

Assessing National Malaria Guidelines in Preventing Severe Malaria in Children Under Five in Benue State Healthcare Facilities

Theresa Mayen Adaji

Public Health Department, Texila American University, Guyana

Abstract

This study assessed healthcare providers' knowledge and attitudes towards the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) in Benue State, Nigeria, evaluate the accessibility of these guidelines within healthcare facilities, explore their application in preventive measures for managing severe malaria among children under five, and identify effective strategies to enhance adherence to NGDTM. A qualitative methodology was employed, utilizing in-depth interviews with healthcare providers across various facilities to gather insights into their experiences and perceptions regarding NGDTM. The thematic analysis revealed several key findings. Participants exhibited a strong awareness and positive attitudes towards NGDTM, acknowledging its effectiveness in improving patient outcomes. However, challenges related to the accessibility of NGDTM materials were evident, as many providers reported limited availability of updated copies and inadequate training on guideline utilization. Additionally, while some facilities implemented preventive measures like indoor residual spraying and insecticide-treated bed net distribution, resource constraints hindered consistent adherence. The implications of these findings underscored the necessity for improved access to NGDTM resources and enhanced training programs for healthcare providers. To address these challenges, the study recommended the establishment of regular, tailored training sessions and the integration of technology to facilitate real-time access to guidelines. Furthermore, fostering a supportive organizational culture that prioritizes adherence to NGDTM could significantly enhance malaria management efforts, particularly in protecting vulnerable populations such as children under five.

Keywords: *Child Health, Healthcare Providers, Malaria Management, National Guidelines, Preventive Measures.*

Introduction

Malaria remains one of the leading causes of morbidity and mortality among children under five years of age in sub-Saharan Africa, including Nigeria. The disease, transmitted primarily through the bites of infected female *Anopheles* mosquitoes, disproportionately affects vulnerable populations, particularly young children and pregnant women [1]. In Nigeria, the prevalence of malaria is exacerbated by various factors, including inadequate healthcare infrastructure, poor access to preventive measures, and a lack of adherence to established guidelines for malaria

management [2]. The National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) were developed to provide a comprehensive framework for malaria case management, including preventive strategies tailored to the specific challenges faced in Nigeria.

The NGDTM serves as a critical tool in combating malaria by outlining evidence-based practices for the diagnosis, treatment, and prevention of malaria, especially in vulnerable populations [3, 4]. This framework is essential for healthcare providers to deliver effective and timely care to children under five, who are particularly susceptible to the severe forms of

malaria that can result in death or long-term health complications. Effective implementation of the NGDTM is crucial for reducing the burden of malaria in this age group and improving overall health outcomes [3].

Despite the existence of these guidelines, studies indicate that there are significant gaps in knowledge, attitude, and adherence among healthcare providers regarding the NGDTM [3]. For instance, one study noted that while healthcare practitioners in Nigeria generally exhibit a high level of awareness of the NGDTM, there is a noticeable discrepancy between this awareness and the practical application of the guidelines [5]. Such gaps can result in suboptimal case management, leading to increased morbidity and mortality rates among children under five.

Understanding healthcare providers' knowledge and attitudes towards the NGDTM is paramount for assessing the effective application of malaria management strategies [3]. According to researchers, healthcare professionals' knowledge significantly influences their clinical practice, particularly in rural settings where access to training and resources may be limited [6]. Furthermore, the attitudes of healthcare providers towards the guidelines play a crucial role in determining their commitment to following the recommended protocols [7, 8]. Studies have revealed that despite a high level of awareness about the NGDTM, many providers do not consistently apply these guidelines in their practice [8, 9]. This inconsistency can lead to varied treatment outcomes and can undermine national efforts to control malaria.

The NGDTM's availability and accessibility within healthcare facilities are important factors that determine how it is used. In many parts of Nigeria, particularly in rural areas, there are major obstacles to the distribution and availability of these guidelines. It has been stated that the inability to obtain updated guidelines can make it more difficult for healthcare providers to treat malaria effectively

[10], and this point out that insufficient supply chains and interruptions in the delivery of necessary medications can make it even more difficult to follow the NGDTM [7]. It is crucial for malaria management that both public and private healthcare facilities are properly stocked with the NGDTM and pertinent antimalarial treatments.

