

**ASSESSMENT OF THE KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS
MALARIA PREVENTION AMONGST UNDERGRADUATE STUDENTS OF THE
UNIVERSITY OF BENIN**



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**A PROJECT SUBMITTED TO THE DEPARTMENT OF CLINICAL PHARMACY AND
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CERTIFICATION

This is to certify that this project work was carried out by **SIMON-EIGBE ESEOSE ETHEL** with Matriculation number **PHA1808462** in the Department of Clinical Pharmacy and Pharmacy Practice, University of Benin, Benin City, Edo State.

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DEDICATION

This project work is dedicated to God almighty for his guidance, mercies, direction and provision throughout the course of this study, to my family for their unwavering love and support and encouragement throughout my academic journey, their belief in me has been my greatest motivation and to my friends for being dependable.

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ETHICAL APPROVAL

ABSTRACT

Background: Malaria Prevention refers to all the measures and Strategies aimed at reducing or stopping the transmission of malaria- a life threatening disease caused by plasmodium parasites transmitted through the bite of infected Anopheles mosquitoes. Malaria prevention is typically low and challenging to implement when the danger is deemed low, despite the fact that it is better and less expensive to prevent than to treat. Additionally, people’s educational background and religious preferences are linked to malaria prevention.

Objectives General: To assess the knowledge, attitudes, and practices related to malaria prevention among students of the University of Benin and to identify the factors influencing their adoption of effective preventive measures.

Method: A cross-sectional, descriptive survey. A structured, self-administered questionnaire was completed by 330 Students (100% response rate). Data were coded and analysed in SPSS v21 using descriptive statistics and Chi-square tests; significance set at $p < 0.05$.

Results: 330 respondents participated. Most respondents (56.1%) were between 21–25 years, indicating that the study population was dominated by young adults typical of university students. Respondents demonstrated good knowledge overall, with mean scores ranging from 2.00–2.37 (on a 5-point scale). Most students agreed that using ITNs is effective (G; mean = 1.98) and that malaria prevention is important for health. The respondents’ attitudes towards malaria prevention were found to be moderately positive. Environmental control measures such as clearing bushes or eliminating stagnant water were practiced by some respondents, but again, only a minority engaged in these practices consistently. The ANOVA results revealed statistically significant differences between faculties with regard to knowledge, perception, and attitude. This suggests that academic discipline influences students’ understanding and mindset towards malaria prevention. For example, pharmacy students—due to their scientific background—may have exhibited higher levels of knowledge and more positive attitudes.

Conclusions: Students demonstrated an understanding that malaria is preventable and acknowledged the importance of preventive measures, yet many reported inconsistent use of ITNs and irregular participation in environmental sanitation or malaria testing.

Keywords: Knowledge, Attitudes, Practice, Students, Malaria Prevention, University of Benin Edo State.

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

1.0 Background of the Study

Malaria Prevention refers to all the measures and Strategies aimed at reducing or stopping the transmission of malaria- a life threatening disease caused by plasmodium parasites transmitted through the bite of infected Anopheles mosquitoes. Malaria is still one of the major tropical health issues facing the world today, with an estimated 1.38 billion people at risk of infection. The infectious sickness is spread by female Anopheles mosquitoes carrying the Plasmodium parasite's infectious Sporozoite stage in their salivary glands. The sociodemographic environment and environmental factors both influence the disease's prevalence and the reproduction of female Anopheles mosquitoes (WHO, 2023).

Malaria prevention is typically low and challenging to implement when the danger is deemed low, despite the fact that it is better and less expensive to prevent than to treat. Additionally, people's educational background and religious preferences are linked to malaria prevention. Malaria has, however, recently been prevented using a variety of strategies, with a focus on vector control in recent years (Adebayo *et al.*,2024). Additionally, Sub-Saharan Africa has seen a rise in indoor residual spraying and insecticide-treated nets throughout time, which has decreased the percentage of the population at risk for the disease.

Malaria elimination is defined as the purposeful interruption of local transmission of a particular malarial parasite species in a defined geographical region as a consequence of deliberate operations. As a result, the prevalence of native malaria decreased. The precautions that have been taken to avoid the reestablishment of transmission must be maintained (Ademowu *et*

et al.,2019). The local transmission of all human malaria parasites must be halted before a country may be officially recognised as having eradicated the illness. Until the disease is completely eradicated, precautions against the recurrence of transmission must be taken indefinitely. The elimination and control of the malaria problem depend on having effective surveillance and response systems in place; information systems must become more “granular” to allow for the identification, tracking, classification, and response to each and every case of malaria (both indigenous and imported). For a country to be able to eliminate the disease, its healthcare system must have both capable leadership and the ability to penetrate all of the country’s communities (e.g., with systems to ensure access, track progress, deliver quality services, and rapidly and effectively respond to epidemiological challenges). Knowledge should be generated through operational research on tools, methods, and delivery and used to enhance recommendations and future elimination initiatives.

1.2 Malaria: Definition and Overview

Malaria is a life-threatening disease caused by *Plasmodium* parasites, which are transmitted to humans through the bites of infected female *Anopheles* mosquitoes. Despite being preventable and treatable, malaria continues to pose a significant public health challenge, particularly in sub-Saharan Africa, Asia, and parts of Latin America.

Malaria is defined as an acute febrile illness caused by protozoan parasites of the genus *Plasmodium*. In humans, it is primarily transmitted by the bite of female mosquitoes of the *Anopheles* genus that have been infected through a previous blood meal from a person carrying the malaria parasite (World Health Organisation, 2023).

Causes of Malaria

The disease is caused by infection with protozoan parasites belonging to the genus *Plasmodium*. There are five *Plasmodium* species known to cause malaria in humans, with *Plasmodium falciparum* being the deadliest and most prevalent in sub-Saharan Africa (World Health Organisation, 2023).

1. *Plasmodium falciparum*—the most dangerous and prevalent, especially in Africa. It causes severe malaria and can lead to cerebral complications and death if untreated.
2. *Plasmodium vivax*—More common in Asia and Latin America; known for its ability to cause relapses due to dormant liver stages (hypnozoites).
3. *Plasmodium ovale*—Similar to *P. Vivax* but less common; also causes relapses.
4. *Plasmodium malariae*—Causes a more chronic infection and has a 72-hour replication cycle.

5. *Plasmodium knowlesi*—A zoonotic species found in Southeast Asia; naturally infects macaques but can also infect humans and cause severe illness.

Malaria is primarily transmitted through:

- Mosquito bites: Infected *Anopheles* mosquitoes transfer sporozoites (a stage of the *Plasmodium* parasite) into the human bloodstream during feeding.
- Congenital transmission: From mother to child during pregnancy.
- Blood transfusions and organ transplants: Though rare, malaria can be transmitted through transfused infected blood.
- Needle sharing: Among intravenous drug users.

1.3 Pathogenesis of Malaria

Malaria begins when an infected female *Anopheles* mosquito bites a human and injects sporozoites the infective stage of the *Plasmodium* parasite—into the bloodstream. These sporozoites rapidly travel to the liver, where they invade hepatocytes (liver cells). Inside the liver cells, the parasites undergo asexual reproduction, developing into merozoites over a period of 7–30 days depending on the species. (CDC, 2023)

After the liver phase (also known as the exoerythrocytic stage), the liver cells rupture, releasing thousands of merozoites into the bloodstream. These merozoites then invade red blood cells (RBCs), initiating the erythrocytic cycle. Inside the RBCs, the parasites multiply further, forming trophozoites and then schizonts, which eventually cause the host RBCs to rupture. This cycle of invasion, multiplication, and rupture leads to the classic symptoms of malaria—fever, chills, and

sweating—which recur at regular intervals (typically every 48 or 72 hours depending on the species). (CDC, 2023)

Infections with *P. Vivax* and *P. Ovale* are notable for their ability to form hypnozoites—dormant liver-stage parasites that can reactivate weeks or months later, causing relapses even in the absence of a new mosquito bite.

