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Health Inequality Among Children with Sickle Cell Disease (SCD) In Nigeria: A Scoping Review

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Abstract

Introduction and aim: Sickle Cell Disease (SCD) significantly impacts Nigerian children, but health inequalities persist despite available healthcare services. This study aimed to assess the health inequality among children with Sickle Cell Disease (SCD) in Nigeria.

Methods: This study applied a scoping review approach using PRISMA guideline for gathering and analysing data on existing peer-reviewed articles relevant to the research topic. Five databases were used to search studies including Scopus, PubMed/Medline, Embase, CINAHL, and ProQuest. Relevant key words were used to achieve studies related to the topic. Peer-reviewed articles that were published in English between 2013 and 2023 were included in this study. Studies that met the criteria were selected and the extracted data was extensively evaluated. Thematic analysis was employed to identify recurring patterns and essential concepts related to health disparities in Sickle Cell Disease (SCD) care for Nigerian children.

Results: The key findings were organized into four subthemes: developing strategies to strengthen healthcare infrastructure and resources, enhancing healthcare workforce capacity and training, formulating policies and guidelines specific to sickle cell disease, and promoting community engagement and awareness programs. The review of twelve studies revealed a national birth prevalence of 1.5%, significant growth impairments, under nutrition, and alarmingly high under-5 mortality (490 per 1000 live births). Access disparities arose from sociodemographic determinants and healthcare system factors, with lower socioeconomic status leading to stunting and wasting, and the upper class associated with overweight/obesity. Racial and ethnic minorities also faced access disparities.

Conclusion: This review emphasizes the significance of newborn screening, comprehensive healthcare strategies, and overcoming sociodemographic and healthcare barriers to foster well-being of Nigerian children with SCD. To address health inequalities, policymakers should collaborate with healthcare providers to enact evidence-based policies, encompassing community awareness initiatives, and healthcare infrastructure enhancement. These measures will foster effective management, and enhanced outcomes for paediatric SCD patients in Nigeria.

Keywords: Sickle cell disease; Children; Health inequality; Scoping review; Nigeria

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Introduction

Sickle Cell Disease (SCD) is a genetic blood disorder characterized by abnormal hemoglobin; a protein responsible for carrying oxygen in the red blood cells [1]. Around 150,000 infants are born each year with sickle cell anemia, which is believed to be the most common form of SCD [2]. SCD in children may cause a variety of physical complications, children with SCD have poor energy levels, muscle weakness, and short stature consequently. Since their blood isn't receiving enough oxygen, they aren't as attentive or productive. Sickle cell crises, also known as Vaso-occlusive events, may cause severe pain in children with sickle cell disease [3]. Young children with sickle cell disease could be particularly susceptible to bacterial infections since their defenses against infection are still developing. Common bacteria that may cause significant disease in persons with SCD include Streptococcus pneumonia and Hemophilic influenza [3].

According to the United Nations estimates reported by Aliyu, et al., (2008) [4], there are between 12 and 15 million people living with SCD in Africa out of the estimated 20 to 25 million worldwide. This indicates that 75-85% of children born with SCD are born in Africa. SCD is a major health concern in Africa, particularly in countries like Nigeria. SCD is a prevalent genetic blood disorder in Nigeria, with the country having the highest burden of the disease globally [5]. In individuals with SCD, the red blood cells become rigid and assume a sickle or crescent shape instead of the normal disc shape which can block blood flow thereby leading to different forms of health complications such as harsh pain, organ damage, low immunity to infections, anemia, and other severe health issues [1].

It is estimated that over 150,000 children are born with SCD each year in Nigeria [6]. Chakravorty, et al., (2015) [7] suggest that Nigeria is one of the few places where the carrier rate for SCD exceeds 25% due to the disadvantages conferred by homozygosity. According to Nnodu, et al., (2021) [8], in Nigeria, there are thought to be more than Forty million SCD carriers each year

Uneven access to medical treatments is one of the problems SCD patients in Nigeria have to deal with. Many families, especially those living in rural regions, can find it difficult to get access to specialist medical treatment, which might result in ineffective illness management and a higher risk of consequences [9]. This shortage of specialized facilities leads to delayed diagnoses, inadequate disease management, and limited access to vital treatments and interventions [10]. Health inequality is a critical issue in healthcare as it highlights the disparities that exist within a population and their impact on overall health and well-being [11].