Insecticide-treated bed nets (ITNs), indoor residual spraying (IRS), and chemoprophylaxis are among the preventative strategies that are part of the NGDTM's application. According to a study, ITNs have been shown to be a successful intervention in lowering the transmission of malaria among susceptible groups, particularly children under five [11]. Research has highlighted the significance of long-lasting insecticidal nets (LLINs) as the main preventive measure [12]. However, issues like coverage rates and user compliance continue to be major barriers to the successful implementation of ITNs, notwithstanding their efficacy [13].

In areas where malaria vectors mostly bite inside, IRS is an additional crucial element of the NGDTM. According to studies, IRS can considerably lower the spread of malaria; nevertheless, its effectiveness is threatened by the development of insecticide resistance [14, 15]. With an emphasis on local context adaptation, the research highlights the necessity of ongoing monitoring and assessment of vector management measures [16]. In order to reduce the risk of severe malaria, chemoprophylaxis is also advised for high-risk groups, including pregnant women and small children. Intermittent Preventive Treatment of Malaria in Pregnant Women (IPTp) has been shown to reduce the negative health outcomes associated with malaria during pregnancy [17, 18]. This highlights the need for similar preventive strategies specifically designed for children under five.

To enhance adherence to the NGDTM, it is essential to identify effective strategies and interventions tailored to the unique challenges

faced by healthcare providers in both public and private healthcare facilities. Continuous professional development and training have been suggested as critical components for improving knowledge and practice among healthcare practitioners [19]. The importance of targeted educational interventions to bridge the knowledge-practice gap cannot be overstated, as evidenced by the disparities in malaria-related practices identified in various studies [20, 21].

Additionally, encouraging cooperation between community stakeholders and healthcare practitioners is essential to promoting NGDTM adherence. Involving communities in malaria prevention initiatives can increase knowledge, facilitate access to preventative care, and guarantee that medical professionals are held responsible for following national regulations. The results of a study, which highlight the significance of comprehending community preferences and behaviours in the creation and application of efficient malaria control strategies, are consistent with this comprehensive approach [22].

The fight against malaria in Nigeria, particularly among children under five, requires a comprehensive understanding of the application of the NGDTM in healthcare settings. By examining healthcare providers' knowledge and attitudes, evaluating the availability and accessibility of the guidelines, exploring the application of preventive measures, and identifying effective strategies to enhance adherence, this study aims to contribute to the ongoing efforts to reduce malaria morbidity and mortality in Benue State. In Benue State where the present study is focused, the application and availability of the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) remain inconsistent, particularly in both public and private healthcare facilities. Despite the availability of these guidelines, a significant number of healthcare providers face challenges

in accessing and applying them effectively particularly to malaria prevention. According to a mapping exercise by USAID, 84.7% of healthcare facilities in Benue State reported limited access to the National Malaria Guidelines, with only 15.3% adhering to their recommended practices [23]. This gap underscores the need for strategic interventions aimed at improving access to the guidelines, enhancing the knowledge of healthcare workers, and promoting adherence to standard protocols for malaria prevention. The effective management of severe malaria also relies on preventive strategies such as the use of insecticide-treated nets (ITNs), seasonal malaria chemoprevention (SMC), and intermittent preventive treatment in infants (IPTi), which are proven to reduce malaria incidence and severity [24].

However, successful implementation of these interventions requires healthcare workers to follow the national guidelines and have access to necessary resources, such as antimalarial drugs and diagnostic tools [8, 25]. Discrepancies between public and private healthcare facilities further complicate this challenge, with private providers often facing resource shortages, including a lack of rapid diagnostic tests (RDTs), which delays accurate diagnosis and proper treatment [23]. Though efforts such as training programs and the distribution of updated guidelines have been initiated to address these issues, more comprehensive strategies are required to overcome the barriers to consistent guideline application and improve preventive measures for managing severe malaria in children under five in Benue State. Addressing the gaps in knowledge and practice, and ensuring that healthcare providers have access to the necessary resources, will be pivotal in advancing malaria control and ultimately achieving the goal of malaria elimination in Nigeria.

