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INTEGRI PROCEDAMUS

MISINFORMATION-DRIVEN BARRIERS TO INSECTICIDE-TREATED BED NET

USAGE IN THE ASHAIMAN MUNICIPAL, GREATER ACCRA REGION

BY

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DECLARATION

I, Emmanuel Cephass Apronti, hereby declare that apart from references to other people's work, which I have duly acknowledged, this work is my independent work and was completed under the supervision of my academic supervisor, Dr. Faustina Hayford Blankson. I further declare that this work has not been submitted in part or full for the award of any degree in this institution or elsewhere.



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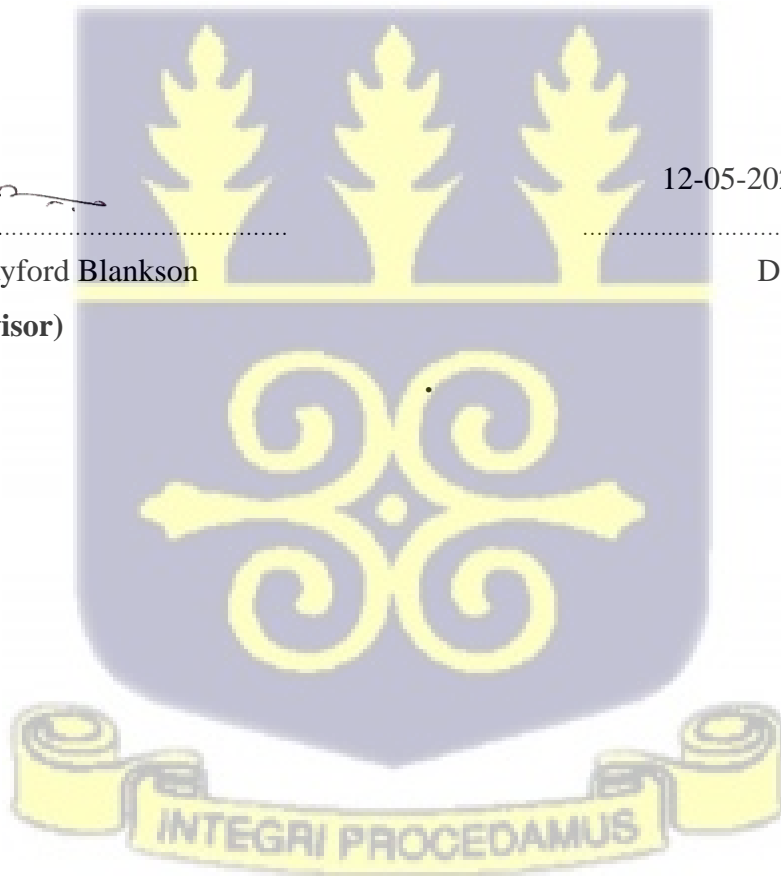


12-05-2025

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Dr. Faustina Hayford Blankson

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Date

(Supervisor)



DEDICATION

This work is dedicated to my wife, Josephine, and my children, Iana, Ian, and Iris, whose support and encouragement have been invaluable throughout this journey. Additionally, I dedicate this work to the people of Ashaiman Municipal, whose experiences and insights have been crucial in understanding the challenges of malaria prevention.



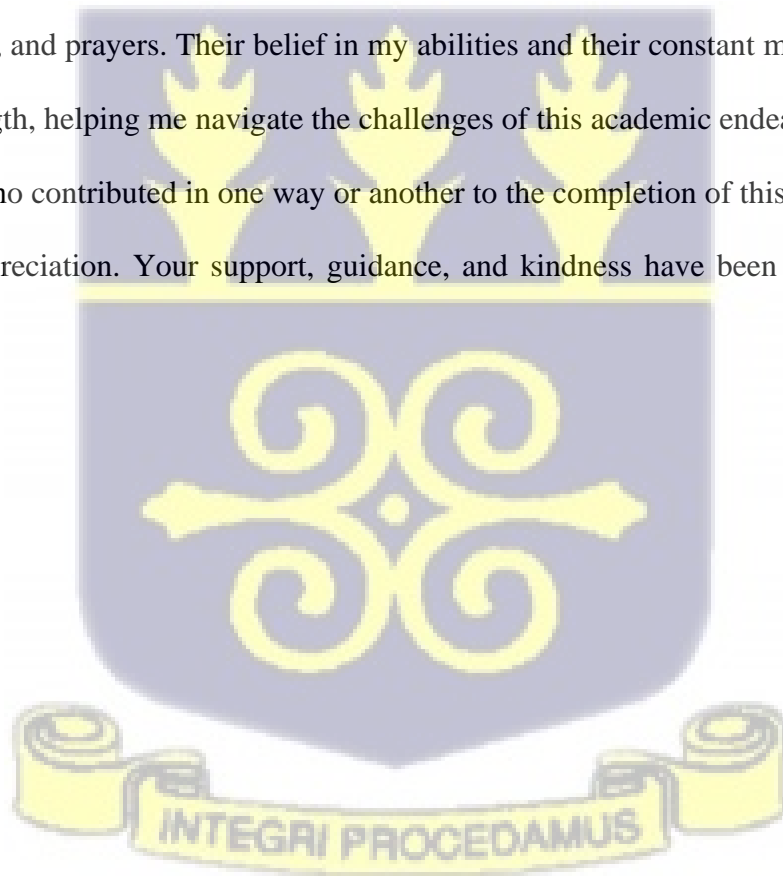
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To everyone who contributed in one way or another to the completion of this dissertation, I extend my sincere appreciation. Your support, guidance, and kindness have been invaluable, and I am truly grateful.



ABSTRACT

Background: Malaria remains a major public health challenge in Ghana, particularly in the Ashaiman Municipality, where transmission rates remain high despite nationwide interventions. Insecticide-Treated Nets (ITNs) are widely recognized as an effective malaria prevention strategy; however, their usage is often hindered by misinformation. This study examines the role of misinformation in ITN adoption and explores how false perceptions influence community behavior regarding malaria prevention.

Methods: A cross-sectional quantitative study was conducted, surveying 272 residents of Ashaiman Municipality using structured questionnaires. The study assessed respondents' knowledge of malaria transmission, perceptions of ITNs, misinformation-related barriers, and the effectiveness of public health campaigns in promoting ITN use. Descriptive statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) to identify trends and relationships between misinformation and ITN usage.

Results: Findings revealed that while community members generally had substantial knowledge of malaria transmission and ITN benefits, misinformation significantly impacted ITN acceptance and usage. Participants reported that the use of ITNs was associated with heat discomfort, skin irritation, sleep disturbances, and interference with sexual activity among couples. Additionally, a perceived low risk of malaria within the community further contributed to reluctance in ITN usage. Healthcare providers were identified as the most trusted source of accurate information, while educational campaigns were perceived as only moderately effective in dispelling misinformation.

Conclusion: Misinformation remains a key barrier to ITN usage in Ashaiman Municipality, limiting its effectiveness as a malaria prevention tool. Addressing these misconceptions through targeted risk communication, leveraging healthcare providers, and enhancing community engagement strategies is crucial for increasing ITN adoption and reducing malaria transmission in the region.

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LIST OF ACRONYMS

ANC:	Antenatal Care
BCC:	Behavior Change Communication
CDC:	Centers for Disease Control and Prevention
CWC:	Child Welfare Clinic
DALYs:	Disability-adjusted life years
DHIMS2:	District Health Information Management System
GHS:	Ghana Health Service
HBM:	Health Belief Model
IPTp:	Intermittent Preventive Treatment
IRS:	Indoor Residual Spraying
ITN:	Insecticide-Treated Net
KAP:	Knowledge, Attitudes, and Practices
NMEP:	National Malaria Elimination Program
OPD:	Outpatient Department
PHC:	Population and Housing Census
RDTs:	Rapid Diagnostic Tests
SMC:	Seasonal Malaria Chemoprevention
SP:	Sulfadoxine-Pyrimethamine
SPSS:	Statistical Package for Social Sciences
WHO:	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.0 Background

The World Health Organization (WHO) describes Malaria as a severe illness transmitted by the bites of female *Anopheles* mosquitoes, predominantly found in tropical regions. Although malaria is preventable and curable, a case can easily progress from uncomplicated to severe and death if not promptly diagnosed and effectively treated (Mousa et. al., 2020).

Globally, the WHO, the 2022 World Malaria Report, estimates that about 247 million cases of malaria were reported in 2021 with an estimated 619,000 fatalities, a majority (76.8%) being children under 5 years. This means out of the almost 1,696 people who died daily from malaria, about 1,302 were children under age 5. The report asserts the disease is however more endemic in the African region, accounting for 95% (234 million) of the global cases and 96% (593,000) of the deaths, with 78.9% (467,877) being children under age 5.

Malaria remains a significant public health challenge in Ghana, impacting not only healthcare facilities but also households, communities, and the nation as a whole (Tetteh et al., 2023). In 2021, Ghana recorded an estimated 5.3 million malaria cases and 12,500 deaths (WHO, 2022), highlighting the persistent public health burden of the disease. In response, the country has implemented various interventions, with ITNs playing a crucial role in malaria prevention. According to the Ghana Malaria Strategic Plan (2021–2025), the use of ITNs has contributed to notable progress in the fight against malaria.

Since 1993, Ghana has piloted different ITN distribution models before adopting the mass distribution campaign strategy, which aims to achieve universal ITN coverage (Nuñez et al., 2023). Under this strategy, every two individuals in a household are allocated one net, ensuring widespread access to this preventive measure. When used correctly, ITNs create a protective

barrier against malaria-transmitting mosquitoes by repelling, disabling, and/or killing those that come into contact with the insecticide-treated material (Lengeler & Snow, 1996). This intervention remains a cornerstone of Ghana's malaria control efforts, significantly reducing transmission risks at the household and community levels.

The WHO 2022 World Malaria Report highlights the significant global distribution of ITNs, with 200 million ITNs provided through National Malaria Programs, primarily targeting malaria-endemic regions. Notably, Sub-Saharan Africa accounted for more than half of the total distribution, receiving 176 million ITNs. Among the top beneficiaries were the Democratic Republic of the Congo (22.6 million), Côte d'Ivoire (21.7 million), Kenya (17.9 million), Ghana (17.8 million), and Nigeria (16.4 million).

In Ghana, the Ghana Malaria Strategic Plan (2021-2025) outlines the routine distribution of ITNs through health facilities, including antenatal clinics (ANCs) and child welfare clinics (CWCs), as well as schools to ensure widespread household access and usage. Additionally, the private sector, including ITN importers and distributors, plays a complementary role by making ITNs available in retail outlets, particularly in urban communities where some individuals may not be reached through mass distribution campaigns or may prefer specific types of ITNs (Paintain et al., 2022).

Beyond ITN distribution, Ghana's National Malaria Elimination Program (NMEP) has implemented various WHO-recommended vector control strategies to reduce malaria transmission. These measures include indoor residual spraying (IRS), larviciding, and other vector management interventions, aimed at controlling the mosquito population and curbing the spread of malaria (Agyemang-Badu et al., 2023).

In Ghana, Behavior Change Communication (BCC) has consistently played a crucial role in ITN distribution programs. These campaigns utilize a range of BCC strategies to educate target populations on the benefits of ITNs, their proper use and maintenance, and the potential health risks associated with not using them. By equipping individuals and communities with essential

information, these efforts aim to promote informed decision-making and encourage the adoption of sustainable malaria prevention practices. This approach aligns with the objectives outlined in the Global Technical Strategy for Malaria 2016-2030, which emphasizes the importance of effective communication in malaria control and prevention.

Misinformation is defined as situations where “people hold inaccurate beliefs, and do so confidently” (Kuklinski et al., 2000, p. 792). While much scholarly attention has been given to the role of misinformation in shaping major societal events, such as political elections (Allcott et al., 2019), its impact extends beyond the political sphere and poses a serious threat to public health. This risk becomes particularly evident during health crises, where misinformation can undermine public health interventions and exacerbate disease transmission.

Research from multiple countries highlights a strong link between the spread of COVID-19 misinformation and decreased adherence to public health guidelines (Imhoff & Lamberty, 2020; Freeman et al., 2022). Misinformation has also been found to contribute to increased vaccine hesitancy (Roozenbeek et al., 2020; Romer & Jamieson, 2020) and reluctance to recommend vaccination to others (Roozenbeek et al., 2020). Similarly, misinformation about malaria prevention strategies—such as doubts regarding the effectiveness of ITNs in reducing mosquito bites and malaria transmission—can diminish public confidence and lower utilization rates (Ahmed et al., 2012). Given its potential to weaken public trust in health interventions, misinformation presents a critical barrier to disease control efforts. Understanding its influence on public perceptions and behaviors is essential for developing effective strategies to combat misinformation and strengthen public health responses.

1.1 Problem Statement

Ghana's Malaria Elimination Program has made significant strides in ensuring the continuous distribution of ITNs through health facilities, households, communities, and schools nationwide. These efforts are complemented by BCC campaigns promoting ITN usage. According to Nuez et

al. (2023), Ghana has exceeded its initial 80% ITN distribution target, indicating that more households than anticipated now have access to ITNs for malaria prevention. However, increased distribution alone does not guarantee effective utilization, as access to ITNs does not necessarily translate into consistent nightly use (Glozah et al., 2022). The persistent burden of malaria in the country suggests that gaps in ITN adoption and usage remain a critical challenge.

The Ghana 2021 Holistic Assessment Report on the health sector reinforces this concern, identifying malaria as the leading cause of health facility visits, accounting for 21% of all consultations. Although ITNs are widely available, their consistent and correct usage remains below expectations. Studies by Azabre et al. (2013) and Axame et al. (2016) have highlighted several contributing factors, including economic hardship, perceived inconvenience, preference for herbal remedies, doubts regarding the effectiveness of ITNs, and the use of alternative vector control methods such as mosquito coils and insecticide sprays. Further investigations (Diema et al., 2017; Konlan et al., 2019; Liheluka et al., 2023) have explored the link between ITN ownership and actual usage, identifying key predictors such as individual awareness, perceptions of malaria severity, and beliefs in ITNs' protective value as influential in shaping behavior.

In the Greater Accra region, the Ashaiman Municipality has emerged as a high-burden area for malaria, ranking second to Accra Metro in reported cases. According to the District Health Information Management System, Ashaiman recorded 18,366 malaria cases in 2022. In response, the municipal health directorate, in collaboration with partners, has implemented multiple initiatives, including the distribution of approximately 20,000 ITNs through ANC, CWC, and schools in 2022. Despite these concerted efforts, anecdotal evidence suggests that misinformation surrounding ITNs is a significant barrier to their use. Community-driven misconceptions may be shaping negative beliefs and attitudes that hinder residents from adopting positive ITN usage behaviors.

This study, therefore, seeks to explore misinformation-driven barriers to ITN usage in the Ashaiman Municipality, shedding light on how misconceptions influence behavior and identifying strategies to improve ITN adoption for effective malaria prevention.

1.2 Research Questions

The research questions below seek to achieve the study's objectives:

1. What is the level of knowledge of community/household members about malaria and its transmission?
2. What are the perceptions of community/household members about ITNs and their usage?
3. What are the misinformation barriers impeding the acceptance and usage of ITNs among household members in the district?
4. To what extent do community/household members perceive the effectiveness of education campaigns in increasing their knowledge of malaria and its transmission?

1.3 Objectives of the Study

The study sought to investigate misinformation-driven barriers to insecticide-treated net usage in the Ashaiman Municipal of the Greater Accra Region. The driving objectives of the study are to:

1. Assess the level of knowledge of community members about malaria and its transmission.
2. Assess the perception of community members about ITN and its usage.
3. Assess misinformation-related barriers that impede the acceptance and usage of ITNs among community members in the district.
4. Assess the effectiveness of education campaigns in promoting the use of insecticide-treated nets (ITNs) among residents of the Ashaiman Municipality.

1.4 Significance of the Study

Despite the availability of multiple WHO-approved vector control strategies to combat malaria and mitigate its negative impact on households, communities, and the nation, ITNs arguably

remain the most effective intervention in Ghana. This effectiveness is attributed to several factors, including Ghana's economic status, the relatively lower cost of ITNs compared to other vector control measures such as IRS and larviciding, their ability to be deployed on a large scale, and their longer lifespan when properly maintained.

The spread of misinformation during public health crises is not a new phenomenon; however, it peaked during the global COVID-19 pandemic, necessitating the allocation of scarce resources to counter false narratives and promote accurate health information. In Ghana, anecdotal evidence suggests that misinformation surrounding other public health interventions, such as family planning, malaria, HIV/AIDS, diabetes, tuberculosis, cancers, and chronic kidney disease, has received significantly less national attention compared to COVID-19-related misinformation. Misinformation often shapes public perceptions, leading to hesitancy in adopting essential health interventions and increasing community risk by encouraging risky behaviors.

While previous studies have explored misinformation in relation to specific public health interventions, there is limited evidence of research on community-level misinformation regarding malaria interventions, particularly in the context of ITN usage. This study aims to bridge that gap by examining how misinformation affects ITN adoption and usage in Ashaiman Municipality, Greater Accra Region. The findings will be valuable to researchers, scholars, and health sector stakeholders, providing insights into misinformation-driven barriers to ITN utilization.

