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Nursing Students' Reflections on Learning Tropical Diseases: A Case Study of Malaria and Dengue Education

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Abstract
Tropical diseases such as malaria and dengue pose significant threats to global health, particularly in low- and middle-income countries (LMICs) where prevention, timely diagnosis, and effective management remain critical challenges. Nurses, as frontline health professionals, are pivotal in controlling the burden of these diseases, making nursing education an essential platform for equipping students with the necessary knowledge and skills. This study explored nursing students' reflections on their learning experiences in a class focused on malaria and dengue within the Tropical and Communicable Diseases (TCD) course. Using focus group discussions and reflective journals, the study adopted a qualitative, descriptive exploratory design to gain insights into how students engaged with the material, the challenges they encountered, and the ways in which the course influenced their preparedness for future clinical practice. A total of 12 third-year BScN students were selected through purposive sampling. All participants had attended the malaria and dengue sessions and agreed to participate in reflective discussions and journaling. Thematic analysis of the data revealed four interrelated themes. The first, Engagement through Real-World Relevance, reflected how students connected classroom learning with real-life cases, outbreak statistics, and community health concerns. The second, Challenges in Grasping Disease Mechanisms, highlighted difficulties in understanding the biological and pathophysiological aspects of malaria and dengue, underscoring the need for more interactive and innovative teaching methods. The third, Preparedness for Clinical Practice, emphasized how the course increased students' confidence, while also pointing to the importance of practical exposure, simulation, and community-based experiences. The final

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theme, The Role of Reflective Learning, demonstrated that reflective journals and group discussions deepened understanding by encouraging students to critically process and internalize knowledge. These findings further highlight the need for improved training for nursing students, particularly through strategies that integrate clinical scenarios, case studies, and skill-based simulations to enhance comprehension and application. They also emphasize the importance of continuous professional development for nurses, as knowledge of tropical diseases must evolve alongside changing epidemiological patterns and emerging health threats. By fostering lifelong learning and ongoing capacity building, nurses can remain well-prepared to address public health challenges in LMIC contexts. In conclusion, this study provides important insights into how nursing students experience and reflect upon learning tropical diseases, and it underlines the significance of aligning nursing curricula with practice-oriented and reflective approaches. Such integration not only strengthens students' academic learning but also prepares them to meet the pressing health needs of their communities more effectively.
Keywords: Nursing education, Student reflections, Tropical diseases, Malaria awareness, Dengue education, Case study, Experiential learning, Community health nursing, Public health teaching, Pakistan.

Introduction

Background

Malaria and dengue are two of the most significant global public health concerns, particularly in tropical and subtropical regions where the environmental conditions are conducive to the life cycle of mosquitoes that act as vectors(Ahmad, Malik, & Mahmood, 2023). Both diseases disproportionately affect populations in low- and middle-income countries (LMICs), with limited access to effective healthcare, which is exacerbating the problem(Álvarez Gálvez, Carretero Bravo, Ramos Fiol, & Ortega Martín, 2023). According to the World Health Organization (WHO), in 2020 alone, there were an estimated 241 million cases of malaria globally, resulting in over 600,000 deaths(Aslam et al., 2024). Similarly, dengue, often referred to as "breakbone fever," infects about 100-400 million people annually, with severe forms of the disease causing life-threatening complications such as dengue hemorrhagic fever and dengue shock syndrome(Al-Worafi, 2023).

In countries like Pakistan, where both diseases are endemic, the healthcare burden is immense, with regular seasonal outbreaks overwhelming health systems, particularly in rural and underdeveloped areas(Ferraguzzi et al., 2023). As a result, nurses, being on the frontlines of patient care, must possess not only theoretical knowledge but also practical skills in diagnosing and managing such diseases(Ferrari et al., 2023). The need for a well-rounded nursing education that includes the study of tropical diseases like malaria and dengue cannot be overstated, as these diseases remain a critical part of the epidemiological landscape in many LMICs(Connell, 2010).