Despite SCD's prominence as a public health concern in Nigeria, there is a scarcity of research focusing on health services' quality and consequences for affected children and determinants influencing their access to healthcare. The goal of this research on health disparities among children in Nigeria who have SCD is to address the gaps in healthcare outcomes and access that currently exist for this vulnerable group. The study's objective is to identify the unique difficulties experienced by children with SCD in Nigeria and to provide evidence-based suggestions for improving their access to treatment and general well-being by looking at the variables causing health inequity. The findings of this study are essential for demonstrating the pressing need for equitable healthcare delivery and for promoting legislative reforms aimed at reducing health inequalities in this community. The aim of this study is to do a scoping review study on health inequality among children with SCD in Nigeria.

Methodology

Study Design

The study design adhered to a rigorous and well-structured scoping review methodology. According to Harris, et al., (2014) [12], a systematic reviews study critically appraises and formally synthesizes the best existing evidence to provide a statement of conclusion that answers specific clinical questions [13]. The scoping review approach was chosen for its methodological transparency, its ability to comprehensively gather and assess existing evidence, and its capacity to generate insights into health inequality determinants and potential strategies for addressing these disparities in the context of SCD among children in Nigeria to ensure a systematic and transparent process, the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) is utilized for gathering data on existing peer-reviewed articles relevant to the research topic. The PRISMA framework provides guidelines for conducting scoping reviews, ensuring comprehensive literature search, selection, and data extraction. The PRISMA framework is an evidence-based guide consisting of a checklist and flowchart intended to be used as tools for authors seeking to write SLR and meta-analyses [14].

Search Strategy

The search strategy focused on studying the health disparities in children with SCD in Nigeria. To ensure comprehensive coverage, five electronic databases including Scopus, PubMed/Medline, Embase, CINAHL, and ProQuest were searched. The selection of these databases was based on their accessibility through the university's library website and their frequent use by researchers in this field. The key words used included "Sickle cell disease," "Sickle cell anemia," "hemoglobinopathy," “Pediatric" or "Pediatrics”, "Nigeria," "Children," “Healthcare access,” and "health inequality." These keywords were chosen to encompass the relevant aspects of the research question. The search strategy involved using a combination of keywords, MeSH terms, and Boolean operators to refine the search results. For example, in MEDLINE, the search strings were constructed using Boolean operators like "OR" to connect synonymous terms (e.g., "Sickle cell disease" OR "Sickle cell anemia" OR "hemoglobinopathy") and "AND" to combine different concepts (e.g., "Nigeria" AND "Children" AND "health inequality"). The search was limited to studies published within the past 10 years to ensure the inclusion of recent and relevant literature.

Inclusion and Exclusion Criteria

The inclusion criteria focused on peer-reviewed articles published in English and published between 2013 and 2023 and applied quantitative, qualitative and mixed-method approaches. The studies seem to predominantly utilize quantitative methods, focusing on numerical data analysis to examine various aspects of health disparities among children with SCD in Nigeria. Cross-sectional, descriptive studies, and case-control studies were included to provide a comprehensive understanding of the topic. Studies without full-text availability, case reports, review articles, systematic review and meta-analysis, and end-of-life studies were excluded to maintain a specific focus on health disparities. Studies that did not

