

## A critical review of the response of Nigeria to tuberculosis as an infectious disease and sickle cell as a long-term disease condition

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### Abstract

**Aims:** Tuberculosis and Sickle cell are public health threats globally and in Nigeria. There is no study that that have captured how tuberculosis and sickle cell diseases have been managed in Nigeria. The aim of this review article is to bridge this study gap by evidently discussing the response of Nigeria and other relevant organization to these diseases and also the current challenges faced in response, management and mitigation of these diseases. This study also aims to keep the public health sector of 'where we are' and facilitate informed solution on 'what can be done' in a bid to manage these diseases more effectively.

**Methods:** Scientific databases such as AJOL, Web of Science and PubMed were used to access relevant data on the disease of interest (Tuberculosis and Sickle cell). Articles relevant to the Nigerian setting was used and articles that did not revolve around the disease of interest were immediately excluded at first screening. Original articles not later than 2002 were included and used for this review, older articles were excluded for the purpose of this study.

**Results:** This study revealed that the Federal Government of Nigeria showed much commitment in past years towards the fight of these diseases by setting up national programs and schemes. However, implementation has been weak since initiation. Government's effort in time past towards mitigating these disease condition have not been effective because financial challenges of patients in getting treatments to manage these diseases. Last of all, associated comorbidities such as HIV, drug resistance and COVID-19 remain a major concern that affects response to tuberculosis and sickle cell disease.

**Conclusion:** The government, relevant stakeholders, international and local NGOs, and ordinary individuals should must work together to effectively combat and eliminate the public health threats and concern posed by tuberculosis and sickle cell disease.

**Keywords:** Tuberculosis; Sickle cell; Infectious diseases; Response; Nigeria

### 1. Introduction

Infectious diseases and long-term disease conditions are significant areas of interest in public health. For centuries, several outbreaks of infectious diseases (tuberculosis, influenza, measles, and chickenpox) have afflicted humanity and, more recently, the COVID 19 pandemic. Infectious diseases are usually caused by bacteria and viruses and are highly contagious. On the other hand, long term diseases (for example, heart disease, cancer, kidney disease, and sickle cell disease) last over a long period, may not have a cure, and could only be managed by ongoing medical attention for the

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rest of the patient's life. Unfortunately, low- and middle-income countries are always significantly affected by infectious diseases and long-term disease conditions than developed nations (1). This review will focus on tuberculosis (an infectious disease) and sickle cell disease (a long-term disease condition) in Nigeria.

Tuberculosis (TB) and sickle cell disease (SCD) share a striking similarity in geographical distribution (2) and are highly prevalent, especially in developing countries like Nigeria. Patients with compromised immune systems, notably in populations with immunosuppressive disorders like the acquired immunodeficiency syndrome (AIDS), are at risk of tuberculosis (3). It is not surprising that tuberculosis is the leading cause of death among persons with HIV/AIDS (4), as this association has been extensively studied. However, the association between tuberculosis and other immunosuppressive conditions like sickle cell disease remains unclear (5).

This review provides an overview of the description, prevalence and incidence of tuberculosis and sickle cell disease in Nigeria. In addition, it will critically examine the public health significance and socioeconomic impacts of these diseases and the response of relevant bodies towards tackling these diseases in Nigeria.

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## 2. Description, Prevalence and Incidence of the Diseases of Interest

### 2.1. Tuberculosis (Infectious Disease)

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis*, a microorganism of the bacilli family. It is readily transmissible via aerosols expelled from an infected person during talking, sneezing and coughing (6). It is a contagious disease that ranks very high in the World Health Organization's (WHO) list of the top 10 leading causes of death globally (7). There have been over 2 billion cases of TB globally, with about 1.5 million mortalities in 2019 (8,9). The WHO's Global Tuberculosis Report (10) estimated that over 25% of the persons who developed TB were geographically from Africa in 2019. Quite unfortunately, Nigeria, with an estimated incidence rate of over 250,000 (11), is classified among the 30 countries with a high disease burden of tuberculosis (12) and ranks 6th among the eight countries that account for over 66% of TB cases globally. Also, tuberculosis is considered the primary cause of opportunistic infection complications among people living with HIV/AIDS. As a result, over 35,000 HIV/AIDS patient dies yearly (13). Thus, TB remains a significant public health problem in Nigeria, especially with the emergence of the HIV/AIDS pandemic (14) despite several successes in tackling its spread.

