, particularly West Africa, hemoglobin variants such as HbS, HbSB-Thalassemia, HbSD, and HbSE are prevalent. Carrier rates in these regions range from 5% to 40%, significantly influencing the epidemiology of sickle cell disease (SCD). SCD imposes significant psychological, social, and economic burdens on individuals and families. In many parts of Africa, particularly in low-resource settings,

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children affected by SCD face high mortality rates due to co-morbidities such as malaria and bacterial infections, compounded by poor access to healthcare (Msheliza, 2021). This framework underscores the importance of accessible, accurate, and contextually relevant information as a foundation for successful genotype screening. Understanding how students' access and interpret information on genotype screening is crucial for designing effective educational interventions. Promoting awareness, addressing misconceptions, and encouraging informed participation in screening programs can ultimately reduce the burden of genetic disorders and improve public health outcomes, especially among young populations in high-risk regions.

2.1 Determining the Level of Awareness of Genotype Screening

Premarital genotype screening provides individuals with crucial information about their genetic makeup and potential hereditary risks. It enables couples to understand the likelihood of passing on genetic conditions to their offspring, particularly when procreation is a central objective of marriage. As such, genetic compatibility becomes an important consideration in marital decisions, especially in the context of preventing hereditary diseases. Among the most common inherited disorders are sickle cell disease, cystic fibrosis, and Tay-Sachs disease—with sickle cell disease being the most prevalent, especially in sub-Saharan Africa. Premarital screening typically involves a range of genetic tests, often recommended for individuals preparing for marriage, to detect carrier status for hemoglobinopathies and other hereditary conditions. According to the World Health Organization (WHO), approximately 5% of the global population carries genes responsible for hemoglobinopathies. Sickle cell anemia is particularly widespread among individuals of sub-Saharan African, Indian, Saudi Arabian, and Mediterranean descent. Each year, over 300,000 babies are born with sickle cell disease globally, with the majority of these births occurring in low- and middle-income countries—especially in Africa. In Nigeria, sickle cell disease represents one of the most common genetic disorders. An estimated 24% of the Nigerian population are carriers (HbAS), while the national prevalence of sickle cell anemia (HbSS) stands at approximately 2%, with over 15,000 children born annually with the condition. The impact of this disease is profound: it is responsible for around 5% of under-five mortality across Africa, over 9% in West Africa, and up to 10% in specific West African countries. Hemoglobinopathies, such as sickle cell disease, are recognized by the WHO as significant global public health concerns. An estimated 240 million people globally are carriers of severe genetic diseases, and at least 200,000 affected individuals are born each year. As genetic conditions become increasingly prevalent, they compound existing health and socioeconomic burdens in many communities.

Preventive measures such as premarital screening, genetic counselling, prenatal and preconception diagnosis, and the use of in vitro fertilization (IVF) with implantation of healthy embryos are available options. Stem cell therapy also offers therapeutic potential, though its availability remains limited in many low-resource settings. Of all prevention strategies, the identification of carriers and the provision of genetic counselling remain the most practical and cost-effective in low-income countries, where sickle cell disease is most widespread. Given that a large proportion of today's youth are unmarried but likely to enter reproductive relationships in the future, they

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represent a critical target for public health interventions. Enhancing awareness and promoting the acceptability of premarital genotype screening among this population is essential for reducing the burden of hereditary diseases. Thus, assessing the awareness level and attitudes of students toward genotype screening is a necessary step in shaping effective intervention strategies. Such efforts can help reduce reproductive risks, enhance genetic health literacy, and ultimately lower the prevalence of sickle cell disease and other hereditary conditions in Nigeria (Oyedele et al., 2020).

2.2 Assessing the Level of Knowledge of Genotype Screening

Genotype screening is a critical aspect of preventive healthcare, especially in countries like Nigeria where the prevalence of sickle cell disease (SCD) is significantly high. Among adolescents and university students, adequate knowledge of genotype screening is essential for promoting informed health and reproductive decisions. While public sensitization efforts have increased over time, existing studies reveal that students often have a limited or superficial understanding of genotype screening. Many mistakenly equate it with blood group testing or even general health assessments, such as nutritional evaluations (Adeyemo et al., 2021). This confusion underscores the need for more targeted educational initiatives to clarify the purpose and significance of genotype screening. Genotype screening, along with subsequent genetic counselling, is increasingly recognized as a fundamental component of preventive medicine. Its growing prominence has sparked discussions about how best to integrate genotype testing into routine public health frameworks, including newborn and premarital screening programs. A clear understanding of societal attitudes toward these initiatives is essential for their successful implementation. Correct knowledge and positive attitudes toward genotype screening are particularly important in the context of sickle cell prevention. Early identification of carrier status and risk through screening allows individuals and couples to make informed reproductive decisions, which can reduce the incidence and impact of SCD. In resource-constrained settings such as Nigeria, this strategy also supports the more efficient allocation of limited healthcare resources. Although genotype screening is typically voluntary, it is increasingly being mandated by some religious organizations and educational institutions as a prerequisite for marriage, school admission, or employment. These trends reflect growing recognition of the role that screening can play in reducing the burden of genetic diseases (Ramsey et al., 2021). Sickle cell disease remains the most prevalent life-threatening genetic disorder globally, with an estimated 312,000 births annually—about half of which occur in Nigeria. The prevalence of sickle cell anemia (HbSS) in Nigeria is estimated at 20 per 1,000 live births, while approximately 25% of the population carries the sickle cell trait (HbAS).

Given this high burden, the future management of SCD depends heavily on improving education, particularly among young people and future healthcare professionals (Scott et al., 2023). Despite rising awareness campaigns, a comprehensive understanding of genotype screening remains insufficient among students. Bridging this knowledge gap requires the development of inclusive, age-appropriate, and culturally sensitive educational interventions. Equipping adolescents with accurate information will not only improve their personal health outcomes but also contribute to broader public health goals by reducing the

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incidence of preventable genetic conditions (Idowu & Okonkwo, 2022).

2.3 Factors Influencing Genotype Screening

Genotype screening—particularly in the context of premarital testing—has significantly contributed to the reduction of hereditary and communicable diseases. It has been instrumental in lowering the prevalence of genetic blood disorders such as sickle cell anemia and thalassemia, as well as infectious diseases including hepatitis B, hepatitis C, and HIV/AIDS (Alhosain et al., 2019). Premarital screening involves a panel of diagnostic tests aimed at detecting genetic, infectious, and blood-transmissible diseases in couples planning to marry, thereby reducing the risk of passing such conditions on to offspring (Rahman et al., 2019). Genetic disorders remain a central focus in premarital screening because of their lifelong health and social consequences. In certain regions, particularly among Arab populations, consanguineous marriages have been linked to an elevated prevalence of rare autosomal recessive disorders such as Bardet-Biedl syndrome, Meckel-Gruber syndrome, spinal muscular atrophy, Sanjad-Sakati syndrome, and renal tubular acidosis (Tadmouri et al., 2020). Morbidity and mortality associated with hereditary conditions are notably on the rise in Middle Eastern countries (Al-Saud et al., 2019). In regions such as North Africa, the Middle East, and Western Asia, the cultural prevalence of cousin marriages has been strongly correlated with increased rates of inherited diseases, including diabetes, blood disorders, cardiovascular conditions, mental health issues, and G6PD deficiency (Bener et al., 2019; Bener et al., 2021). In Oman, for example, 58% of all marriages are consanguineous, with 75% being between first cousins (Rajab et al., 2020). This has contributed to a high incidence of genetic blood disorders. To address this challenge, Oman introduced a national premarital screening program in 1999, supported by the Child Law (Royal Decree No. 22/2014), which emphasizes the importance of screening and counseling prior to marriage (Cook, 2021). Although premarital screening services are provided free of charge, levels of awareness and acceptance remain inconsistent, highlighting the need for ongoing public education (Ali et al., 2022). In the Nigerian context, several factors influence the uptake of genotype screening among secondary school students. One of the most significant is the method of information dissemination. Engaging, relatable health messages—particularly through digital platforms such as social media, webinars, and online workshops—have been shown to increase awareness and motivate young people to get tested (Ezeonu et al., 2021; Taylor et al., 2023). Incentivizing screening is another strategy that has proven effective. Programs offering free or subsidized genotype tests, academic scholarships, or other rewards can significantly improve participation among students (Miller et al., 2021; Davis et al., 2023).