The Role of Nursing Education in Addressing Tropical Diseases

In response to the growing health threats posed by tropical diseases, nursing education programs are increasingly incorporating communicable diseases into their curricula(Al-Worafi, 2023). This enables students to gain a comprehensive

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understanding of disease etiology, transmission, clinical presentation, and appropriate management protocols(Fithriyyah, Alda, Satalar, Saifudin, & Hygiene, 2024). Nursing curricula, particularly in regions like South Asia, have made efforts to integrate tropical diseases as part of the communicable disease modules, allowing students to be better prepared for clinical practice in settings where such diseases are rampant(Aslam et al., 2024).

However, simply providing theoretical knowledge about these diseases may not be enough(Gatrell, 2016). The complexity of diseases like malaria and dengue, which involve intricate pathogen life cycles, diverse clinical presentations, and varying severity levels, poses a significant challenge for students(Gea et al., 2023). Educators have recognized the need for more interactive and practical approaches to teaching these diseases, including case-based learning, simulations, and reflective practices, which can significantly enhance the learning process by making abstract concepts more tangible(Schiavo, May Leung, Brown, & Health, 2014).

Reflective learning, in particular, is gaining prominence as a valuable pedagogical tool in nursing education(Mahajan, Jadhav, & Healthcare, 2019). Encouraging students to reflect on their learning experiences allows them to critically assess their understanding, recognize gaps in knowledge, and actively engage in the learning process(Fithriyyah et al., 2024). Reflection also fosters deeper cognitive processing, as it pushes students to apply what they have learned to real-world situations, thus bridging the gap between theory and practice(Al-Worafi, 2023). When applied to the study of tropical diseases, reflective learning can help students navigate the complexities of malaria and dengue by allowing them to relate their theoretical knowledge to potential clinical scenarios they may encounter in their nursing practice(Epidemiologists, 2015).

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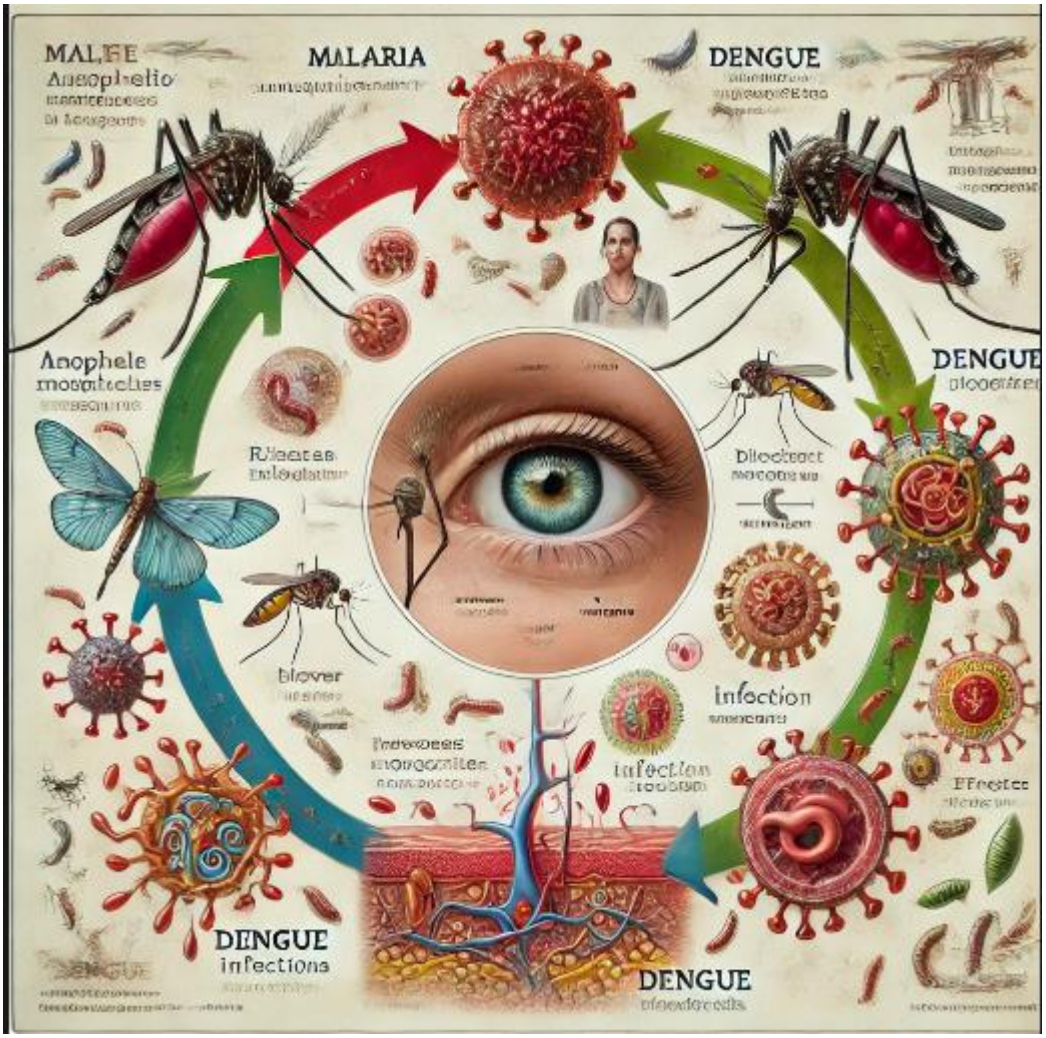