### 2.2. Sickle Cell Disease (Long Term Disease Condition)

Bediako (15) states that sickle cell affects over 250 million persons globally. Research conducted by Mulumba and Wilson (16) revealed that sickle cell disease is the most common form of blood disorder among the black African population. Sickle Cell Disease, which could also be referred to as Sickle Cell Anaemia, is a long-term disease condition that results from an individual inheriting two irregular strands of the haemoglobin (HBs) gene, one from each parent. Haemoglobin is the oxygen-carrying component of red blood cells. As a result of the defect in the haemoglobin gene, the blood cells assume a "Sickle-Cell" shape (against its usual biconcave disked shape), thus disrupting the normal flow of blood (17). The restricted blood flow and reduction in the blood cells' oxygen-carrying capacity result in other acute or chronic health conditions like chronic pain, organ damage, stroke, or even death (18). Reports from WHO estimated that over 300,000 new births with sickle cell disease occur annually (19). Sadly, Nigeria accounts for about 100,000 new births annually, leaving Nigeria the most sickle cell endemic country globally (20).

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## 3. Determinants and Socioeconomic Impact of Tuberculosis and Sickle Cell

### 3.1. Tuberculosis

Nigeria is a developing country and her citizens, especially the poor populations living in rural communities, are more vulnerable to the risk and dangers of infectious diseases like TB. This is usually because of low availability and access to quality healthcare services. Also, most parts of Nigeria frequently experience security crises ranging from banditry, Fulani herders clashing with farmers, kidnapping and Boko haram. As a result, many locals have been displaced and forced to flee their homes to take refuge in internally displaced person (IDP) camps. There is much evidence documenting the increased risk and transmission of TB associated with crisis and migration (21). Owoaje *et al.* (21) went further to state that issues like overcrowding, malnutrition and stress and trauma of conflict combined with the high TB burden in Nigeria put IDP camps and the rest of the society at immediate risk for tuberculosis. This statement corroborated the findings as the IDPs screened had TB burdens that were twice the estimated national incidence rate.

Furthermore, with the increasing awareness of the association between HIV and TB among the general public (22), there is a growing concern about the stigmatisation and discrimination of TB patients. Discrimination and stigma are known hurdles impeding the success of TB and HIV intervention programmes (23). In a recent finding, about 20 per cent of participants showed potential for stigmatising persons with TB and suggesting they keep their distance (22). With such adverse reactions, persons with suspected TB hesitate to go for confirmatory tests and diagnosis on time. Hence, this poses a potential risk to others as they may unknowingly begin to infect others rather than commencing treatment. In addition, stigma and discrimination create a multiplier effect that permeates into other aspects of the life of an infected TB patient. For instance, stigma and discrimination brings about depression, low self-esteem, isolation and withdrawal from social gatherings (23).

It is also believed that TB impacts the most promising population in the country. This sickness results in the loss of a vast amount of productive work hours annually. Thus, denying household sources of livelihood and hence increasing the economic burden on society. Although, the provision for treatment and diagnosis of TB is available at no cost to the public, patients may also incur some costs like transportation to access these services. Withdrawing from the public can also affect the finances of such individuals and hence, making it increasingly difficult for them to cope with expenses incurred as a result of the sickness (22). Therefore, there is a need to bridge the knowledge gap in society through behavioural change-based intervention to address the menace caused by stigma and discrimination toward TB patients.

### 3.2. Sickle Cell

According to Muoghalu (24), low awareness, couples neglecting factual realities (incompatible genetical screening outcome) because of emotions, misconceptions of SCD, unavailability of screening centers in rural communities were some of the factors (highlighted by parents living with SCD sufferers) that led to birthing a sickle cell child. Sickle cell disease tremendously affects an individual psychosocial system and those of close family and friends of the individual. The impact of this disease transverse through the individual's social, physical, mental, and psychological aspects.

Firstly, Sickle cell disease condition poses a very traumatic experience for families, especially parents and partners, to bear (24). Sufferers of this condition always need medical attention, which could be traumatic and create family tensions. In a study conducted in Nigeria by Adegoke and Kuteyi (25), 42 per cent of respondents revealed that the pressure of catering to the needs of their sickle cell child or ward often made them pay less attention to other members of the family. Also, 14.2 per cent stated that their communication with other family members is affected and that the child's condition usually results in disputes in 12.4 per cent (25). In Nigeria, women are primarily the caregivers while the husbands, on many occasions, may be out for work. The woman may invest so many emotions and energy in the child with sickle cell while unintentionally neglecting other family members and the father. This neglect may be the beginning of the crisis, conflicts and unhappiness in the home. In agreement with the findings from the study conducted by Adegoke and Kutevi (25), many participants had regrets about birthing children with sickle cell disease because of the trauma they have to go through in looking after the child. Also, there is this subtle fear among family members that the sickle cell sufferer may die at any time. These problems that started in the family have a ripple effect on the rest of society.