Additionally, this study will serve as a crucial resource for policymakers at the national and sub-national levels, equipping them with evidence-based insights to design Social and Behavior Change Communication (SBCC) strategies that address real-time misinformation. By doing so, it will contribute to enhancing ITN uptake, reducing malaria prevalence in Ghana, and specifically improving public health outcomes in Ashaiman Municipality.

1.5 Theoretical Framework

This study is guided by the Health Belief Model (HBM), one of the most widely applied conceptual frameworks for understanding health-related behaviors and their maintenance over time. The model provides a structured approach to examining why individuals adopt or refrain from engaging in health-promoting behaviors.

The HBM was first developed in the 1950s by social psychologists at the United States Public Health Service to investigate why individuals were reluctant to participate in disease prevention and early detection programs (Hochbaum, 1958; Rosenstock, 1960). Over time, its application expanded to explore how individuals respond to symptoms (Kirscht, 1974) and adhere to medical treatments following a diagnosis (Becker, 1974).

At its core, the HBM posits that individuals are more likely to engage in health-protective behaviors when they perceive:

1. Susceptibility, a belief that they are at risk of developing a specific health condition.
2. Severity, an understanding of the serious consequences associated with the condition.
3. Benefits, the advantages of taking preventive action to reduce or eliminate the risk.
4. Barriers, the perceived obstacles, costs, or challenges associated with adopting the behavior.

These four primary constructs (Janz & Becker, 1984) are frequently used in health behavior research, while two additional components, self-efficacy and cues to action, have been incorporated to further explain behavioral variations. Self-efficacy refers to an individual's confidence in their ability to successfully perform the desired health behavior (Rosenstock et al., 1988; Glanz et al., 2008). Cues to action are external or internal triggers, such as media campaigns, reminders, or symptoms, that prompt individuals to take action toward healthier behaviors (Carpenter, 2010).

1.5.1 Relevance of Health Belief Model to the study

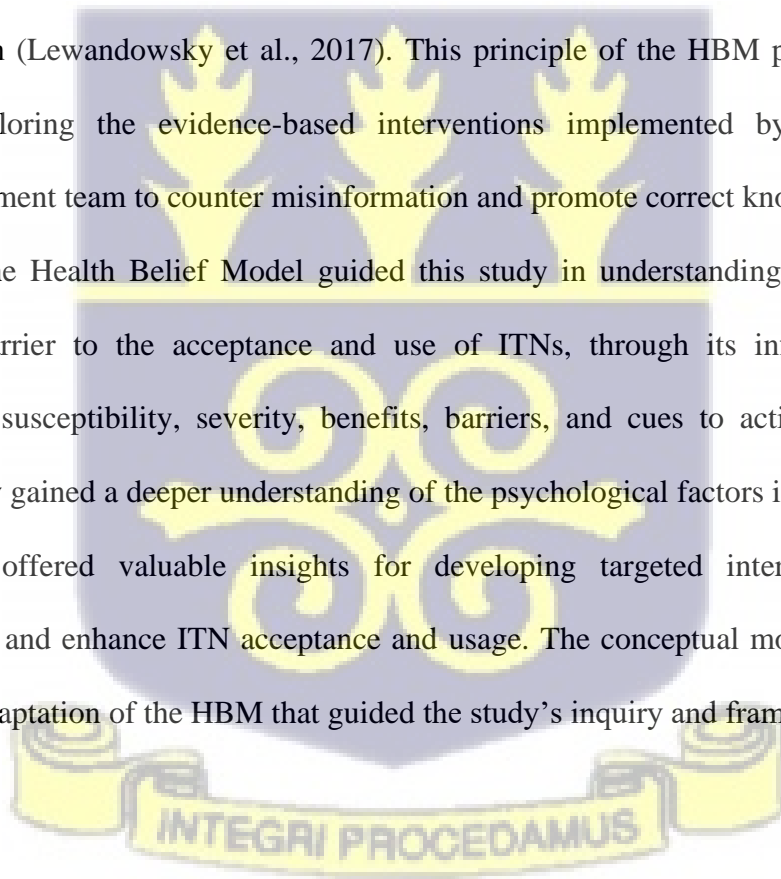
The Health Belief Model (HBM) was adopted as the theoretical framework in this study to examine how misinformation hinders residents of the Ashaiman Municipal from adopting health-promoting behaviors, particularly in the use of ITNs. Misinformation can significantly alter individuals' attitudes and perceptions, thereby influencing their decision-making processes regarding preventive health measures. The HBM, which is grounded in psychological theories of health behavior, offers a useful lens through which the effects of misinformation can be understood, especially in terms of how it impacts individuals' perceptions of risk and preventive actions.

1. **Perceived Susceptibility and Severity**, the HBM suggests that individuals are more likely to engage in preventive behaviors when they perceive themselves to be at risk for a health threat and believe that the consequences of that threat are severe (Glanz et al., 2008). However, misinformation can distort these perceptions by downplaying or misrepresenting the risks associated with malaria. As a result, residents may fail to recognize their susceptibility to the disease or underestimate its severity, which in turn undermines the perceived need to use treated nets as a preventive measure (Betsch et al., 2012).
2. **Perceived Benefits and Misinformation**, the model also posits that individuals are more likely to engage in health-promoting behaviors if they believe the benefits outweigh the costs (Champion & Skinner, 2008). However, misinformation about the effectiveness of ITNs can hinder this perception. If residents are exposed to inaccurate or misleading information about the benefits of using treated nets, they may develop skepticism about their efficacy. This skepticism can reduce their motivation to adopt the recommended health behaviors, such as consistent ITN usage (Nyhan & Reifler, 2015).
3. **Perceived Barriers** are the perceived obstacles or negative aspects associated with performing the health behavior, such as inconvenience, cost, or side effects of using ITNs, even when the threat of malaria is acknowledged (Champion & Skinner, 2008). Such

distorted perceptions of barriers are crucial to address, as they prevent the adoption of an otherwise effective and accessible health intervention (Bashirian et al., 2020).

4. Cues to Action and Addressing Misinformation, cues to action are triggers that motivate individuals to take health-related action; these may include internal cues (e.g., symptoms) or external cues (e.g., health education messages, media campaigns, advice from others) (Glanz et al., 2008). The HBM emphasizes the importance of these cues in overcoming barriers to behavior change. In the context of this study, correcting misinformation through targeted communication strategies and community education becomes a key component in promoting ITN usage. By addressing misconceptions, these interventions can foster more accurate beliefs about the benefits and safety of treated nets, thereby encouraging greater adoption (Lewandowsky et al., 2017). This principle of the HBM provides a framework for exploring the evidence-based interventions implemented by the district health management team to counter misinformation and promote correct knowledge.

In summary, the Health Belief Model guided this study in understanding how misinformation serves as a barrier to the acceptance and use of ITNs, through its influence on residents' perceptions of susceptibility, severity, benefits, barriers, and cues to action. By applying the HBM, the study gained a deeper understanding of the psychological factors influencing ITN usage behavior and offered valuable insights for developing targeted interventions to combat misinformation and enhance ITN acceptance and usage. The conceptual model (Figure 1) below illustrates an adaptation of the HBM that guided the study's inquiry and framework.



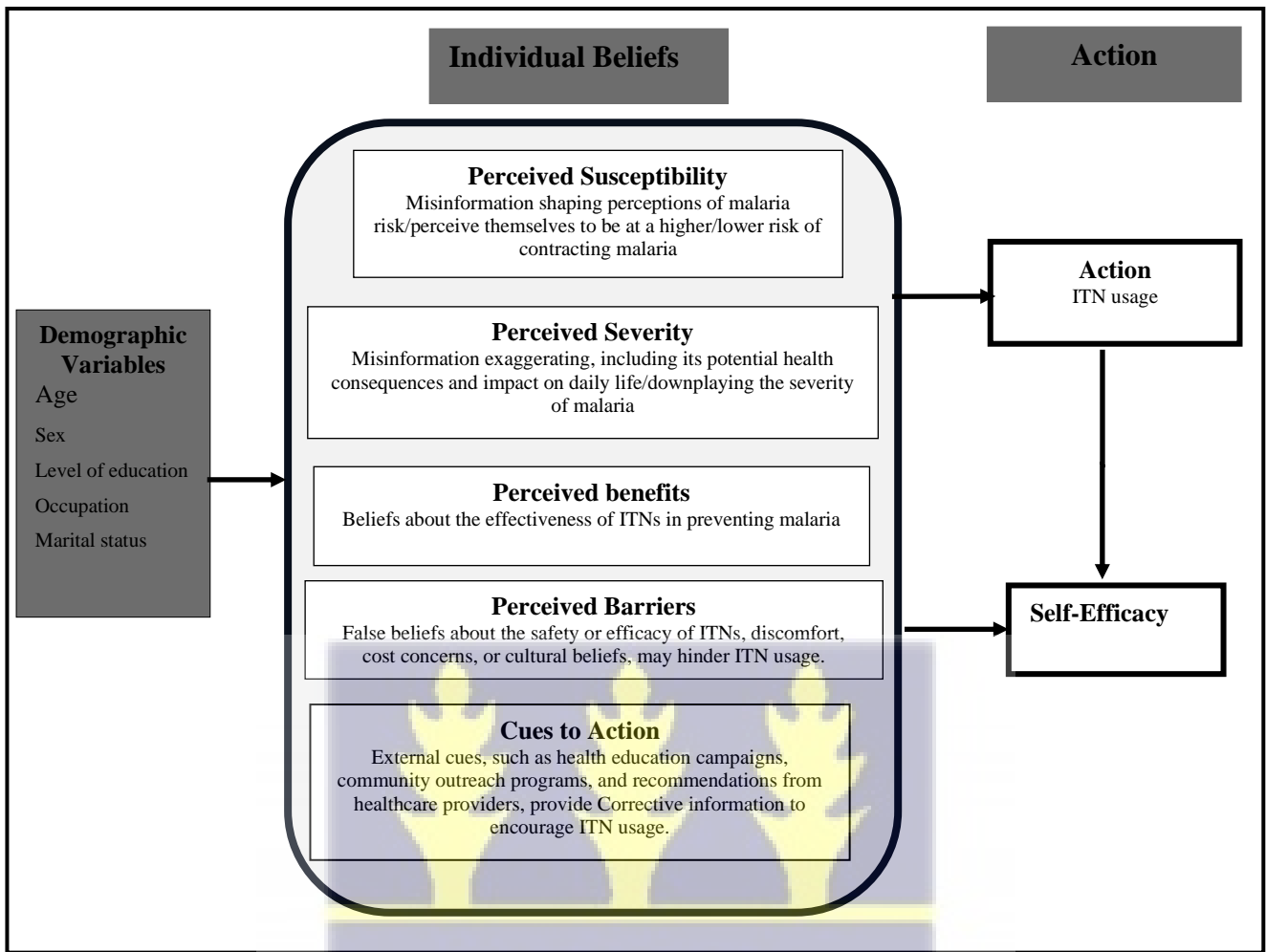
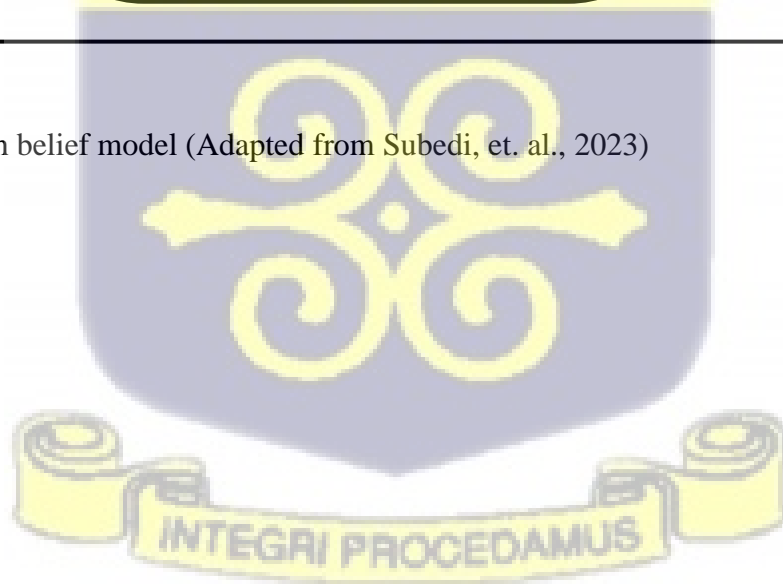


Figure 1: Health belief model (Adapted from Subedi, et. al., 2023)



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The spread of misinformation regarding health interventions presents a significant challenge to public health, particularly in the effective management of pandemics and disease control efforts. Beyond undermining public confidence in scientifically proven interventions and public health directives (Van Der Linden, 2022), misinformation fosters misconceptions that can lead to risky behaviors, especially among vulnerable populations. Such behaviors, in turn, contribute to poor health outcomes and hinder the success of disease prevention strategies (Depoux et al., 2020; Islam et al., 2020). In the context of malaria prevention, misinformation has been identified as a key barrier to the adoption and proper use of ITNs, a critical tool in malaria control.

This section of the study examines existing literature on misinformation-driven obstacles to ITN usage, focusing on how misinformation shapes public perceptions and affects adherence to recommended malaria prevention measures. The literature review is structured around two main themes: Malaria burden and malaria interventions in Ghana. Under these broad themes, subsections will explore Ghana's malaria burden and the role of ITNs in malaria prevention, their effectiveness, and the factors influencing their acceptance and utilization. Additionally, the review will analyze the impact of misinformation on ITN adoption, highlighting misconceptions that contribute to low usage rates and potential strategies for addressing these barriers.

By synthesizing relevant studies, this review provides a comprehensive understanding of how misinformation affects ITN use in Ghana, ultimately informing strategies to enhance public awareness and improve malaria prevention efforts.

2.1 Ghana's Malaria Burden

Malaria, a parasitic infection transmitted through the bite of the female *Anopheles* mosquito, remains a major global health concern due to its acute and potentially life-threatening nature (Buck & Finnigan, 2022). The infection cycle begins when an infected mosquito injects malaria parasites into a person's bloodstream, which then travel to the liver to mature before spreading into the red blood cells (Baer et al., 2007). As the parasites multiply, the infected cells rupture, releasing more parasites and continuing the cycle of infection. This process leads to the onset of malaria symptoms, typically occurring between 10 days and 4 weeks after infection, though cases of delayed symptoms have been recorded up to a year later (Milner, 2018). In addition to mosquito bites, malaria can be transmitted through blood transfusions, the sharing of contaminated needles, and from mother to child during pregnancy (Abrol & Lal, 2012). The disease presents a wide range of symptoms, including fever, chills, nausea, headache, vomiting, diarrhea, and respiratory distress (WHO, 2020).

Globally, malaria remains a significant public health burden, particularly in sub-Saharan Africa, where it contributes to a persistent cycle of illness and poverty (Manzoni et al., 2024). Africa accounts for most malaria-related deaths, with approximately 593,000 out of 619,000 fatalities recorded in 2021 (WHO, 2022). The disease disproportionately affects children under five and pregnant women, exacerbating health disparities in resource-limited communities. While substantial progress has been made in reducing malaria-related mortality through intensified control efforts, the disease remains a persistent challenge (WHO, 2023).

2.1.1 Malaria in Ghana

In Ghana, malaria is the leading cause of morbidity and mortality, significantly impacting the healthcare system and the economy. Between 2009 and 2016, malaria accounted for 31% to 44% of all outpatient department (OPD) cases (WHO, 2021), placing Ghana among the top 10 countries with the highest malaria burden globally (WHO, 2020). The situation worsened in 2018,

when Ghana was identified as one of two African countries reporting an 8% increase in malaria cases (Heinemann et al., 2020). In 2021 alone, the country recorded an estimated 5.3 million malaria cases, resulting in 12,500 deaths (WHO, 2022). Malaria-related mortality was highest among children under five, followed by individuals aged 15 to 49 years (Sasu, 2022). Despite ongoing interventions, malaria continues to be a major health challenge, accounting for a significant portion of Ghana's disease burden (Kawaguchi et al., 2022).

According to the Global Burden of Disease assessment, malaria remains the leading cause of death and disability in Ghana, as measured by disability-adjusted life years (DALYs) (Diawara et al., 2021). In 2017 alone, malaria was responsible for approximately 19,000 deaths, nearly equaling the combined mortality from HIV/AIDS and tuberculosis (Basiru et al., 2022).

2.1.2 Economic and Social Impact of Malaria

Beyond its direct health consequences, malaria exerts a profound social and economic burden on individuals, households, and national economies. The financial strain associated with malaria treatment and prevention is particularly severe for low-income families, where access to healthcare services is often limited (Aheto, 2022). The cost of seeking treatment (including consultation fees, medications, hospitalization, and transportation) can be overwhelming for many households, forcing them to make difficult choices between healthcare and other essential needs such as food, education, and shelter (Ankomah et al., 2015). This economic pressure is even more pronounced in communities with inadequate healthcare infrastructure, where delayed treatment or reliance on traditional remedies can lead to prolonged illness and complications, further increasing financial hardships.