Photo 1.0: Data on Pakistan for both Malaria and Dengue

Research Aim

This study aims to explore nursing students' reflections on their learning experiences in a Tropical and Communicable Diseases (TCD) class focused on malaria and dengue. By examining students' reflective journals and conducting focus group discussions, this research seeks to understand how students processed the content, what challenges they faced, and how they perceived the relevance of the knowledge gained in preparing them for clinical practice. As reflective learning is an emerging approach in nursing education, this study also aims to contribute to the broader discourse on how reflection can be used to improve understanding and retention of complex medical information.

Significance of the Study

Given the increasing prevalence of tropical diseases and the critical role that nurses play in managing outbreaks, it is imperative to ensure that nursing students receive effective education in this area(Ahmad et al., 2023). Understanding how students reflect on their learning experiences will provide valuable insights for educators, helping them design curricula and teaching methods that are more aligned with students' needs (Ferraguzzi et al., 2023). Moreover, by focusing specifically on the diseases of malaria and dengue two of

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the most pressing tropical diseases in Pakistan this study has the potential to influence how future nurses are trained to handle these conditions, thus contributing to improved healthcare outcomes in the region.

Research Questions

1. How do nursing students reflect on their learning experiences regarding malaria and dengue?
2. What challenges did students face in understanding the course content?
3. How do students perceive the class's contribution to their preparedness for clinical practice?

Literature Review

Overview of Malaria and Dengue in Low- and Middle-Income Countries (LMICs)

Tropical diseases, particularly malaria and dengue, are significant public health concerns in Low- and Middle-Income Countries (LMICs)(Connell, 2010). These diseases thrive in tropical and subtropical climates, disproportionately affecting populations in these regions due to environmental, socio-economic, and healthcare infrastructure challenges(Fithriyyah et al., 2024). Malaria, caused by parasites of the *Plasmodium* species, and dengue, caused by the dengue virus (*DENV 1-4*), are transmitted primarily through mosquito bites(Gatrell, 2016). Both diseases pose serious threats to public health, especially in LMICs where resources for prevention, diagnosis, and treatment are often limited(Gorman-Murray et al., 2023). According to the World Health Organization (WHO), over 241 million malaria cases occurred globally in 2020, with 94% of cases in Sub-Saharan Africa. Similarly, dengue has been a growing epidemic, affecting over 100 million individuals globally, with the majority of cases in Southeast Asia and Latin America(Hussain, Alamgir, & Shahzad, 2015). LMICs struggle with weak healthcare systems, exacerbating the morbidity and mortality rates from these diseases(Gea et al., 2023).