Furthermore, integrating genotype screening into school-based health services, in collaboration with healthcare providers and genetic counselors, can greatly enhance accessibility and acceptance (Lerner et al., 2021; Johnson et al., 2023). Ultimately, factors influencing genotype screening include sociocultural beliefs, religious practices, health literacy, accessibility of services, perceived benefits, and institutional policies. Addressing these factors through a multidimensional strategy that combines education, accessibility, community involvement, and policy support is essential to improving genotype screening uptake among adolescents.

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2.4 Strategies to Promote Uptake of Genotype Screening

Encouraging genotype screening among university students is essential for the early identification of genetic traits such as sickle cell, which can significantly influence future reproductive decisions. One of the most impactful approaches is the integration of genotype education into the school curriculum, particularly through subjects like Biology, Social Sciences Civic Education, and Health Science. Structured classroom instruction helps students develop a scientific understanding of genetics, appreciate the health implications of genotype compatibility, and recognize the role of screening in preventing hereditary disorders (Ogunbiyi et al., 2023). School-based screening programs have also proven effective in increasing participation among adolescents. By organizing regular, cost-free or subsidized genotype screening events in collaboration with healthcare professionals, government agencies, and non-governmental organizations, schools can eliminate financial and logistical barriers to access. These initiatives not only enhance screening uptake but also promote a preventive health culture within educational settings (Idowu & Okonkwo, 2022). Incorporating genotype screening education through interactive methods—such as group discussions, peer education, workshops, and hands-on demonstrations—has been shown to deepen understanding and engagement among students. When students are actively involved in learning about the relevance of genotype screening, they are more likely to perceive its value and seek screening services voluntarily (Smith et al., 2022; O'Connor et al., 2021). Parental involvement also plays a crucial role in improving screening uptake. Parents and guardians can be engaged through platforms such as Parent-Teacher Association (PTA) meetings, community health forums, and school-organized seminars. These forums provide an opportunity to educate families about the significance of genotype screening and empower them to support their children in making informed health decisions (Gómez-López et al., 2021; Hernandez et al., 2022). Additionally, leveraging digital media platforms and adolescent-friendly communication tools can enhance awareness and interest in genotype screening. Social media platforms such as Instagram, WhatsApp, school blogs, YouTube, and interactive radio programs can be used to disseminate accurate and relatable information. When messages are delivered through platforms familiar to students, they are more likely to resonate and prompt action. In summary, promoting the uptake of genotype screening among higher institution students requires a multifaceted approach. This includes curriculum integration, school-based testing initiatives, parental engagement, interactive learning experiences, and the strategic use of digital media. These combined efforts can create a more informed, proactive generation that values genetic health and makes responsible reproductive choices.

2.5 Theoretical Framework

The **Health Promotion Model (HPM)**, developed by Nola J. Pender in 1982, serves as the theoretical foundation for this study. As noted by Petiprin (2019), the model was introduced as a complement to existing models of health protection and aims to conceptualize health as a positive and dynamic state, rather than merely the absence of disease. The primary goal of the model is to enhance individual well-being by fostering behaviors that promote health. It emphasizes the multidimensional nature of individuals as they interact with their environment in the pursuit of improved health outcomes. According to Williams (2020), the success of the HPM is grounded

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in several assumptions: individuals strive to create optimal living conditions; they possess the capacity for self-assessment and are aware of their strengths and values; they are motivated to grow and regulate their behaviors; and they are capable of interacting with and transforming their environment. Furthermore, nurses and other healthcare professionals are considered essential agents in facilitating these changes within the community.

Major Concepts of the Health Promotion Model

As reviewed by Williams (2020) and Gonzalo (2020), the HPM is built upon three major components:

1. **Individual Characteristics and Experiences**
   This includes prior related behaviors and personal factors that influence health actions.
2. **Behavior-Specific Cognitions and Affect**
   These refer to perceived benefits and barriers to action, perceived self-efficacy, emotional responses associated with health behaviors (activity-related affect), interpersonal influences, and situational influences.
3. **BehavioralOutcomes**
   These encompass the individual's commitment to a plan of action, immediate competing demands, and competing preferences that may impact behavior execution.

Sub-Concepts of the Model

Further elaborations by Petiprin (2019) and Gonzalo (2020) identify several sub-concepts critical to understanding the functioning of the model:

- **Personal Factors**: These are divided into:
  - Biological factors: age, gender, body mass index, physical fitness, etc.
  - Psychological factors: self-esteem, motivation, perceived health status, and personal competence.
  - Socio-cultural factors: race, ethnicity, education level, acculturation, and socioeconomic status.
- **Perceived Benefits of Action**: The anticipated positive outcomes associated with adopting a health-promoting behavior (Petiprin, 2019).
- **Perceived Barriers to Action**: These include real or imagined obstacles that hinder health behavior, including perceived costs or difficulties (Petiprin, 2019).
- **Perceived Self-Efficacy**: This is the individual's confidence in their ability to organize and perform health-promoting activities. Higher self-efficacy tends to lower perceived barriers (Petiprin, 2019).
- **Activity-Related Affect**: These are the emotional reactions that occur before, during, or after engaging in a behavior, which in turn influence self-efficacy. Positive emotions increase the likelihood of behavior repetition (Petiprin, 2019).
- **Interpersonal Influences**: These include social norms, beliefs, or support derived from family, peers, and healthcare providers. Observational learning and modeling behaviors are key mechanisms (Gonzalo, 2020).
- **Situational Influences**: These refer to the individual's perception of their environment, including available options, environmental features, and demands. They can directly or indirectly influence the adoption of health behaviors (Gonzalo, 2020).
- **Commitment to a Plan of Action**: This involves the intention to implement a specific health behavior, coupled with the identification of strategic actions (Williams, 2020).

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- **Immediate Competing Demands and Preferences**: These are alternative behaviors influenced by external factors, such as work or family obligations, which may interfere with the intended health action (Williams, 2020).

In summary, the Health Promotion Model provides a comprehensive framework for understanding the motivational and contextual factors influencing health behavior. By integrating personal, cognitive, social, and environmental components, it offers a valuable lens through which health-promoting interventions can be designed and implemented.