More specifically, the following specific objectives were developed based on the above:

1. Examine healthcare providers' knowledge and attitudes towards the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM).
2. Evaluate the accessibility of the NGDTM in healthcare facilities.
3. Explore the application of NGDTM in preventive measures for vulnerable populations in managing severe malaria among children under five.
4. Identify effective strategies or interventions to enhance adherence to the NGDTM in healthcare facilities.

Methods

This section is part of a wider PhD research study investigating the management of severe malaria in children under the age of five in Benue State, Nigeria. Some of this study has previously been published [3]. While the whole study takes a mixed-methods approach, this section of the research focuses only on qualitative methodology. The qualitative technique was chosen to investigate the numerous social, cultural, and contextual aspects that influence adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM). This qualitative phase aims to capture the perspectives, experiences, and attitudes of healthcare professionals and carers through in-depth interviews and thematic analysis, resulting in nuanced insights into the barriers and facilitators of effective malaria management.

Research Design

The study uses a phenomenological design, which is ideal for investigating participants' actual experiences and perspectives of severe malaria treatment. Phenomenology allows researchers to investigate how people perceive and make sense of their roles, responsibilities, and obstacles within the healthcare system [26]. This design is ideal for identifying the subjective meanings healthcare professionals attach to their adherence, or lack thereof, to

national malaria guidelines, as well as understanding how their professional experiences influence their decision-making processes. In-depth interviews (IDIs) were selected as the major data collection strategy. This method is useful because it allows for a detailed evaluation of participants' personal and professional experiences in a flexible but structured manner. The open-ended nature of the IDIs allowed participants to freely express their opinions while also allowing the researcher to delve deeper into certain themes that arose during talks.

Sampling Technique

The study used a purposive sample strategy to identify people with specific skill and experience in severe malaria care. Purposive sampling is especially useful for gathering information from those who have the greatest direct engagement in the subject being investigated [27]. Healthcare workers from various healthcare settings, including doctors, nurses, chemists, and laboratory technicians, were specifically chosen to provide a comprehensive variety of viewpoints on NGDTM adherence.

Furthermore, a snowball sample strategy (i.e., chain referral sampling) was used to recruit individuals who would not have been easily available using traditional sampling methods, particularly top Ministry of Health officials and leaders of professional healthcare organisations. Snowball sampling uses existing networks to discover individuals with critical insights into the institutional and systemic issues of severe malaria control [28]. The qualitative study comprised a total of fifteen people. This sample size is deemed sufficient to achieve data saturation, which occurs when no new information or themes emerge from additional interviews, ensuring the findings' robustness [29].

Instrument for Data Collection

A semi-structured interview guide was used as the main tool for gathering data in order to examine different aspects of managing severe malaria. In order to gather information about participants' experiences implementing NGDTM, difficulties adhering to the guidelines, and opinions regarding the guidelines' efficacy in enhancing the health of children under five, the guide contained open-ended questions. In addition to offering flexibility to explore new themes as they came up throughout the discussions, the semi-structured style provided for uniformity between interviews. In addition to sharing their thoughts on how institutional and sociocultural factors influence adherence to guidelines, participants were invited to offer suggestions for enhancing the treatment of severe malaria in their particular hospital environments.

Data Collection Process

In order to gather data, interviews were conducted in medical facilities throughout Benue State over the course of three months. Every interview was planned at a time that worked for the participants and was conducted in a private venue to protect anonymity and reduce outside distractions. All participants gave their informed consent before the interviews began, and they were guaranteed that their answers would be kept private. A qualified researcher performed the interviews, with one researcher facilitating the conversation and another taking thorough notes. To guarantee that the talks' content was accurately captured, all interviews were audio recorded with the participants' permission. The recordings were later transcribed verbatim for analysis. Each interview lasted between 45 and 60 minutes, depending on the depth of the participant's responses.

Data Analysis

Thematic analysis, as described by Braun and Clarke, was used to examine the qualitative

information gathered from the in-depth interviews [30]. A versatile technique that enables the researcher to find, examine, and present patterns or themes in the data is thematic analysis. When examining complicated phenomena, like healthcare administration, where several variables interact to affect procedures and results, it is especially helpful.