Disease Burden in Pakistan

Pakistan, like many LMICs, faces a dual burden of infectious diseases, with both malaria and dengue being endemic in several regions(Ahmad et al., 2023). The environmental conditions, especially during and after the monsoon season, provide ideal breeding grounds for mosquitoes, resulting in periodic outbreaks(Yung et al., 2011). Malaria remains a critical issue, particularly in rural areas, where healthcare access is limited(Schiavo et al., 2014). Pakistan reports approximately 3 million malaria cases annually, with regions such as Balochistan and Khyber Pakhtunkhwa being the most affected(Epidemiologists, 2015). Dengue, on the other hand, has become a growing concern in urban areas, with major outbreaks in cities like Karachi, Lahore, and Rawalpindi(Ahmad et al., 2023). In 2020 alone, Pakistan reported over 50,000 dengue cases. Urbanization, inadequate sanitation, and insufficient vector control measures contribute significantly to the spread of dengue in densely populated cities(Ndawula, 2022; Rathinam, Thundikandy, Balagiri, & Inflammation, 2021).

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The Role of Nurses in LMICs and Pakistan

The role of nurses, particularly in LMICs like Pakistan, is vital in the prevention, diagnosis, and management of tropical diseases(Assir, Masood, & Ahmad, 2014). Nurses are often the frontline healthcare workers, especially in rural or under-resourced areas where doctors and specialists may not be readily available(Vohra et al., 2023). In many instances, they are responsible for administering life-saving treatments, educating communities about disease prevention, and conducting surveillance to control outbreaks(Vohra et al., 2023). However, the education and training of nurses in tropical diseases like malaria and dengue remain a challenge in LMICs(Arshad, Wajahat, Jabeen, & Ali, 2022). The lack of structured educational programs that focus on endemic diseases can hinder the ability of nursing professionals to effectively manage and control such diseases(Iftikhar et al., 2024).

In Pakistan, the shortage of well-trained healthcare professionals is a recurring issue(Abbasi et al., 2009). According to the Pakistan Nursing Council, there is an estimated shortage of over 1 million nurses in the country, which poses significant challenges in meeting the healthcare needs of a population of over 220 million(Rasheed, Butlin, & Boots, 2013). In regions with high malaria and dengue burdens, nurses play a crucial role in diagnosing symptoms, initiating treatment, and managing complications(Hisam, Khan, Kadir, & Azam, 2014). Despite this, nurses often face challenges such as inadequate access to continuing education, lack of professional development opportunities, and minimal resources to effectively perform their roles in preventing and controlling the spread of these diseases(Assir et al., 2014). Addressing these gaps in knowledge and skills is crucial for improving health outcomes in Pakistan and similar LMICs(Arshad et al., 2022).

Data on Pakistan for both Malaria and Dengue:

Disease	High-Burden Regions	Annual Cases in LMICs	Health Impact	Challenges in LMICs
Malaria	Sub-Saharan Africa, Southeast Asia (e.g., Nigeria, Congo, Uganda, India, Indonesia); Pakistan reports over 3 million cases annually	241 million (94% in Sub-Saharan Africa)	Leading cause of death among children under 5 years; Pakistan struggles with underreporting and limited healthcare access in rural areas	Limited access to healthcare, inadequate vector control, lack of antimalarial drugs; similar issues in Pakistan's rural regions
Dengue	Southeast Asia, Latin America (e.g., Philippines,	100-400 million (majority in Southeast	Severe outbreaks, particularly during	Inadequate mosquito control, urbanization,

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	Brazil); Pakistan has annual outbreaks with over 50,000 reported cases	Asia and Latin America); Pakistan: 50,000+ cases	monsoon seasons; Pakistan reports spikes in dengue cases due to urbanization and inadequate control measures	overcrowded hospitals, limited healthcare access; Pakistan experiences frequent urban outbreaks

Table data 1.0. Pakistan highlights the country's challenges in managing both diseases.