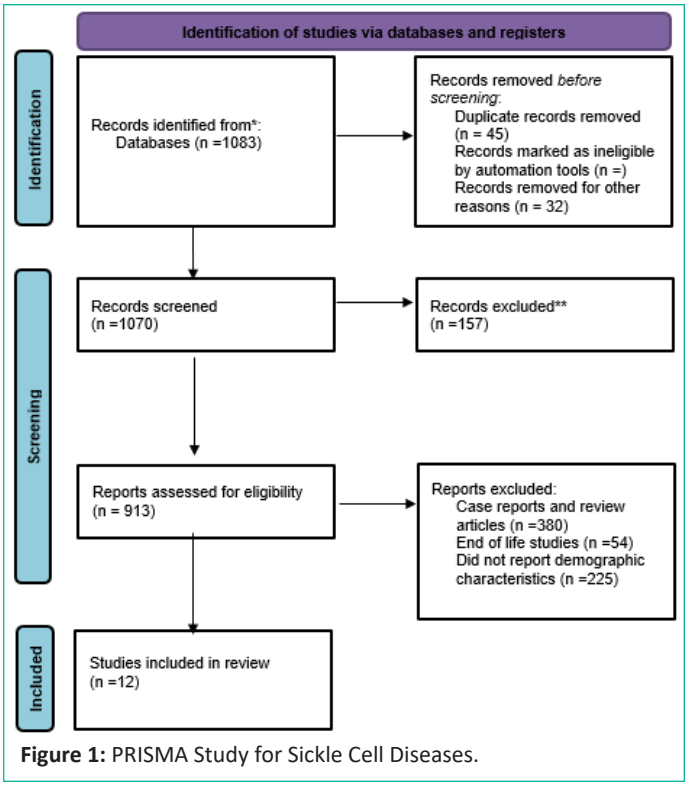

Figure 1: PRISMA Study for Sickle Cell Diseases.

differentiate the cause of anaemia or only included nutrition interventions without reporting nutrition-related outcomes were also excluded. Furthermore, studies that did not report demographic characteristics or had a study population outside of Nigeria or comprised older age groups were not included.

Selection Process

The selection process of papers for this scoping review followed a rigorous and systematic approach, adhering to predefined inclusion and exclusion criteria. To ensure a comprehensive search, multiple databases, including Scopus (n=81), Embase(n=108), Medline(n=145), Google Scholar(n=30), CINAHL(n=145), ProQuest(n=267), and PubMed(n=32), were utilized. Initially, duplicate studies were identified and removed using appropriate software or manual comparison. The remaining papers were then screened based on their titles and abstracts to identify studies relevant to the research topic. Subsequently, the full texts of the selected articles underwent a thorough evaluation, considering factors like study methodology, objectives, sampling type, and data collection methods. Throughout the selection process, the PRISMA guidelines were followed, ensuring transparency and rigor. The study that met the criteria were 12, the selected twelve full text articles are presented in the Figure 1.

Quality Assessment

The Critical Appraisal Skills Programme (CASP) tool was utilized to assess data quality in twelve selected studies for the scoping review. Various components, including study settings, sampling methods, data collection approaches, and ethics approval, were systematically evaluated using "YES," "NO," or "Maybe" options. Methodology and objectives were carefully reviewed for alignment with the research question. Studies consistently receiving "YES" or "Maybe" for most CASP components were classified as high quality, showcasing methodological rigor and alignment with research objectives. Studies with a mixture of "YES," "NO," and "Maybe" responses were categorized as moderate quality, while those predominantly receiving "NO" responses were considered of low quality, signalling significant methodological limitations. Key findings were synthesized thematically, presenting a current overview of health disparities. Inconsistencies were identified, emphasizing the need for further research in specific areas (Table 1).

Table 1: CASP tool score of the twelve studies.

Study Title	CASP Score	Quality
Obiageli E Nnodu et al. (2021)	10	High Quality
Christopher Bismarck Eke et al. (2015)	7	Moderate Quality
Idowu Odunayo Senbanjo et al. (2016)	7	Moderate Quality
Samuel A. Adegoke et al. (2017)	6	Moderate Quality
Onukwuli et al. (2018)	9	High Quality
OM Ukoha et al. (2020)	7	Moderate Quality
Emokpae et al. (2019)	10	High Quality
Kudirat et al. (2019)	6	Moderate Quality
Samuel A. Adegoke et al. (2018)	9	High Quality
Oladele Simeon Olatunya et al. (2021)	7	Moderate Quality
Hezekiah Isa et al. (2023)	7	Moderate Quality
Adegoke et al. (2017)	10	High Quality

Data Extraction

A data extraction sheet was developed to extract relevant information required for analysis and theme development for the study. The Population, Intervention, Control, and Outcomes (PICO) framework guided the extraction, including the author's name, publication year, region, study design, setting, age of participants, sample size, methodology, and key findings. This information provided citation details, geographical context, research design, study location, participant age range, sample size, research approach, and significant outcomes. The study design identified the specific research design employed in each study, such as descriptive, cross-sectional, longitudinal, or case-control (Table 2).

Synthesis of Results

The extracted data was then extensively evaluated once all the included research had been read. The purpose of this analysis was to address research questions posed by a comprehensive look at health inequalities for kids and to extract useful information from the resulting data. Thematic analysis was employed to identify recurring patterns and essential concepts related to health disparities in SCD care for Nigerian children. This approach categorized findings into themes like prevalence, mortality, health impacts, access to healthcare, challenges in care provision, and strategies for improvement. The analysis provides a comprehensive understanding of disparities, guiding targeted interventions for enhanced healthcare and well-being.