Some merozoites differentiate into sexual forms called gametocytes, which, if taken up by another mosquito during a blood meal, can continue the transmission cycle in the mosquito’s gut. Inside the mosquito, the gametocytes mature, fertilise, and produce new sporozoites that migrate to the mosquito’s salivary glands—ready to infect another human host.

The pathological effects of malaria result primarily from the destruction of red blood cells and the immune response to the infection. *Plasmodium falciparum*, in particular, can cause severe disease because it leads to cytoadherence—a process where infected red blood cells stick to blood vessel walls, blocking capillaries and leading to complications such as cerebral malaria, renal failure, pulmonary oedema, and metabolic acidosis (Cowman *et al.*, 2016).

1.4 GLOBAL HEALTH BURDEN OF MALARIA

Malaria remains a formidable global health challenge, exerting a significant toll on public health systems, economies, and the lives of individuals in affected regions (Adams *et al.*, 2023; White, 2008). According to the World Health Organization (WHO), malaria accounts for over 200 million cases annually, with more than 600,000 deaths reported each year (WHO, 2020). Alarmingly, a substantial proportion of these deaths occur among vulnerable populations, particularly children under the age of five and pregnant women, who are at heightened risk of

severe disease and mortality due to their compromised immunity (Ferguson, 2023; Aregawi *et al.*, 2022).

Malaria is endemic in 87 countries, with the majority of cases and deaths concentrated in sub-Saharan Africa, which bears over 90% of the global malaria burden (Hay, 2022). Countries such as Nigeria, the Democratic Republic of the Congo, Uganda, and Mozambique report some of the highest malaria-related morbidity and mortality rates (Sachs, 2024). However, the disease also affects parts of Asia, Latin America, and the Middle East, where it contributes to ongoing public health challenges.

The prevalence of malaria in low- and middle-income nations highlights the interconnectedness of poverty and disease (Mabunda, 2020; Gupta, 2024). Limited access to healthcare services, inadequate preventive measures, and poor infrastructure contribute to the persistence of malaria in these regions. The economic burden of malaria exacerbates existing inequalities by draining household incomes and national healthcare budgets, perpetuating a cycle of poverty and ill health (Cecil *et al.*, 2025; Ferguson, 2023).

Malaria poses a significant obstacle to achieving global health objectives, including the United Nations Sustainable Development Goals (SDGs) (Sachs, 2014), which aims to ensure healthy lives and promote well-being for all, explicitly targets the reduction of malaria incidence and mortality (World Health Organization, 2020). Despite progress in malaria control over the past two decades, including a 30% decline in mortality rates, the fight against malaria is far from over (Baird, 2018; White, 2008). Emerging challenges such as drug resistance, insecticide resistance, and climate change threaten to reverse these gains, requiring sustained efforts and innovation to achieve elimination goals.

In endemic regions, malaria is a leading cause of hospital admissions, outpatient visits, and healthcare expenditures (Greenwood, 2020). The disease places a significant strain on healthcare resources, diverting attention from other pressing health concerns (Miller, 2022). Malaria deaths, which primarily result from severe complications such as cerebral malaria and severe anaemia, are largely preventable with timely diagnosis and treatment (Cunningham et al., 2019; Baird, 2018). However, late presentation, limited access to effective antimalarial drugs, and lack of awareness contribute to avoidable mortality (Murtaza, 2017; Horne, 2023).

Beyond the immediate health impacts, malaria has far-reaching consequences on families and communities (Kara, 2017; Parker, 2024). Malaria-related illnesses lead to loss of productivity, school absenteeism among children, and financial hardship due to the cost of treatment (Gupta, 2024). In pregnant women, malaria increases the risk of miscarriage, low birth weight, and maternal mortality, further undermining maternal and child health (Tegenge, 2018; Horne, 2023).

Malaria transmission and its burden often vary between urban and rural areas (Parker, 2024). While urban areas may have better access to healthcare and preventive measures, rural areas often experience higher transmission rates due to environmental conditions such as proximity to stagnant water bodies, inadequate housing, and poor sanitation (Mabunda, 2020; Miller, 2022). This disparity further highlights the need for targeted interventions that address the unique challenges faced by rural populations (Kramer, 2021; Gupta, 2024).

1.5 ECONOMIC AND DEVELOPMENTAL CONSEQUENCES

The economic burden of malaria extends beyond healthcare costs. Malaria significantly impacts workforce productivity, as individuals who contract the disease are often unable to work for extended periods (Miller, 2022). This loss of productivity affects both household income and

national economic growth, particularly in countries where agriculture and manual labour are primary sources of livelihood (Sachs, 2024; Tegenge, 2018). The costs associated with treatment, transportation to healthcare facilities, and preventive measures strain household finances, particularly for families living below the poverty line.

In endemic regions, malaria acts as both a cause and a consequence of underdevelopment (Miller, 2022; Sachs, 2024). Countries heavily burdened by malaria tend to have slower economic growth rates, as resources that could be allocated to education, infrastructure, and other developmental priorities are diverted to combat the disease (Kara, 2017; Cunningham *et al.*, 2019). Thus, tackling malaria is not only a public health imperative but also a critical step toward achieving broader developmental goals.

The human toll of malaria cannot be overstated. The loss of life, particularly among children under five and pregnant women, leaves deep scars on families and communities (Ferguson, 2023; Aregawi *et al.*, 2022). Beyond mortality, the recurrent nature of malaria infections reduces quality of life, leaving individuals debilitated and unable to contribute fully to their families or societies (Cunningham *et al.*, 2019). Furthermore, the psychological burden of living in malaria-endemic regions, where the risk of infection is constant, affects mental health and overall well-being.

1.6 LIFE CYCLE OF PLASMODIUM IN THE HUMAN BODY

The life cycle of Plasmodium is complex and involves two primary hosts: humans, where the asexual reproduction occurs, and female Anopheles mosquitoes, where sexual reproduction takes place. Understanding this cycle is critical for designing effective control and treatment strategies (White, 2024).

1. Liver Stage (Exoerythrocytic Stage)

When an infected mosquito bites a human, it injects sporozoites from its salivary glands into the bloodstream. The sporozoites travel rapidly to the liver, where they invade hepatocytes (liver cells). Inside the liver cells, sporozoites multiply asexually and mature into thousands of merozoites within 7 to 10 days. This phase is asymptomatic. Some species, such as *P. vivax* and *P. ovale*, form dormant liver-stage hypnozoites, which can reactivate weeks or even years later, causing relapses.

2. Blood Stage (Erythrocytic Stage)

Merozoites are released from the liver into the bloodstream and invade red blood cells (RBCs). Inside the RBCs, the parasites undergo asexual replication, progressing through ring, trophozoite, and schizont stages. This process produces more merozoites, which are released upon RBC rupture. The synchronous rupture of infected RBCs releases toxins and other inflammatory molecules, triggering the characteristic fever and chills of malaria.

3. Gametocyte Formation

Some parasites differentiate into sexual forms known as gametocytes, which remain dormant in the human bloodstream. When another mosquito bites an infected person, it ingests these gametocytes. Inside the mosquito's midgut, the gametocytes fuse to form zygotes, initiating the mosquito stage of the life cycle.

1.7 CLINICAL MANIFESTATIONS OF MALARIA

Malaria presentations range from mild, self-limiting illness to severe and potentially fatal complications. The clinical spectrum depends on factors such as the species of *Plasmodium*, the patient's immunity, and the availability of timely treatment (Dondorp *et al.*, 2020; White, 2024).