The Need for Improved Training for Nursing Students

Training nursing students to manage tropical diseases such as malaria and dengue is critical to addressing the public health needs of LMICs like Pakistan(Vohra et al., 2023). As future healthcare professionals, nursing students must be equipped with the skills and knowledge necessary to tackle endemic diseases that are prevalent in the regions they will serve(Al-Worafi, 2023). Educational curricula must prioritize tropical diseases, particularly in countries where they are endemic(Mahajan et al., 2019). This includes both theoretical knowledge and practical skills related to prevention, diagnosis, and treatment(Mian et al., 2023).

Simulation-based learning has proven to be an effective educational method for nursing students, especially in resource-constrained settings(Ali et al., 2024). By integrating simulations into the nursing curriculum, students can gain practical experience in handling real-life situations related to the diagnosis and management of tropical diseases(Ali et al., 2024). For example, simulation exercises can allow students to practice diagnosing malaria through rapid diagnostic tests (RDTs) or managing dengue patients by monitoring fluid balance and recognizing early signs of dengue hemorrhagic fever(Ali et al., 2024). Furthermore, simulations can bridge the gap between theoretical knowledge and clinical practice, preparing nursing students to respond efficiently to disease outbreaks(Vohra et al., 2023).

In Pakistan, initiatives to integrate tropical disease management into the nursing curriculum are still developing. Institutions such as the Aga Khan University School of Nursing and Midwifery (AKU SONAM) are taking steps to introduce innovative teaching methods, including simulations, to train nursing students on handling communicable diseases. However, widespread implementation of these educational innovations is needed to ensure that all nursing graduates possess the necessary competencies to combat the burden of tropical diseases effectively.

The Importance of Continuous Professional Development for Nurses

For nurses who are already working in clinical settings, continuing professional development (CPD) is essential to keep them updated on the latest advances in the management of tropical diseases(Campani et al., 2023). In many LMICs, including Pakistan, healthcare professionals may not have regular access to up-to-date information, which can limit their ability to provide the best care(Aslam

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et al., 2024). CPD programs that focus on tropical diseases can provide nurses with the tools to enhance their clinical decision-making skills, improve patient outcomes, and contribute to public health initiatives aimed at controlling the spread of malaria and dengue(Aslam et al., 2024).

Telemedicine and online learning platforms offer opportunities for nurses in remote areas to access CPD courses on tropical diseases(Latif et al., 2017). For example, online courses on the management of malaria or dengue outbreaks can provide nurses with updated protocols on disease control measures, patient management techniques, and the use of new diagnostic tools. Furthermore, professional development opportunities can strengthen the leadership roles of nurses in disease prevention programs, enabling them to contribute to broader public health efforts in their communities(Assir et al., 2014).

Methodology

Research Design

This study adopts a qualitative case study approach to capture the reflections of nursing students on a specific class covering malaria and dengue in the context of a TCD course. This design allows for an in-depth exploration of individual and collective experiences, shedding light on how students processed the information presented in the class and how it influenced their understanding of tropical diseases.

Participants

The participants in this study were third-year BScN nursing students enrolled in the Tropical and Communicable Diseases course. A total of 12 students were selected through purposive sampling. All participants had attended the malaria and dengue session and agreed to participate in the reflective discussions and journaling process.

Data Collection

Data were collected using two primary methods:

1. Focus Group Discussions (FGDs): Two focus group discussions were conducted, each with six participants. These semi-structured discussions lasted for approximately 60 minutes and allowed students to express their thoughts and reflections in a guided yet open-ended environment.
2. Reflective Journals**:** Students were asked to submit reflective journals one week after the class. The journals provided personal insights into their learning experience, challenges encountered, and perceived value of the session.

Data Analysis

Thematic analysis was used to analyze the data collected from FGDs and reflective journals. This method involved coding the data to identify recurring themes and patterns, followed by categorizing these themes into broader categories that addressed the research questions.