Results

The literature search yielded a total of twelve studies conducted in Nigeria, focusing on various aspects of SCD in children. As Table 1 reveals, the studies included children aged 6 months to 18 years (8.3%), school-aged children: ages 5 to 18 years (66.6%), and adults: ages above 18 years old (25%) from various regions in Nigeria, including Enugu, Lagos, Benin City, Kano, and Ilesa. Sample sizes ranged from 70 to 11,186 participants, consisting of both children with SCD and non-SCD controls. Out of the twelve studies mentioned, several of them share similar study designs. Specifically, eight studies used a cross-sectional design (66.6%), while three studies employed a case-control design (25%). Additionally, one study used a longitudinal Study design (8.3%). Seven studies focused on

Table 2: Data Extraction sheet of twelve studies for scoping review.

S. #	Author name & Year of publication	Region	Study design	Age of participants	Sample size	Methodology	Key findings
1	Obiageli E Nnodu et al. (2021)	Nigeria	Model-estimated, population-level Cross-sectional study	Children aged 6-59 months	11,186 tested children, 17,205 untested siblings	Analyzed mortality differences using inheritance-derived genotypic distribution of untested siblings	Approximately 4.2% of national under-5 mortality was attributable to excess mortality from sickle cell disease.
2	Christopher Bismarck Eke et al. (2015)	Enugu, Nigeria	Cross-sectional descriptive study	6 to 18 years	132 subjects and controls respectively	Bioelectric impedance analysis	Children with SCA, particularly older males, have impaired body composition indices.
3	Idowu Odunayo Senbanjo et al. (2016)	Lagos, Nigeria	Prospective case-control study	Mean age of children with and without (SCD): 7.46 ± 3 and 7.01 ± 3.58 years respectively.	118 SCD children, 118 non-SCD children	Standard techniques for measuring weight, height, and HC	The head circumference of children with sickle cell disease (SCD) is not significantly different from that of non-SCD children.
4	Samuel A. Adegoke et al. (2017)	Brazil and Nigeria	Comparative study	4-11 years School-aged children	109 Brazilian children and 95 Nigerian children	Nutritional parameters of Brazilian and Nigerian children with SCD attending routine clinic visits in Brazil and Nigeria, respectively.	The BMI-for-age z-score and height-for-age z-score were lower in Nigerian children compared to Brazilian children.
5	Onukwuli et al. (2018)	UNTH, Enugu, Nigeria	Cross-sectional, Case-control	6-18 years	81 subjects (female)	The cross-sectional, case-control study.	Mean weights and BMI of sickle cell anemia (SCA) patients were significantly lower than controls.
6	OM Ukoha et al. (2020)	Enugu, Southeast Nigeria	Cross-sectional analytical study	1-18 years	175 subjects and controls	Weight and height measurements, BMI calculation, HemoCue Hb201+ Analyzer for hemoglobin concentration	Subjects had significantly lower Z-scores for weight, height, and BMI compared with controls.
7	Emokpae et al. (2019)	Benin City, Nigeria	Case-control study	4-20 years	100 SCA patients and 50 controls, 53 males and 47 females	. Unpaired Student's t-test was used for comparisons. Spearman correlation coefficient was used for association with disease severity scores.	Copper and zinc levels were significantly different between patients in steady clinical state and vaso-occlusive crisis.
8	Kudirat et al. (2019)	Aminu Kano Teaching Hospital, Kano, Northern Nigeria	Descriptive Longitudinal Study	6 months to 15 years	70 subjects each for SCA in acute painful crisis, SCA in steady state, and HbAA groups	Serum zinc levels were analyzed using atomic absorption spectrophotometry.	The mean serum zinc level of SCA with acute painful crisis was higher than SCA in steady state, but the difference was not statistically significant. The HbAA control group had significantly higher mean serum zinc levels than both SCA groups.
9	Samuel A. Adegoke et al. (2018)	Ilesa, Nigeria	Cross sectional, Community-based	21-56 years	182 CHWs	Questionnaires and Observational Checklists	37.9% had good knowledge of SCD. - Only 4.3% of PHC centers treated patients with SCD. -
10	Oladele Simeon Olatunya et al. (2021)	Ekiti, Nigeria	Cross sectional study	Above 18 years	110 SCD patients + 110 non-SCD patients	Questionnaires used for self-reported sociodemographic data and health-seeking behavior (HSB).	- More SCD patients received treatments at private hospitals, patent medicine stores, and faith-based centers compared to non-SCD counterparts. -
11	Hezekiah Isa et al. (2023)	Nigeria	Cross sectional study	Above 18 years	312 stakeholders attended the engagement meeting	The engagement involved PowerPoint presentations, structured questionnaires, and an interactive session.	The majority of stakeholders had good knowledge of what causes SCD and the best place to get help during SCD crisis. However, knowledge of specific preventive measures and crisis management was not optimal.
12	Adegoke et al. (2017)	Wesley Guild Hospital Ilesa Unit, Nigeria	Cross sectional, comparative study	Mean age of two groups was (7.35 ± 2.47 years and 6.80 ± 2.57 years	95 SCA children and 75 matched controls	Serum 25-OHD, IL-1β, 2, 6, 8, 11, 12, 13, 17, 18 were determined using HPLC.	Pro-inflammatory cytokines IL-2, 6, 8, 12, 17, and 18 were higher in SCA children than the controls. There was no significant variation in IL-11 and 13.