At the national level, malaria control requires substantial government expenditure, diverting critical resources from other development priorities such as education, infrastructure, and social welfare (Eggers & Macmillan, 2013). Investments in malaria interventions, including ITNs, IRS, rapid diagnostic tests (RDTs), and antimalarial drugs, demand significant financial commitments.

While these efforts are crucial in reducing malaria transmission and mortality, they place a heavy burden on national budgets, limiting investments in other sectors that contribute to long-term economic growth.

The economic impact of malaria extends beyond direct healthcare costs to productivity losses, affecting both individuals and the broader economy. Asante and Asenso-Okyere (2003) highlight that malaria is a leading cause of absenteeism from work and school, disrupting livelihoods and education. Infected individuals often experience repeated episodes of illness, leading to reduced work efficiency, missed income opportunities, and lower overall productivity. For businesses, frequent absenteeism due to malaria-related illnesses among employees results in diminished output, reduced efficiency, and increased costs associated with sick leave and healthcare coverage.

2.1.3 Environmental and Climatic Factors

Ghana's geographical and climatic conditions play a significant role in sustaining malaria transmission. The country's tropical climate, abundant forests, wetlands, and high humidity provide ideal breeding conditions for *Anopheles* mosquitoes (Kumi-Boateng et al., 2015). Frequent and intense rainfall leads to stagnant water accumulation, creating breeding grounds for mosquito larvae (Coon et al., 2014). Improper sanitation practices, such as open defecation, poor waste management, clogged drains, and indiscriminate littering, further contribute to the proliferation of malaria vectors (Vinti et al., 2023).

Environmental management and sanitation have been identified as promising strategies for malaria control. Agyemang-Badu et al. (2023) highlighted the potential of environmental sanitation as an effective vector control measure. However, they emphasized that environmental interventions should be implemented alongside other primary malaria control strategies, such as insecticide-treated nets (ITNs), indoor residual spraying (IRS), and improved access to healthcare.

2.2 Malaria Interventions in Ghana

Ghana has a long history of malaria control efforts, dating back to the pre-independence era. Over the years, interventions have primarily focused on two main approaches: treating the disease in infected individuals and preventing its transmission by targeting the *Anopheles* mosquito, the primary vector. Treatment strategies have involved the use of antimalarial medications to eliminate the parasite within human hosts, while preventive measures have centered on vector control methods such as ITNs, IRS, and environmental management. These efforts have evolved, guided by national policies and global malaria control strategies, with the NMEP playing a key role in coordinating and implementing interventions (NMCP, 2013).

2.2.1 Malaria Prevention Strategies in Ghana

Efforts to prevent malaria in Ghana encompass a multifaceted approach that integrates several key interventions. These include the use of ITNs, Seasonal Malaria Chemoprevention (SMC), IRS, and Intermittent Preventive Treatment in Pregnancy (IPTp) (Nice et al., 2020). Each of these strategies plays a critical role in reducing malaria transmission and protecting vulnerable populations.

IRS involves the application of insecticide within homes, particularly on walls and other surfaces where malaria-carrying mosquitoes rest. This method eliminates mosquitoes coming into contact with treated surfaces, effectively disrupting the malaria transmission cycle (Killeen, 2014).

IPTp is a preventive intervention targeting pregnant women, a high-risk group for malaria. It involves the administration of sulfadoxine-pyrimethamine (SP) at recommended intervals during the second and third trimesters of pregnancy, significantly reducing the risk of maternal and neonatal complications associated with malaria (Desai et al., 2015).

SMC, on the other hand, is a preventive approach designed to protect children, who are particularly vulnerable to malaria. This strategy entails the periodic administration of a complete course of antimalarial medication to children aged 3–59 months during the peak malaria

transmission season. In areas with highly seasonal malaria transmission, SMC typically consists of up to four treatment courses of SP and amodiaquine at monthly intervals, significantly reducing the incidence of malaria-related morbidity and mortality (Barry et al., 2018).

ITNs serve as a crucial vector control tool by acting as a physical and chemical barrier against mosquito bites. These nets are impregnated with insecticide, which not only repels but also incapacitates or eliminates mosquitoes upon contact. Even in cases where nets contain small tears, the insecticidal properties remain effective in reducing mosquito survival rates and malaria transmission. ITNs are widely recommended by the WHO as a primary malaria prevention measure, particularly in endemic regions like Ghana (Shonga et al., 2018; Sougoufara et al., 2020).

The effectiveness of ITNs in malaria control has been demonstrated in various studies. For example, Aliyu et al. (2009) examined ITN utilization among boarding school students in Zaria, Nigeria, and found that students who consistently used ITNs reported a significant reduction in malaria episodes. Based on these findings, the authors advocated for the institutionalization of ITN usage in school health programs to promote a culture of malaria prevention among young populations.

2.2.2 Knowledge, Attitudes, and Practices (KAP) on Malaria Transmission and Prevention

Understanding community knowledge, attitudes, and practices regarding malaria is crucial for designing effective prevention interventions. Research across different settings has shown variations in malaria awareness and comprehension of its transmission and control measures.

Dambhare et al. (2012) investigated the KAP of malaria transmission and prevention among school-going adolescents in Wardha District, Central India. Their study, involving 1,096 students, revealed that while 84.7% had heard about malaria, only 69.8% correctly identified mosquito bites as the mode of transmission. Furthermore, misconceptions persisted, with 32.8% mistakenly believing houseflies were responsible for malaria transmission. Television and radio were

identified as the primary sources of malaria information (51.7%), highlighting the role of mass media in health education. Despite the relatively high awareness levels, knowledge about the causative agent and effective prevention methods was limited, underscoring the need for improved educational interventions.

A similar study conducted by Manana et al. (2018) in Mamfene, KwaZulu-Natal, South Africa, assessed malaria-related KAP among 400 residents. Their findings revealed that although 99% of participants were aware that malaria is transmitted through the bite of a mosquito; only 32% knew that the female *Anopheles* mosquito is responsible. The study also revealed that local health facilities (53%) and radio (15%) were the most common sources of malaria-related information. Notably, 59% of respondents expressed a need for more comprehensive malaria education, demonstrating the necessity for community-based awareness programs.

Lopez and Brown (2023) examined malaria prevention and control knowledge among communities in Ghana's Eastern Region using a household-based cross-sectional survey involving 323 participants. Their findings mirrored trends observed in other studies, with a general awareness of malaria but notable gaps in understanding its transmission and preventive measures. The study emphasized the importance of health workers and media in disseminating malaria-related information and advocated for targeted educational interventions to enhance community knowledge and practices.

Additionally, Aragie (2020) explored malaria prevention knowledge and associated factors among rural households using a mixed-method approach involving structured questionnaires and focus group discussions. The study, conducted among 770 households, highlighted that while malaria awareness was widespread, in-depth knowledge of prevention and control methods remained limited. Key factors influencing knowledge levels included educational attainment and access to reliable health information. The study recommended tailored health education strategies to bridge these knowledge gaps and improve malaria prevention practices.

The reviewed literature underscores a recurring pattern: while general awareness of malaria is high across diverse populations, significant gaps persist in understanding its transmission, prevention, and control. Misconceptions about malaria transmission, inadequate knowledge of vector control methods, and limited access to accurate health information continue to hinder effective malaria prevention efforts.

2.2.3 Effectiveness of ITN and its Education in Malaria Prevention

ITNs are mosquito nets impregnated with insecticides designed to repel, incapacitate, or kill mosquitoes upon contact (Taremwa et al., 2020). Functioning similarly to a protective tent, ITNs are hung over sleeping areas, creating a physical barrier that minimizes human-mosquito interaction (Gatton et al., 2013). Insecticidal treatment further enhances protection by repelling mosquitoes and reducing their likelihood of entering indoor spaces (Okumu et al., 2013). Specifically, ITNs are treated with pyrethroid insecticides, which exhibit excitatory-repellent properties, deterring mosquitoes and killing those attempting to bite individuals sleeping under the net (Lissenden et al., 2021; Paaijmans & Huijben, 2020). This dual-action mechanism significantly reduces the risk of malaria transmission by disrupting the mosquito blood-feeding cycle.

The efficacy of ITNs in preventing malaria has been extensively examined and validated through numerous studies (Ezezika et al., 2022). Epidemiological models have demonstrated the crucial role of ITNs in malaria control by offering both personal and community-wide protection due to their insecticidal and repellent properties (Birget & Koella, 2015). Research indicates that proper ITN usage can decrease malaria transmission by up to 60%, making it one of the most effective interventions for reducing malaria incidence and mortality, particularly in Sub-Saharan Africa (Musa et al., 2009; Lindsay et al., 2021). Between 2000 and 2015, ITNs were instrumental in preventing approximately 69% of the 663 million malaria cases reported in Africa (Bhatt et al., 2015). Moreover, ITNs have been associated with a 45% reduction in severe malaria cases in

regions with stable malaria transmission (Scott et al., 2021) and a 55% decrease in malaria-related morbidity among children under five (Eisele et al., 2010).

Beyond individual protection, ITNs contribute to community-wide malaria control by reducing mosquito populations and decreasing parasite prevalence within affected areas (Hawley et al., 2003; Howard et al., 2000). Widespread ITN coverage has been shown to significantly diminish the mosquito population's lifespan and density, offering indirect protection to individuals who may not own or use an ITN (Lengeler, 2004). The United States Centers for Disease Control and Prevention (CDC) highlights that when ITN usage reaches a critical threshold, it creates a mass protective effect by depriving mosquitoes of necessary blood meals, thereby lowering overall transmission rates (Birget & Koella, 2015).

Given the proven efficacy of ITNs, the WHO advocates for free or highly subsidized distribution in malaria-endemic regions to ensure broad access (Singh et al., 2013).

In Ghana, the Ghana Health Service (GHS) has implemented multiple ITN distribution strategies, including mass distribution campaigns, school-based distribution, and provision at ANC and CWCs (Dun-Dery et al., 2022). Complementing these efforts, the GHS has integrated behavior change communication campaigns to educate the population on proper ITN hanging, usage, and maintenance, aiming for a minimum of 80% ITN coverage among at-risk populations (Afagbedzi et al., 2022). Despite these initiatives, disparities in ITN utilization persist across different regions and demographic groups in Ghana, highlighting the need for continuous education and advocacy (Ahorlu et al., 2019).

Scholars have examined the role of educational interventions in promoting ITN usage and malaria prevention. Onyinyechi et al. (2023) conducted a meta-analysis of studies spanning two decades to assess the impact of health education on malaria awareness and ITN adoption in Sub-Saharan Africa. Their findings suggest that health education interventions are moderately effective in increasing ITN usage and enhancing malaria knowledge, thus contributing to global malaria

control efforts. Similarly, Polec et al. (2015) evaluated various strategies to improve ITN ownership and usage, analyzing data from 12,637 households across 10 studies. Their research found that educational interventions increased ITN adoption compared to no intervention, though the evidence indicates that other factors also influence ITN utilization.

Further emphasizing the importance of education, Ezezika et al. (2022) investigated ITN implementation strategies in Tanzania, with a focus on educational campaigns. Their systematic review highlighted that direct engagement and continuous education significantly improved villagers' attitudes towards ITN procurement and usage. Additionally, sustained communication between stakeholders was identified as a key factor in fostering long-term ITN adherence. These findings underscore the need for ongoing community engagement and targeted education to maximize the effectiveness of ITN interventions in malaria-endemic regions.

2.2.4 Perceptions of ITN and Usage

ITNs are widely recognized as an accessible and cost-effective tool for malaria prevention and control (WHO, 2022). Over time, their effectiveness in reducing malaria transmission and their affordability have led to increased adoption by both international and national malaria programs (Ye et al., 2017). These programs emphasize rigorous evaluation, mass distribution, and routine provision of ITNs to high-risk populations, such as pregnant women and children under five, during ANC and CWC, respectively (Afagbedzi et al., 2022). The World Health Organization (WHO) recommends ensuring at least one ITN for every two individuals per household to maximize coverage and protection (WHO, 2017).

Despite widespread availability, ITN usage remains inconsistent across malaria-endemic regions. Koenker & Kilian (2014) highlight that although ITN ownership has significantly increased in sub-Saharan Africa, only about 50% of individuals at risk reported sleeping under an ITN the previous night. This disparity between ITN ownership and actual use indicates that availability

alone does not guarantee utilization (Pulford et al., 2011). Several studies suggest that ITN usage is influenced by a complex interplay of factors at the individual, household, and community levels (Graves et al., 2011; Ngondi et al., 2011). These determinants shape health-related behaviors and impact ITN adherence (Ngondi et al., 2011; Scott et al., 2021; Ricotta et al., 2019).

Community attitudes toward ITNs are shaped by various cultural, behavioral, and demographic factors, including ethnicity, gender dynamics, accessibility, and perceptions of malaria risk (Heggenhougen et al., 2003). Research indicates that acceptance and consistent use of ITNs depend not only on their availability but also on how they are perceived within local contexts (Thomson et al., 1996; Binka & Adongo, 1997; Winch et al., 1997). The effectiveness of ITNs is contingent on their integration into household malaria prevention practices, which can be hindered by concerns regarding the insecticide component, discomfort from heat, feelings of confinement, and beliefs about low mosquito density reducing the need for protection (Winch et al., 1997; Pulford et al., 2011; Ahorlu et al., 2019). Additionally, some individuals may associate the chemical treatment of ITNs with toxicity, influencing their willingness to use them (Chukwuocha et al., 2010).

The Health Belief Model (Becker, 1974) provides a framework for understanding ITN utilization. According to this model, individuals are more likely to adopt preventive health measures when they perceive themselves as susceptible to malaria and recognize its serious consequences. Moreover, the perceived benefits of ITN use must outweigh any perceived barriers, such as discomfort or inconvenience. This model underscores the need for targeted interventions to address misconceptions and enhance the perceived value of ITNs in malaria prevention.

Several studies have explored perceptions and usage of ITNs across different populations. For instance, Orji et al. (2018) examined caregivers' attitudes toward ITN utilization for children under five in Abakaliki, Nigeria. Their cross-sectional survey of 410 caregivers revealed that 52.4% of respondents consistently used ITNs for their children, while 28.0% used them occasionally, and 19.5% never used them. The findings highlighted the need for increased

awareness and education to improve ITN adherence. Similarly, Chukwuocha et al. (2010) investigated ITN perceptions among pregnant women in the Imo River Basin, Nigeria, revealing that while awareness was high, actual usage was influenced by cultural beliefs, misconceptions, and accessibility challenges.

Ladu et al. (2024) conducted a systematic review on barriers to mosquito net use in malaria-endemic countries. The study synthesized findings from literature published between 2011 and 2021, categorizing barriers into four themes: human factors, net factors, housing structure, and access. Commonly cited reasons for non-use included discomfort due to heat, perceived low malaria risk, concerns about insecticide safety, and lack of access to ITNs. These insights reinforce the importance of addressing both physical and psychological barriers to ITN use.

Ekeleme et al. (2023) explored ITN attitudes and practices among rural dwellers in Oyo State, Nigeria, using a cross-sectional survey of 278 respondents. Their findings indicated that while most respondents recognized ITNs as a malaria prevention tool and possessed them in their households, usage varied. The primary barriers to consistent ITN use included discomfort from heat and negative perceptions of insecticide. The study also found that ITN utilization was significantly associated with demographic factors such as age, marital status, education level, and awareness of ITNs. Younger individuals, those with lower education levels, and those who doubted ITN effectiveness or safety were less likely to use them consistently.

2.2.5 Misinformation-Related Barriers to ITN Acceptance and Usage

The ITN is widely recognized as one of the most effective and cost-efficient tools for malaria prevention (Toé et al., 2009). However, mere ownership of ITNs does not automatically translate into consistent usage, thereby limiting their potential public health benefits (Diema et al., 2017). Despite large-scale free distribution campaigns and public health education efforts, various misinformation-related barriers continue to hinder ITN acceptance and sustained use among different populations.

Toé et al. (2009) argue that while mass distribution of ITNs provides individuals with the means to protect themselves, many still fail to use them regularly. This discrepancy can partly be attributed to misinformation surrounding malaria transmission and prevention. Gyapong et al. (1996) highlight that in some communities, malaria is mistakenly associated with behaviors such as consuming sweets, exposure to sunlight, and maternal transmission at birth. Such misconceptions can lead individuals to believe that ITNs are ineffective or unnecessary, reducing motivation for their use.

Pulford et al. (2011) further emphasizes the influence of social factors on ITN non-use, citing beliefs that sleeping elsewhere or staying awake at night negates the need for mosquito nets. These perceptions demonstrate how cultural and behavioral misconceptions can shape malaria prevention practices. According to Kleinman (2007), illness is interpreted within an individual's cultural and social framework, affecting health-seeking behaviors. This perspective aligns with Okafor and Amzat (2007), who argue that cultural beliefs regarding disease causation significantly influence the selection of preventive measures. Thus, widespread misinformation about malaria etiology may shape attitudes toward ITN use, reinforcing skepticism and reducing uptake.