Furthermore, sickle cell disease patients suffer severe psychological complications due to the associated challenges presented by the disease. For example, the constant pain, daily struggles of discomfort and the general perception of the society towards them are enough to compound the trauma for sufferers (26). Also, findings show that sufferers of SCD condition are restricted in making important decisions about their lives, like finding a suitable spouse for marriage and career choices. A study conducted by Anie (27) showed that the most commonly experienced psychological problems are depression, anxiety, below-par academic performance, lack of association and aggression. For a developing country like Nigeria, overcoming hurdles as a person living with sickle cell disease is increasingly demanding. Adequate routine services required by sickle cell patients seem scarce as health services are not adequately tailored to cater to sickle cell disease. Hence, there is a need to increase awareness, availability and accessibility of sickle cell management services and counselling services for those living in a marginalized community.

In addition, SCD places a substantial financial burden and responsibility on parents or caregivers of people with sickle cell disease. A Nigerian study, Ohaeri and Shokunbi (28), also confirmed this. The enormous financial burden is primarily a result of the high cost of treatments in Nigerian hospitals since the concept of user charges was introduced in government hospitals. Also, other associated costs of accessing healthcare services like transportation contribute to the increased financial burden, especially as sufferers need to seek medical care frequently. With 4 in 10 persons living below the national poverty line in Nigeria (29), one can imagine how difficult it is for most Nigerians to survive daily. This situation gets even worse when such individuals also deal with the sickle cell disease condition. The financial burden also explains why some families resorted to loans to cater to the hospital bills of sufferers of SCD (25). This

creates a ripple effect as a lack of funds results in poor nutrition for other family members of the household and culminates in the poor health of Nigerians (24). In addition, SCD is mainly symptomatic, and people living with the disease are continuously being monitored and cared for. Most of the child's parents, most of the time, sacrifice another aspect of their lives, including their jobs, to provide the desired amount of attention to the sufferers. This also affects the total income of the household and result in higher poverty level among many families in the country (24).

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## 4. Response of Nigeria and Other Relevant Organization to the Disease

### 4.1. Tuberculosis

Over three decades ago, the Federal Government of Nigeria (FGN) demonstrated its commitment to the fight against TB by establishing the National Tuberculosis and Leprosy Control Programme (30) as a sub-division in the Department of Public Health FMOH (31). As of 2014, Nigeria was implementing the “National Strategic Plan for Tuberculosis Control Towards Universal Access to Prevention, Diagnosis and Treatment 2015 – 2020” until new information like the development of novel rapid diagnostic systems for tuberculosis came to light that prompted the National Tuberculosis and Leprosy Control Programme (NTBLCP) department to review her plans and address areas of weakness in the ongoing implementation policy (32). Also, a survey study conducted to test the knowledge and perception of TB revealed the low level of awareness among the population (33). To address these challenges, the NTBLCP organized a session with its stakeholders to devise a more practical approach to tackle health system challenges that have impeded efforts toward achieving set targets for TB in the country. Subsequently, a six-year National Strategic Plan for TB Control 2015-2020 identified five priority goals (33). In addition, the NTBLCP is addressing the challenge posed by the twin epidemic, i.e., TB and HIV, by collaborating with relevant stakeholders to expand TB/HIV integrated services in Nigeria. There is also a policy in place by NTBLCP that ensures that all antiretroviral therapy centres have provision for Directly Observed Treatment, Short-course (TB-DOTS).

Nigeria has frantically made efforts to normalize routine TB screening across all medical centres. According to Okoro *et al.* (34), the National Council of Health in Nigeria directed all medical facilities to commence routine screening of all patients for tuberculosis. This directive was to aid the elimination of the disease and meet the sustainable development goal (SDG) 3 by 2035 (35).

Furthermore, intervention programmes could be specific or combined with one or more related diseases. For instance, the United States has supported the fight for a tuberculosis-free Nigeria through bilateral and multilateral programs (33). Jackson and Garba (33) also stated that the investment by the United States government in the 2016 fiscal year was to the tune of US\$24 million for tuberculosis and TB/HIV intervention projects. Also, the Centre for Disease Control (CDC) collaborates with the FMOH and stakeholders to implement effective and sophisticated national HIV response interventions under the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). However, HIV and TB are tragically linked. Hence, the CDC provided TB/HIV integrated service delivery as part of the activities. In addition, the CDC encourages the increase of TB diagnostic services.