In carrying out the analysis, the researcher first familiarized themselves with the data by thoroughly reading and re-reading the transcripts, taking note of initial thoughts and observations regarding adherence to the Nigerian Guidelines for Diagnosis and Treatment of Malaria (NGDTM) and issues around managing severe malaria. This immersion allowed for deeper insight into the data, guiding the next steps in the analysis. Following this, the data were systematically coded, with key phrases and concepts highlighted to capture significant ideas about participants' experiences, attitudes, and perceived barriers to guideline adherence. The codes were then grouped to identify potential themes within the datasets.

The themes were subsequently reviewed and refined to ensure they accurately represented the data, with some themes merged or broken into sub-themes for greater specificity. Clear definitions and concise names were assigned to each theme, with various names emerging as key themes in understanding the issues surrounding malaria management in Benue State. Finally, the themes were integrated into a cohesive narrative that connected the qualitative findings to the study's research objectives. This narrative provided a detailed understanding of the barriers and facilitators influencing adherence to NGDTM guidelines, offering valuable insights into healthcare providers' practices and the broader context of severe malaria management.

Ethical Considerations

Throughout the study, strict ethical guidelines were followed to protect the rights and privacy of participants. Ethical approval was obtained from the appropriate institutional review board prior to data collection. Informed consent was secured from all participants, who were fully briefed on the purpose of the study, their right to withdraw at any time, and the measures in place to ensure confidentiality. To maintain anonymity, all participants were assigned codes (e.g., P1, P2) in the transcripts and final report. Additionally, the audio recordings, transcripts, and any identifying information were securely stored and accessible only to the research team. Participants were also assured that their responses would not be used in any way that could negatively impact their professional standing. By adhering to these ethical standards, the study ensured that the rights and dignity of participants were respected, while maintaining the integrity and credibility of the research process.

Results

The thematic analysis of the qualitative data revealed several key themes regarding healthcare providers' knowledge, attitudes, and challenges related to adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) in Benue State, Nigeria. These themes are presented in this section.

Knowledge and Attitude towards NGDTM

Qualitative narratives provide diverse insights into the factors shaping healthcare providers' attitudes towards NGDTM. Participants underscored the widespread awareness of NGDTM among healthcare providers. As one participant illustrated, “...the guidelines in question are supposed to be ingrained in our daily practice... so it is expected that almost everyone would be aware and this in a way is a reflection of a broad understanding of malaria management

principles among professionals” (Physician, Female, 42 years). This vividly portrays the deep-rooted knowledge base shared by healthcare workers across various healthcare settings.

Building upon this, another participant fervently expresses the supportive attitude towards NGDTM, articulating,

The guideline isn't just a set of guidelines; it's a lifeline for our patients. There's an unwavering belief in its effectiveness in improving patient outcomes. We actively rally behind initiatives aimed at promoting adherence because we've seen firsthand the positive impact it has on patient care” (Physician, Male, 38 years).

This therefore highlights the profound belief in NGDTM's ability to enhance patient well-being and the commitment of healthcare providers to uphold its principles.

However, amidst this resounding support, a contrasting theme emerged regarding NGDTM's role in reducing morbidity. Perspectives diverge on the integration of NGDTM into facility protocols. A healthcare provider reflects,

There's a general consensus in favor of NGDTM, but there's also apprehension about its seamless integration into our institutional practices. Each facility operates differently, with varying priorities and organizational contexts, leading to debates and discussions on how best to align NGDTM with our existing protocols” (Physician, Male 40 years).

This insight highlights the complexities of adapting NGDTM to diverse healthcare settings and underscores the need for consensus-building efforts tailored to each institution's unique needs.

In all, these diverse perspectives gleaned from qualitative insights enrich our understanding of healthcare providers' knowledge and attitudes towards NGDTM. While there is a robust foundation of awareness and support, the contrasting view underscores the importance of fostering open dialogue,

addressing any misconceptions, and ensuring clear communication to promote widespread acceptance and effective implementation of NGDTM principles.