Social scientists have long emphasized the importance of prioritizing the study of human behavior and comprehension. This emphasis is crucial for enhancing efforts in malaria control and prevention (Spjeldnæs et al., 2014). Such emphasis likely stems from the recognition that grasping local perspectives on malaria causation and prevention can inform the development of sustainable, community-centered malaria control initiatives. These initiatives, in turn, can catalyze behavioral shifts and the acceptance of novel approaches or interventions (Adongo et al., 2005).

In certain Nigerian contexts, while malaria was acknowledged as a significant disease, ITNs were perceived to offer only partial benefits due to the belief that malaria had various causes.

Additionally, concerns were raised about the chemicals used in treating ITNs being linked to family planning (Chukwuocha et al., 2010).

Several studies across different contexts have documented the impact of misinformation on ITN acceptance. In Nigeria, Chukwuocha et al. (2010) found that while malaria was widely recognized as a severe disease, ITNs were perceived as offering only partial protection. Additionally, concerns arose regarding the chemicals used in treating ITNs, with some individuals believing they were linked to family planning efforts, thereby discouraging their use.

Similarly, Chuma et al. (2010) identified barriers to ITN use in Kenya, where qualitative data from focus groups and interviews revealed deep-seated misconceptions. Some communities associated white nets with misfortune, bad dreams, or death, leading to their rejection. Others repurposed ITNs for non-health-related activities such as fishing or home decoration, undermining their intended purpose. Mistrust also emerged due to targeted ITN distribution, with suspicions that the nets could have hidden adverse effects on future generations.

In rural Tanzania, Nnko et al. (2012) investigated skepticism surrounding ITNs, particularly those promoted through social marketing. Despite high awareness of ITNs, many community members hesitated to purchase them due to concerns about their effectiveness and potential health risks. While financial constraints were acknowledged as a limiting factor, the study found that misinformation played a more decisive role in discouraging ITN adoption.

Further evidence from Ethiopia reinforces these findings. Yirsaw et al. (2021) assessed ITN utilization among pregnant women and children under five in East Belessa District, reporting a 56.5% usage rate. The study identified several misinformation-related barriers, including beliefs that ITNs could cause health problems and that they were unnecessary during the dry season. Structural household factors, such as room size and roofing materials, also influenced ITN use.

Diema et al. (2017) explored ITN use in Ghana's Upper East Region, revealing that while ITNs were initially used for sleeping, they were often repurposed for other activities such as nursing seedlings, protecting poultry, and fencing animal pens. Misinformation, coupled with complacency and male dominance in household decision-making, emerged as significant barriers to sustained ITN use.

2.3 Identified Gaps in Literature

Despite a growing body of literature on malaria prevention and the role of ITNs, several gaps persist in current research, particularly in the Ghanaian context.

First, limited context-specific research exists on the impact of misinformation on ITN usage in densely populated urban areas like Ashaiman. While studies have examined ITN utilization in rural or national contexts (Pulford et al., 2011; Diema et al., 2017), few have focused on how urban-specific factors—such as overcrowding, housing conditions, and socio-cultural diversity—interact with misinformation to influence health behavior. This geographical and contextual gap restricts the applicability of generalized findings to communities such as Ashaiman.

Second, misinformation has not been sufficiently examined as a central barrier. Although research has acknowledged the presence of misconceptions about ITNs (Gyapong et al., 1996; Chukwuocha et al., 2010), these studies often mention misinformation in passing rather than conducting in-depth investigations into how specific types of misinformation shape ITN adoption behavior. More empirical evidence is needed to understand the mechanisms by which misinformation influences perceptions and practices regarding malaria prevention.

Third, there is a lack of disaggregated data by demographic subgroups in existing research. While demographic factors like age, gender, and education have been noted as influencing ITN usage (Ekeleme et al., 2023; Ladu et al., 2024), few studies have analyzed how misinformation affects

different population segments. Understanding these variations is essential for developing targeted, equity-driven communication interventions.

Finally, limited evaluation of the effectiveness of health communication campaigns exists, particularly in terms of their ability to counter misinformation. Although BCC strategies are widely implemented in Ghana (Afagbedzi et al., 2022), studies rarely assess their real-world impact on correcting false beliefs and increasing ITN usage. Without such evaluations, it remains difficult to optimize or scale up truly effective interventions.

This study addresses these gaps by exploring how misinformation specifically affects ITN adoption in the Ashaiman Municipality. It also assesses the effectiveness of communication strategies in overcoming these barriers, thereby providing actionable insights for designing context-specific, evidence-based interventions.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

Malaria prevention programs have proven most effective when incorporating the widespread distribution of ITNs, which have been estimated to reduce the malaria burden by 68% (WHO, 2022). To ensure large-scale impact, the World Health Organization (WHO) recommends deploying ITNs treated with pyrethroid-based insecticides, a strategy that has been widely implemented in malaria-endemic regions (Barker et al., 2023). Ghana, as one such country, records approximately 5.3 million malaria cases annually, with 12,500 deaths attributed to the disease (WHO, 2022). Given this significant burden, malaria prevention remains a public health priority. Research has consistently demonstrated the effectiveness of ITNs, with projections indicating that achieving 70% population coverage could lead to a more than 17% reduction in malaria-related childhood mortality in Ghana (Binka et al., 1996). Despite these well-documented benefits, misinformation and other behavioral factors may hinder ITN utilization in certain communities. This study, therefore, aims to explore misinformation-driven barriers to ITN usage in the Ashaiman municipality, where malaria remains a pressing concern.

This chapter outlines the methodological framework employed to conduct this study. It details the research design, study area, target population, sampling size and technique, data collection methods and instruments, as well as data analysis procedures. By systematically examining these methodological components, the chapter ensures a comprehensive approach to understanding the factors influencing ITN adoption in the study area.

3.1 Study Design

The study adopted a cross-sectional quantitative approach, which involved the collection and statistical analysis of numerical data (Neuman, 2014). This research method allowed for the examination of data from a specific population or a representative subset at a single point in time,

enabling an assessment of the prevalence of the phenomenon under investigation (Setia, 2016). By employing this approach, the study systematically quantified relationships among key variables, using statistical tools to identify patterns and associations.

Specifically, the study aimed to estimate the prevalence of factors influencing the use of ITNs, including the extent of misinformation surrounding them and the barriers to their utilization. Furthermore, the approach facilitated an analysis of the association between misinformation and ITN usage, providing empirical insights into how misinformation might impact adoption rates (Levin, 2006). The cross-sectional design was particularly suited for this research, as it enabled a snapshot evaluation of these dynamics within the study population, supporting evidence-based conclusions.

3.2 Study Area

The research was conducted in the Ashaiman Municipality, located in the Greater Accra Region of Ghana. The municipality is one of the twenty-nine (29) metropolitan, municipal, and district assemblies (MMDAs) within the region and was originally part of the Tema Municipal Assembly before attaining independent municipal status. It covers an area of approximately 30.2 square kilometers and shares boundaries with Tema Metropolitan to the east, Ledzokuku Municipal to the south, Adentan Municipal to the north, and La Nkwantanang-Madina Municipal to the west.

Geographically, Ashaiman is situated about 4 kilometers north of Tema and approximately 30 kilometers from Accra. While Tema is aligned with the Greenwich Meridian at Longitude 0°, Ashaiman lies at Latitude 5° 42' North and Longitude 0° 01' West.

Due to its strategic location near Tema and Accra, Ashaiman has benefited from access to essential social amenities, including a network of well-maintained roads, a reliable water supply, healthcare facilities, and electricity. The municipality serves as a residential hub for workers employed in Tema's industrial sector. Additionally, a significant portion of the population is engaged in trading and other informal economic activities.

Administratively, the Ashaiman Municipal Health Directorate is structured into seven subdistricts: Amui Jor, Blakpatsona, Gbemi, Maamomo, Mantseman, Niiman, and Tsinaï-Agber. The municipality hosts 27 health facilities, comprising one municipal hospital and 26 health centers and clinics, four of which are public and 22 privately owned. These facilities provide a range of healthcare services, including laboratory diagnostics, pharmaceutical services, family planning, and reproductive, maternal, and child health services. Furthermore, Tema General Hospital serves as the primary referral center for patients requiring specialized care beyond what is available within the municipality.

According to data obtained from the Ashaiman Municipal Health Directorate, the leading public health concerns in the municipality include malaria, hypertension, and diabetes. These conditions were identified as the most prevalent health issues affecting the population within the municipality.

3.3 Population of Study

Creswell (2012) defines a population as any collection of individuals who share one or more common characteristics that are of interest to a researcher. A population may encompass all individuals within a particular group or a more defined subset of that group, depending on the research focus.

For this study, the target population comprised residents of the Ashaiman Municipality, a highly malaria-endemic area within the Greater Accra region, as identified by the District Health Information Management System (DHIMS2) data. Due to the high malaria transmission rates in this municipality, residents were at an increased risk of infection.

Within this broader population, the study specifically focused on vulnerable subgroups, including pregnant women, adolescents, and individuals facing economic hardships. These groups were considered particularly at risk due to a combination of socio-economic and health-related factors that heightened their susceptibility to malaria infection. Pregnant women, for instance, were more

vulnerable due to physiological changes that made them more prone to severe malaria complications, while adolescents often exhibited inconsistent malaria prevention behaviors. Economically disadvantaged individuals face barriers in accessing health information and malaria prevention tools, further increasing their risk.

Despite the availability of ITNs, one of the most effective malaria prevention strategies—residents of Ashaiman accessed ITNs through various continuous distribution channels such as mass campaigns, schools, healthcare facilities, and retail outlets. However, despite this access, some community members were exposed to misinformation or misconceptions regarding ITN usage. These misconceptions had the potential to shape their attitudes and behaviors toward malaria prevention, possibly leading to underutilization or incorrect usage of ITNs. This study, therefore, sought to examine how these vulnerable groups perceived and utilized ITNs and the extent to which misinformation influenced their malaria prevention practices.

According to the 2021 Population and Housing Census (PHC) of the Ghana Statistical Service, the population of Ashaiman Municipality was estimated at 208,060, representing 3.8% of the Greater Accra region's total population. This total comprised 103,410 males (49.70%) and 104,650 females (50.30%), reflecting a nearly equal gender distribution. The demographic composition of the municipality provided a critical context for understanding malaria prevention behaviors and the factors influencing ITN usage among its residents.

3.4 Sample Size Determination

Using Cochran's (1963) formula, the sample size for the study for a population of 208,060 at a 90% confidence interval is estimated below.

$$n = \frac{Z^2 p(1-p)}{E^2}$$

Where:

n = sample size

Z = Z-score corresponding to the desired level of confidence (90%), approximately 1.645

p = estimated proportion of the population with a particular characteristic or outcome as critical value, p as sample proportion (0.5 is used as a conservative estimate),

E = the desired margin of error (expressed as a proportion) i.e. 0.05 (5%).

Therefore,

$$\begin{aligned}n &= \frac{(1.645)^2 \cdot 0.5(1-0.5)}{0.05^2} \\ &= \frac{2.716025 \cdot 0.25}{0.0025} \\ &= \frac{0.67650625}{0.0025} \\ &= 271.6025\end{aligned}$$

When rounded to the nearest whole number, the necessary sample size (n) is approximately 272.

3.5 Sampling Technique

The study employed a stratified sampling technique to systematically select participants. Stratified sampling is a method in which a population is divided into distinct subgroups, or strata, based on specific characteristics that are relevant to the research objectives (Thompson, 2012). This approach ensures that each subgroup is adequately represented, leading to more precise and generalizable findings (Wimmer & Dominic, 2011).

For this study, the population within the Ashaiman Municipality was stratified based on the seven geographical sub-districts of the municipal health directorate, namely: Amui Jor, Blakpatsona, Gbemi, Maamomo, Mantseman, Niiman, and Tsinai-agber. Each of these sub-districts represented a unique stratum, ensuring that the sample captured the diversity of the municipality.

Once the strata were established, the sample size for each stratum was determined proportionally based on the total population of each sub-district. After calculating the required sample size for each stratum, participants were randomly selected to form the final study sample.

A systematic random sampling approach was used to select participants within each stratum. This involved defining a sampling frame, randomly selecting a starting point from the sampling frame, and applying a fixed interval selection method, where every third individual on the list was chosen based on key demographic characteristics such as age, sex, education level, and employment status. This process continued until the required number of participants was obtained for each stratum.

By employing stratified sampling, the study ensured representativeness across all sub-districts, reducing selection bias and enhancing the reliability of the findings. The proportional sample size calculation method used for each stratum is detailed in Table 3.0.1 below.

Table 3.0.1: Sample Size Determination by Sub-District

Sub-district	Population	Proportion of Municipal Population	Sample Size
Amui Jor	22,887	11%	30
Blakpatsona	37,035	17.6%	48
Gbemi	23,719	11.4%	31
Maamomo	31,417	15.1%	41
Mantseman	20,181	9.6%	26
Niiman	33,914	16.2%	44
Tsinai-agber	38,907	19.1%	52
Total	208,060	100%	272

3.5.1 Inclusion Criteria:

The following defines the inclusion criteria for the survey:

- i. Individuals of ages 18 years and above, residing within the Ashaiman Municipal area.
- ii. Individuals who have access to ITNs, through the various continuous distribution channels.
- iii. Individuals who are willing to participate in the study and provide information regarding their knowledge, perceptions, and practices related to ITN usage.
- iv. Individuals who can understand and respond to survey questions or interview inquiries.

3.5.2: Exclusion Criteria:

The following defines the exclusion criteria for the survey:

- i. Individuals who do not have access to ITNs
- ii. Individuals who refuse to provide consent for the study.
- iii. Individuals who are not available or accessible during the data collection period.

3.6 Data Collection Method

The data collection phase of this research was designed to investigate the prevalence and impact of misinformation on the utilization of ITNs among community members. To ensure ethical considerations were upheld, all eligible participants were first provided with detailed information regarding the study's objectives, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw at any stage without any consequences.

Before their participation, informed consent was obtained from each respondent, ensuring that they fully understood the purpose and implications of the study. Following this, structured questionnaires were administered to participants individually through face-to-face interactions. To facilitate comprehension and accurate responses, the questionnaires were conducted in the respondents' preferred language. This approach ensured that participants could comfortably express their perspectives, thereby enhancing the reliability and validity of the collected data.

3.7 Data Collection Tool

In line with the quantitative research methodology, the study utilized a survey as the primary data collection tool to gather information from community members in the Ashaiman Municipal, to make inferences about the broader population (Collins & Hussey, 2013). The data were collected using an interviewer-administered structured questionnaire, which was designed to gather both demographic and substantive information aligned with the study's objectives and theoretical framework.

The questionnaire was organized into distinct subsections for clarity and focus. Section A collected demographic data from respondents, including their age, sex, education level, and employment status. Section B was dedicated to assessing participants' knowledge of malaria, particularly its transmission dynamics. Section C focused on the respondents' perceptions regarding the use of ITNs, examining their attitudes and behaviors toward these preventive measures. Section D aimed to identify any barriers stemming from misinformation that could hinder the effective use of ITNs. Finally, Section E explored the presence of any misconceptions or misleading information that might influence participants' behavior and attitudes toward ITN usage, contributing to an understanding of the factors that affect malaria prevention efforts in the community.

3.8 Data Collection Procedure

During the data collection process, eligible participants were provided with comprehensive information regarding the study's purpose, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw from the study at any time. Informed consent was obtained from each participant before they engaged in the study.

Subsequently, structured questionnaires were administered to participants on an individual basis through face-to-face interactions. These interactions occurred in the participants' preferred language to ensure clarity and comfort. Throughout this process, the researcher guided the participants as they answered the questions on the questionnaire. Each questionnaire was designed to be completed in approximately 10 minutes. Upon completion, the questionnaires were collected from the participants and organized for subsequent data analysis.

3.9 Study Variables

Table 3.0.2: Study Variables and their Definitions

Variable	Variable	Definition	Measurement
Independent Variable	Misinformation about ITNs	Incorrect or misleading information that individuals believe about insecticide-treated bed nets, such as myths about their safety, effectiveness, or proper use.	1. Categorical (Binary): Belief in misconceptions about ITNs: "Yes", "No", "Unsure" 2. Categorical: Types of misinformation heard in the community (open-ended)
	Socioeconomic Status	The economic and social position of individuals or households, based on income, education, occupation	1. Categorical: Education Level: "No formal education", "Primary", "JHS", "SHS", "Tertiary", "Other" 2. Occupation: "Employed", "Unemployed", "Student", "Retired", "Other"
	Cultural Beliefs	Traditional beliefs and practices that influence perceptions and behaviors related to health, including the use of ITNs.	1. Categorical: Beliefs that prevent ITN usage: "Perception of discomfort", "Beliefs about ventilation", "Spiritual or religious beliefs", "Perceived ineffectiveness", "Low malaria risk", "ITNs cause allergies", "Other"
	Access to Information	Availability and sources of accurate ITN/malaria prevention information, including media exposure and health education programs.	1. Categorical: Sources of information: "Healthcare providers", "NGOs", "Educational Institutions", "Mass media", "Other" 2. Categorical (Binary): Exposure to ITN benefits information: "Yes", "No", "Not Sure"
Dependent Variable	ITN Usage	Frequency and consistency of ITN use among respondents	1. Categorical (Binary): Ever slept under an ITN: "Yes", "No" 2. Categorical (Binary): Slept under an ITN last night: "Yes", "No"
	Malaria Transmission Risk	The likelihood of individuals being exposed to and contracting malaria, often influenced by ITN usage and other preventive measures.	1. Categorical: Perception of ITN effectiveness: "Highly Effective", "Moderately Effective", "Not Very Effective", "Ineffective"

In this study, the dependent variable is ITN usage, defined as the regular use of insecticide-treated nets for malaria prevention. It was operationalized using two self-reported items: (1) whether the respondent had ever used an ITN, and (2) whether they slept under an ITN the night before the survey. Responses to these questions were coded as binary values (Yes = 1, No = 0).