Despite efforts to curb the TB menace, achieving global targets have remained elusive. Many problems in recent times have impeded TB control and prevention. Some of these challenges are highlighted below;

- The HIV/AIDS pandemic exacerbates TB cases and poses a significant issue for its diagnosis and management (36).
- The evolution of drug-resistant tuberculosis, such as extensively drug-resistant (XDR) TB and multidrug-resistant TB (MDR-TB), complicates the control measures for tuberculosis globally (WHO Global tuberculosis report 2021), making it increasingly challenging. It also can nullify the successes made so far for TB control.
- With the emergency of the COVID-19 pandemic, there has been a reallocation of limited resources toward curbing the pandemic. Also, the 'sit at home' mandate in the eastern part of Nigeria has restricted movement and limited access to healthcare services. This competing priority may likely negatively impact the burden of TB and other infectious diseases in Nigeria (37).
- Although treatment of TB is primarily free, the cost of accessing these services places a substantial financial burden on poor households (38), thus, rendering the available TB control services underutilized.
- Low awareness knowledge among the population concerning TB and other infectious diseases is associated with neglect of available screening services, resulting in delayed diagnosis and treatment of the disease (3).

### 4.2. Sickle Cell

Undoubtedly, Nigeria is the country with the highest-burden of SCD globally, and SCD accounts for about 8 per cent of infant mortality across Nigeria (39). These statistics are worrisome and also implies the high disease burden directly or indirectly impacts many families. As published by the News Agency of Nigeria (40), the Nigerian legislatures took action in June 2016 to push for the subsidization of the treatment of sickle cell disease across the country. Also, every 19th of June, in a bid to create awareness of the disease, Nigeria joins in the commemoration of the world sickle cell day.

Aside from commemoration of the world sickle cell day, it is believed that sickle cell disease is not garnering as much attention as it is supposed to garner in Nigeria despite the increasing rate of sickle cell-related deaths among children. It is like a cankerworm that is slowly eating up the populace, especially in poor populations in rural communities. Just like Inusa *et al.* (41) stated, there have been no concrete programmes that specifically tackle sickle cell disease despite the public health threat to the country for a long time. However, this does not imply that the government has not made any efforts whatsoever. The Nigerian Government formally acknowledges sickle cell disease as a top priority and, in 2013, formulated frameworks and policies for its screening of newborns, prevention and control (42). However, the question that remains unanswered is, how effective has the implementation of these policies and frameworks been? What successes have been achieved so far?

Like many other African countries like Tanzania, Benin, Ghana, and Nigeria have established SCD centres (43). Through the Federal Ministry of Health (FMOH), the Nigerian Government built an all-encompassing screening centre in each of the six geopolitical zones in the country for newborns. However, these centres are underutilized and function below par due to the expensive nature of the required diagnostic reagents and underskilled health personnel (44).

Besides building SCD centres, there is a perceived lack of political will to fund sickle cell research and programmes in Nigeria compared to other cases like HIV/AIDS programmes. Apart from these issues, corruption is endemic in Nigeria. The widespread corruption among political leaders has further plunged citizens' economic and financial power, hence resulting in poverty among Nigerians (45). Hence, most families that are poor and have persons with sickle cell disease find it challenging to access quality health services nearby. The lack of access to excellent and affordable healthcare predisposes those from poor homes to death, thus giving sickle cell child mortality a sociodemographic perspective (45).

Away from government interventions, some individuals have also joined the fight against sickle cell disease through donations to relevant NGOs like the Sickle Cell Foundation Nigeria (SCFN). The chairman of SCFN, in a lecture, urged well-meaning Nigerians and stakeholders to continue to donate to help NGOs effectively combat the rising incidence of the disease. He also cited that over 80% of the Sickle Cell Association of America budget comes from donations made by ordinary citizens compared to those from corporate bodies.

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## 5. Methods

A search for relevant original articles was conducted on scientific databases such as AJOL, Web of Science and PubMed. Articles that did not revolve around the disease of interest were immediately excluded at first screening. Original articles not later than 2002 were included and used for this review, older articles were excluded for the purpose of this study. Articles and case study centered on Nigeria were used because of the peculiarity of this study. Due to limited number of reviews published in African journal, relevant and related articles published in other international journals was also used. The articles were reviewed accordingly for critical comparison across tuberculosis and sickle cell disease.

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## 6. Conclusion

Tuberculosis and sickle cell disease jointly constitute a significant public health challenge for Nigeria and pose a considerable threat to the country's development, security, community existence, survival, and reduced life span of Nigerians. High poverty rate, low knowledge and awareness, and continuous security challenge predispose citizens to weightier impacts of these diseases. This plunges the country into a huge economic burden due to losing a good workforce, reduced efficiency and redirection of limited funds towards control and disease management. Honestly, there is no magical easy way out of these public health problems. However, the government, relevant stakeholders, international and local NGOs, and ordinary individuals should cooperate and join forces to effectively combat and eliminate the public health threats and concern posed by tuberculosis and sickle cell disease.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

The authors declare no conflict of interest.

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### *Authors' contributions*

Emmanuel Nathaniel James conceptualized the topic/idea, wrote and approved the manuscript, Goshen David Miteu wrote, revised and approved the manuscript, Francis Ndowo Ajuk revised and approved the manuscript.

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