1. Uncomplicated Malaria

Uncomplicated malaria is the most common presentation and is typically seen in patients with partial immunity or early-stage infection.

- **Symptoms:** Fever, chills, sweating, headache, muscle and joint aches, nausea, and vomiting.
- **Cyclical Fever:** The fever often follows a periodic pattern (e.g., every 48 or 72 hours) corresponding to the synchronized rupture of infected RBCs

2. Severe Malaria

Severe malaria is a medical emergency that requires prompt diagnosis and treatment. It is most commonly caused by *P. falciparum* and is associated with high parasite loads (Cunningham *et al.*, 2019; Talisuna, 2022).

It includes:

- **Cerebral Malaria:** The most severe manifestation, characterized by seizures, confusion, or coma due to the sequestration of infected RBCs in cerebral capillaries
- **Severe Anemia:** Results from the destruction of RBCs and the suppression of erythropoiesis, leading to fatigue, pallor, and reduced oxygen delivery to tissues (Dondorp *et al.*, 2020; Baird, 2018).
- **Multi-Organ Dysfunction:** Includes acute kidney injury, respiratory distress from pulmonary edema, and circulatory shock (Cecil *et al.*, 2023; Dondorp *et al.*, 2020).
- **Hypoglycemia:** Often a complication of severe disease or quinine therapy, particularly in children and pregnant women

1.8 RISK FACTORS FOR SEVERE MALARIA

Several factors increase the risk of severe malaria, including:

- Young age, especially children under five years
- Pregnancy, particularly during the first and second trimesters
- Non-immune individuals, such as travellers from non-endemic regions
- Co-infections with other diseases, such as HIV
- Delayed access to effective treatment

1.9 IMPORTANCE OF EARLY DIAGNOSIS AND TREATMENT

Timely diagnosis and appropriate treatment are crucial in preventing progression to severe malaria and reducing mortality. Microscopy and rapid diagnostic tests (RDTs) are the primary tools for malaria diagnosis (Cheng, 2023; Cunningham *et al.*, 2019).

First-line treatments, such as artemisinin-based combination therapies (ACTs), have proven highly effective in clearing Plasmodium from the bloodstream (White, 2024; Talisuna, 2022). However, drug resistance remains a growing concern, underscoring the need for continuous monitoring and development of new therapeutic agents (Dondorp *et al.*, 2020; WHO, 2023).

1.10 MALARIA IN NIGERIA: IMPACT ON SOCIETY, ECONOMY, AND HEALTH

Nigeria bears the heaviest malaria burden in the world, accounting for approximately 27% of global malaria cases and 31% of global deaths in 2022 (WHO, 2023). Malaria is endemic in all 36 states and the Federal Capital Territory, with transmission occurring year-round, although it is more intense during the rainy season.

The disease is the leading cause of outpatient visits (60%), hospital admissions (30%), and child mortality in Nigeria (Federal Ministry of Health, 2021). This overwhelms healthcare systems, particularly in rural and underserved areas, where facilities are poorly equipped and human resources are limited. Malaria-related cases account for a significant portion of public health resource allocation, which affects the system's ability to respond to other health challenges.

Furthermore, recurrent episodes of malaria—especially in children—lead to anaemia, malnutrition, and increased susceptibility to other infections. For pregnant women, malaria contributes to maternal mortality, miscarriages, and low birth weight infants, placing additional strain on neonatal and maternal healthcare services.

2. Socio-Economic Impact

Malaria imposes significant economic costs on households and the nation. At the household level, expenses arise from:

- Cost of treatment and transportation to health facilities.
- Lost income due to carers missing work.
- School absenteeism for children.

It is estimated that malaria reduces Nigeria's GDP by about ₦132 billion annually (approximately USD 300 million) through lost productivity and healthcare costs (National Malaria Elimination Programme, 2020). In agricultural communities, where productivity is tied to physical labour, malaria can devastate household income, particularly during planting and harvesting seasons.

At the national level, malaria contributes to slower economic development by affecting the health of the workforce and discouraging foreign investment in high-risk areas. According to Gallup data, firms operating in high malaria-risk zones often report increased operating costs due to employee absenteeism, medical treatment, and implementation of preventive measures

3. General Well-being and Human Development

Malaria negatively influences overall quality of life in Nigeria. Frequent illness reduces people's ability to engage in daily activities, take care of their families, or pursue educational and economic opportunities. In endemic areas, communities often live in a cycle of poverty and disease, where the cost of malaria prevents them from investing in better housing, nutrition, or education.

In children, repeated malaria infections are linked to impaired brain development and poor academic performance (Fernando et al., 2023). This has a long-term effect on national human capital development, further reinforcing the poverty trap.

1.11 MALARIA PREVENTION STRATEGIES/MEASURES

Nigeria has implemented a range of malaria prevention strategies, including:

1) Repellents and Protective Clothing

Mosquito repellents are chemical or natural substances applied to the skin or clothing to deter mosquitoes from biting. The most commonly used active ingredients include DEET (N,N-diethyl-meta-toluamide), Picaridin, and IR3535. These have been shown to offer protection for several hours, depending on the concentration and environmental conditions (Carroll & Loye, 2021; WHO, 2023). Research shows that repellents are especially useful for individuals engaged in outdoor activities during mosquito peak biting hours, such as in agricultural, recreational, or

travel contexts. In Nigeria, however, the use of repellents is still relatively low due to factors like limited awareness, cost, and availability (Adebayo et al., 2023). Moreover, misconceptions regarding their safety and effectiveness also hinder widespread adoption. A study conducted by Kweka et al. (2022) in Tanzania emphasized that proper education on repellent usage and reapplication intervals can significantly enhance compliance and overall protection. Wearing long-sleeved shirts, long trousers, socks, and hats can act as a physical barrier to mosquito bites. This method is particularly effective when clothing is light-colored (as mosquitoes are attracted to dark colors) and worn during peak biting times—dawn and dusk. In some settings, clothing can also be treated with insecticides (e.g., permethrin) to increase protection. Moore et al. (2022) found that protective clothing, especially when treated, significantly reduced mosquito bites. However, challenges such as heat discomfort and cultural preferences often lead to poor adherence, particularly in tropical countries like Nigeria (Iliyasu et al., 2021). In rural and semi-urban communities, the cost and practicality of protective clothing often limit its sustained use.

2) Use and Effectiveness of Insecticide-Treated Nets (ITNs)

Globally, the deployment of ITNs has been a central component of malaria prevention strategies. The World Health Organization (WHO) recommends universal coverage of ITNs in malaria-endemic regions, defined as one net for every two people in a household. As of 2022, over 2.7 billion ITNs had been distributed globally, with Africa receiving more than 80% of them (WHO, 2023). In Nigeria, national campaigns have promoted ITN distribution through routine immunization programs, antenatal clinics, and mass campaigns. Despite these efforts, ownership and use of ITNs remain inconsistent. According to the Nigeria Demographic and Health Survey (NDHS, 2018), although 60% of households owned at least one ITN, only about 43% of children under five years and 45% of pregnant women reported sleeping under a net the night before the

survey. Factors affecting usage include heat, discomfort, misconceptions about the nets, and lack of replacement nets (Afolabi et al., 2020). Evidence consistently supports the effectiveness of ITNs in reducing malaria morbidity and mortality. A landmark study by Lengeler (2024) found that ITN use can reduce all-cause child mortality by 17% and malaria episodes by 50%.

Similarly, a Cochrane review confirmed that sleeping under ITNs significantly reduces the incidence of uncomplicated malaria and anemia among children (Eisele et al., 2020). In endemic settings like Nigeria, the regular use of ITNs has been linked to a substantial decline in malaria transmission, particularly when coverage rates are high. The presence of insecticide on the net kills mosquitoes on contact, thereby reducing mosquito populations in communities a phenomenon referred to as the “mass effect” (Kilian et al., 2023).