Table 3: General characteristics of the selected studies.

Variables	Frequency	Percentage
Age of participants		
Preschool Children (ages 6-59 months)	1	8.3
School-Aged Children (ages 5 to 18 years)	8	66.6
Adults (ages above 18 years old)	3	25
Study year		
2015-2017	3	25
2018-2020	6	50
2021-2023	3	25
Study design		
Cross-sectional Studies	8	66.6
Case-Control Studies	3	25
Longitudinal Studies	1	8.3
Data Analysis Tool		
Anthropometric and Nutritional Assessments	6	50
Questionnaires and Observational Checklists	3	25
Zinc and Serum Analysis	3	25

estimating the high incidence of sickle cell disease, analyzing mortality rates, and examining the health impacts on children in Nigeria (Table 3).

The CASP tool was utilized to systematically evaluate study quality, assessing aspects like study design, methodology, sample size, data collection methods, and potential biases, facilitating an unbiased assessment of each study's strengths and limitations.

Themes Identified

Four main themes were mentioned in the key findings. Seven studies explored the disparities in accessing care services for children with SCD in Nigeria. Five studies identified concerning socio-demographic factors in accessing healthcare services. Three studies identified and discussed the obstacles faced in delivering high-quality healthcare to children, including financial constraints and cultural stigma. Five studies presented strategies to enhance healthcare accessibility and quality for children, emphasizing the importance of community engagement, policy formulation, and healthcare workforce capacity (Table 4).

Table 4: Themes and Subthemes.

Theme	Subthemes	Number of studies
Prevalence, Mortality, and Health Impacts	• Genotype Prevalence in Children • Excess Mortality and Under-5 Deaths • Health Impacts and Nutritional Status	7
Access to Healthcare Services	• Sociodemographic Determinants • Healthcare System Factors	5
Challenges in Providing High-Quality Services	• Systemic Healthcare Challenges • Financial Constraints and Affordability	3
Strategies to Improve Access and Quality of Health Services	• Strengthening Healthcare Infrastructure • Enhancing Healthcare Workforce Capacity	5

Theme 1: Prevalence, mortality, and health impacts of SCD: Among twelve studies, a total of seven studies were identified in the scoping review that provides valuable insights into the prevalence, mortality, and health impacts of Sickle Cell Disease (SCD) in Nigerian children, as well as the access to healthcare services and health inequalities they face. Nnodu, et al., (2021) and Adegoke, et al., (2018) [8,15] findings emphasize the significant burden of SCD in the country.

Nnodu, et al., (2021) and Onukwuli, et al., (2017) [8,16] revealed that children with SCD had a higher under-5 mortality hazard probability compared to children without the disease. The estimated national average under-5 mortality for this cohort was alarmingly high at 490 per 1000 live births. This emphasizes the necessity for interventions and comprehensive healthcare strategies to reduce the mortality rates associated with SCD in Nigerian children.

Five studies consistently reported lower weight, height, BMI, and body fat percentage in children with SCD compared to controls [15-19]. The prevalence of stunting and thinness was significantly higher in children with SCD, particularly in the 11-15 age group. Furthermore, SCD children had lower mean haematocrit, MCV, MCH, MCHC, and HbF levels compared to controls, indicating the severity of the disease's effects on their health. Another important finding was the significantly lower serum zinc levels in children with SCD, and zinc deficiency was associated with acute painful events.