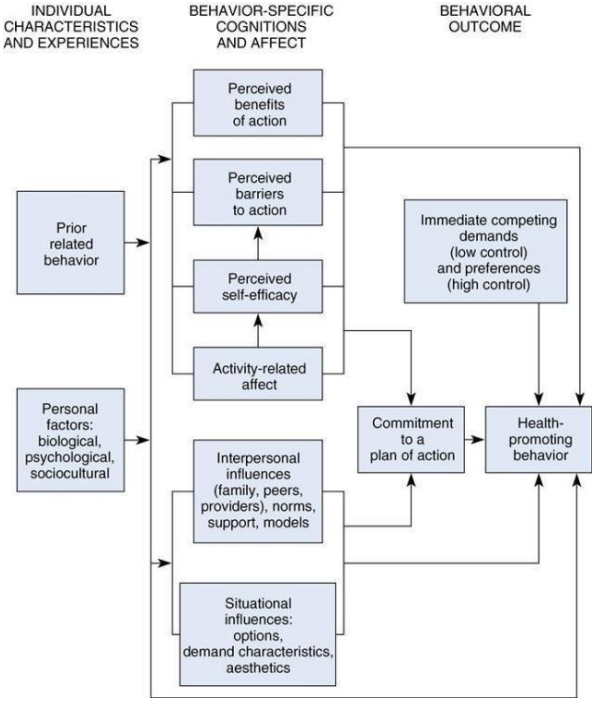

Fig 2.1. NOLA PENDER'S HEALTH PROMOTION MODEL YEAR 1982

Application of the Theoretical Framework to the Study

The Health Promotion Model (HPM) developed by Nola Pender offers a valuable lens through which to examine and enhance health behaviors among adolescents. As a widely recognized framework in health education, the HPM focuses on the motivational factors that drive individuals to engage in health-promoting behaviors and avoid disease. Its emphasis on cognitive-perceptual, interpersonal, and environmental influences makes it especially applicable to school-based interventions, such as promoting genotype screening among the students.

1. **IndividualCharacteristicsand Experiences**

- Prior Related Behavior: Many adolescents may have limited exposure to genetic education or genotype screening, which can influence their current health behaviors. A history of low engagement in preventive health activities may result in reduced motivation to participate in screening programs.
- Personal Factors: Variables such as age, socioeconomic background, cultural beliefs, and family history of sickle cell disease play a critical role. Adolescents from families that demonstrate proactive health-seeking behavior are more likely to recognize the value of genotype screening and participate in such initiatives.

2. **Behavior-Specific Cognitions and Affect**

- Perceived Benefits of Action: Students are more inclined to undergo genotype screening if they understand its relevance in informing future reproductive choices and preventing the transmission of genetic disorders. Health education efforts should therefore highlight the personal and societal benefits of knowing one's genotype.
- Perceived Barriers to Action: Common obstacles include fear of test results, lack of awareness, financial costs, and social stigma. These barriers can be mitigated through targeted school-based interventions that offer free and accessible screening services, provide accurate and

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culturally sensitive information, and address misconceptions.

- Perceived Self-Efficacy: Students' confidence in their ability to undergo screening and comprehend the outcomes can be enhanced through structured health talks, peer-led educational sessions, and access to trained counsellors. Building self-efficacy is essential to empowering students to take proactive health actions.
- Activity-Related Affect: Positive emotional associations with health education—such as feeling supported by peers or motivated by engaging activities—can improve students' attitudes toward genotype screening and increase their willingness to participate.
- Interpersonal Influences: Support from teachers, parents, peers, and healthcare professionals can significantly shape students' health decisions. The involvement of trusted figures, such as community health workers or influential role models, can foster a supportive environment that encourages participation.
- Situational Influences: The physical and social context within schools is a critical determinant of behavior. When genotype screening is integrated into familiar and convenient settings—such as school clinics or during routine health days—and presented in a respectful, culturally appropriate manner, student participation is likely to improve.

3. **Behavioral Outcome**

- Commitment to a Plan of Action: With appropriate motivation, education, and environmental support, students are more likely to commit to undergoing genotype screening. This commitment may manifest through scheduled participation during school health programs or engagement with mobile outreach teams.
- Health-Promoting Behavior: The anticipated outcome of applying the HPM in this context is increased uptake of genotype screening among university students. This not only fosters informed decision-making and healthier future relationships but also contributes to the long-term goal of reducing the prevalence of genetic conditions such as sickle cell disease.

2.6 Empirical Review

Several empirical studies have explored awareness and knowledge of sickle cell disease (SCD) and genotype screening across different populations in Nigeria. The current study found that a majority of participants were aware of sickle cell disease, a finding consistent with those reported by Adewoyin et al., Olelaru et al., Bindhani, and Smith et al., who also observed high levels of awareness among National Youth Service Corps (NYSC) members in Benin City, Nigeria. In the present study, participants also demonstrated a relatively good understanding of genotype screening, although the level of knowledge was slightly lower than that reported by Adeyemo Oyenike et al., Kalambe et al., and Oludare et al. (2019). Conversely, studies by Grosse et al. (2020) and Ebele et al. (2021) documented limited knowledge of genotype screening among their respondents. Similarly, a cross-sectional study by Abioye-Kuteyi et al. conducted among local government workers in Ile-Ife, Nigeria revealed that 69% of participants had poor knowledge of SCD, genotype screening, and premarital testing.

In terms of sources of information, the present study revealed that schools were the most common source, followed by healthcare professionals and the internet. These findings align with those reported by Olatona et al. (2023). However, they contrast with the findings of Gbenoi et al., Galadanci et al., and Busari et al., who reported that initial recommendations for

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genotype screening often came from religious leaders or traditional healers. Additionally, research by Adenike et al. in a tertiary institution in southwestern Nigeria indicated that mass media was the predominant source of information on SCD and genotype screening. Further supporting this evidence, Maduka and Okubor (2023) found that 55.1% of their study participants were aware of their genotype, while 44.9% were not. The study also indicated that variables such as age and parity did not significantly affect genotype awareness ($p = 0.12$ and $p = 0.59$, respectively), whereas education level, religion, marital status, and type of marriage showed significant associations ($p < 0.001$). Among those aware of their genotype, 44.2% had genotype AA and 10.7% had AS, with no reported cases of SS or other haemoglobinopathies. Regarding the source of information, 30.5% of participants first learned about SCD from healthcare providers, while 23.7% heard about it from friends. A large proportion (45.1%) of those who knew their genotype did so out of personal health awareness, while 24.7% were motivated by marital requirements, and 3.3% learned their genotype during antenatal screening. Participants also proposed various strategies to enhance community awareness of genotype status. Suggestions included community enlightenment programs (22.1%), messaging through SMS and WhatsApp (21.9%), television campaigns (20.5%), and church-based education (14.7%). In a more recent study, Samaru (2024) identified a lack of awareness about the implications of not undergoing genotype screening as a significant challenge, with 32.8% of respondents at Federal University Birnin Kebbi, Kebbi State citing this as a key barrier to effective information dissemination. These findings are consistent with those of Abioye-Kuteyi et al. (2019), who also reported a high prevalence of poor knowledge about SCD. However, they contradict the conclusions of Yalma and Awodiji (2021) and Ugwu (2016), who found that most university students in Nigerian tertiary institutions possessed adequate knowledge of SCD and genotype screening. The data underscore the necessity of targeted information dissemination to improve public understanding of genotype screening as a preventive strategy against SCD. Although some challenges to information sharing were noted—such as poor network connectivity, absence of supportive policies, and concerns about privacy—unreliable electricity supply was not considered a major obstacle by students in Kebbi State, a finding that contrasts with results from several other studies conducted across Nigeria.