Despite their proven benefits, several factors affect the sustained effectiveness of ITNs including, Improper use (e.g., not tucking the net properly or using it for unintended purposes like fishing), Wear and tear, reducing physical integrity and efficacy over time, Insecticide resistance in mosquito populations, which threatens the long-term viability of ITNs as a stand-alone intervention (Hemingway et al., 2021), Behavioral resistance, where mosquitoes feed earlier in the evening or outdoors to avoid contact with ITNs.

3) Environmental Management (Drainage and Waste Control)

According to the World Health Organization (WHO, 2020), environmental management is a cost-effective and sustainable method of mosquito control, especially when integrated with other preventive strategies. It is classified into three main approaches: environmental modification (permanent changes such as improved drainage), environmental manipulation (temporary changes like water flushing), and behavioral changes (encouraging communities to clean surroundings). Research from various regions demonstrates the effectiveness of environmental

measures. A study by Vanek and Jawara (2020) in The Gambia found that eliminating standing water significantly reduced mosquito larval habitats. Similarly, Ujuju et al. (2024) in Nigeria reported that poor environmental sanitation correlated strongly with high mosquito density and increased malaria incidence. In urban and semi-urban Nigerian communities, blocked drains, indiscriminate refuse dumping, and lack of awareness about environmental hygiene have consistently contributed to mosquito proliferation (Afolabi et al., 2021). These practices are often exacerbated by poor infrastructure and limited municipal waste management.

Environmental sanitation efforts are most effective when there is strong community participation and support from local authorities. Education campaigns and community mobilization have been successful in increasing compliance with environmental cleanliness practices. For example, Yé et al. (2021) found that community-based environmental interventions in Burkina Faso significantly decreased mosquito breeding sites and malaria transmission. However, sustainability remains a challenge. Temporary clean-up exercises often fail to produce long-term benefits unless accompanied by policy enforcement, public health education, and routine monitoring. In this context, investigating community attitudes, awareness, and barriers to sustained environmental practices is key, which this study aims to address.

4) Public Health Campaigns

Several studies have demonstrated that well-designed health education and promotion campaigns significantly influence community behavior toward mosquito bite prevention. According to Ajayi et al. (2023), mass media and community mobilization programs led to a 34% increase in the consistent use of mosquito nets in rural Nigerian communities. The campaign included radio jingles, posters, and community dialogue sessions. The World Health Organization (WHO, 2021) emphasizes that community participation driven by continuous public education is a cornerstone

of integrated vector management. It improves the uptake of preventive tools and ensures sustainability.

Health campaigns use diverse channels to disseminate messages:

Mass media (TV, radio, newspapers), Social media and mobile technology, School-based education, Community outreach and house-to-house sensitization, Religious and traditional institutions

In Nigeria, the National Malaria Elimination Programme (NMEP) collaborates with NGOs and local governments to organize public sensitization campaigns. For example, Ezeoke et al. (2024) noted that such efforts in Anambra State led to a notable decline in malaria incidence by increasing household knowledge of breeding site elimination and net usage. Despite their importance, public health campaigns often face challenges such as inadequate funding, low literacy levels, cultural resistance, and limited reach in remote areas. In some cases, campaigns are not sustained long enough to ensure lasting behavioral change. According to Fana et al. (2020), the impact of public health messaging can wane without community follow-up or reinforcement strategies. There is also a need to tailor messages to specific demographics, especially children, pregnant women, and people living in high-risk areas. Contextualized and participatory communication strategies are more effective than generic messages (Yohannes & Boelee, 2022).

However, challenges persist, including

Insecticide and drug resistance, Low health-seeking behaviour and self-medication, Poor access to healthcare in rural areas, Funding gaps in national malaria programs, Climate-related expansion of mosquito breeding sites

The National Malaria Strategic Plan (2021–2025) aims to reduce malaria mortality by 50% and achieve zero malaria deaths by 2030 (Federal Ministry of Health, 2021), but achieving this will require sustained political will, community engagement, and international support.

Malaria remains a formidable barrier to health and development both globally and in Nigeria. While the disease is preventable and treatable, its persistence—especially in Nigeria—continues to strain healthcare systems, hinder economic growth, and erode human development. Effective interventions, particularly when combined with community participation and strong governance, are essential for breaking the cycle of malaria and poverty.

1.12 MALARIA PREVENTION PRACTICES AMONGST STUDENTS AND YOUTHS IN NIGERIA

1. Secondary-school Adolescents in Calabar

A survey of 400 secondary-school adolescents in Calabar, Cross River State, found:

About 77.5% understood that malaria is transmitted via mosquito bites. Only 25.7% reported using insecticide-treated nets (ITNs). A small proportion engaged in environmental measures: clearing vegetation (13.5%), draining standing water (11%), and filling potholes (16.9%). Just 11.2% used antimalarial drugs prophylactically; only 11% received information through teachers.

These results highlight a gap between knowledge and actual preventive behaviours—especially low ITN use and environmental action, and minimal influence from school-based education. (Udonwa *et al.*, 2010)

2. University Students in Lagos

A 2021 study among 172 university students living on-campus in Lagos reported:

Overall good knowledge, but variability in use of preventive practices. Many relied on self-treatment and home remedies rather than seeking formal care or using mosquito nets. The paper emphasised the need for university-led malaria control efforts, such as ITN distribution and health education initiatives on campus. (Afolayan *et al.*, 2023)

3. Students at Federal University of Tech., Owerri (FUTO)

In 2018, among 160 FUTO students: 96.3% correctly identified mosquito bites as the cause of malaria. About 46.9% did not practice any preventive controls (e.g., ITNs, indoor spraying). Knowledge of formal diagnostic methods (RDT, microscopy) was low—29.4% preferred self-diagnosis, and 41.3% had no idea about formal testing.

This suggests that while awareness is high, actual preventive and diagnostic knowledge/practices are lacking in tertiary institutions (Mgbemena *et al.*, 2020).

1.13 STUDENTS KNOWLEDGE AND ITS ROLE IN MALARIA MANAGEMENT

Some basic definitions:

1. **Students Knowledge:** This refers to a Students understanding of health conditions, diseases, treatments, and their role in managing their health. It includes awareness of symptoms, causes, prevention, and treatment options.
2. **Students Knowledge of Malaria:** This specifically relates to the Students understanding of malaria as a disease. It includes knowledge about its causes (e.g., mosquito bites), symptoms (e.g., fever, chills, headache), prevention methods (e.g., mosquito nets, insecticides), and the importance of seeking timely treatment.
3. **Students Knowledge about Antimalarial Drugs:** This focuses on the patient's awareness of the medications used to treat or prevent malaria. It includes understanding

the proper use of antimalarial drugs, their side effects, the importance of adherence to the prescribed regimen, and the role of preventive medications in malaria-endemic areas.

1.14 Understanding Students Knowledge About Malaria Prevention

Common symptoms like fever, chills, sweating, headaches, and body aches are often recognized by patients. However, early warning signs of severe malaria, such as confusion, respiratory distress, or jaundice, are less understood.

While many individuals know that malaria is transmitted through mosquito bites, there are misconceptions in some communities. For instance, beliefs that malaria is caused by eating certain foods or exposure to cold weather can undermine preventive measures.

Students knowledge of preventive strategies, such as using insecticide-treated nets (ITNs), wearing protective clothing, and applying mosquito repellents, is often limited by accessibility, cultural practices, and misinformation. Educational campaigns have improved awareness but must be tailored to local contexts for better impact.

1.15 EMPIRICAL LITERATURE REVIEW

Several empirical studies have investigated the use, effectiveness, and determinants of mosquito bite prevention measures in various endemic regions, particularly in sub-Saharan Africa. These studies provide evidence-based insights into behavioral practices, coverage of interventions, and factors influencing their adoption among different populations.