Accessibility to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) in Healthcare Facilities

Based on the findings from the IDI data elicited and analysed, a number of themes emerged. First, many of the IDI participants reported that NGDTM materials which could be easily reached are limited and most often with majority of the available copies being outdated. As one participant mentioned;

In our healthcare facility, the availability of NGDTM materials is quite limited. We do have some printed copies, but they are often outdated and not easily accessible. Electronic versions are virtually non-existent, making it challenging for us to refer to the guidelines regularly (Nurse, Female 32 years).

However, one participant who mentioned that the NGDTM materials could be accessed on the Internet complained of lack of Internet access and mobile smart phones capable of download a 2015 edition [which is the edition they are aware of], as impediments to the accessibility of the NGDTM. IDI participants were equally asked whether they are aware of the a revised edition which was published in October of 2023, a majority of the participants indicated lack of awareness of such update. Furthermore, participants stated that the unavailability of the guidelines, particularly in a printed format will always be an experience in many healthcare facilities. The participant attributed this to the inability of several facilities to digitize a lot of the paper based data and information available for use. As he mentioned:

Accessing the NGDTM when needed is a cumbersome process. Even if we manage to find a printed copy, it's usually buried under piles of paperwork or locked away in a cabinet. Electronic access is practically nonexistent, as

we don't have access to computers or tablets in our facility (Physician, Male 40 years).

Issues surrounding lack of access was also attributed to the lack of inadequate training which they believed limits the opportunity to receive current, clear and up-to-date information about the guideline. This was how one of the participants put it:

Inadequate training on how to access NGDTM is also a significant barrier. Many healthcare providers are unaware of where to find the guidelines or how to interpret them effectively. This lack of guidance hampers our ability to deliver optimal care to malaria patient (Doctor, Female 38 years).

The Application of NGDTM in Preventive Measures in the Management of Severe Malaria among Children under 5

Based on thematic analysis conducted, results showed that most participants reported varying levels of implementation of the preventive strategies described in the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) within their healthcare institutions. While some facilities followed NGDTM guidelines closely, others managed to completely implement these preventive techniques. One common theme identified among participants is the importance placed on indoor residual spraying (IRS) and the distribution of insecticide-treated bed nets (ITNs) as per NGDTM guidelines. Several participants highlighted the proactive efforts made to conduct IRS and distribute ITNs to vulnerable populations, aligning with NGDTM directives.

For example, one participant stated, *"In our facility, we prioritize indoor residual spraying and ensure that insecticide-treated bed nets are distributed according to NGDTM guidelines. This proactive approach helps to reduce the prevalence of malaria among children under five" (Health Officer, Male, 35 years).*

However, despite these efforts, some participants cited obstacles to fully implementing NGDTM preventive measures. Challenges such as limited resources, logistical constraints, and inadequate training were commonly mentioned as barriers to effective implementation. As expressed by some participants,

While we aim to implement NGDTM preventive measures, we face challenges such as limited funding and manpower shortages. This often hampers our ability to conduct indoor residual spraying and distribute insecticide-treated bed nets as recommended **(Nurse, Female, 28 years)**.

Inadequate training and limited resources pose significant challenges in effectively implementing NGDTM preventive measures. Without proper training and access to essential resources, healthcare providers struggle to execute strategies like indoor residual spraying and distributing insecticide-treated bed nets, hindering our efforts to combat malaria effectively **(Physician, Female, 42 years)**.

Summarily, the qualitative findings underscore the importance of proactive implementation of NGDTM preventive measures in reducing severe malaria cases among children under five. While some facilities demonstrate effective integration of these strategies into practice, addressing obstacles such as resource constraints and training gaps will be essential for ensuring universal adherence to NGDTM guidelines and improving malaria prevention efforts.

Effective Strategies or Interventions Exist that can Improve Adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) in Healthcare Facilities

Effective strategies and interventions play a crucial role in improving adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) in healthcare facilities, according to IDI data elicited in the

study. One effective approach highlighted by respondents is the implementation of regular and tailored training programs. A healthcare provider emphasizes this, stating, “*Continuous education and training sessions tailored to the specific needs of healthcare workers are essential for keeping them updated and skilled in adhering to NGDTM*” **(Physician, Female, 42 years)**. This underscores the importance of ongoing professional development to reinforce adherence to evolving guidelines.