This outcome variable was selected because it directly reflects the behavior influenced by the independent variables (misinformation, cultural beliefs, socioeconomic status, and education campaigns). It provides a measurable indicator for assessing the practical impact of barriers and enablers related to ITN adoption.

3.10 Data Analysis

The completed questionnaires for the study were subjected to descriptive analysis using the Statistical Package for Social Sciences (SPSS version 23). Descriptive statistical analysis was performed on the data collected on community members' knowledge about malaria and its transmission, as well as their perceptions regarding ITNs and their usage. Frequency distributions were utilized to summarize responses to knowledge-related questions and perceptions, offering a comprehensive overview of the community's understanding of malaria and the factors influencing ITN usage. Additionally, a comparative analysis was conducted to identify any significant differences in perceptions based on demographic variables, allowing for a deeper examination of how factors such as age, gender, and educational background may influence attitudes toward ITNs. This approach provided valuable insights into the factors affecting malaria prevention efforts within the community.

3.11 Ethical Consideration

The study adhered strictly to all ethical guidelines concerning the collection of data from human subjects. Ethical approval was granted by the Ethics Review Committee of the Ghana Health Service (GHS-ERC: 040/10/24). Additionally, the necessary permissions were obtained from the Greater Accra Regional and Ashaiman Municipal Health Directorates, ensuring that the research complied with local regulatory standards.

Informed consent was a key aspect of the study's methodology. Participants were provided with a consent form included in the introductory section of the data collection tool, which outlined the purpose, procedures, and potential impacts of their involvement. Participation was entirely voluntary, with individuals given the freedom to decide whether to take part in the study or not. Those who chose to participate signed or thumb-printed the consent form as an expression of their willingness to engage in the research.

The study posed no significant risks to participants beyond minimal disruption to their schedules, ensuring that their well-being was maintained throughout the process. Participants were not offered monetary compensation for their involvement; however, they were informed that the knowledge derived from the research could contribute to improved malaria prevention interventions, thereby enhancing health outcomes.

The study was conducted without any conflicts of interest and was entirely self-funded, ensuring impartiality in its execution. To protect participants' rights, all collected data was handled with the utmost confidentiality. The privacy of all individuals was safeguarded through secured storage of questionnaires and data, both during the study and beyond, guaranteeing that sensitive information remained protected.

3.11.1 Confidentiality

Confidentiality was maintained throughout the study by implementing strict data protection measures. All collected data were securely stored on password-protected servers, with access restricted to authorized research personnel only. To prevent unauthorized access, encryption was used during data transmission and storage. Personal identifiers were removed or anonymized to ensure that respondents' identities remained protected. Additionally, all participants were informed about the confidentiality measures in place and assured that their responses would not be shared in a way that could reveal their identity. These precautions ensured compliance with ethical research standards, fostering trust and protecting the integrity of the study.

3.11.2 Anonymity

To ensure anonymity, the study implemented methods such as assigning random ID numbers to responses or using anonymous survey tools that did not link respondents to their data. This approach created a safer environment for respondents, encouraging them to provide honest answers. By safeguarding anonymity, the study minimized bias and enhanced the reliability of the data collected.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 Introduction

This chapter presents the results of the study, which employed a quantitative approach through a survey questionnaire administered to 272 respondents in the Ashaiman Municipality. Descriptive statistics were used to analyze and present the findings. The study explored misinformation-driven barriers to the use of ITNs. Specifically, it aimed at assessing community members' knowledge of malaria and its transmission, examined their perceptions of ITNs and their usage, identified misinformation-related barriers that hinder ITN acceptance and usage, and evaluated the effectiveness of educational campaigns in promoting ITN use. The results are presented in alignment with the study's objectives.

4.1 Demographical Information of Respondents

Table 4.1 presents the demographic characteristics of the respondents surveyed in the Ashaiman Municipality. In terms of gender distribution, 158 respondents were female, accounting for 58.1% of the total, while males comprised 114 respondents (41.9%).

Regarding age, 60 respondents (22.1%) were below 18 years old, followed by 53 respondents (19.5%) in the 26–35 age group. Additionally, 46 respondents (16.9%) fell within the 46–55 age bracket. The lowest age group was 18–25 years, consisting of 35 respondents (12.9%).

Education levels varied among the respondents. The largest proportion, 61 respondents (22.4%), had completed primary education. Interestingly, the second-largest group, 57 respondents (21.0%), had no formal education, while only 29 respondents (10.7%) had pursued other forms of education.

In terms of employment status, more than half of the respondents (153, representing 56.3%) were employed. Unemployed individuals and students accounted for 46 respondents (16.9%). Retirees formed the smallest occupational group, with 27 respondents (9.9%).

Table 4.0.1: Demographical Information of Respondents

Sex of respondent		
Sex	Frequency	Percent
Male	114	41.9
Female	158	58.1
Total	272	100.0
Age of respondent		
Age	Frequency	Percent
Below 18	60	22.1
18 – 25	35	12.9
26 – 35	53	19.5
36 – 45	39	14.3
46 – 55	46	16.9
56 and Above	39	14.3
Total	272	100.0
Education Level		
Education Level	Frequency	Percent
No formal education	57	21.0
Primary	61	22.4
JHS	40	14.7
SHS	35	12.9
Tertiary	50	18.4
Other	29	10.7
Total	272	100.0
Occupation		
Occupation	Frequency	Percent
Employed	153	56.3
Unemployed	46	16.9
Student	46	16.9
Retired	27	9.9
Total	272	100.0

4.2 Respondents' Level of Knowledge about Malaria

This section presents findings on respondents' knowledge level regarding malaria.

4.2.1 Respondents' Knowledge of Malaria and its Transmission

Table 4.0.2 presents the level of respondents' knowledge regarding malaria and its transmission.

The data indicate that most of the respondents, 93 (34.2%) demonstrated a good understanding of malaria and how it spreads. In contrast, 21 respondents (7.7%) exhibited very poor knowledge of the disease and its transmission. The mean score (mean = 3.57, standard deviation = 1.20) exceeds

the central point value of 3, suggesting that, overall, respondents in the Ashaiman Municipality possess a relatively good understanding of malaria and its mode of transmission.

Table 4.0.2: How would you describe your knowledge about malaria and its transmission?

Extent of Knowledge	Frequency	Percent
Very Poor	21	7.7
Poor	31	11.4
Average	59	21.7
Good	93	34.2
Very Good	68	25.0
Total	272	100.0
Mean	3.57	
Std. Deviation	1.200	

4.2.2 Mode of Malaria Transmission

Table 4.0.3 below indicates the respondents' knowledge of the mode of malaria transmission. Most of the respondents, 181 (66.5%) indicated that malaria can be transmitted through the bite of infected mosquitoes, while 47 (17.3%) revealed malaria transmission through consumption of contaminated food and water. Only 4 respondents (1.5%) provided other means of transmission.

Table 4.0.3: How is malaria primarily transmitted to humans?

	Frequency	Percent
Through contaminated food and water	47	17.3
Through the bite of infected mosquitoes	181	66.5
Through sexual contact	24	8.8
Through respiratory droplets	16	5.9
Other	4	1.5
Total	272	100.0

4.2.3 Relationship between Education Level and Extent of Knowledge about Malaria Transmission

Table 4.0.4 presents a cross-tabulation of respondents' education levels and their extent of knowledge about malaria transmission. The data revealed that respondents with tertiary education

demonstrated the highest level of knowledge, with 23 individuals (46.0%) classified as having good knowledge of malaria and its transmission. Similarly, 20 respondents with primary education (32.8%) also exhibited good knowledge. Notably, 18 respondents with no formal education (31.6%) also demonstrated a good understanding of malaria transmission.

Table 4.0.4: Cross-tabulation of Education Level and knowledge about malaria and its transmission

		How would you describe your knowledge about malaria and its transmission?					Total	
		Very Poor	Poor	Average	Good	Very Good		
Education Level	No formal education	Count	10	8	13	18	8	57
		% within Education Level	17.5%	14.0%	22.8%	31.6%	14.0%	100.0%
	Primary	Count	4	3	14	20	20	61
		% within Education Level	6.6%	4.9%	23.0%	32.8%	32.8%	100.0%
	JHS	Count	1	8	11	12	8	40
		% within Education Level	2.5%	20.0%	27.5%	30.0%	20.0%	100.0%
	SHS	Count	0	1	8	13	13	35
		% within Education Level	0.0%	2.9%	22.9%	37.1%	37.1%	100.0%
	Tertiary	Count	0	2	6	23	19	50
		% within Education Level	0.0%	4.0%	12.0%	46.0%	38.0%	100.0%
	Other	Count	6	9	7	7	0	29
		% within Education Level	20.7%	31.0%	24.1%	24.1%	0.0%	100.0%
Total		Count	21	31	59	93	68	272
		% within Education Level	7.7%	11.4%	21.7%	34.2%	25.0%	100.0%

4.2.4 Respondents' Knowledge of the Symptoms of Malaria

Table 4.0.5 below shows respondents' knowledge of malaria symptoms. From the table, 181 respondents (66.5%) indicated fever as a major symptom of malaria. Also, 182 respondents (66.9%) indicated chills as another symptom of malaria. A total number of 157 (57.7%) revealed that they experience a general feeling of discomfort when they contract malaria. Headache was indicated as another symptom from 174 (64.0%). Nausea and vomiting were revealed as symptoms by 134 respondents (49.3%) when they contract malaria. While 84 respondents (30.9%)

experience diarrhea during malaria episodes, 85 (31.3%) report that they experience abdominal pain when affected by the disease. Moreover, 170 respondents (62.5%) indicated muscle or joint pain as a symptom of malaria. Lastly, only 45 respondents (16.5%) revealed other symptoms of malaria such as loss of appetite and dizziness.

Table 4.0.5: What are some of the symptoms of malaria?

Fever	Frequency	Percent
Yes	181	66.5
No	91	33.5
Total	272	100.0
Chills	Frequency	Percent
Yes	182	66.9
No	90	33.1
Total	272	100.0
General feeling of discomfort	Frequency	Percent
Yes	157	57.7
No	115	42.3
Total	272	100.0
Headache	Frequency	Percent
Yes	174	64.0
No	98	36.0
Total	272	100.0
Nausea and vomiting	Frequency	Percent
Yes	134	49.3
No	138	50.7
Total	272	100.0
Diarrhea	Frequency	Percent
Yes	84	30.9
No	188	69.1
Total	272	100.0
Abdominal pain	Frequency	Percent
Yes	85	31.3
No	187	68.8
Total	272	100.0
Muscle or joint pain	Frequency	Percent
Yes	170	62.5
No	102	37.5

Total	272	100.0
Other	Frequency	Percent
Yes	45	16.5
No	227	83.5
Total	272	100.0

4.3 Respondents' Perceptions about ITNs and Their Usage

The main outcome variable assessed in this study was the usage of ITNs. Respondents' ITN usage was captured through their responses to two items: whether they had ever used an ITN, and whether they slept under one the previous night. These responses were analyzed as binary variables to determine the prevalence of usage and to assess the impact of misinformation, cultural beliefs, and access to information. This dependent variable aligns with the study's overall objective of evaluating the practical effect of these factors on malaria prevention behavior.

This section presents findings on respondents' perceptions about ITNs and their usage in malaria prevention.

4.3.1 Respondents' Awareness of ITNs

Table 4.0.6 below shows respondents' awareness of ITNs. Majority of the respondents, 221 (81.2%) revealed that they have heard about ITNs, while 51 (18.8%) indicated they have not.

Table 4.0.6: Have you heard about Insecticide-Treated Bed Nets (ITNs)?

	Frequency	Percent
Yes	221	81.2
No	51	18.8
Total	272	100.0

4.3.2 Extent of Respondents' Opinion on Using ITNs for Malaria Prevention

Table 4.0.7 below presents the opinion of respondents on the effectiveness of ITNs in preventing malaria transmission. Many of the respondents, 100 (36.8%) indicated that ITNs are very effective for malaria prevention. Also, 81 respondents (29.8%) indicated that ITNs are moderately effective, whilst 33 (12.1%) indicated that ITNs are extremely effective in preventing malaria.

Only 25 (9.2%) of the respondents indicated that ITNs are very ineffective for malaria prevention. Since the mean value (Mean = 3.31, Standard deviation = 1.12) is higher than the central value of 3, it can be implied that the use of ITNs for malaria prevention is effective.

Table 4.0.7: What is your opinion of using ITNs for preventing malaria?

Extent of Opinion	Frequency	Percent
Very Ineffective	25	9.2
Ineffective	33	12.1
Moderately Effective	81	29.8
Very Effective	100	36.8
Extremely Effective	33	12.1
Total	272	100.0
Mean	3.31	
Std. Deviation	1.120	

4.3.3 The Tendency for Respondents to Sleep under ITNs

Table 4.0.8 below shows a cross-tabulation of sleeping under ITNs and the last time of sleeping under the ITNs. From the table, the majority of the respondents, 186 have slept under ITNs before. However, out of the 186 respondents, only 32 (17.2%) slept under ITNs last night, while 51 (27.4%) have not slept under ITNs for over a year. Moreover, 79 of the total respondents indicated they have either not slept under ITNs or are not sure of sleeping under ITNs. These groups of people were categorized as others.

Table 4.0.8: Cross-tabulation of Sleeping under ITNs and Last Time of Sleeping under ITNs
When was the last time you slept under an ITN?

		When was the last time you slept under an ITN?						Total		
		Last night	Last week	Last two weeks	Last months	Six month s	Over a year	Other		
Have you ever slept under an ITN?	Yes	Count	32	21	22	22	33	51	5	186
	% within Have you ever slept under an ITN?		17.2%	11.3%	11.8%	11.8%	17.7%	27.4%	2.7%	100.0%
No	Count		0	0	0	0	0	0	79	79
	% within Have you ever slept under an ITN?		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total	Count		32	21	22	22	33	51	84	265
	% within Have you ever slept under an ITN?		12.1%	7.9%	8.3%	8.3%	12.5%	19.2%	31.7%	100.0%

4.3.4 Relationship between Age and Last Time of Sleeping Under ITNs

Table 4.0.9 below shows a cross-tabulation of the age of respondents and the last time they slept under ITNs. As shown in the table, respondents under 18 years frequently use ITNs, with 14 individuals (24.6%) reporting that they slept under an ITN the previous night, 9 respondents (15.3%) have not used ITNs for over a year, 28 respondents aged 26–35 (53.8%) reported the same. Additionally, 11 respondents aged 36–45 (29.7%) indicated that it has been six months since they last slept under an ITN.

Table 4.0.9: Cross-tabulation of Age and the last time Respondents slept under an ITN

			When was the last time you slept under an ITN?						Total	
			Last night	Last week	Last two weeks	Last month	Six months	Over a year		Other
Age of respondent	Below 18	Count	14	9	3	9	7	9	6	57
		% within Age of respondent	24.6%	15.8%	5.3%	15.8%	12.3%	15.8%	10.5%	100.0%
	18 - 25	Count	5	6	5	3	8	5	2	34
		% within Age of respondent	14.7%	17.6%	14.7%	8.8%	23.5%	14.7%	5.9%	100.0%
	26 - 35	Count	7	1	1	1	7	28	7	52
		% within Age of respondent	13.5%	1.9%	1.9%	1.9%	13.5%	53.8%	13.5%	100.0%
	36 - 45	Count	7	2	2	6	11	6	3	37
		% within Age of respondent	18.9%	5.4%	5.4%	16.2%	29.7%	16.2%	8.1%	100.0%
	46 - 55	Count	4	14	12	10	2	3	1	46
		% within Age of respondent	8.7%	30.4%	26.1%	21.7%	4.3%	6.5%	2.2%	100.0%
	56 and Above	Count	4	6	8	4	8	8	1	39
		% within Age of respondent	10.3%	15.4%	20.5%	10.3%	20.5%	20.5%	2.6%	100.0%
Total		Count	41	38	31	33	43	59	20	265
		% within Age of respondent	15.5%	14.3%	11.7%	12.5%	16.2%	22.3%	7.5%	100.0%

4.4 Misinformation-Related Barriers that Impede the Acceptance and Usage of ITNs

This section presents findings on misinformation-related barriers to respondents' acceptance and usage of ITNs in malaria prevention.