A study by Afolabi et al. (2023) in Ogun State, Nigeria, evaluated the utilization of insecticide-treated nets (ITNs) among households. The study found that although awareness of ITNs was high (over 80%), actual usage was significantly lower, with only 52.3% reporting consistent nightly use. The key barriers identified were heat discomfort and misconceptions about side

effects. This highlights a gap between knowledge and practice, emphasizing the need for improved education and behavioral change strategies. Similarly, a study conducted by Oyeyemi et al. (2023) in northern Nigeria assessed the effectiveness of community-based health interventions on ITN adoption. Results showed a 30% increase in net use within six months of introducing targeted health education campaigns. This underscores the importance of public health campaigns in promoting preventive behavior and overcoming cultural resistance to vector control tools. In Ghana, Baume and Marin (2021) used household surveys to assess factors influencing ITN ownership and use. They found that cost, availability, and household size significantly affected ITN usage. Households with pregnant women or children under five were more likely to prioritize mosquito prevention. The study also showed that free distribution programs increased both ownership and regular use of nets.

Another empirical study by Yaya et al. (2020) in East Africa examined the role of socioeconomic status in determining access to mosquito prevention tools. The findings revealed that individuals in higher-income households were more likely to use repellents, wear protective clothing, and maintain clean surroundings. Conversely, lower-income populations relied more heavily on free public health interventions, suggesting equity gaps in access to preventive options. Chukwuocha et al. (2024) conducted a study in rural Imo State, Nigeria, focusing on environmental management practices for mosquito control. Their results showed that only 38% of respondents engaged in regular environmental sanitation activities like clearing stagnant water and gutters, mainly due to lack of awareness and community coordination. However, communities with active health committees demonstrated better participation and outcomes, indicating the role of community engagement in prevention success.

1.16 STATEMENT OF PROBLEM

Despite widespread awareness that malaria is transmitted through mosquito bites, malaria continues to be a leading cause of morbidity among young people in Nigeria. Several studies have shown that while students and youths demonstrate a relatively high level of knowledge about the causes of malaria—ranging from 77% to over 90% awareness—this knowledge does not consistently translate into effective prevention practices (Udonwa *et al.*, 2010; Mgbemena *et al.*, 2020; Afolayan *et al.*, 2023).

Low usage of insecticide-treated nets (ITNs), minimal participation in environmental control activities, and a reliance on self-medication remain prevalent among secondary and tertiary school students. In Calabar, for instance, only 25.7% of adolescents reported using ITNs, while less than 15% engaged in key preventive practices such as draining stagnant water or clearing vegetation (Udonwa *et al.*, 2020). Similarly, research among university students in Lagos and Owerri revealed that despite high awareness, nearly half of the respondents did not practice any form of malaria prevention (Afolayan *et al.*, 2023; Mgbemena *et al.*, 2020).

Furthermore, school- and campus-based health education interventions are either weak or absent, resulting in poor engagement from teachers and limited institutional promotion of preventive measures. These gaps not only perpetuate malaria transmission among youths but also place a significant burden on their health, education, and future productivity.

This disconnect between knowledge and practice presents a critical challenge for malaria control efforts. Understanding the behavioural, institutional, and systemic factors that hinder effective

prevention among students is essential for developing targeted interventions and strengthening malaria elimination strategies in Nigeria.

1.17. JUSTIFICATION FOR THE STUDY

Malaria remains a significant public health concern in Nigeria, contributing to high rates of morbidity and mortality, particularly among vulnerable populations such as children and young adults. While national and international malaria control programs have focused on the distribution of insecticide-treated nets (ITNs), seasonal chemoprevention, and public health campaigns, evidence indicates that students and youths continue to experience a high burden of malaria, largely due to poor translation of knowledge into consistent preventive practices (Udonwa *et al.*, 2020; Afolayan *et al.*, 2023; Mgbemena *et al.*, 2020).

Young people, especially those in secondary schools and tertiary institutions, represent a crucial demographic in malaria control for several reasons. First, they are often exposed to malaria both in their residential settings and in school environments where preventive infrastructure may be lacking. Second, they are typically more receptive to health education and behaviour change initiatives, making them ideal targets for sustained malaria awareness and prevention programs. Third, this group represents the future workforce and leadership of the nation; thus, protecting their health contributes directly to national development goals.

Despite the clear importance of this population, there is a lack of context-specific data on the actual malaria prevention practices among students, particularly in how their behaviours are shaped by institutional policies, social norms, and access to resources. Existing studies reveal gaps between awareness and practice, low ITN usage rates, poor engagement in environmental sanitation, and limited formal health education efforts within schools and campuses (Udonwa *et*

al., 2010; Mgbemena *et al.*, 2020). These gaps hinder the effectiveness of broader national malaria strategies.

This study is therefore justified, as it will:

- Provide updated, evidence-based insights into the knowledge, attitudes, and preventive practices related to malaria among Nigerian students.
- Identify barriers to effective prevention, including infrastructural, behavioural, and policy-related challenges.
- Inform the development of targeted, youth-focused interventions, including school-based health programs and university-level malaria campaigns.
- Support national efforts under the National Malaria Strategic Plan (2021–2025) to reduce malaria-related morbidity and mortality through integrated and community-sensitive approaches.

By focusing on this underserved but pivotal group, the study contributes to the broader goal of malaria elimination in Nigeria and reinforces the importance of youth engagement in public health.

1.18 OBJECTIVE OF THE STUDY

General Objective:

To assess the knowledge, attitudes, and practices related to malaria prevention among students of the University of Benin and to identify the factors influencing their adoption of effective preventive measures.

Specific Objectives:

1. To evaluate the level of knowledge students have about malaria transmission, symptoms, and prevention methods.
2. To examine the attitudes of students and youths towards malaria prevention strategies such as the use of insecticide-treated nets (ITNs), environmental sanitation, and chemoprevention.
3. To assess the actual malaria prevention practices commonly adopted by students in the University of Benin

CHAPTER TWO

METHODS

Study Setting

The research was carried out at the University of Benin, Ugbowo in Benin City, Edo State. As a federal university in Nigeria situated in an urban centre and the capital of Edo State, the university of Benin hosts a diverse population of students.

Uniben is a renowned tertiary institution known for its pivotal role as a referral centre for a variety of medical conditions. The university of Benin has a total of 15 faculties/schools with an average number of 40,000 students. The mission of the university of Benin is building students in character and Learning. The university has accommodation, halls, welfare, counselling where many students organizational and recreational activities, hence the importance of our study.

Study Design

This study adopted a descriptive cross-sectional design to assess the knowledge, attitudes, and practices towards malaria prevention amongst students of the University of Benin.

Study Population

The participants in this study consisted of students from the Faculty Pharmacy, Faculty of Law and the department of English and literature in the university of Benin.

Eligibility Criteria

Inclusion Criteria:

- Students in 100L to 600L from the Faculty of law, Pharmacy and department of English and literature.
- Students from the Three departments that voluntarily agree to take part in the study by providing informed consent.

Sample Size

A sample size of 330 participants was selected from three departments (department of law, Pharmacy, English and literature) to ensure sufficient data for statistical analysis. Participants were selected using a random sampling technique from students across the two departments from the university of Benin.

To determine the sample size, Slovin's formula ($n = N / (1+Ne^2)$) was used to calculate for students from the two departments.

Slovin's Formula:

$$n = N / (1+Ne^2)$$

Where:

n = required sample size

N = total population size

e = margin of error

The formula was used after establishing the total population size of students in both of the departments selected.

The margin of error is typically set at 5% or 0.05 for most studies, indicating a 95% confidence interval.

The population of students (N) used was derived from the list of students and staff in all faculties, schools and departments in the university of Benin which was obtained from the office of the director of academic planning of the university of Benin.