Theme 2: Access to healthcare Services and health inequalities: Among the twelve studies, five studies highlighted the theme; access to healthcare services for children with Sickle Cell Disease (SCD) in Nigeria is influenced by various sociodemographic determinants. According to the qualitative study on healthcare professionals' views by Samuel, et al (2017) [15], lower socioeconomic class is associated with a higher likelihood of stunting and wasting, while the upper socioeconomic class is linked to an increased likelihood of overweight/obesity in children with SCD. These disparities in access to healthcare can result in significant health inequalities for vulnerable populations. Additionally, two studies emphasize the importance of investigating healthcare system factors affecting access to care. Their review discusses how barriers such as cost, accessibility, and language barriers can hinder access to adequate healthcare services for children with SCD. These factors contribute to the challenges faced by families affected by SCD, particularly those from economically disenfranchised backgrounds or ethnic minority status [17,18].

Furthermore, a study by Onukwuli, et al., (2017) and Kudirat, et al., (2019) [16,20] calls for understanding the consequences of limited access to healthcare on disease management and outcomes. Research has shown that disparities in receiving healthcare among racial/ethnic minority groups, including African Americans, are associated with inadequate results in people suffering from SCD. Addressing these sociodemographic and healthcare system factors is essential to improve access to quality healthcare for children with SCD in Nigeria and reduce health inequalities. Implementing comprehensive care programs and targeted interventions based on the insights from these studies can potentially enhance healthcare accessibility.

Theme 3: Challenges in providing high quality services: Among twelve studies, three studies identified this theme. In Nigeria, children with sickle cell disease (SCD) face significant challenges in accessing high-quality healthcare. The study

conducted by Isa, et al., (2023) and Olatunya, et al., (2021) [21,22] highlights the systemic obstacles impacting healthcare services. Financial constraints burden families, hindering access to essential SCD management and medical interventions. Moreover, the scarcity of specialized healthcare professionals and resources, such as hematologists and pediatricians, further impedes timely and comprehensive care. Cultural stigma and misconceptions surrounding SCD contribute to delays in seeking medical attention and adhering to treatment plans.

Adegoke, et al., (2018) [15] compared steady-state nutritional parameters of Brazilian and Nigerian children. The study found that a relatively high proportion of children in both Brazil and Nigeria (23.5%) were wasted (BMI-for-age z-score < -2). Notably, the BMI-for-age z-score and height-for-age z-score were lower in Nigerian children compared to Brazilian children. This disparity in nutritional status highlights the financial constraints and affordability issues that families with sickle cell disease face in accessing adequate healthcare and nutrition, particularly in resource-constrained regions like Nigeria. Addressing these issues requires collaborative efforts between policymakers, healthcare providers, and communities. Key strategies should focus on improving care program accessibility, reducing financial burdens, strengthening healthcare professional distribution, and promoting cultural sensitivity and awareness. By prioritizing these measures, the healthcare system for children with SCD in Nigeria can be enhanced, positively impacting their overall well-being.

Theme 4: Strategies to improve access and quality of health services: Five research studies have highlighted the importance of comprehensive strategies to enhance the handling of sickle cell disease in pediatric patients, focusing on strengthening healthcare infrastructure, workforce capacity, policy formulation, and community engagement. According to Isa, et al., (2023) [21] his qualitative study highlighted the valuable insights of medical professionals in overcoming patient barriers and delivering high-quality care. By addressing training needs, healthcare professionals can be better equipped to navigate challenges and provide comprehensive care to pediatric patients with sickle cell disease.

Formulating evidence-based policies and guidelines specific to sickle cell disease is essential to improve healthcare access and quality of care for affected children. Onukwuli, et al., (2017) and Kudirat, et al., (2019) [16,20] recognized the disparities in healthcare access and outcomes between high-income and low- to middle-income countries. By establishing effective policies and guidelines, healthcare systems can bridge these gaps and optimize care delivery for young patients with SCD.

Promoting community engagement and awareness programs plays a significant role in overcoming barriers and enhancing healthcare access for children with sickle cell disease. Two studies [21,22] emphasized the importance of interventions aimed at improving healthcare utilization, particularly in resource-limited settings. Engaging communities in the healthcare process can raise awareness and address barriers, leading to improved healthcare access and outcomes for pediatric patients. For the community role, 25.6% of participants were aware of their key role in spreading the real impact in society regarding the management of SCD in the environment. The primary barriers faced by the patients included healthcare facilities, prolonged hospital stays, late diagnostic results, improper communication, lack of healthcare staff services, costly diagnosis, etc.