Another effective strategy mentioned is the establishment of supportive organizational cultures that prioritize NGDTM adherence. One participant explains, “When healthcare facilities foster a culture that values adherence to guidelines and provides resources and incentives to support it, healthcare workers are more likely to comply” **(Community Health Worker, Female 32 years)**. This highlights the pivotal role of organizational leadership in creating an environment conducive to guideline adherence. Additionally, leveraging technology and digital tools emerges as a promising intervention to enhance adherence to NGDTM. A healthcare professional shares, “*Implementing digital platforms for guideline dissemination and decision support can streamline processes and facilitate real-time access to updated information, thereby improving adherence*” **(Community Health Worker, Male 44 years)**. This suggests that incorporating technology into healthcare practices can augment adherence by providing readily accessible and up-to-date guidance.

Moreover, community engagement and education are identified as effective strategies to promote NGDTM adherence. One participant notes, “*Engaging with local communities and raising awareness about the importance of NGDTM not only empowers patients to demand appropriate care but also fosters a supportive environment for healthcare providers to adhere to guidelines*” **(Community Health Worker, Female 32 years)**. This underscores the importance of community

involvement in reinforcing adherence practices within healthcare settings. In summary, these qualitative findings underscore the multifaceted nature of effective strategies and interventions to improve adherence to NGDTM in healthcare facilities. By incorporating tailored training programs, fostering supportive organizational cultures, harnessing technology, and engaging with communities, healthcare facilities can enhance adherence to NGDTM and ultimately improve malaria management outcomes.

Discussion

The findings on healthcare professionals' knowledge and attitudes towards the National recommendations for Diagnosis and Treatment of Malaria (NGDTM) in Benue State are consistent with prior research demonstrating high levels of awareness of national recommendations among healthcare practitioners. Extant studies found that healthcare personnel usually grasp malaria guidelines and believe they can enhance patient outcomes [31, 32]. The widespread support for NGDTM demonstrated in this study highlights a good trend towards adherence to best practices in malaria control. However, the existence of significant differences in how these guidelines are actually put into practice draws attention to the knowledge gap, a recurring problem that has been noted in related studies conducted in various locations, including those by previous authors [10, 33]. This knowledge-to-practice gap implies that, in spite of awareness, full adherence is hampered by real-world obstacles including resource constraints and contextual difficulties.

The lack of updated recommendations is one of the biggest obstacles to NGDTM adherence that this study identified; this issue has also been noted in previous studies. One study stressed that consistent adherence to malaria treatment procedures depends on having access to up-to-date, printed, or digital guideline materials [34]. System-level flaws that could influence clinical decision-making are reflected

in the study participants' complaints about out-of-date materials and inadequate instruction on using electronic versions of NGDTM. Similar problems were also brought to light by a previous research, who found that poor training and insufficient access to current resources were major barriers to the successful application of malaria recommendations [35]. This implies that, while healthcare practitioners may be ready to implement NGDTM, structural impediments such as outmoded resources and a lack of digital infrastructure greatly impede their efforts.

Furthermore, the challenges related to the implementation of preventive measures such as IRS and ITN distribution resonate with findings from studies in other African regions. Research points to resource shortages and logistical difficulties as major impediments to the effective deployment of malaria preventive strategies [21]. The current study's finding that some healthcare facilities struggle with resource limitations mirrors these broader trends. Facilities with inadequate funding or logistical support are less likely to implement NGDTM recommendations effectively, leading to gaps in malaria prevention. This further emphasizes the need for equitable resource distribution to ensure all facilities can adhere to national malaria guidelines, a concern also raised by one author who argued for targeted interventions to address disparities between well-resourced and under-resourced facilities [25].

The study's recommendation of leveraging technology for better guideline dissemination and continuous training also draws support from the existing literature. Studies have noted that the integration of technology, such as mobile health platforms, can significantly enhance access to up-to-date guidelines and facilitate ongoing education for healthcare providers [9, 22]. By adopting digital tools, healthcare systems can address some of the gaps in NGDTM accessibility, as proposed by the current findings. This also aligns with the

suggestion elsewhere that incorporating technology into healthcare settings is essential for improving guideline adherence, particularly in rural or underserved areas [7].