Chapter Three
ResearchMethodology

3.0 Research Methodology

This chapter outlines the methodological framework adopted for the study. It details the research design, study setting, target population, sampling strategy, data collection instruments, procedures for ensuring validity and reliability, methods of data collection and analysis, as well as ethical considerations.

3.1 Research Design

The study employed a **descriptive cross-sectional design**, which is appropriate for assessing the current status of a phenomenon within a specific population at a single point in time. The design enabled the collection of relevant data using a semi-structured, self-administered questionnaire tailored to the study objectives. Although descriptive in nature, the study utilized **qualitative techniques** to explore perceptions and knowledge in depth.

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3.2 Research Setting

This study was conducted across selected departments within **Lagos State University of Education (LASUED), Ijanikin, Lagos State**. The university comprises three main colleges: the **College of Science**, the **College of Humanities**, and the **College of Information and Technology**, each housing multiple specialized departments. The institution accommodates a diverse student population from various ethnic backgrounds, including Yoruba, Hausa, and Igbo, with the Yoruba ethnic group forming the majority. The school was selected as the study site due to its substantial adolescent population, making it a suitable environment for investigating health-related knowledge and behaviors among youths.

3.3 Target Population

The **target population** for this study were first year **undergraduate students** enrolled in selected departments within Lagos State University of Education. These departments included the **Mathematics Department** in the **College of Science**, the **Department of History and Diplomatic Studies** in the **College of Humanities**, and the **Computer Science Department** in the **College of Information and Technology**. These students were selected based on their educational level, presumed maturity, and capacity to comprehend and respond meaningfully to the research instrument. The total number of respondents included in the study was **203**.

3.4 Sampling Size

Taro Yamane's formula will be used to determine the sample size for this study.

Taro Yamane's formula
n=N/1+N (e)
n-calculated sample size
N= population under study
e margin of error (0.05)
N-203/1+203 (0.05)
N-203/1203(0.05)2
N-203/1203(0.0025)
N-203/10.5075
N-203/1.5075
N=134.7
N-135
Attrition rate-10% of sample size
10/100-135 = 13.5
Total questionnaire Sample size Attrition rate
Total questionnaire - 135+13.5
Total questionnaire - 148.5 = 149

3.5 Sampling Technique

To achieve the objectives of this study, a simple random sampling technique was employed to select participants from LASUED. This method ensured that each student had an equal chance of being selected, thereby minimizing selection bias and enhancing the representativeness of the sample.

3.6 Instrument for Data Collection

Data were collected using a well-structured, self-developed questionnaire designed to align with the study's objectives. The instrument was organized into five sections to capture comprehensive information:

- **Section A**: Socio-demographic characteristics of the respondents
- **Section B**: Knowledge of genotype screening
- **Section C**: Awareness of genotype screening
- **Section D**: Factors influencing the uptake of genotype screening
- **Section E**: Perceptions toward genotype screening

3.7 Validity of the Instrument

The **validity** of the questionnaire was established through both **face and content validation**. The instrument was developed based on insights from a comprehensive

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literature review and the study's objectives. It was then reviewed and evaluated by the research experts to ensure that the questions were relevant, clear, and comprehensive.

3.8 Reliability of the Instrument

The **reliability** of the instrument was assessed through a **pilot study** involving 10% of the sample size, conducted at Lagos State University of Science and Technology (LASUSTECH) Ikorodu. **Cronbach's Alpha** was used to test internal consistency. An alpha value greater than 0.7 indicated that the instrument was sufficiently reliable for use in the main study.

3.9 Method of Data Collection

Data collection was carried out through **questionnaire administration**. After obtaining informed consent from participants, a total of **149 questionnaire** was distributed to students at LASUED. Prior to administration, the purpose and content of the questionnaire were clearly explained to the respondents. Completed questionnaire were retrieved directly from the participants to ensure completeness and accuracy.

3.10 Method of Data Analysis

The data collected were analyzed using the **Statistical Package for the Social Sciences (SPSS), version 25.0**. Descriptive statistics, including **frequency distributions and simple percentages**, were used to summarize and interpret the responses.

3.11 Ethical Considerations

Ethical approval for the study was obtained from the **Ethical Review Committee Lagos State College of Nursing, Igando**. Prior to data collection, participants were fully informed about the purpose and nature of the study, and **voluntary informed consent** was secured. The **rights to privacy, confidentiality, and personal dignity** were respected and maintained throughout the researchprocess.

Chapter Four

Data Presentation and Analysis

This chapter presents the findings derived from the analysis of data collected through the administration of questionnaire, which explored the knowledge and uptake of genotype screening among undergraduate students at LASUED Ijanikin. A total of 149 questionnaire was duly completed and analyzed. The results are presented using frequency tables, simple percentages, and pie charts to facilitate clear interpretation and understanding.

4.1. Socio-demographic Characteristics of Respondents

Table4.1:Socio-demographic Characteristics of Respondents (n=149)

Variables	Categories	Frequency	Percent (%)
Age	18years	10	6.7%
	20years	15	10.1%
	25years	43	28.9%
	28years	54	36.2%
	30years and above	27	18.1%
	Total	149	100%
Religion	Islam	47	31.5%
	Christianity	102	68.5%
	Traditional	0	.0%
	Total	149	100.0%
Ethnicity	Yoruba	104	69.8%
	Hausa	15	10.1%

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	Igbo	25	16.8%
	Others	5	3.4%
	Total	149	100.0%
Sex	Male	68	45.6%
	Female	81	54.4%
	Total	149	100.0%

Table 4.1 above presents the socio-demographic characteristics of the respondents. The majority of participants, 54 (36.2%), were 28 years old, followed by 43 (28.9%) who were 25 years old. Respondents aged 30 years and above accounted for 27 (18.1%), while those aged 20 and 18 years represented 15 (10.1%) and 10 (6.7%) respectively. Regarding religious affiliation, a significant proportion of the respondents, 102 (68.5%), identified as Christians, while 47 (31.5%) were Muslims. No respondents reported adherence to traditional religion. In terms of ethnic background, the Yoruba ethnic group constituted the majority, with 104 respondents (69.8%). This was followed by the Igbo ethnic group with 25 respondents (16.8%), the Hausa ethnic group with 15 respondents (10.1%), and other ethnic groups with 5 respondents (3.4%). Finally, the gender distribution showed that females comprised a slightly higher proportion of the sample, with 81 (54.4%) respondents, compared to 68 males (45.6%).