Discussion

This scoping review aimed to investigate health inequalities among children with SCD) in Nigeria. The findings from the reviewed studies reveal important insights into the prevalence of SCD and its impact on child mortality, growth, and nutritional status in the Nigerian context. The national birth prevalence of SCD in Nigeria was estimated to be nearly 1.5%, with the highest prevalence observed in the south-west region as reported by other studies [8,17,18. These findings highlight the urgent need for improved strategies to address the high child mortality associated with SCD in Nigeria. Furthermore, the scoping review identified growth impairments and undernutrition among children with SCD in Nigeria. One notable observation was the increased incidents of overweight/under-weight and poor body stature among Nigerian children with SCD compared to their counterparts in São Paulo, Brazil [15]. Other studies have reported that the low prescription rate of hydroxyurea in Nigeria, compared to Brazil, could contribute to the difference in disease severity and growth patterns [23].

The study revealed that patients and caregivers faced challenges in accessing timely and appropriate care due to institutional and attitudinal delays, limited specialist SCD centers, and unfriendly healthcare providers [22]. Healthcare system-level factors encompass the availability, affordability, and quality of healthcare services [24]. The cost implications of outpatient care, prohibitive drug costs, and lack of adequate health insurance coverage were also major barriers to accessing care [21]. Families without adequate insurance may struggle to afford the costs associated with SCD management. Lack of insurance coverage can lead to fragmented care and delays in receiving necessary treatments, exacerbating the health challenges faced by children with SCD [25]. The reliance on non-orthodox healthcare providers, such as patent medicine vendors and faith-based centres, further compounded the issue, resulting in delayed presentation to formal healthcare settings and potentially harmful practices [15]. The studies suggest that zinc and copper levels, as well as the copper/zinc ratio, may play a significant role in the severity of SCD and vaso-occlusive crisis [22]. Deficiencies in these metals may contribute to reduced antioxidant activity and increased risk of associated complications in SCD patients [27].

Genetic screening programs can help identify carriers of SCD and provide counselling to individuals and families [28]. These programs involve the use of family pedigrees and screening tests to detect carriers of the sickle cell trait. Postnatal diagnosis for SCD disorders can also be conducted [29]. Increasing awareness and knowledge among healthcare providers about SCD and its management is crucial for the success of prevention efforts [30]. Early neonatal screening for SCD allows for timely intervention and comprehensive care. However, access to newborn screening in low-resource countries like Nigeria is limited due to economic constraints [31]. Efforts should be made to expand comprehensive newborn management programs to improve initial diagnosis and management of SCD [32]. Routine immunizations based on country-specific guidelines are essential for children with SCD [33]. Vaccinations against pneumococcal infections and prophylactic antibiotic treatments have shown positive outcomes in reducing mortality rates in developed countries [34].

Strengths and Limitations

The scoping review's strength lies in its comprehensive

analysis of multiple studies, providing a robust understanding of health inequalities among children with SCD in Nigeria. However, the review does have some limitations. The exclusion of studies conducted outside Nigeria may have limited the generalizability of the findings to other settings with different healthcare systems and cultural contexts. Additionally, the exclusion of studies focusing on children under 6 months old may have restricted the understanding of SCD prevalence in this specific age group. The reliance on available published literature may introduce publication bias, as not all relevant studies might have been accessible or included. Some studies might have relied on self-reported or caregiver-reported information, which could introduce recall bias or inaccuracies.

Conclusion

This review emphasizes the significance of newborn screening, comprehensive healthcare strategies, and overcoming sociodemographic and healthcare barriers to foster well-being of Nigerian children with SCD. To address health inequalities, policymakers should collaborate with healthcare providers to enact evidence-based policies, encompassing community awareness initiatives, and healthcare infrastructure enhancement. These measures will foster effective management, and enhanced outcomes for pediatric SCD patients in Nigeria. Future research in the field of SCD in Nigeria should explore emerging areas such as gene therapies, targeted treatments, and the implementation of technological advancements in healthcare delivery.

Author Statements

Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

The data sets used and/or analysed during the current study are available from the corresponding author upon request.

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