Furthermore, the current findings that emphasise the value of institutional support in promoting the adoption of guidelines are consistent with the focus on developing supportive organisational cultures to enhance NGDTM adherence. Healthcare facilities that foster a culture of ongoing learning and support are more likely to achieve better adherence to national protocols, according to previous studies [21]. The current findings highlight the significance of these elements in enhancing adherence to malaria treatment standards, and they suggest the creation of supportive organisational structures and frequent training programs. Healthcare professionals are more likely to regularly incorporate NGDTM into their practice if they work in settings that value continuing professional development and offer sufficient support.

The results of this study hold great promise for enhancing the management of malaria in Benue State, Nigeria, especially when it comes to filling in the gaps between healthcare professionals' understanding of and adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM). The issues raised—such as restricted access to updated guidelines, insufficient training, and resource limitations—emphasize the necessity of systemic changes, such as more funding for healthcare infrastructure, more equitable resource distribution, and the incorporation of technology to help disseminate guidelines. Better malaria outcomes would result from these changes, especially for vulnerable groups like children under five, as they would boost adherence to NGDTM and reinforce preventive interventions like IRS and ITN distribution. Additionally, fostering supportive organizational cultures through regular training and staff engagement could promote sustained

adherence, improving the overall effectiveness of malaria control programs in the region.

The limitations of this study are several as it is common with many other studies. First, it employed a qualitative approach, which restricts the ability to establish causal relationships between healthcare providers' adherence to the National Guidelines for Diagnosis and Treatment of Malaria (NGDTM) and patient outcomes. While the broader research used a mixed-methods design, the qualitative nature of this segment lacks the quantitative data necessary for stronger evidence of the guideline's impact. Second, the study relied on self-reported data, introducing potential biases such as social desirability and recall bias, as participants might have over- or under-reported their adherence to NGDTM or the challenges faced.

Third, the study's generalizability is limited due to its focus on a single state, Benue, out of Nigeria's 36 states, meaning the findings may not represent challenges experienced across other regions with different health systems and malaria prevalence rates. Additionally, the lack of an experimental approach limits the ability to directly observe how interventions, like training or increased access to resources, might influence adherence and health outcomes. Lastly, differences in resource availability across healthcare facilities, such as access to up-to-date NGDTM materials and training opportunities, may have introduced variability in the experiences reported by participants, potentially skewing the findings.

To improve the findings' generalisability and offer a more comprehensive grasp of the difficulties in NGDTM adherence, it is advised that future research be extended to several states in Nigeria. Furthermore, using experimental designs may make it easier to prove a link between health outcomes and following guidelines. The effects of focused interventions, such training courses and easier access to current resources, on enhancing compliance and lowering the number of malaria

cases in various hospital environments should potentially be investigated in more detail.

Conclusion

While the study highlights encouraging levels of awareness and positive attitudes towards NGDTM among healthcare providers, it also exposes significant challenges that limit full adherence to the guidelines. These include access to up-to-date materials, resource shortages, and logistical barriers. The recommendations for leveraging technology, fostering organizational support, and providing regular training align with previous research, reinforcing the need for comprehensive strategies to address these challenges. By tackling the systemic and infrastructural issues identified in this and prior studies, healthcare systems can improve adherence to NGDTM and ensure better outcomes in malaria management, particularly for vulnerable populations like children under five.

Based on the findings, healthcare facilities in Benue State should improve access to current NGDTM materials by expanding the availability of both printed and electronic copies. Regular training sessions should be organised to ensure that healthcare providers are familiar with the standards and can

effectively integrate them into facility protocols. Furthermore, employing technology to facilitate the dissemination of recommendations and cultivating a supportive organisational culture might improve adherence. Addressing resource constraints for preventive initiatives such as IRS and ITN dissemination is also critical. Raising awareness about malaria prevention and treatment in communities can help to improve adherence and health outcomes, especially among vulnerable populations like children under five.

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Conflict of Interest

The authors declare no conflict of interest for the study.

Author Contribution

Theresa Mayen A has conducted the literature collection, study design, fieldwork, written, reviewed and edited the manuscript.

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