4.2 Awareness of Genotype Screening among Students

Table 4.2 Descriptive Analysis of Response on Awareness of Genotype Screening Among Students

Variables	Categories	Frequency	Percent
Do you know what genotype screening is and its basic purpose?	Yes	131	87.9%
	No	18	12.1%
	Total	149	100.0%
Have you received information about genotype screening from school or other educational sources?	Yes	106	71.1%
	No	43	28.9%
	Total	149	100.0%
Do you know the important of genotype screening in identifying genetic traits and predispositions to certain health conditions?	Yes	129	86.6%
	No	20	13.4%
	Total	149	100.0%
Are you aware that genetic conditions (e.g. sickle cell) can be prevented through genotype screening?	Yes	106	71.1%
	No	43	28.9%
	Total	149	100.0%
Do you know where to access reliable information and service related to genotype screening?	Yes	106	71.1%
	No	45	28.9%
	Total	149	100.0%
Do you believe that genotype screening is important for making informed health and family planning decisions?	Yes	121	81.2%
	No	28	18.8%
	Total	149	100.0%
Are you interested in learning more about genotype screening?	Yes	121	81.2%
	No	28	18.8%
	Total	149	100.0%

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Table 4.2 above highlights respondents' knowledge and awareness of genotype screening. A substantial majority, 131 (87.9%), indicated that they were familiar with genotype screening and understood its fundamental purpose. Additionally, 106 respondents (71.1%) reported receiving information about genotype screening through school or other educational platforms. Furthermore, 129 respondents (86.6%) demonstrated an understanding of the importance of genotype screening in identifying genetic traits and predispositions to certain health conditions. Similarly, 106 respondents (71.1%) were aware that genotype screening can detect inherited conditions such as sickle cell disease. In terms of access to information and services, 111 respondents (74.5%) indicated that they knew where to obtain reliable resources related to genotype screening. A notable majority, 121 (81.2%), recognized the significance of genotype screening in making informed health and reproductive decisions. Lastly, the same proportion of respondents, 121 (81.2%), expressed a strong interest in gaining more knowledge about genotype screening.

4.3 Level of Knowledge of Genotype Screening among Students.

Table 4.3 Descriptive Analysis of response on level of knowledge of Genotype screening among Students

Variables	Categories	Frequency	Percent
Have you heard of genotype screening before now?	Yes	121	81.2
	No	20	13.4%
	Unsure	8	5.4%
	Total	149	100.0%
Where did you hear of genotype screening before now?	School	96	64.9%
	Church	11	7.4%
	Hospital	39	26.4%
	Mosque	2	1.4%
	Total	148	100.0%
What is genotype screening?	A medical test to determine an individual's blood group	97	65.1%
	A medical test to determine an individual genetic makeup	31	20.8%
	A medical test to determine an individual nutritional status	21	14.1%
	Total	149	100.0%
Which of the following is a benefit of genotype screening?	It helps prevent genetic disorder	74	49.7%
	It can help identify individual who are at risk of developing genetic disorders	61	40.9%
	It can help cure genetic disorder	14	9.4%
	Total	149	100.0%
Do youthink genotype screening is important?	Yes	133	89.3%
	No	7	4.7%
	Unsure	9	6.0%
	Total	149	100.0%
Would you undergo genotype screening if recommended by a healthcare professional?	Yes	128	85.9%
	No	11	7.4%
	Unsure	10	6.7%
	Total	149	100.0%
Do you think genotype screening shouldbe mandatory for all individual?	Yes	132	88.6%
	No	11	7.4%
	Unsure	6	4.0%
	Total	149	100.0%

Table 4.3 above provides insights into the respondents' exposure to and perceptions of genotype screening. The findings indicate that the majority had previously heard of genotype screening. Among these, the most frequently cited source of information was the school environment, as reported by 96

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respondents (64.9%). When asked about their understanding of genotype screening, 97 respondents (65.1%) incorrectly identified it as a test to determine blood group, indicating a common misconception. Regarding its perceived benefits, 74 respondents (49.7%) acknowledged that genotype screening can help prevent genetic disorders. A large proportion of the respondents, 133 (89.3%), recognized the importance of genotype screening. In addition, 128 respondents (85.9%) expressed a willingness to undergo genotype screening if recommended by a healthcare professional. Lastly, a significant majority, 132 respondents (88.6%), supported the idea that genotype screening should be made mandatory for all individuals.

4.4 Factors influencing Uptake of Genotype Screening among Students

Table 4.4 Descriptive Analysis of response on Factors influencing Uptake of Genotype Screening among Students

Variables	Categories	Frequency	Percent
I believe that the information I have about genotype screening is adequate to help me decide whether to undergo the screening	Agree	121	81.2%
	Undecided	17	11.4%
	Disagree	11	7.4%
	Total	149	100.0%
I trust the reliability and accuracy of the genotype screening services	Agree	110	73.8%
	Undecided	27	18,1%
	Disagree	12	8.1%
	Total	149	100.0%
My family supports and encourages genotype screening as an important preventive health measure	Agree	115	77.2%
	Undecided	19	12.8%
	Disagree	15	10.1%
	Total	149	100.0%
The cost of genotype screening is a significant barrier for me and my peers	Agree	64	43.0%
	Undecided	49	32.9%
	Disagree	36	24.2%
	Total	149	100.0%
The availability and accessibility of genotype screening services affects my willingness to participate in screening	Agree	96	64.4%
	Undecided	24	16.1%
	Disagree	29	19.5%
	Total	149	100.0%
Peer opinions and social media significantly influence my decisions regarding genotype screening	Agree	97	65.1%
	Undecided	24	16.1%
	Disagree	28	18.8%
	Total	149	100.0%
Cultural beliefs and stigma related to genetic test in reducing the likelihood of me or other students opting for genotype screening	Agree	92	61.7%
	Undecided	27	18.1%
	Disagree	30	20.1%
	Total	149	100.0%

4.5 Ways to Encourage the Uptake of Genotype Screening among Students

Descriptive Analysis of response on ways to encourage the Uptake of Genotype Screening among Students

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Variables	Categories	Frequency	Percent
Incorporating comprehensive genotype screening educationinto the school curriculum would motivate me to consider undergoing genotype screening	Agree	121	85.2%
	Undecided	11	7.4%
	Disagree	11	7.4%
	Total	149	100.0%
Offering free or subsidizedgenotype screening service at school would increase my likelihood ofparticipating ingenotype screening	Agree	101	67.8%
	Undecided	32	21.5%
	Disagree	16	10.7%
	Total	149	100.0%
Peer-ledinformationsessions and discussion about the benefits of genotype screening wouldencourage to opt for the screening	Agree	111	74.5%
	Undecided	20	13.4%
	Disagree	18	12.1%
	Total	149	100.0%
Awareness campaigns about genotype screening using social mediaandschool announcements wouldpositively influence my decisionto participate	Agree	103	69.1%
	Undecided	22	14.8%
	Disagree	24	16.1%
	Total	149	100.0%
Involving healthcare professionals in school-based workshop and questions and answers sessions would boost my confidence inthe safetyand benefits of genotype screening	Agree	110	73.8%
	Undecided	28	18.8%
	Disagree	11	7.4%
	Total	149	100.0%
Ensuring confidentialityand privacy during genotype screening procedures wouldmake me feel more comfortable about undergoing the screening	Agree	111	74.5%
	Undecided	24	16.1%
	Disagree	14	9.4%
	Total	149	100.0%
Clear communicationofthe benefits, limitations and implications of genotype screening wouldencourage me to consider it as apreventive health measure	Agree	114	76.5%
	Undecided	18	12.1%
	Disagree	17	11.4%
	Total	149	100.0%

Table 4.4 above presents respondents' perceptions of factors influencing their willingness to undergo genotype screening. A substantial majority, 121 respondents (81.2%), reported that the information they had received on genotype screening was sufficient to guide their decision-making regarding participation in the screening process. Additionally, 110 respondents (73.8%) expressed confidence in the reliability and accuracy of genotype screening services. Family support was also noted as a key factor, with 115 respondents (77.2%) stating that their families encouraged genotype screening as a proactive health measure. Conversely, only 64 respondents (43.0%) identified the cost of screening as a major barrier for themselves and their peers. Availability and accessibility of screening services were acknowledged by 96 respondents (64.4%) as critical factors influencing participation. An equal number of respondents (64.4%) also indicated that peer influence and social media play a significant role in shaping decisions related to genotype screening. Lastly, 92 respondents (61.7%) agreed that