The total population size(N) for students in the two departments was 1,940. Calculating the sample size for both using Slovin's formula gave 330.

Study Instrument

A questionnaire was structured into distinct sections obtaining information on demographics, health literacy and Knowledge, attitudes, and practices towards malaria prevention.

A 25-item questionnaire was structured into five distinct segment was adopted to address the objectives of the study. The first section focused on gathering demographic information about the students, the second section labelled B assessed the students on the knowledge . Third section C assessed students attitudes towards malaria prevention.

The third segment of the questionnaire labelled as C delved into the students attitude towards malaria prevention. Section D assessed students practice towards malaria prevention.

The final part of the questionnaire designated as section E focused on assessing students perception of the towards malaria prevention

Validation of the Instrument

A pilot test of 10 questionnaires was conducted to determine the clarity, reliability, and validity of the instrument. Feedback from the pilot test was used to refine questions and ensure they are clear, unbiased, and capable of generating meaningful data. The questionnaire was reviewed by experts and supervisors to enhance its validity.

Data Collection

The data collection procedure is an essential component of any research study. A self-structured questionnaire, based on the study objectives and relevant literature, was utilized as the primary instrument for data collection. The questionnaire was distributed to participants from the Faculty of Pharmacy, law and the department of English and literature. The questionnaire comprised of multiple sections representing information on demographics, health literacy and Knowledge, attitudes, and practices towards malaria prevention.

Data Analysis

The data collected during this study was coded to organize and simplify the information into a structured format. Once coded, it was entered into Microsoft Excel. The Excel-prepared data was imported into SPSS software version 21.0 (developed by SPSS Inc., Chicago, Illinois, USA). Descriptive statistics was employed to summarize and report the frequency distribution of the responses. Inferential statistical was applied to determine the relationships and associations within the data. Specifically, Chi-square tests was used to determine the existence of statistically significant associations. Any result with a p-value less than 0.05 was regarded as statistically significant, indicating a meaningful relationship between the variables under

Ethical Considerations

This study will be conducted following ethical guidelines, starting with obtaining approval from the ethical committee of the University of Benin. This approval ensures the study aligns with established standards to protect participants' rights, safety, and well-being.

Before participation, informed consent will be secured from all participants. They will receive clear and detailed information about the study's purpose, procedures, potential risks, and benefits, enabling them to make an informed decision.

The research will uphold ethical principles, including providing information in an accessible manner and emphasizing that participation is entirely voluntary. Participants will be informed of their right to withdraw at any point without facing any consequences.

Key principles such as voluntary participation, anonymity, and confidentiality will be strictly maintained. Participants will not be coerced into joining, their identities will not be linked to the data, and all information shared will remain confidential.

CHAPTER THREE

RESULTS

3.1 SOCIO-DEMOGRAPHICS OF RESPONDENTS

Most respondents (56.1%) were between 21–25 years, indicating that the study population was dominated by young adults typical of university students. The lowest proportion (17.9%) were aged 26–30 years. This reflects the normal age distribution of undergraduates at UNIBEN. There was a slight female majority (51.8%), showing a fairly balanced gender representation. Students from 300 level (32.4%) formed the largest proportion, while 100 level students were the least represented (7.0%). Half of the respondents (50.6%) were from the Faculty of Pharmacy, About half of the students (50.9%) lived off-campus, while 44.5% lived on-campus. Living location can influence malaria exposure, as off-campus environments may have poorer sanitation and mosquito control.

Table 3.1 SOCIO-DEMOGRAPHICS OF RESPONDENTS

VARIABLE	FREQUENCY	PERCENTAGE
AGE		
15-20 YEARS	86	26.1
21-25 YEARS	185	56.1
26-30 YEARS	59	17.9
GENDER		
MALE	159	48.2
FEMALE	171	51.8
CURRENT ACADEMIC LEVEL		
100L	23	7.0
200L	77	23.3
300L	107	32.4
400L	58	17.6
500L AND ABOVE	65	19.7
FACULTY		
PHARMACY	167	50.6
LAW	81	24.5
ENGLISH AND LITERATURE	78	23.6
OTHERS	4	1.2
RESIDENCE		
ON-CAMPUS	147	44.5
OFF-CAMPUS	168	50.9
OTHERS	15	4.5

3.2 SECTION B: RESPONDENTS KNOWLEDGE

Respondents demonstrated good knowledge overall, with mean scores ranging from 2.00–2.37 (on a 5-point scale). The highest awareness was about mosquito breeding sites and clearing bushes . However, fewer students were aware of malaria preventive drugs, suggesting the need for intensified health education on chemoprophylaxis.

The results demonstrate a generally high level of knowledge among respondents regarding malaria prevention. A majority showed strong agreement with key knowledge indicators such as the role of mosquitoes in malaria transmission, the impact of stagnant water as a breeding site, and the importance of clearing bushes around living areas. The mean scores obtained for most knowledge questions ranged from 2.00 to 2.37 (on a scale where lower values indicate stronger agreement), reflecting a solid understanding of core preventive measures.

However, knowledge regarding the availability and proper use of malaria preventive drugs scored comparatively lower. This suggests that while students possess adequate knowledge about environmental and vector-control measures, awareness of chemoprophylaxis and its use remains limited. These findings underline the need to strengthen education on the full spectrum of malaria prevention strategies.

Table 3.2: Respondents Knowledge

VARIABLE	SA	A	N	D	SD	MEAN±STD
A	114	126	64	24	2	2.01±0.94
B	92	129	76	28	5	2.17±0.98
C	116	117	80	16	1	2.00±0.90
D	101	136	67	22	4	2.07±0.94
E	77	106	103	36	8	2.37±1.03

A= I am familiar with the concept of malaria prevention

B= I am aware that Using ITNs is an effective way to prevent malaria

C= I understand that stagnant water breeds Mosquito

D= I Know the importance of clearing bushes and tall grasses

E= I am aware of Malaria prevention drugs

NOTE:

SA = STRONGLY AGREE

A = AGREE

N = NEUTRAL

D = DISAGREE

SD = STRONGLY DISAGREE

3.3 SECTION C: RESPONDENTS ATTITUDE TOWARDS MALARIA PREVENTION

Most students agreed that using ITNs is effective (G; mean = 1.98) and that malaria prevention is important for health (F). However, higher mean values for **I (3.13)** and **J (3.20)** indicate some students find malaria prevention a “low priority” or “too much effort,” showing mild complacency among a segment of respondents.

The respondents’ attitudes towards malaria prevention were found to be moderately positive. A sizable proportion expressed strong agreement with the importance of malaria prevention and the effectiveness of insecticide-treated nets (ITNs). These positive attitudes reflect an understanding of malaria as a significant health concern requiring regular preventive action.

Despite these generally positive attitudes, the results also showed that some students perceived malaria prevention efforts as time-consuming, stressful, or inconvenient. The mean values for statements related to low priority or lack of motivation were comparatively higher, indicating that a segment of the population may underestimate the personal importance of malaria prevention. This pattern suggests that although students may intellectually acknowledge the importance of malaria prevention, their attitude does not always translate into active commitment.

Table 3.3: Respondents Attitude Towards Malaria Prevention

VARIABLE	SA	A	N	D	SD	MEAN ±STD
F	107(32.4%)	105(31.8%)	85(25.8%)	26(7.9%)	7(2.1%)	2.15 ±1.03
G	111(33.6%)	135(40.9%)	56(20.0%)	16(4.5%)	2(0.6%)	1.98 ±0.88
H	75(22.7%)	114(34.5%)	92(27.9%)	35(10.6%)	14(4.2%)	2.39 ±1.07
I	28(8.5%)	88(20.8%)	103(31.2%)	96(29.1%)	35(10.6%)	3.13 ±1.11
J	22(6.7%)	53(16.1%)	133(40.3%)	81(24.5%)	41(12.4%)	3.20 ±1.06

F= Malaria Prevention is importance for prevention and Overall Health

G= Using ITNs is effective is Malaria Prevention

H= I believe reducing Mosquito breeding site is my responsibility

I= I feel Malaria Prevention is low priority

J= Taking Preventive measure is too much effort.