4.4.1 Rumour or Misinformation about ITNs

Table 4.0.10 below indicates respondents' responses about the rumour or misinformation heard about the use of ITNs in the Ashaiman Municipality. A total of 176 respondents (64.7%) reported hearing various rumors or misinformation about ITN usage in their community, while 96 respondents (35.3%) stated that they had not encountered any such rumours.

Table 4.0.10: Have you heard of any rumour or misinformation about ITNs in your community?

	Frequency	Percent
Yes	176	64.7
No	96	35.3
Total	272	100.0

4.4.2 Kinds of Rumours or Misinformation on ITNs Heard by Respondents

Table 4.0.11 below reveals the kinds of rumours or misinformation heard by the respondents about the use of ITNs in malaria prevention. Based on the data presented, 137 respondents (50.4%) reported that they have not heard of sleep discomfort as a common rumour associated with sleeping under ITNs. Conversely, the majority, 179 respondents (65.8%), acknowledged hearing allergic reactions as a rumoured side effect of ITN use. Additionally, 143 respondents (52.6%) affirmed the belief that sleeping under ITNs generates heat. Regarding other misconceptions, 153 respondents (56.3%) did not support the claim that ITNs cause skin rashes, while 228 respondents (83.8%) dismissed the notion that ITNs negatively impact the sexual lifestyle of couples. Furthermore, 194 respondents (71.3%) rejected the perception that malaria or mosquito bites pose a low risk in the Ashaiman Municipality. Beyond these specific misconceptions, 221 respondents (81.3%) reported having heard other rumors related to sleeping under ITNs.

Table 4.0.11: Kinds of Rumours or Misinformation

Sleep discomfort	Frequency	Percent
Yes	135	49.6
No	137	50.4
Total	272	100.0
Allergic reactions	Frequency	Percent
Yes	93	34.2
No	179	65.8
Total	272	100.0
Heat	Frequency	Percent
Yes	143	52.6
No	129	47.4
Total	272	100.0
Skin rashes	Frequency	Percent
Yes	119	43.8
No	153	56.3
Total	272	100.0
Affect the sexual lifestyle of couples	Frequency	Percent
Yes	44	16.2
No	228	83.8
Total	272	100.0
Perceived low risk of malaria or mosquito bites in my community	Frequency	Percent
Yes	78	28.7
No	194	71.3
Total	272	100.0
Other	Frequency	Percent
Yes	51	18.8
No	221	81.3
Total	272	100.0

4.4.3 Main Issues Preventing Community Members' Acceptance of ITNs

Table 4.0.12 below highlights the key factors that have hindered respondents from adopting and using ITNs in the Ashaiman Municipality. The majority, 173 respondents (63.6%), reported that sleeping under ITNs causes discomfort. However, beyond this discomfort perception, most respondents did not face significant barriers to accepting and using ITNs. The belief about

ventilation did not prevent 146 respondents (53.7%) from using ITNs. Similarly, spiritual or religious beliefs did not stop 202 respondents (74.3%) from accepting ITNs. Additionally, the perception of ineffectiveness did not deter 195 respondents (71.7%) from using ITNs, nor did the belief in a low malaria risk prevent 199 respondents (73.2%) from using them. The perception that ITNs cause allergies did not affect 190 respondents (69.9%) in adopting them, and other factors did not prevent 239 respondents (87.9%) from accepting and using ITNs.

Table 4.0.12: Main Issues Preventing the Acceptance of ITNs by the Respondents

Perception of discomfort	Frequency	Percent
Yes	173	63.6
No	99	36.4
Total	272	100.0
Beliefs about ventilation	Frequency	Percent
Yes	126	46.3
No	146	53.7
Total	272	100.0
Spiritual or religious beliefs	Frequency	Percent
Yes	70	25.7
No	202	74.3
Total	272	100.0
Perceived ineffectiveness	Frequency	Percent
Yes	77	28.3
No	195	71.7
Total	272	100.0
Perception of low malaria risk	Frequency	Percent
Yes	73	26.8
No	199	73.2
Total	272	100.0
ITNs cause allergies	Frequency	Percent
Yes	82	30.1
No	190	69.9
Total	272	100.0
Other	Frequency	Percent
Yes	33	12.1
No	239	87.9
Total	272	100.0

4.4.4 Information Sources that Encourage the Acceptance and Usage of ITNs

Table 4.0.13 below outlines the sources of information that motivate respondents to accept and use ITNs. The primary source of information is healthcare providers, followed by NGOs, educational institutions, mass media, and other sources. Among the total respondents, 204 individuals (75.0%) reported that healthcare providers encouraged them to accept and use ITNs. A total of 89 respondents (32.7%) were influenced by NGOs, while 69 respondents (25.4%) were encouraged by educational institutions. Mass media encouraged 102 respondents (37.5%), and 38 respondents (14.0%) received encouragement from other sources.

Table 4.0.13: Information Sources that Encourage ITNs' Usage

Healthcare providers	Frequency	Percent
Yes	204	75.0
No	68	25.0
Total	272	100.0
NGOs	Frequency	Percent
Yes	89	32.7
No	183	67.3
Total	272	100.0
Educational Institutions	Frequency	Percent
Yes	69	25.4
No	203	74.6
Total	272	100.0
Mass media	Frequency	Percent
Yes	102	37.5
No	170	62.5
Total	272	100.0
Other (please specify)	Frequency	Percent
Yes	38	14.0
No	234	86.0
Total	272	100.0

4.4.5 Information about the Benefits of Using ITNs

Table 4.0.14 below presents the respondents' answers regarding the sources from which they received information about the benefits of using ITNs. According to the table, 188 respondents (69.1%) reported having received information from various sources, while 49 respondents (18.0%) stated they had not. Additionally, 35 respondents (12.9%) were uncertain about whether they have received such information.

Table 4.0.14: information about the benefits of using ITNs

	Frequency	Percent
Yes	188	69.1
No	49	18.0
Not Sure	35	12.9
Total	272	100.0

4.4.6 Benefits of Using ITNs Received from the Information Sources

Table 4.0.15 below presents the benefits of using ITNs as reported by the respondents who received information on their advantages. Out of the 188 respondents, 132 (70.1%) stated that ITNs help prevent malaria transmission, 18 (9.6%) mentioned that ITNs reduce the likelihood of mosquito bites, 13 (6.9%) highlighted that ITNs lower malaria-related deaths among pregnant women and infants, and 12 (6.4%) noted that ITNs are used for malaria control. Additionally, 8 respondents (4.3%) reported that ITNs repel and kill mosquitoes and other insects, while 5 respondents (2.7%) mentioned that using ITNs reduces the cost of treating malaria.

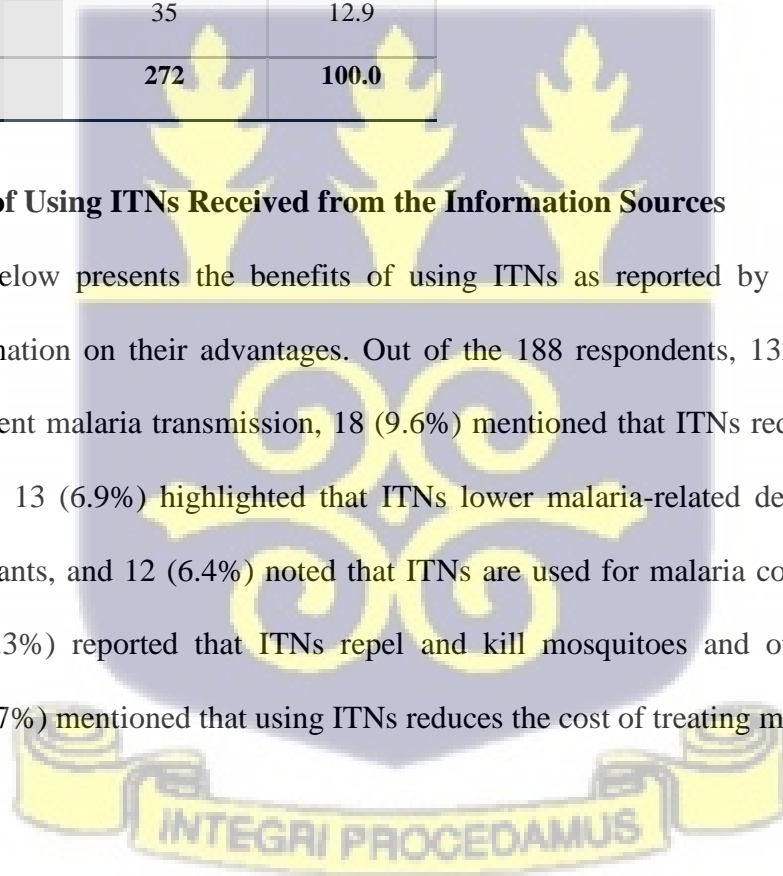


Table 4.0.15: Benefits of using ITNs

	Frequency	Percent
ITNs prevent Malaria	132	70.1
Reduce malaria-related deaths among pregnant women and infants	13	6.9
Decrease the chances of mosquito bites	18	9.6
For malaria control	12	6.4
Reduces the cost of treating malaria	5	2.7
Repels and kills mosquitoes and other insects	8	4.3
Total	188	100.0

4.4.6 Effectiveness of Education Campaigns in Promoting ITNs' Usage

Table 4.0.16 below illustrates the effectiveness of education campaigns aimed at promoting the use of ITNs in the Ashaiman Municipality. Among the total respondents, 115 (42.3%) felt the campaigns were somewhat effective, 71 (26.1%) rated them as very effective, and 43 (15.8%) deemed them ineffective. Additionally, 29 respondents (10.7%) considered the campaigns very ineffective, while 14 (5.1%) described them as extremely effective. Based on the results, with a mean value of 2.99 and a standard deviation of 1.027, which is lower than the midpoint value of 3, it can be concluded that the education campaigns promoting ITN use have not been very effective in the Ashaiman Municipality.

Table 4.0.16: Effective of Education Campaigns in Promoting ITN Usage

	Frequency	Percent
Very Ineffective	29	10.7
Ineffective	43	15.8
Somewhat Effective	115	42.3
Very Effective	71	26.1
Extremely Effective	14	5.1
Total	272	100.0
Mean	2.99	
Std. Deviation	1.027	

4.4.7 Relationship between Education Level and Effectiveness of Education Campaigns of ITNs' Usage

Table 4.0.17 below presents a cross-tabulation of respondents' education levels and their views on the effectiveness of education campaigns promoting the use of ITNs. The table shows that most respondents, regardless of their education level, felt that these education campaigns have been somewhat effective. Specifically, 25 respondents without formal education (43.9%), 26 with primary education (42.6%), 14 with JHS education (35.0%), 19 with SHS education (54.3%), and 22 with tertiary education (44.0%) all agreed that the campaigns promoting ITN usage have had a somewhat positive impact.

Table 4.0.17: Cross-tabulation of Education Level and Effectiveness of Education Campaigns

		How effective do you think community education campaigns are in promoting ITN usage?					Total	
		Very Ineffective	Ineffective	Somewhat Effective	Very Effective	Extremely Effective		
Education Level	No formal education	Count	7	11	25	11	3	57
		% within Education Level	12.3%	19.3%	43.9%	19.3%	5.3%	100.0%
Primary	Count	5	11	26	13	6	61	
		% within Education Level	8.2%	18.0%	42.6%	21.3%	9.8%	100.0%
JHS	Count	6	5	14	13	2	40	
		% within Education Level	15.0%	12.5%	35.0%	32.5%	5.0%	100.0%
SHS	Count	3	2	19	10	1	35	
		% within Education Level	8.6%	5.7%	54.3%	28.6%	2.9%	100.0%
Tertiary	Count	4	6	22	17	1	50	
		% within Education Level	8.0%	12.0%	44.0%	34.0%	2.0%	100.0%
Other	Count	4	8	9	7	1	29	
		% within Education Level	13.8%	27.6%	31.0%	24.1%	3.4%	100.0%
Total	Count	29	43	115	71	14	272	
		% within Education Level	10.7%	15.8%	42.3%	26.1%	5.1%	100.0%

4.4.7 Respondents' Opinion on the Best Way to Share Accurate Information about ITNs

Table 4.0.18 below outlines respondents' views on the most effective ways to disseminate accurate information about ITN usage in the Ashaiman Municipality. According to the table, most respondents believe that healthcare facilities, community health workers, and mass media are the best channels for sharing accurate ITN information. Other methods, such as educational workshops, seminars, and social media, were considered but not overwhelmingly supported by respondents. Specifically, 181 respondents, or 66.5%, agreed that healthcare facilities and community health workers should be the primary sources for sharing accurate ITN information. A total of 84 respondents (30.9%), believed that educational workshops and seminars could serve as effective platforms for this purpose. Additionally, 155 respondents, or 57.0%, indicated that mass media are a suitable medium for conveying ITN-related information. One hundred and nine respondents (109), accounting for 40.1%, suggested social media platforms as a means to share accurate ITN information. Finally, 40 respondents (14.7%), proposed other platforms for disseminating this information, aside from those previously mentioned.

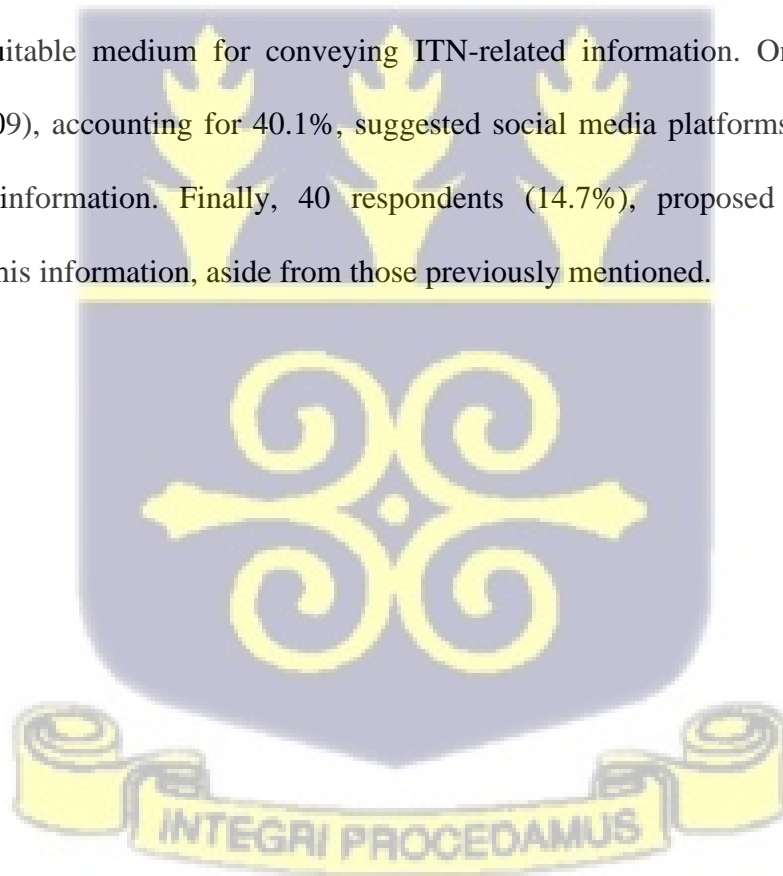
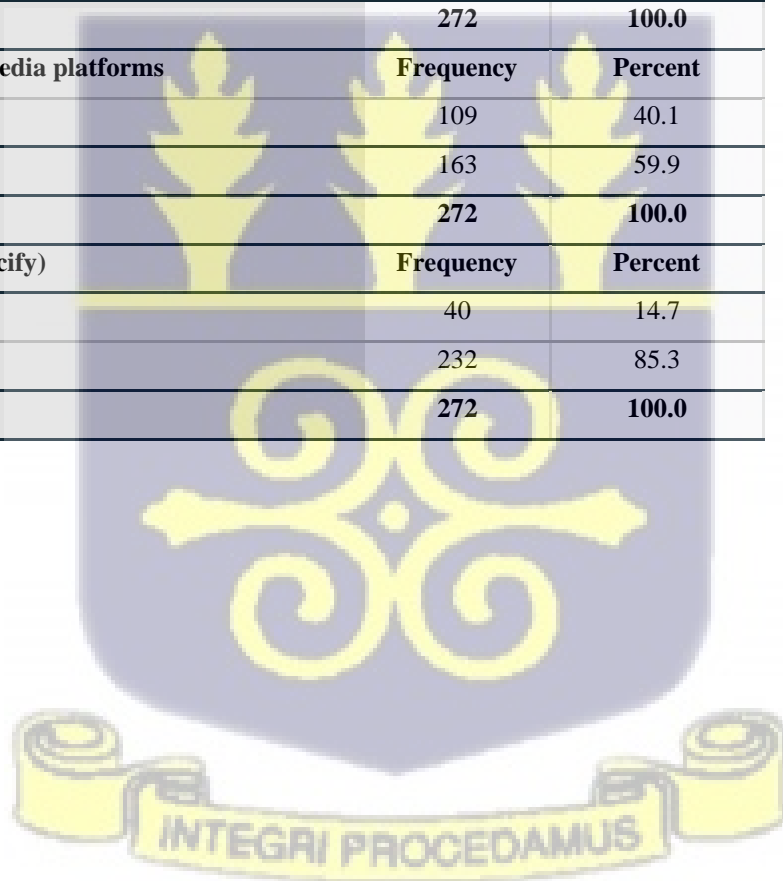


Table 4.0.18: Best Way to Share Accurate Information about ITNs Through healthcare facilities and community

health workers	Frequency	Percent
Yes	181	66.5
No	91	33.5
Total	272	100.0
Through educational workshops and seminars	Frequency	Percent
Yes	84	30.9
No	188	69.1
Total	272	100.0
Through mass media campaigns (TV, radio, newspapers)	Frequency	Percent
Yes	155	57.0
No	117	43.0
Total	272	100.0
Through social media platforms	Frequency	Percent
Yes	109	40.1
No	163	59.9
Total	272	100.0
Other (please specify)	Frequency	Percent
Yes	40	14.7
No	232	85.3
Total	272	100.0



CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

The current study assessed the misinformation-driven barriers to insecticide-treated net usage in the Ashaiman Municipality of the Greater Accra Region. Specifically, the study assessed the level of knowledge of community members about malaria and its transmission, the perception of community members about ITN and its usage, misinformation-related barriers that impede the acceptance and usage of ITNs, and the extent of effectiveness of education campaigns in promoting ITNs usage in the municipality. As a result, this chapter presents a discussion of the study's results in relation to the literature that was reviewed. The findings are discussed to either support or not support the empirical studies that were reviewed as literature. Accordingly, the discussion of the findings is presented based on the research questions that were raised in the study. The following are the research questions of the study.