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Results

Theme 1: Engagement through Real-World Relevance

Students expressed that learning about malaria and dengue felt directly relevant to their future roles as nurses, especially given the endemic nature of these diseases in Pakistan. Many students emphasized the real-world importance of understanding how to manage these diseases effectively. One student remarked, "*Knowing that these diseases are something we will encounter frequently makes the learning feel more critical and practical.*"

Theme 2: Challenges in Grasping Disease Mechanisms

Despite the real-world relevance, students encountered difficulties in comprehending the complex mechanisms of malaria and dengue. In particular, understanding the life cycle of the malaria parasite and the immune response in severe dengue cases were cited as challenging. As one student noted, "*There were a lot of stages in the malaria cycle, and I found it hard to remember what happens at each stage.*"

This highlights a need for more visual aids and simplified conceptual models to assist students in digesting complex biological processes.

Aspect	Malaria	Dengue
Causative Agent	Plasmodium (P. falciparum, P. vivax, etc.)	Dengue Virus (DENV 1-4)
Primary Vector	Anopheles Mosquito	Aedes Mosquito
Incubation Period	7-30 days	4-10 days
Clinical Symptoms	Fever, chills, headache, anemia	High fever, severe headache, joint and muscle pain, rash
Geographical Distribution	Tropical and subtropical regions, mainly Africa and Asia	Tropical and subtropical regions, Southeast Asia, Africa, Central and South America
Geographical Distribution	Tropical and subtropical regions, mainly Africa and Asia	Tropical and subtropical regions, Southeast Asia, Africa, Central and South America

Chart 2.0: Comparative Features of Malaria and Dengue

Theme 3: Preparedness for Clinical Practice

Students reflected that the knowledge gained from the class helped them feel more confident in their ability to recognize and manage malaria and dengue in clinical settings. Several students noted that the emphasis on clinical manifestations and nursing interventions equipped them with a practical understanding of how to address these diseases in a hospital setting. One student reflected, "*I now feel more confident about diagnosing and managing cases of malaria and dengue. The class showed us what to look for and how to intervene.*"

Theme 4: The Role of Reflective Learning

Many students reported that being asked to reflect on the class helped them consolidate their learning. Reflective learning enabled them to identify gaps in their understanding and plan strategies for improvement. One student explained,

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"*Writing the reflection made me realize what I didn't fully understand, and it gave me a chance to review the material.*"

Discussion

The findings and insights gathered from studying the role of nurses and nursing students in managing tropical diseases, such as malaria and dengue, emphasize several critical points relevant to healthcare education and practice in Pakistan and other Low- and Middle-Income Countries (LMICs). This discussion will explore these key points, addressing their broader implications for public health and nursing education, with a particular focus on the challenges faced in LMICs.

The Central Role of Nurses in Disease Prevention and Management

Nurses are essential healthcare providers in LMICs, often serving as the primary point of contact for patients, particularly in rural areas where doctors and specialists are scarce(Assir et al., 2014). In countries like Pakistan, where healthcare systems are overburdened and under-resourced, the role of nurses becomes even more critical(Mian et al., 2023). Malaria and dengue outbreaks place an immense strain on healthcare facilities, especially during peak transmission seasons, such as post-monsoon periods(Arshad et al., 2022). Nurses are not only responsible for administering treatments but also for educating patients and communities on preventive measures, conducting surveillance, and ensuring early detection of outbreaks(Ali et al., 2024).

In Pakistan, where the healthcare workforce is stretched thin, nurses are often tasked with managing several responsibilities simultaneously(Aslam et al., 2024). This makes their education and training even more significant(Iftikhar et al., 2024). Properly trained nurses can help alleviate the pressure on healthcare systems by diagnosing and treating diseases like malaria and dengue at earlier stages, which reduces the burden on secondary and tertiary care facilities(Assir et al., 2014). Moreover, nurses with a strong foundation in tropical disease management are better equipped to educate communities, particularly in rural areas where literacy rates are low, and misconceptions about diseases persist(Vohra et al., 2023).