NOTE:

SA = STRONGLY AGREE

A = AGREE

N = NEUTRAL

D = DISAGREE

SD = STRONGLY DISAGREE

3.4 SECTION D: RESPONDENTS PRACTICE TOWARDS MALARIA PREVENTION

The findings showed that students' preventive practices were moderate rather than optimal. Only a small proportion reported always sleeping under an ITN, despite recognizing its effectiveness. A larger proportion used ITNs only occasionally, pointing to inconsistent adherence to preventive measures.

Environmental control measures such as clearing bushes or eliminating stagnant water were practiced by some respondents, but again, only a minority engaged in these practices consistently. Similarly, preventive health-seeking behaviors, including regular malaria testing or seeking medical care, were not practiced by the majority.

This discrepancy between knowledge and practice is significant. It highlights the existence of a knowledge–practice gap, where students know what should be done but fail to translate this knowledge into consistent preventive actions.

Table 3.4: Respondents Practice Towards Malaria Prevention

VARIABLE	ALWAYS	OFTEN	SOMETIMES	RARELY	NEVER	MEAN ±STD
K	31(9.4%)	51(15.5%)	106(32.1%)	100(30.3%)	42(12.7%)	3.22 ±1.14
L	29(8.8%)	93(28.2%)	127(38.5%)	49(14.8%)	32(9.7%)	2.88 ±1.07
M	37(11.2%)	88(20.8%)	127(38.5%)	83(25.2%)	15(4.5%)	2.91 ±1.04
N	33(10.0%)	81(18.5%)	124(37.6%)	73(22.1%)	39(11.8%)	3.07 ±1.13
O	42(12.7%)	69(20.9%)	123(37.3%)	63(19.1%)	39(11.8%)	2.93 ±1.14

K= Do you regularly sleep under ITNs

L= How often do you use ITNs

M= How often do you or your household takes steps to remove stagnant water

N= how Often do you take ant-malaria for prevention

O= How often do you seek medical advice or run diagnostic test when you develop symptoms suggestive of Malaria.

3.5 SECTION E: PERCEPTION OF RESPONDENTS

The study also explored fears, misconceptions, and perceived difficulties surrounding malaria prevention. Many students reported concerns about sleeping under ITNs, such as feelings of heat or discomfort. Others expressed fear of possible side effects from preventive medications and mosquito repellents. These perceived barriers contribute to reduced willingness to adopt preventive measures consistently.

Students also reported that maintaining preventive routines could be complicated or burdensome. Such findings emphasize the role of psychological and practical barriers in undermining effective malaria prevention efforts among university students.

Table 3.5 Perception Of Respondents

VARIABLE	SA	A	N	D	SD	MEAN
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						±STD
P	29(8.8%)	46(13.9%)	75(22.7%)	126(38.2%)	54(16.4%)	3.39 ±1.17
Q	29(8.8%)	86(26.1%)	105(31.5%)	88(26.7%)	22(6.7%)	2.96 ± 1.07
R	22(6.7%)	55(16.7%)	89(30.0%)	115(34.8%)	49(14.8%)	3.34 ±1.12
S	22(6.7%)	73(22.1%)	68(20.8%)	119(36.1%)	48(14.5%)	3.20 ±1.16
T	28(8.5%)	64(19.4%)	59(17.9%)	107(32.4%)	72(21.8%)	3.39 ±1.25

P= I have a fear sleeping under ITNs

Q= I am anxious about the safety of Mosquito Repellants

R= I am afraid of the side effects of Malaria Preventive Medicine

S= I am afraid because Malaria Preventive are too complicated to follow

T= I experience fear when I see a Mosquito even when protected.

NOTE:

SA = STRONGLY AGREE

A = AGREE

N = NEUTRAL

D = DISAGREE

SD = STRONGLY DISAGREE

3.6 ASSOCIATION BETWEEN DEMOGRAPHICS AND OTHER VARIABLES (INFERENTIAL STATISTICS)

The results (Table 3.6.1) revealed statistically significant differences between faculties with regard to knowledge, practice, attitude, and perception. This suggests that academic discipline influences students' understanding and mindset towards malaria prevention. For example, pharmacy students due to their scientific background may have exhibited higher levels of knowledge and more positive attitudes.

Interestingly, the difference in practice across faculties was not statistically significant. This implies that regardless of academic background, students exhibited similar preventive behaviors. This further reinforces the earlier identified knowledge–practice gap, showing that even those with better knowledge do not necessarily practice malaria prevention more consistently.

Chi-square tests (Table 3.6.2) also showed a significant association between faculty and each knowledge-related item, supporting the finding that knowledge varies across academic disciplines. These results underline the need for targeted, faculty-specific malaria awareness campaigns.

Table 3.6.1: Association between respondents Knowledge with Faculty

		Sum of Squares	df	Mean Square	F	Sig.
Knowledge	Between Groups	24.114	3	8.038	18.610	.000
	Within Groups	139.943	324	.432		
Perception	Between Groups	5.445	3	1.815	5.602	.001
	Within Groups	104.973	324	.324		
Attitude	Between Groups	3.195	3	1.065	2.849	.038
	Within Groups	121.124	324	.374		
Practice	Between Groups	3.708	3	1.236	1.890	.131
	Within Groups	211.873	324	.654		

Table 3.6.2: Association Between Respondents Faculties and Knowledge of students

Variable	Chi-Square Value	Df	P-value
Knowledge			
A	35.2	12	<0.001
B	64.6	12	<0.001
C	32.0	12	<0.001
D	34.6	12	<0.001
E	42.8	12	<0.001

CHAPTER FOUR

DISCUSSION

This study assessed the knowledge, attitude, and practices (KAP) toward malaria prevention among students of the University of Benin (UNIBEN). The findings revealed that the majority of respondents possessed good knowledge of malaria transmission and preventive strategies, yet their attitudes and preventive practices were only moderate. These results highlight a persistent knowledge practice gap, a trend commonly reported in malaria-related behavioral research in sub-Saharan Africa (Astatkie et al., 2019; Nwaneri et al., 2021). The results showed that most respondents demonstrated high knowledge regarding malaria transmission, particularly recognizing mosquitoes as vectors and stagnant water as breeding sites. The majority agreed that clearing bushes and using insecticide-treated nets (ITNs) are effective preventive measures. However, knowledge of chemoprophylaxis (use of preventive antimalarial drugs) was less widespread.

KNOWLEDGE OF RESPONDENTS TOWARDS MALARIA PREVENTION

This pattern aligns with studies conducted among tertiary students in Nigeria and other African countries. For example, Nwaneri et al. (2021) found that 89% of students at the University of Nigeria, Nsukka, correctly identified mosquitoes as malaria vectors, but fewer (42%) knew about prophylactic use of antimalarial drugs. Similarly, Taremwa et al. (2021) in Uganda reported high awareness of vector control methods but limited understanding of preventive medication. These consistent findings indicate that university students, though generally literate, rely heavily on environmental and vector-focused knowledge rather than pharmaceutical prevention approaches. The dominance of health-related students (especially Pharmacy) in the current study could partly

explain the overall high knowledge scores. Students in science-based faculties are typically exposed to courses addressing disease transmission and control. This was supported by the significant association between faculty and knowledge levels observed in the ANOVA and chi-square analyses, suggesting that field of study influences malaria-related awareness. Olasehinde et al. (2024) reported similar faculty-based differences at Covenant University, Nigeria, where medical students exhibited higher knowledge scores than non-medical peers.