1. What is the level of knowledge of community/household members about malaria and its transmission?
2. What are the perceptions of community/household members about ITNs and their usage?
3. What are the misinformation barriers impeding the acceptance and usage of ITNs among household members in the district?
4. To what extent do community or household members perceive the effectiveness of education campaigns in increasing their knowledge of malaria and its transmission?

5.1 Knowledge of Malaria Transmission

The study investigated the knowledge of community and household members in the Ashaiman Municipality regarding malaria and its transmission. Findings revealed a generally high level of awareness among respondents, with nearly all participants accurately identifying mosquito bites as the cause of malaria. Additionally, most respondents demonstrated familiarity with key

symptoms such as fever and chills, indicating a solid understanding of the disease and its clinical presentation.

These findings are consistent with previous studies conducted in high-transmission settings. For example, Dambhare et al. (2012) reported that 84.7% of adolescents in rural India had heard of malaria, with 69.8% correctly identifying mosquitoes as the vector. Similarly, Manana et al. (2018), in their assessment of knowledge, attitudes, and practices related to malaria in KwaZulu-Natal, South Africa, found that 99% of participants recognized mosquito bites as the primary means of transmission. A more recent survey by Lopez and Brown (2023) in Ghana's Eastern Region further supports this trend, reporting that 85.4% of adults attained high malaria knowledge scores. Collectively, these findings suggest that sustained public health education campaigns have been effective in disseminating foundational knowledge about malaria in various endemic settings.

A noteworthy aspect of the present study was its examination of the relationship between respondents' educational attainment and their knowledge of malaria. Contrary to common assumptions, the data showed no significant association between formal education level and knowledge of malaria transmission. More than 90% of respondents, regardless of educational background, correctly identified mosquito bites as the cause of malaria. This contrasts with findings from studies such as Aragie (2020), which reported that lower levels of education in rural Ethiopia were associated with greater knowledge gaps and misconceptions. The divergence likely reflects contextual differences. Ashaiman, being a peri-urban area with relatively high literacy rates and widespread media exposure, offers residents greater access to health information through schools, clinics, and mass media. Ghana's long-standing malaria control programs, which include school-based initiatives and radio messaging, may also contribute to the diffusion of accurate information across all demographic groups. In contrast, Aragie's study was conducted in a remote

rural district where access to health information may be limited and more dependent on interpersonal communication, thus amplifying the role of formal education.

In terms of symptom recognition, respondents in Ashaiman commonly cited fever, chills, headaches, and body aches—symptoms that align with the clinical presentation of malaria. Approximately half of the sample identified fever as a key symptom, echoing the findings of Dambhare et al. (2012), who reported that 51% of adolescents in India recognized fever as indicative of malaria. A smaller proportion of respondents mentioned gastrointestinal symptoms such as vomiting and diarrhea, which, while less classic, are still plausible manifestations of the disease.

Overall, the results underscore a strong baseline of malaria knowledge among Ashaiman residents. However, as discussed in subsequent sections, awareness alone does not necessarily translate into consistent adoption of preventive practices, highlighting the need to address behavioral and structural barriers to effective malaria control.

5.2 Perceptions and Reported Use of ITNs

The dependent variable, actual usage of ITNs, served as a focal point for this section of the analysis, providing a measurable outcome through which to examine how individual perceptions, shaped by misinformation and socio-demographic factors, influence malaria prevention behaviors. The study investigated residents' perceptions of ITN use in Ashaiman Municipality and compared these with their reported usage patterns. While the majority of respondents acknowledged the effectiveness of ITNs in preventing malaria and had used them at some point, fewer reported consistent, nightly use. This gap between awareness and sustained practice mirrors findings from previous research. For instance, Orji et al. (2018) reported that although over 90% of Nigerian caregivers were aware of the protective benefits of ITNs, only 52.4% used them every night. Similarly, in the current study, high levels of ownership and favorable attitudes toward ITNs did

not necessarily translate into routine usage. This pattern, widespread access and general approval, yet inconsistent use, is echoed in other African contexts. Ekeleme et al. (2023), for example, found that although rural Nigerian communities believed in the efficacy of ITNs, actual usage fluctuated based on variables such as age and perceived comfort.

Age and marital status emerged as significant predictors of ITN usage. In this sample, respondents under the age of 18 were the most consistent users, while middle-aged and older adults reported lower usage rates. This aligns with previous findings, including those by Orji et al. (2018), who noted that mothers were particularly diligent in ensuring their under-five children slept under ITNs. In Ashaiman, married individuals were more likely to have nets hanging in their homes compared to unmarried participants. This trend is consistent with observations from the Ashanti Region of Ghana, where Ladu et al. (2024) found higher net usage among older, married couples. In contrast, single young adults were less likely to use ITNs regularly, potentially due to a lower perceived vulnerability to malaria. These behavioral patterns may reflect the emphasis of national health campaigns, which often target children and pregnant women as high-priority groups for malaria prevention.

A divergence in risk perception was also noted. A notable subset of participants in Ashaiman believed that the risk of contracting malaria in their immediate environment was low. This perception, “not much malaria here” is uncommon in high-endemic rural settings but has been observed in semi-urban areas with improved access to healthcare. Supporting this, Doe et al. (2024) documented a decline in ITN usage in communities where reduced mosquito presence led residents to underestimate their malaria risk. In the present study, the availability of alternatives such as ceiling fans, mosquito coils, and aerosols may have contributed to a sense of complacency among some respondents.

Overall, the findings reflect a familiar regional narrative: high awareness of ITNs and general approval of their benefits, yet inconsistent, context-dependent use. Differences in usage patterns based on education, age, or marital status can often be attributed to local contextual factors such

as urban versus rural settings and the specific focus of health promotion campaigns. Notably, persistent barriers, such as discomfort and inaccurate risk perception, highlight critical areas for intervention in efforts to improve ITN uptake and sustained usage.

5.3 Misinformation as a Barrier to ITN Use

A key and novel contribution of this study is the identification of specific forms of misinformation and belief systems that limit the use of ITNs. Respondents cited a variety of rumors and misconceptions regarding ITNs, including concerns that nets cause excessive heat and discomfort during sleep, trigger rashes or itching, or require unpleasant fumigation before use. These concerns reflect widely documented barriers to ITN utilization. For example, both Pulford et al. (2011) and Doe et al. (2024) have noted that heat entrapment and the chemical smell of treated nets are among the most reported deterrents. Similarly, a recent scoping review of Ghanaian ITN literature identified heat during warm weather, strong odors, and skin irritation as persistent disincentives to consistent net use (Doe et al., 2024). Participants in the present study echoed these findings, with many citing discomfort, particularly excessive heat and itching, as major reasons for avoiding net use.

Beyond these well-known issues, the study also uncovered less commonly reported misconceptions. Some older men and women expressed fears that ITN use could interfere with marital intimacy or reduce sexual passion, while others mentioned spiritual concerns, such as the belief that nets could disturb local spirits. Although such beliefs have not been widely reported in mainstream ITN surveys, a few qualitative studies have identified similar rumors. For instance, Chuma et al. (2010) found that the white color of nets in Kenya was associated with death rituals, prompting avoidance, while Yirsaw (2021) documented seasonal myths in Ethiopia (e.g., “no malaria in the dry season”) that influenced net use. The "sexual lifestyle" belief encountered in the current study may represent a culturally specific variant of these broader social myths. That such concerns emerged in Ashaiman, but not in many other studies, could be due to the unique

sociocultural context of the area or the relative openness of urban residents in discussing sensitive topics. These findings suggest that even in communities where awareness campaigns are frequent, localized and idiosyncratic fears may continue to undermine intervention uptake.

Another significant finding was the widespread perception of low malaria risk in certain neighborhoods, which also discouraged net use. Several respondents stated that they had not experienced malaria in recent months or seasons and therefore perceived ITNs as unnecessary. This reflects a misconception that undermines perceived susceptibility, an important determinant of preventive behavior. Similar patterns have been observed in other studies: Ladu et al. (2024) reported that perceived low malaria risk was a common reason for net avoidance in Ghana, while Pulford et al. (2011) ranked low mosquito density as the second most cited reason for non-use, following heat discomfort. The current study highlights a persistent gap between factual knowledge and practical behavior: although most participants understood that mosquitoes transmit malaria, some inferred that a temporary absence of mosquitoes or malaria cases meant they were not at risk, a flawed belief in endemic settings like Ashaiman.

These findings collectively underscore the role of misinformation and misperceptions, whether widespread or held by a vocal minority, in discouraging ITN use. Importantly, the results highlight that factual knowledge about malaria transmission, which was relatively high among participants, is not sufficient to ensure preventive behavior. False beliefs, social rumors, and subjective experiences act as perceptual barriers. This aligns with established theoretical frameworks such as the Health Belief Model, which emphasizes that perceived barriers and self-efficacy critically shape health behavior. In this study, dominant perceived barriers were directly influenced by misinformation (e.g., discomfort, ineffectiveness, or cultural taboos), reinforcing the theoretical argument that effective behavior change interventions must go beyond knowledge dissemination to address specific misconceptions.

Comparative evidence from other settings supports this conclusion. A recent study in Malawi identified misinformation, alongside access and durability issues, as a major factor influencing ITN use (Benito et al., 2024). During the COVID-19 pandemic, some communities in Tanzania reportedly circulated false claims that insecticide-treated nets could transmit the virus or cause infertility (Kihwele et al., 2025). While such examples may seem tangential, they illustrate how misinformation can flourish in the absence of clear and context-specific health communication. The Ashaiman findings add valuable insight by documenting the local content of such rumors, particularly those not frequently addressed in national campaigns.

Ultimately, these results reinforce the idea that the success of ITN interventions cannot be measured solely by distribution metrics. Community beliefs, both accurate and distorted, play a central role in shaping behavioral outcomes. While many of the concerns identified mirror those in other countries, the specific content of the myths, such as fears about marital intimacy, reflects cultural particularities that demand locally adapted communication strategies. Furthermore, the study's urban setting and its deliberate inclusion of questions about rumors may have contributed to the emergence of these unique findings, highlighting the importance of study design in capturing community perceptions.

5.4 Effectiveness of Education Campaigns

The study explored residents' perceptions of the effectiveness of educational campaigns in promoting the use of ITNs in the Ashaiman Municipality. Overall, respondents expressed the view that malaria education campaigns are helpful; however, many believed that current efforts are inadequate in countering widespread misinformation. A significant majority identified health centers, community health workers, and mass media as the most trusted sources for accurate information on ITNs. This perception is consistent with existing literature suggesting that multifaceted health communication strategies are more effective in promoting behavior change.

Supporting this, a meta-analysis by Onyinyechi et al. (2023) demonstrated that health education interventions across sub-Saharan Africa significantly improved malaria knowledge and ITN utilization. Communities that received targeted education interventions had higher odds of ITN use compared to control groups, reinforcing the value of structured educational initiatives. Nevertheless, the review also noted that the overall effect size was moderate, suggesting that while education plays a critical role, it is not uniformly transformative without appropriate depth, frequency, and contextual relevance.

The findings from the present study reinforce the best practice recommendations, notably that ITN promotion should leverage health facilities, radio programming, and community-based outreach. Ghana's national "Aha Ye De" campaign exemplifies this approach, using mass media and local outreach to reach over 80% of its intended audience and significantly reducing the proportion of individuals who believed that ITNs are unnecessary (The Communication Initiative Network, 2015). Similarly, other studies have shown that communication strategies incorporating mass media, local drama, and interpersonal engagement outperform singular, isolated messages in changing attitudes and behaviors.

Despite this, evidence from Ashaiman suggests that current campaigns may not fully address local information needs. Participants advocated for more interactive formats such as workshops, seminars, and the integration of social media, especially among younger populations. The emphasis on involving community health workers underscores a well-documented strategy: health messages are more persuasive when delivered by trusted local figures. In several settings, the involvement of community health volunteers has significantly improved net usage and hanging practices.

Interestingly, these findings diverge somewhat from those of Ezezika et al. (2022) in Tanzania, where focused ITN education sessions, often complemented by direct household follow-ups, yielded high levels of behavioral uptake. By contrast, respondents in Ashaiman rated their local

campaigns as only "somewhat effective." Several factors may explain this discrepancy, including differences in campaign frequency, specificity, and audience targeting. While Ezezika et al. (2022) concentrated on expectant mothers and involved intensive, personalized engagement, Ashaiman's efforts may have been more generic and sporadic. Moreover, persistent local myths surrounding ITN use may limit the impact of broad-based messaging, underscoring the need for targeted, context-specific interventions.

Collectively, the evidence suggests that educational campaigns do contribute meaningfully to ITN use, but their success hinges on being continuous, theory-informed, and tailored to the sociocultural realities of the target population. Onyinyechi et al. (2023) emphasize that interventions rooted in behavioral science frameworks tend to yield the most substantial results. In practice, this implies that Ghana's malaria control strategy should incorporate these insights by designing communication efforts that directly address prevalent myths, such as concerns about heat or discomfort, and promote positive narratives, such as testimonials from satisfied users. Employing culturally resonant messaging, local languages, and repeated exposure across multiple platforms will likely enhance the effectiveness and sustainability of ITN uptake in Ashaiman and beyond.

5.5 Practical Implications and Recommendations

The findings of this study carry significant implications for malaria control efforts in Ashaiman and comparable urban settings. While knowledge of ITNs was generally high among participants, consistent use remains suboptimal due to persistent misconceptions, discomfort, and sociocultural barriers. These insights underscore the need for comprehensive, context-sensitive interventions that go beyond net distribution to address behavioral and perceptual barriers. The following strategic recommendations emerge from the data:

1. Strengthen Community-Based Health Education

Health authorities, non-governmental organizations (NGOs), and development partners should prioritize training for community health workers, clinic staff, and volunteers to deliver clear, accurate, and culturally appropriate information on ITNs. Educational interventions must explicitly counter prevalent myths, for example, by clarifying that ITNs are safe and by demonstrating techniques to reduce discomfort. Evidence from the current study, supported by prior research (Pulford et al., 2011; Doe et al., 2024), suggests that health messages are more effective when conveyed by trusted local figures through widely accessible media channels. Engaging communication methods such as drama, songs, and community testimonials can further enhance message acceptance and recall.

2. Develop Targeted Myth-Busting Campaigns

The study highlights the value of responsive communication strategies that identify and directly address emerging rumors. Periodic community surveys or social listening tools can help detect misconceptions in real time. Based on these insights, tailored “myth versus fact” campaigns, delivered via radio talk shows, community forums, or targeted outreach, can help dispel misinformation. For instance, specific concerns such as ITNs affecting marital intimacy could be addressed through separate educational sessions for couples. Partnering with respected community and religious leaders to deliver accurate messages can lend credibility and foster trust.

3. Adapt ITN Design and Distribution Strategies

Given that discomfort due to heat and limited space were recurrent concerns, malaria control programs should consider piloting ITNs with user-centered designs. This may include producing nets made from lighter, more breathable materials, larger sizes for family use, and designs that facilitate improved air circulation. Ensuring consistent availability of replacement nets is equally important, as shortages often lead to the reuse of worn-out nets, reducing efficacy. Health

facilities should also provide practical demonstrations on correct net hanging and maintenance during distribution to improve the user experience.