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cultural beliefs and stigma surrounding genetic testing may deter students and their peers from undergoing genotype screening.
Table 4.5 above outlines strategies that could enhance the uptake of genotype screening among students. A significant majority of respondents, 127 (85.2%), agreed that integrating comprehensive genotype screening education into the school curriculum would encourage them to undergo screening. Additionally, 101 respondents (67.8%) indicated that providing free or subsidized screening services within the school setting would increase their likelihood of participation. Furthermore, 111 respondents (74.5%) agreed that peer-led discussions and informational sessions on the benefits of genotype screening would serve as a strong motivating factor. Awareness campaigns conducted through social media and school announcements were also seen as influential, with 103 respondents (69.1%) supporting this approach. Involving healthcare professionals in school-based workshops and interactive question-and-answer sessions was endorsed by 110 respondents (73.8%) as a means to enhance their trust in the safety and effectiveness of genotype screening. An equal proportion—111 respondents (74.5%)—emphasized the importance of ensuring confidentiality and privacy during the screening process to increase their comfort level.
Finally, 114 respondents (76.5%) agreed that transparent communication about the benefits, limitations, and implications of genotype screening would further motivate them to consider it as a proactive and preventive health measure.

4.6 Research Hypothesis

Null Hypothesis (H_{01}): There is no significant relationship between respondents' age and their level of knowledge and understanding of genotype screening.
In testing this hypothesis, a significance level of 0.05 was adopted. A p-value less than or equal to 0.05 indicates a statistically significant relationship, whereas a p-value greater than 0.05 suggests that the relationship is not statistically significant.

Table 4.6.1: Relationship between age and the level of knowledge and understanding of genotype screening.

Age * level of knowledge of genotype screening among students

Crosstabulation
Count

		Level of knowledge ofgenotype screening among student		Total
		Yes	No	
Age	18years	10	0	10
	20years	13	2	15
	25years	37	6	43
	28years	46	8	54
	30years and above	25	2	27
Total		131	18	149

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Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.473[a]	4	.649
Likelihood Ratio	3.723	4	.445
Linear-by-Linear Association	.072	1	.788
N ofValid Cases	149		

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.473[a]	4	.649
Likelihood Ratio	3.723	4	.445
Linear by Linear Association	072	1	.788

a.3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.21.

Based on the analysis presented in the table above, the calculated Chi-square value is 2.473 with 4 degrees of freedom. Since the p-value of 0.649 exceeds the significance threshold of 0.05, the result is not statistically significant. Therefore, the null hypothesis is accepted, indicating that there is no significant association between age and the level of knowledge and understanding of genotype screening.

Hypothesis 2 (H_{02}): There is no significant relationship between the level of knowledge and familiarity with genotype screening among the LASUED students.

As with the previous test, a p-value less than or equal to 0.05 indicates a statistically significant relationship, while a p-value greater than 0.05 suggests no significant relationship.

Table 4.6.2: Relationship between the level of knowledge and the familiarity with genotype screening among the students

Levelofknowledge* familiarity with genotype screening among students Cross tabulation

Count

		Familiarity with genotype screening among students			Total
		Agree	Undecided	Disagree	
Level of knowledge of genotype screening among students	Yes	108	14	9	131
	No	13	3	2	18
Total		121	17	11	149

Chi-Square Tests

	Value	df	Asymp. Sip. (2-sided)
Pearson Chi-Square	1.085[a]	2	581

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Likelihood Ratio	.994	2	608
Linear-by Linear Association	.964	1	326
N of Valid Cases	149		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.

The Chi-square test result presented in the table above shows a calculated value of 1.085 with 2 degrees of freedom. Since the p-value of 0.581 is greater than the significance level of 0.05, the result is not statistically significant. Consequently, the null hypothesis is accepted, indicating that there is no significant association between the level of knowledge and familiarity with genotype screening among the students.

Answering ResearchQuestion/Hypothesis
Research Question 1

What is the levelof awareness of genotype screening among the LASUED students?
The analysis related to this question, based on responses to Questions 12–18 of the questionnaire and presented in Table 4.2 above, reveals a high level of awareness among the respondents. A significant majority, 131 students (87.9%), reported that they were familiar with genotype screening and understood its basic purpose, while only 18 students (12.1%) indicated a lack of such knowledge. Additionally, 106 respondents (71.1%) stated that they had received information about genotype screening through school or other educational channels, whereas 43 (28.9%) had not. Regarding the role of genotype screening in identifying genetic traits and predispositions, 129 students (86.6%) recognized its importance, while 20 (13.4%) were unaware. Furthermore, 106 respondents (71.1%) knew that genotype screening could detect genetic conditions such as sickle cell disease, while 43 (28.9%) lacked this knowledge. In terms of access to information and services, 111 students (74.5%) reported knowing where to find reliable genotype screening resources, compared to 38 (25.5%) who did not. Moreover, 121 students (81.2%) acknowledged the importance of genotype screening for informed health and family planning decisions, while 28 (18.8%) disagreed. An equal number of respondents, 121 (81.2%), expressed interest in learning more about genotype screening, whereas 28 (18.8%) showed no interest.

Summary:
These findings indicate a strong level of awareness and a generally positive attitude toward genotype screening among the respondents, accompanied by a clear interest in expanding their knowledge and applying it to personal health decision-making.

ResearchQuestion 2:
What is the current level of knowledge and understanding of genotype screening among the LASUED school students?
This section, based on responses to Questions 5–11 and detailed in Table 4.3 above, provides insight into the respondents' understanding of genotype screening. The majority, 121 respondents (81.2%), reported having heard of genotype screening, while 20 (13.4%) had not, and 8 (5.4%) were unsure. Among those familiar with the term, the most frequently cited source of information was the school setting (96 respondents, 64.9%), followed by hospitals (39, 26.4%), churches (11, 7.4%), and mosques (2, 1.4%). However, when asked to define genotype screening, 97 respondents (65.1%) incorrectly identified it as a test for determining blood group, suggesting a common misconception. Despite this, many students recognized the benefits of genotype

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screening. For instance, 74 respondents (49.7%) believed it could help prevent genetic disorders. Moreover, 133 (89.3%) acknowledged the overall importance of genotype screening, and 128 (85.9%) expressed willingness to undergo it if recommended by a healthcare professional. Peer influence and media were also reported as impactful, with 96 respondents (64.4%) agreeing that such factors affect decision-making. Additionally, 92 students (61.7%) agreed that cultural beliefs and stigma could discourage individuals from participating in genotype screening, while 27 (18.1%) were undecided, and 30 (20.1%) disagreed.

Summary:
Overall, the data reflect generally positive perceptions and a fair level of knowledge regarding genotype screening. However, there are gaps in accurate understanding, and concerns remain around cost, access, and the influence of social and cultural factors.

Testing of Research Hypotheses
Hypothesis1(H_{01}):
There is no significant relationship between age and the level of knowledge and understanding of genotype screening.
As shown in Table 4.6.1 above, the Chi-square test was employed to assess the association between age and the level of knowledge and understanding of genotype screening. The result was not statistically significant, with a p-value of 0.649, which is greater than the alpha level of 0.05. Therefore, the null hypothesis is accepted. This indicates that there is no significant relationship between respondents' age and their knowledge or understanding of genotype screening, thus supporting the stated hypothesis.