For example, educating communities about mosquito control measures, such as using insecticide-treated nets (ITNs), eliminating stagnant water, and the importance of vaccination campaigns, can be instrumental in preventing the spread of malaria and dengue. Nurses, through community outreach programs, can build trust and rapport with local populations, which is vital for effective public health interventions in countries like Pakistan(Arshad et al., 2022).

Educational Gaps in Nursing Curriculum

Despite the critical role that nurses play in LMICs, there are significant gaps in the training and education they receive, particularly in relation to tropical diseases like malaria and dengue(Mian et al., 2023). Many nursing curricula in LMICs, including Pakistan, do not provide adequate coverage of the prevention, diagnosis, and management of these diseases. This limits the ability of nurses to respond effectively to outbreaks, compromising patient care and increasing the risk of disease transmission(Ali et al., 2024).

The need to address these educational gaps is especially urgent given the rising incidence of tropical diseases in Pakistan. Malaria remains endemic in parts of

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the country, and dengue has become a recurrent public health threat in major cities(Hisam et al., 2014). Incorporating comprehensive education on tropical diseases into nursing programs is essential to equipping future nurses with the skills they need to manage these diseases effectively(Iftikhar et al., 2024).

Simulation-based learning, as previously discussed, offers a promising solution to bridge the gap between theoretical knowledge and clinical practice(Mahmood, Jahan, Groen, Javed, & Shafait, 2020). Simulation exercises allow nursing students to practice handling real-life scenarios, such as diagnosing a patient with malaria or managing a dengue outbreak(Butt, Imran, McKinney, Batool, & Aftab, 2023). These experiences provide a safe environment for students to develop critical thinking and decision-making skills, which are vital when working in under-resourced settings(Saeed et al., 2023). Simulation can also enhance the students' understanding of infection control measures, which are key in preventing the spread of tropical diseases within healthcare settings.

In addition to simulation, nursing curricula must integrate more theoretical content focused on the epidemiology, clinical manifestations, and global impact of tropical diseases(Abdur Rehman et al., 2020). By strengthening the foundational knowledge of nursing students, educational institutions can ensure that graduates are well-prepared to address the unique healthcare challenges posed by malaria, dengue, and other tropical diseases in LMICs.

The Importance of Continuing Professional Development

While improving nursing education is crucial, it is equally important to ensure that practicing nurses have access to continuing professional development (CPD) opportunities(Javed & Research, 2022). In LMICs like Pakistan, the healthcare landscape is constantly evolving due to factors such as climate change, urbanization, and shifting disease patterns(Aslam et al., 2024). As a result, nurses need to stay up to date with the latest developments in disease prevention, diagnosis, and treatment(Iftikhar et al., 2024).

Unfortunately, access to CPD opportunities is limited in many LMICs, particularly for nurses working in rural or remote areas(Mian et al., 2023). This is a significant challenge in Pakistan, where a substantial portion of the population lives in rural regions. Without regular access to professional development, nurses may rely on outdated information or practices, which can compromise patient outcomes(Assir et al., 2014).

Telemedicine and e-learning platforms have emerged as valuable tools for delivering CPD courses to nurses in LMICs (Partnerships, 2010). These platforms enable healthcare professionals to access training on topics such as the latest malaria treatment protocols or new diagnostic tools for dengue, regardless of their location(Epidemiologists, 2015). In Pakistan, initiatives that leverage digital technologies to enhance nurse education and CPD are beginning to gain traction, although much more needs to be done to scale these programs across the country.

By investing in CPD for nurses, Pakistan and other LMICs can ensure that their healthcare workforce remains competent and capable of responding to evolving health challenges(Vohra et al., 2023). This is particularly important for managing tropical diseases, which require up-to-date knowledge of

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epidemiological trends, vector control strategies, and treatment options(Iftikhar et al., 2024).