4. Apply Theory-Driven Behavior Change Approaches

The application of established behavioral theories, such as the Health Belief Model, can enhance the effectiveness of malaria interventions. Strategies that increase perceived susceptibility (e.g., highlighting ongoing malaria risks even in the absence of recent cases) and emphasize perceived benefits (e.g., showcasing healthy children protected by nets) can strengthen motivation. Prior studies (Onyinyechi et al., 2023) indicate that interventions grounded in behavioral theory and social marketing principles significantly improve ITN adoption. It is therefore recommended that policymakers integrate these models into the design and delivery of behavior change campaigns.

5. Promote Multi-Sectoral Collaboration

Following WHO guidance, Ghana's malaria control strategy should engage multiple sectors, including education, technology, and media. For example, incorporating malaria education into school curricula and using mobile platforms (e.g., SMS, WhatsApp) to disseminate prevention tips can broaden outreach. In addition, social media, particularly platforms popular among local youth, can be leveraged to amplify evidence-based messages and counteract viral misinformation.

6. Establish Robust Monitoring and Evaluation Mechanisms

To ensure accountability and adaptability, health authorities should consider implementing systems for continuous monitoring of community beliefs and behaviors related to ITNs. Mechanisms such as periodic household surveys, community feedback sessions, or suggestion boxes can help track the impact of interventions and identify emerging issues. This allows timely adjustments to programs and reinforces a responsive, evidence-based approach.

From a theoretical perspective, these findings reaffirm that the availability of ITNs alone is insufficient to ensure their consistent use. The persistence of perceived barriers, such as

discomfort, inconvenience, and fear, despite widespread awareness, highlights the critical role of health behavior theories. Interventions that directly reduce these barriers and enhance individuals' confidence in their ability to use ITNs correctly (i.e., self-efficacy) are likely to be the most effective.

In conclusion, malaria control in Ashaiman would benefit from integrated, multi-level communication strategies that combine reliable net access with continuous community engagement, myth correction, and supportive behavioral interventions. By aligning policy and practice with these findings, health authorities and partner organizations can enhance the reach and effectiveness of current programs and move closer to achieving universal ITN coverage and usage in malaria-endemic settings.



CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the Study

This study investigated the misinformation-driven barriers affecting the usage of ITNs in the Ashaiman Municipality, Greater Accra Region. Malaria remains a significant public health challenge in Ghana, despite ongoing interventions such as ITN distribution. While ITNs are proven to be an effective preventive measure, their usage remains suboptimal in many communities. The study aimed to assess community knowledge about malaria transmission, perceptions of ITNs, and the influence of misinformation on ITN adoption. Additionally, it examined the effectiveness of educational campaigns in promoting ITN use within the municipality.

The study revealed that although residents of Ashaiman generally understood malaria transmission and recognized ITNs as effective preventive tools, misinformation posed a major barrier to widespread adoption. Key misconceptions included concerns about ITN-induced heat, sleep discomfort, allergic reactions, and even beliefs that ITNs could negatively impact couples' sexual lifestyles. Additionally, some residents perceived a low risk of malaria in their communities, further discouraging consistent ITN use. Age differences also influenced ITN utilization, with children under 18 being the most consistent users, while adults aged 26–35 reported significantly lower usage rates.

Findings from the study highlighted that healthcare providers were the most trusted sources of information on ITN usage, followed by NGOs, educational institutions, and mass media. However, the effectiveness of ITN education campaigns was perceived as only moderate, suggesting a need for improved strategies. The study employed a cross-sectional quantitative approach, collecting data from 272 residents through structured questionnaires. Analysis of the

responses indicated that addressing misinformation and enhancing awareness through trusted sources could significantly improve ITN adoption rates in the municipality.

Misinformation remains a critical obstacle to ITN acceptance and usage in Ashaiman, necessitating targeted interventions to counter false beliefs. Enhancing education through healthcare facilities, community health workers, and mass media was recommended as the most effective strategy for promoting ITN use. The study emphasized that addressing misinformation could improve malaria prevention efforts, ultimately reducing the disease burden and its economic impact on both households and the broader healthcare system.

6.2 Conclusions of the Study

This study investigated the role of misinformation in shaping perceptions and behaviors related to ITN usage among residents of Ashaiman Municipality. The findings reveal that despite high awareness of malaria transmission and ITN availability, misinformation, such as beliefs that ITNs cause heat, discomfort, skin irritation, or interfere with sexual activity, remains a significant barrier to consistent use. These false perceptions, combined with a reduced sense of malaria risk, contribute to low adherence despite widespread access.

Regarding the study's objectives, the results show that:

1. Knowledge of malaria is relatively high.
2. ITNs are perceived positively in theory but face practical resistance in practice.
3. Misinformation fueled by rumors, inadequate engagement, and cultural narratives directly impedes ITN adoption.
4. Health education campaigns, though moderately effective, require enhancements in content delivery and community trust-building to improve ITN uptake.

These findings contribute to the broader understanding of how misinformation acts as a behavioral determinant in public health intervention adherence. They also underscore the need for

communication strategies that go beyond awareness to address emotional, cultural, and social dimensions of belief.

This study reinforces that ITN distribution alone is not sufficient. Public health programs must prioritize behavior-centered communication and theory-driven interventions (e.g., Health Belief Model) to bridge the gap between knowledge and action. While the findings are context-specific, they offer transferable insights for malaria control programs in similar urban, high-burden environments.

Limitations of the study include its reliance on self-reported behavior, which may be subject to social desirability bias, and its cross-sectional design, which limits causal inference. Future research should explore longitudinal data and qualitative insights to deepen understanding of belief persistence and misinformation spread in urban malaria-endemic settings.

6.3 Recommendations

Based on the study's findings, the following evidence-informed recommendations are proposed:

6.3.1 Recommendations for Policy and Practice (GHS)

1. **Develop targeted misinformation response strategies**, identify prevalent ITN-related myths through regular community assessments, and design myth-debunking materials tailored to specific groups (e.g., couples, youth, traders).
2. **Strengthen community-based education**, train community health volunteers and local influencers to deliver accurate, culturally sensitive ITN messages using storytelling, drama, and testimonials. Prioritize trusted sources like healthcare providers and religious leaders to enhance credibility.
3. **Redesign ITNs for comfort and usability**, explore alternatives such as lighter, breathable materials and larger nets suited for urban housing. Pilot these user-friendly nets in Ashaiman and assess community feedback.

4. **Improve health communication strategies**, ground malaria messaging in behavioral theories like the Health Belief Model to enhance perceived risk and self-efficacy. Highlight both personal and collective benefits of ITN use.
5. **Leverage digital and non-traditional media**, utilize mobile platforms (SMS/WhatsApp), local radio, and social media to deliver consistent and engaging ITN messages, especially among youth and mobile populations.
6. **Integrate ITN training into routine care**, At ANC, CWC, and OPD services, demonstrate correct ITN hanging and maintenance, and directly address common concerns through short counseling sessions.

6.3.2 Recommendations for Future Research

Future research should explore the underlying psychosocial factors contributing to ITN refusal through in-depth qualitative studies. These investigations should examine the role of peer norms, gender dynamics, and the influence of social media in shaping perceptions and behaviors around ITN use. Additionally, it is recommended that future studies assess the effectiveness of targeted communication interventions, particularly those grounded in behavioral theories and designed to counter misinformation, in improving ITN uptake and consistent usage. Such research will provide valuable insights for the development of evidence-based strategies to enhance malaria prevention efforts.



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APPENDICES

Appendix A: Respondents Information Sheet

Title of Study:

Misinformation-Driven Barriers to Insecticide-Treated Bed Net Usage in the Ashaiman Municipal

Introduction:

You are invited to participate in a research study conducted by Emmanuel Cephas Apronti, a Master of Public Health Student of the School of Public Health, University of Ghana. This study aims to understand the barriers to the usage of insecticide-treated bed nets (ITNs) in Ashaiman Municipal, with a specific focus on how misinformation influences these barriers.

Purpose of the Study:

The primary goal of this study is to identify and analyze the misinformation that affects the usage of ITNs and to explore how this misinformation creates barriers to their effective use in preventing malaria.

Procedures:

If you agree to participate in this study, you will be asked to complete a survey that will take approximately 10 minutes. This survey will include questions designed to assess your knowledge and beliefs about insecticide-treated bed nets (ITNs). Additionally, the survey will explore both barriers and enablers related to misinformation about ITNs, as well as your sources of information on this topic. Finally, you will be asked about your personal experiences with using ITNs to better understand how misinformation might influence their usage.

Voluntary Participation:

Your participation in this study is entirely voluntary. You may choose to withdraw from the study at any time without any consequences.

Confidentiality:

All information collected in this study will be kept confidential. Your responses will be anonymized, and no personally identifiable information will be shared in any reports or publications resulting from this study.

Risks and Benefits:

There are no significant risks associated with participating in this study. However, you may feel uncomfortable answering some questions. You are free to skip any questions you do not wish to answer.

While there may be no direct benefit to you, your participation will contribute to a better understanding of the challenges to ITN usage and may help improve public health interventions in the future.

Contact Information:

If you have any questions about the study, please feel free to contact:

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Social and School of Public Health

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If you wish to seek further information concerning ethical issues and rights as participants, you can kindly call:

Nana Abena Apatu

Administrator,

Ghana Health Service Ethics Review Committee

Tel: +233503539896

By signing below, you acknowledge that you have read and understood the information provided above and agree to participate in this study.

Participant's Name:

Signature:

Date:



Appendix B: Informed Consent for Respondents

Participant Unique ID: _ / _ / _ /

PARTICIPANTS' STATEMENT

I have read and understood the information provided in the Participant Information Sheet for the study titled "Misinformation-Driven Barriers to Insecticide-Treated Bed Net Usage in the Ashaiman Municipal." I have been allowed to ask questions about the study and my participation. I understand that my participation is voluntary and that I can withdraw from the study at any time without any consequences. I also understand that all information I provide will be kept confidential and used only for this research.

By signing below, I consent to participate in this study and agree to the procedures described.

Participant's Name:

Signature/Thumbprint:

Date:

Medium of Communication:

Read by self

Read and interpreted by interviewer/interpreter

Consent through a witness

Witness Details

I, _____, was present when this study was explained to
_____. I can attest that this interviewee voluntarily
agreed to participate in the study.

Witness Signature: _____

Date: _____

Interpreter Details

I, _____, read and interpreted the consent form in (Ga/Adangbe/Ewe/Akan/Hausa) to _____, who voluntarily agreed to participate in the study.

Interpreter Signature: _____

Date: _____

Witness Statement

I was present when the purpose and contents of the Participant Information Sheet were read and explained satisfactorily to the participant in the language they understood. I confirm that they were given the opportunity to ask questions and seek clarifications, which were duly answered to their satisfaction before voluntarily agreeing to be part of the research.

Name: _____

Signature/Thumb Print: _____

Date: _____

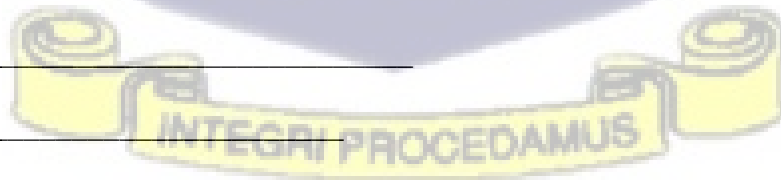
Investigator Statement and Signature

I certify that the participant/respondent has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's Name: _____

Signature: _____

Date: _____



5. Very Good []
6. How is malaria primarily transmitted to humans?
1. Through contaminated food and water []
 2. Through the bite of infected mosquitoes []
 3. Through sexual contact []
 4. Through respiratory droplets []
 5. Other (Specify)
7. What are some of the symptoms of malaria? **Choose all that apply**
1. Fever []
 2. Chills []
 3. Headache []
 4. Nausea and vomiting []
 5. Diarrhea []
 6. Abdominal pain []
 7. Muscle or joint pain []
 8. General feeling of discomfort []
 9. Other (Specify)

Section C: Perception about Insecticide-Treated Bed Nets (ITNs)

8. Have you heard about Insecticide-Treated Bed Nets (ITNs)?
1. Yes []
 2. No []
9. What is your opinion of using ITNs for preventing malaria?
1. Very Ineffective []
 2. Ineffective []
 3. Moderately Effective []
 4. Very Effective []
 5. Extremely Effective []
10. Have you ever slept under an ITN?
1. Yes []
 2. No []

11. When was the last time you slept under an ITN?

1. Last night []
2. Last week []
3. Last two weeks []
4. Last month
5. Six months ago []
6. Over a year []
7. Other (please specify):.....

Section D: Misinformation-Related Barriers

12. Have you heard of any rumor or misinformation about Insecticide-Treated Net Bed Nets (ITNs) in your community?

1. Yes []
2. No []

13. If yes, please state any misinformation you have heard about ITNs in your community.

Choose all that apply

1. Sleep discomfort []
2. Allergic reactions []
3. Heat []
4. Skin rashes []
5. Affect the sexual lifestyle of couples []
6. Perceived low risk of malaria or mosquito bites in my community []
7. Other (please specify):

14. In your opinion, what are the main issues preventing community members from accepting and using ITNs? Choose all that apply

1. Perception of discomfort []
2. Beliefs about ventilation []
3. Spiritual or religious beliefs []

19. What do you think is the best way to share accurate information about ITNs in your community? **Choose all that apply.**

1. Through healthcare facilities and community health workers []
2. Through educational workshops and seminars []
3. Through mass media campaigns (TV, radio, newspapers) []
4. Through social media platforms []
5. Other (please specify):.....

Thank You



GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-960628
Email: ethics.research@ghs.gov.gh
2nd December 2024

My Ref: GHS/RDD/ERC/Admin/App/24/580
Your Ref. No.

Emmanuel Cephas Apronti
University of Ghana
School of Public Health
P.O. Box LG 13
Legon

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 040/10/24
Study Title	Misinformation-Driven Barriers to Insecticide-Treated Bed Net Usage in the Ashaiman Municipal, Greater Accra Region
Approval Date	2 nd December 2024
Expiry Date	1 st December 2025
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

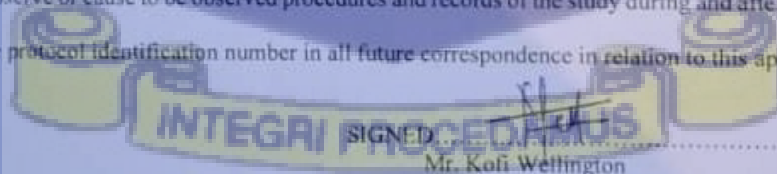
- Submission of a yearly progress reports of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol



SIGNED:
Mr. Kofi Wellington
(GHS ERC Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra



GHANA
HEALTH
SERVICE

REGIONAL HEALTH
DIRECTORATE, GREATER
ACCRA

P.O. BOX 184

ACCRA – GREATER ACCRA

Digital Address: GR-076-0430

Quote this number and date on all
correspondence

My Ref: GHS/GAR/RHD/ORD/24

Your Ref:

Date: 16TH DECEMBER, 2024

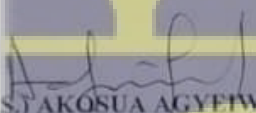
THE MUNICIPAL DIRECTOR OF HEALTH SERVICE
• ASHAIMAN

RE: LETTER OF INTRODUCTION

• EMMANUEL CEPHAS APRONTI

Kindly find an attached letter dated 9th September, 2024 from the Head of Department, Department of Social and Behavioural Sciences, University of Ghana on the above subject matter for your information and necessary support.

Thank you.



DR. (MRS.) AKOSUA AGYEIWAA OWUSU-SARPONG
REGIONAL DIRECTOR OF HEALTH SERVICE
GREATER ACCRA REGION

Cc: Ag. Deputy Director, Clinical Care



Email: rhhs.gar@ghs.gov.gh

Tel: 0302248997

Website:

ASHAIMAN MUNICIPAL HEALTH DIRECTORATE

In case of reply the number
And the date of this
Letter should be quote

My Ref No: GHS/RHD/AMHD/GF/1090

Your Ref:



ASHAIMAN MUNICIPAL HEALTH
DIRECTORATE
GHANA HEALTH SERVICE

P. M. B.
ASHAIMAN
Tel: (0303) 308896

26TH DECEMBER, 2024

THE MEDICAL SUPERINTENDENT:
ASHAIMAN MUNICIPAL HOSPITAL
COMMUNITY 22 POLYCLINIC

ALL FACILITY/SUB-MUNICIPAL HEADS
ASHAIMAN MUNICIPALITY

LETTER OF INTRODUCTION

MR. EMMANUEL CEPHAS APRONTI- STUDENT

This is to introduce to you the above named student from the Department of Social and Behavioral Sciences, University of Ghana, who has my instructions to do his research on the topic "Misinformation-Driven Barriers to Insecticide-Treated Bed Net in the Ashaiman Municipality, Greater Accra Region."

He would need your support in your facility to enable him to carry out his research work.

You are kindly requested to report his performance to this Office in due course.

Thank you.

MRS. DZATSUI KORLEY
DEPUTY DIRECTOR OF PHARMACEUTICAL SERVICES
FOR: MUNICIPAL DIRECTOR OF HEALTH SERVICES
ASHAIMAN MUNICIPAL