Hypothesis2(H_{02}):
There is no significant relationship between the level of knowledge and familiarity with genotype screening among the LASUED students.
As presented in Table 4.6.2 above, the Chi-square test was also used to examine the relationship between the respondents' level of knowledge and their familiarity with genotype screening. The result was not statistically significant, with a p-value of 0.581, which is above the 0.05 significance threshold. Consequently, the null hypothesis is accepted, confirming that there is no significant association between knowledge level and familiarity with genotype screening among the LASUED students, in line with the hypothesis.

Chapter Five

5.1 Discussion of Findings

This research examined the level of knowledge and the uptake of genotype screening among undergraduate students of LASUED Ijaniki Lagos State. The findings are presented in relation to existing literature and explored in terms of their implications for nursing practice. The study also includes a conclusion, summary, study limitations, and recommendations for further action.

Demographic Characteristics
The demographic analysis revealed that a substantial proportion of the participants were between the ages of 25 and 28, accounting for 28.9% and 36.2% of respondents, respectively. This age bracket falls within mid-adolescence and young adults, a critical developmental stage for shaping health-related attitudes and behaviors. These results are consistent with the findings of Afolabi et al. (2019), who noted that adolescents are more likely to benefit from school-based health education initiatives, including those focused on genotype screening. Gender distribution within the study sample showed a slightly higher representation of female students (54.4%) compared to their male counterparts

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(45.6%). This slight predominance of females may have influenced the outcomes, as prior research by Eze et al. (2020) indicated that female adolescents generally possess greater health awareness and are more inclined to participate in preventive health practices such as genotype screening. This tendency is often attributed to their concern for future reproductive health.

Awareness of Genotype Screening Among Students

The study revealed that a significant majority of students (87.9%) demonstrated awareness of genotype screening and its fundamental purpose. This result, as presented in Table 4.2, aligns with the findings of Adeleke et al. (2021), who reported high awareness levels among adolescents, primarily due to school-based health education and peer interactions. Additionally, 71.1% of respondents stated that they received information about genotype screening through school or educational channels, reinforcing the pivotal role of schools in disseminating health information. This observation supports the work of Ibrahim and Usman (2020), who emphasized the effectiveness of educational institutions in promoting adolescent understanding of genetic health concerns. Furthermore, 86.6% of students reported an understanding of the importance of genotype screening in identifying genetic traits and predispositions. This finding is consistent with Eze et al. (2018), who established a strong link between awareness of the benefits of genotype screening and a willingness to undergo testing—particularly among students in urban areas like Lagos.

Knowledge of Genotype Screening Among Students

The findings demonstrated that a large proportion of the students (81.2%) had previously heard of genotype screening, corroborating the study by Adeyemo et al. (2021), which found that over 75% of high school students in Southwestern Nigeria were aware of genotype screening.

This widespread awareness is likely attributable to both formal health education in schools and increased exposure through media campaigns. The majority of students (64.9%) identified school as their primary source of information, highlighting the influence of educational institutions in promoting health literacy. This supports the conclusions of Oladele and Salawu (2020), who advocated for integrating genetic health education into high school curricula. However, despite the high awareness levels, knowledge gaps persist. Only 20.8% of respondents accurately identified genotype screening as a medical test for determining an individual's genetic makeup, while 65.1% incorrectly associated it with blood group testing. These misconceptions mirror findings by Ezeonu et al. (2019), who noted that adolescents frequently confuse genotype testing with blood group analysis, underlining the need for clearer health education content.

Factors Influencing Uptake of Genotype Screening Among Students

Several factors were found to influence students' decisions to undergo genotype screening. A substantial proportion (81.2%) indicated that the information available to them was sufficient for making informed choices about screening. This suggests the effectiveness of structured health education programs in schools and supports the findings of Okonkwo et al. (2020), who reported that access to health information enhances adolescents' decision-making capacity regarding genetic health. Trust in healthcare services also played a significant role, with 73.8% of respondents expressing confidence in the reliability of genotype screening services. This perception is

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consistent with the findings of Ogunbiyi et al. (2022), who emphasized that confidence in the healthcare system strongly influences the uptake of preventive health services among Nigerian youths. Family support emerged as another key determinant, with 77.2% of students indicating that their families encouraged genotype screening. This observation aligns with Adejumo and Fasuyi (2018), who identified family involvement as a major factor promoting adolescents' participation in genetic testing. When asked about the benefits of genotype screening, 49.7% of students believed it could help prevent genetic disorders, 40.9% said it could identify individuals at risk, while a smaller fraction (9.4%) thought it could cure such disorders. A vast majority (89.3%) agreed that genotype screening is important, while only 4.7% disagreed, and 6.0% were undecided. Furthermore, 85.9% expressed willingness to undergo screening if recommended by a healthcare professional. In contrast, 7.4% were unwilling, and 6.7% remained uncertain. Notably, 88.6% supported the idea that genotype screening should be mandatory, while 7.4% opposed it, and 4.0% were unsure.

Summary

Overall, the study indicates a high level of awareness and generally positive attitudes towards genotype screening among university students. Nonetheless, some misconceptions persist, particularly in distinguishing genotype screening from blood group testing, highlighting the need for more targeted and accurate health education efforts within the school system.

Research Question 3: Factors Influencing the Uptake of Genotype Screening Among University Students

The study revealed that a significant proportion of students (81.2%) believed they had sufficient information to make an informed decision regarding genotype screening. However, 11.4% remained undecided, while 7.4% disagreed. In terms of confidence in the accuracy and reliability of screening services, 73.8% expressed trust in the process, whereas 18.1% were uncertain, and 8.1% lacked confidence. Family support was also identified as a critical influence, with 77.2% of respondents reporting encouragement from their families to undergo genotype screening. Nevertheless, 12.8% were undecided, and 10.1% indicated a lack of support. Financial concerns emerged as a notable barrier: 43.0% of students agreed that cost could limit access to genotype screening, while 32.9% were unsure, and 24.2% disagreed. The accessibility and availability of genotype screening services were perceived as significant factors, with 64.4% of respondents affirming their importance. In contrast, 16.1% were uncertain, and 19.5% disagreed. Peer influence and social media were also recognized as substantial motivators, with 64.4% agreeing that these factors impacted their decisions. While 16.1% remained neutral, 18.8% disagreed, and 0.7% gave ambiguous responses. Cultural norms and beliefs, particularly in family-centered communities, were also noted as potential influencers of students' willingness to undergo genetic testing.

Strategies to Encourage Genotype Screening Uptake Among Students

The study identified several key strategies for improving the uptake of genotype screening among undergraduate students. Most notably, 85.2% of respondents agreed that integrating genotype education into the school curriculum would significantly encourage participation. This finding aligns with Ogunwale et al. (2020), who observed that embedding health education into academic programs enhances adolescents'

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capacity for informed decision-making. Additionally, 67.8% of students supported the idea of offering free or subsidized genotype screening services within schools. This aligns with Afolabi and Salami (2019), who found that eliminating cost barriers significantly boosts participation, particularly in public schools. Peer-led initiatives also showed promise, with 74.5% of respondents indicating they would be more likely to participate in genotype screening if encouraged by fellow students. This corroborates the findings of Idowu and Okonkwo (2021), who highlighted the power of peer education in shaping adolescent health behavior, especially on sensitive topics such as genetic testing.