Addressing the Resource Constraints in LMICs

One of the key challenges highlighted in this paper is the resource constraints faced by healthcare systems in LMICs, including Pakistan. These constraints impact not only the delivery of healthcare services but also the education and training of healthcare professionals(Mian et al., 2023). In resource-limited settings, where healthcare facilities are often understaffed and under-equipped, nurses are frequently expected to perform their duties with minimal support(Arshad et al., 2022). This can lead to burnout and reduced job satisfaction, ultimately affecting the quality of patient care(Ali et al., 2024).

For nursing students, resource constraints can limit access to essential learning materials, such as textbooks, laboratory equipment, and simulation tools(Gea et al., 2023). This can hinder their ability to gain a comprehensive understanding of tropical diseases and their management(Vohra et al., 2023). Addressing these challenges requires a multi-faceted approach that includes increasing government investment in healthcare and education, fostering international partnerships, and encouraging local innovation(Lopes, Sousa, Cohen, & Gomes, 2023).

In Pakistan, efforts to improve healthcare infrastructure and access to education are ongoing, but progress has been slow(Campani et al., 2023). The government's National Health Vision (2016–2025) outlines a strategic framework for improving healthcare access and quality, with a focus on marginalized populations. However, the success of these initiatives will depend on sustained political commitment, adequate funding, and the active involvement of healthcare professionals, including nurses(Ahmad et al., 2023).

International partnerships, such as collaborations between Pakistani nursing schools and global health organizations, can also play a role in addressing resource gaps. By leveraging global expertise and resources, nursing schools in Pakistan can develop more robust educational programs that equip students with the skills and knowledge needed to tackle tropical diseases.

Implications for Public Health

The effective management of tropical diseases in LMICs has significant implications for public health(Saeed et al., 2023). Malaria and dengue are preventable and treatable diseases, but without the necessary resources and skilled healthcare professionals, outbreaks can quickly spiral out of control, placing a heavy burden on already fragile healthcare systems. Investing in nursing education and professional development is a cost-effective strategy for strengthening healthcare systems and improving public health outcomes(Fithriyyah et al., 2024).

In Pakistan, strengthening the role of nurses in the management of tropical diseases could lead to significant reductions in disease burden(Hussain et al., 2015). By empowering nurses with the skills and knowledge to take on leadership roles in disease prevention and control, the country can make meaningful progress toward reducing the incidence of malaria and dengue(Mahmood et al., 2020).

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Conclusion

This study explored the reflections of nursing students on their learning experiences in a class covering malaria and dengue. The results suggest that while students found the class highly relevant to their future practice, they faced challenges in understanding complex disease mechanisms. Reflective learning emerged as a valuable tool in consolidating knowledge and preparing students for real-world clinical settings. Future iterations of the course could benefit from enhanced visual aids and interactive teaching methods to address the challenges identified by students. In LMICs like Pakistan, the high burden of tropical diseases such as malaria and dengue presents significant challenges to healthcare systems. Nurses and nursing students play a pivotal role in combating these diseases by providing frontline care, educating communities, and implementing preventive measures. However, there is a pressing need for improved educational curricula that prioritize tropical disease management, as well as continuing professional development programs that keep nurses informed of the latest advances in disease prevention and treatment. By addressing these educational gaps, Pakistan and other LMICs can strengthen their healthcare systems and reduce the devastating impact of tropical diseases on their populations.

Recommendations

1. Incorporate visual learning tools: More use of diagrams, flowcharts, and animations will help students grasp complex disease processes such as the malaria life cycle.
2. Utilize simulation-based learning: Simulations of clinical scenarios involving malaria and dengue can provide students with practical, hands-on learning experiences.
3. Encourage reflective practice: Continued use of reflective journals or reflective discussions after each session can enhance students' critical thinking and help them internalize complex concepts.
4. Adapt teaching methods for diverse learners: Recognizing that students learn in different ways, a range of teaching methods, including auditory, visual, and kinesthetic approaches, should be employed.

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