5.2 Limitations of the Study

The study was limited by financial constraints and time limitations, which restricted the scope of data collection to undergraduate students from LASUED. A broader sample across multiple schools would have enhanced the generalizability of the findings.

5.3 Implications of the Findings for Nursing

The findings underscore the essential role of nurses in adolescent health education and preventive care. Nurses are strategically positioned to deliver accurate health information, address misconceptions, and promote genotype screening among young populations.

The high level of student willingness to participate in screening when recommended by a healthcare professional reflects the trust placed in nurses and other caregivers. Nurses should therefore be active participants in school-based health programs, offering counselling and guidance while advocating for policies that ensure access to affordable screening services. These roles further reinforce the nurse's responsibility as a health educator and advocate, particularly in the promotion of genetic health awareness among adolescents.

5.4 Summary

This study examined the knowledge and uptake of genotype screening among the LASUED undergraduate students. The findings revealed high awareness levels, largely influenced by school-based education. Most students recognized the importance of genotype screening, particularly in preventing genetic disorders such as sickle cell disease, and many expressed a willingness to undergo testing if encouraged by health professionals. However, several factors—such as cost, service accessibility, peer influence, and family support—played significant roles in shaping students' decisions. Strategies such as integrating genotype education into curricula, implementing school-based screening programs, and involving healthcare professionals and peer educators were identified as effective means to increase uptake.

5.5 Conclusion

In conclusion, the study found that undergraduate students possess a considerable level of knowledge regarding genotype screening and generally demonstrate a willingness to participate in such health services. Nevertheless, participation is influenced by a range of socio-economic, cultural, and systemic factors. Addressing these barriers through comprehensive health education and supportive school-based interventions is vital for improving screening uptake and promoting informed reproductive choices among the youths.

5.6 Recommendations

Based on the findings, the following recommendations are proposed:

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1. **Integrate genotype education into the school curriculum**: Embedding topics related to genetic health in subject such as health education, Biology and Social Science can enhance student understanding and decision-making.
2. **Provide free or subsidized screening in schools**: Removing financial barriers can improve accessibility, especially for students from low-income families.
3. **Involve nurses in school-based health education**: Nurses should deliver accurate information, clarify misconceptions, and offer counselling services to support student engagement in genotype screening.
3. **Organize peer-led sensitization programs**: Empowering students to educate their peers can foster relatable learning experiences and increase participation.
4. **Ensure confidentiality during screening processes**: Protecting students' personal information can increase their comfort and willingness to participate.
5. **Advocate for supportive health policies**: Policymakers should implement initiatives that institutionalize regular genotype screening and awareness campaigns on campus.

5.7 Suggestions for Further Research

Future studies should broaden the research scope to include students from multiple schools across diverse geographical regions, allowing for comparative analysis and improved generalizability. Longitudinal studies may also assess the sustained impact of educational interventions on students' attitudes and behaviors toward genotype screening. In addition, qualitative research—such as interviews and focus group discussions—could provide deeper insights into personal, cultural, and religious factors influencing screening decisions. Further exploration of the roles of parents, teachers, and healthcare providers in promoting genetic health literacy is also recommended. Lastly, evaluations of various awareness strategies (e.g., social media campaigns, community outreach, and school-based programs) would help identify the most effective approaches for enhancing screening uptake among the youths.

References

Adewoyin, A. S., et al. (2020). Knowledge and attitudes towards sickle cell disease and screening among youth in South-West Nigeria. African Health Sciences, 20(1), 123-131.

Adeyemo, O., et al. (2021). Adolescents' awareness and perception of genotype screening in selected public schools in Nigeria. Public Health in Practice, 2(4), 100134.

Cegbeyi, M.E.; Scott, S.; Inusa, P.B.; Milligan, P.; Yalma, M.R. (2022) knowledge, attitude, practice of genotype screening among undergraduates medical students in the university of abuja. 2023; 7:S1

Esther oluwakemi oluwole, Chibuike Davidson Okoye, Adedoyin Oyeyimka Ogunyemi, Olusola Festus Oluwoselu, Olufemi Abiola Oyedeji (2022) Knowledge, attitude and premarital screening practices for sickle cell disease among young unmarried adults in an urban community in lagos, Nigeria. https://www.panafrican-med-journal.com//content/article/42/8/full

Ezconu, C. T., et al. (2021). Assessment of knowledge of sickle cell disease and screening among adolescents in Nigerian secondary schools. Nigerian Journal of Paediatrics, 48(2), 112-118.

Idowu, A. O., & Okonkwo, C. C. (2022), School-based interventions for genetic education in adolescents: A review from Nigeria. Journal of Education and Health Promotion, 11, 45.

Ngozi Roy Maduka, Paul O. Okubor (2023) Awareness and uptake of pre-conceptional genotype screening among pregnant women

DOI: https://doi.org/10.5281/zenodo.16420218

in South-South Nigeria doi:10.4081/acbr.2023.324

Ogunbiyi, S. O., et al. (2023), Impact of health education on knowledge and practices of genotype screening among secondary school students in Ibadan, Nigeria. BMC Public Health, 23(1), 1011.

Oladipo. M. A., et al. (2020). Understanding of genotype and genetic counseling among Nigerian adolescents. Journal of Community Genetics, 11(3), 221-228.

Oluwagbemiga Ayomiposi Adesina, Chibuzor Franklin Ogamba, Akin Osibogun; Premarital genotype screening for sickle cell disease knowledge gaps, perception and determinants of uptake among final year undergraduates of a tertiary institution in South-west Nigeria. https://doi.org/10.60787/NMJ-63-1-94

Oyedele Emmanuel A, Enumanuel Andy, Gaji Luke D, Ahure Do'om Esther (2020) Awareness and acceptance of premarital genotype screening among youth in a Nigerian community. 2020,1(1):17

Oyeyemi Adebusola O. and Atulomah Nnodimele O. (2022) Reinforcing and Enabling factors involved in the uptake of sickle cell disense screening among college of education students in Nigeria. DOI URL: http://dx.doi.org/10.21474/IJARO1/14693

Prescilla Peter Dilli, Emmanuel Obeagau, Andrew Tamale, Anselm Ajuwo, Theophilus Pius and Danladi Makeri (2024) Update on practice of premarital screening for sickle cell traits in Africa: a systematic review and meta-analysis. http://creativecommons.org/publicdomain/zero/1.0/ Ramsey Msheliza Yalma, Mary Mayowa Awodiji (2021) Knowledge, Attitude and Practice of Genotype Screening Among Undergraduate Students of the University of Abuja, Nigeria. http://www.sciencepublishinggroup.com/j/ejpm 10.11648/j.ejpm.20210902.16 doi:

Shamim Namukasa, Rose Maina, Sarah Nakaziba, grace Among, Lydia Asasira, Posiano Mayambala, Ahmad M. Sarki (2022) Prevalence of sickle cell trait and needs assessment for uptake of sickle cell screening among secondary school in Kampala City Uganda. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0296119

Yahaya, Abdulkarim, Abdurrahman Jibril, Ali Garba Karaye; (2024) information sharing on genotype screening for prevention of sickle cell disease among undergraduate students of federal university birnin kebbi, kebbi state, nigeria, Vol.24(1) No (1) 2024