ATTITUDE OF RESPONDENTS TOWARDS MALARIA PREVENTION

Respondents' attitudes toward malaria prevention were moderately positive. Most students agreed that malaria is preventable and recognized the importance of ITNs. Nevertheless, a subset of respondents expressed negative perceptions, describing malaria prevention as stressful or unnecessary. Such attitudes can undermine preventive behavior even among knowledgeable individuals. The observed pattern corresponds with findings from Adebayo et al. (2023) in Lagos, who noted that while students acknowledged the importance of malaria control, fewer than half expressed willingness to use preventive drugs regularly. Likewise, Njama et al. (2020) found that among Kenyan undergraduates, 70% considered malaria prevention important, yet over 30% regarded ITN use as uncomfortable or unnecessary due to perceived low risk. These findings are consistent with the Health Belief Model (HBM), which proposes that preventive actions are influenced not only by knowledge but also by perceived susceptibility and perceived benefits versus barriers (Rosenstock, 1974). Many university students may not consider themselves highly vulnerable to malaria because of perceived immunity, urbanization of the campus environment, or infrequent exposure to mosquito bites. Such perceptions can reduce motivation to engage in preventive measures. Furthermore, the observed gender balance could have influenced attitude trends. Female students often demonstrate slightly better health-seeking

behaviors compared to males (Kanyangarara et al., 2018). However, the present study did not find significant gender differences, possibly due to the nearly equal representation of both sexes.

PRACTICE OF RESPONDENTS TOWARDS MALARIA PREVENTION

Although knowledge was high, preventive practices were only moderate, reflecting a classic knowledge–practice gap. Only about one-tenth of respondents reported always sleeping under ITNs, while many used them occasionally. Similarly, a minority regularly eliminated stagnant water or undertook malaria testing when symptomatic. Comparable patterns have been observed in other Nigerian studies. Aina and Ayeni (2021) found that only 25% of Lagos undergraduates consistently used bed nets despite 90% awareness of their benefits. Ademowo et al. (2019) reported similar results among Osun State students, linking irregular ITN use to discomfort, heat, and perceived low mosquito density. These behavioral inconsistencies show that awareness alone does not guarantee preventive action. The moderate practice levels among UNIBEN students may also be influenced by environmental and socio-economic factors. Many off-campus hostels are situated in areas with poor drainage, high mosquito density, and inadequate waste management—conditions conducive to malaria transmission. While these factors heighten risk, they can also lead to fatalism or resignation, reducing proactive preventive behavior (Okafor et al., 2020).

PERCEPTION OF RESPONDENTS TOWARDS MALARIA PREVENTION

The study identified several perceived barriers to malaria prevention, including fear of side effects of preventive drugs, discomfort when using ITNs, and perceptions that preventive routines are complicated. Such barriers are consistent with behavioral studies across sub-Saharan Africa. Deressa et al. (2018) in Ethiopia reported that 36% of respondents avoided ITN use due to heat and discomfort, while Onyeneho and Iremeka (2023) found that misconceptions about

chemical toxicity discouraged use of mosquito repellents among Nigerian youths. Similarly, Taremwa et al. (2024) noted that some students associated antimalarial drugs with nausea and dizziness, discouraging prophylactic use.

ASSOCIATION BETWEEN DEMOGRAPHICS AND OTHER VARIABLES

The ANOVA results revealed significant differences among faculties in knowledge, perception, and attitude, but not in practice. This finding implies that while health-related faculties such as Pharmacy exhibited higher awareness and more positive attitudes, these advantages did not necessarily translate into better preventive behaviors. This aligns with Kareem et al. (2020), who found similar trends among students in northern Nigeria: health science students scored higher in malaria knowledge but displayed similar behavioral patterns to non-health peers. The absence of differences in practice suggests that individual lifestyle and convenience factors may outweigh academic knowledge when it comes to consistent preventive action.

Across Africa, KAP studies among young adults consistently demonstrate high knowledge but inconsistent practice. Mazigo et al. (2020) in Tanzania found that 94% of university students knew mosquitoes transmit malaria, but less than 40% regularly used preventive measures. In Ghana, Asante et al. (2020) reported that although 85% of students recognized ITN effectiveness, fewer than half had nets at home. The present study's results mirror these regional patterns and confirm that the challenge lies not in knowledge dissemination but in behavioral reinforcement. The results also reflect global observations that malaria risk perception diminishes in urban and semi-urban populations where transmission appears less intense (WHO, 2023). University environments often create a false sense of security, leading students to neglect preventive behaviors even when they know better.

LIMITATIONS OF STUDY

Despite the valuable insights generated, this study is not without limitations:

1. **Self-reported Data:** The study relied on self-administered questionnaires, which may have introduced social desirability bias. Respondents might have overstated positive behaviors (e.g., ITN use) or understated negative ones.
2. **Cross-sectional Design:** The study design captures information at one point in time and therefore cannot establish causal relationships between knowledge, attitude, and practice variables.
3. **Sampling Scope:** Although the study included participants from different faculties, the dominance of pharmacy students may have skewed the results toward higher overall knowledge.
4. **Lack of Qualitative Insights:** The use of only quantitative data limited the depth of understanding regarding personal perceptions, motivations, and barriers influencing malaria-prevention behaviors.
5. **Environmental Variation:** The study did not account for the different living environments of off-campus students, which may affect exposure to malaria and influence prevention behaviors differently.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This study assessed the knowledge, attitude, and practices (KAP) toward malaria prevention among students of the University of Benin (UNIBEN). The findings revealed that most respondents possessed a high level of knowledge about malaria transmission and prevention strategies, particularly regarding the role of mosquitoes, stagnant water as breeding sites, and the use of insecticide-treated nets (ITNs). Despite this, their attitudes and preventive practices were only moderate, indicating the presence of a knowledge–practice gap. Students demonstrated an understanding that malaria is preventable and acknowledged the importance of preventive measures, yet many reported inconsistent use of ITNs and irregular participation in environmental sanitation or malaria testing.

The study also found that academic discipline significantly influenced knowledge and attitude— with health-related students (especially those in the Faculty of Pharmacy) showing greater awareness and more positive attitudes than non-health students. However, preventive practices did not differ significantly across faculties, suggesting that knowledge alone does not necessarily translate into better behavior.

RECOMMENDATIONS

Based on the study findings, the following recommendations are made for students, university authorities, public health agencies, and policymakers:

1. Health Education and Awareness

The University of Benin Health Services, in collaboration with the Edo State Ministry of Health, should organize regular malaria awareness campaigns targeting all faculties. Health talks, posters, and social media campaigns should be used to correct misconceptions about ITNs, repellents, and preventive medications. Peer education programs should be strengthened to make malaria prevention messages more relatable among students.

2. Promotion of Consistent Preventive Practices

The university should partner with the National Malaria Elimination Programme (NMEP) and donor agencies to distribute insecticide-treated nets (ITNs) free of charge to students, especially those living in hostels and off-campus areas. Fumigation of hostels and drainage clearance should be done regularly to reduce mosquito breeding sites. Students should be encouraged to participate in environmental sanitation exercises and avoid storing water in open containers.

3. Strengthening Student Health Services

The university's medical center should provide periodic malaria screening and ensure access to effective treatment for infected students. Counseling services should be available for students expressing fear or misconceptions about preventive medicines.

4. Curriculum and Faculty Integration

Faculties, especially non-health disciplines, should integrate basic malaria education modules into general studies (GST) or public health courses to reach all students. Collaborative projects between pharmacy, nursing, and social science departments could help design effective health communication strategies for malaria prevention.

5. Policy and Research

The National Agency for Food and Drug Administration and Control (NAFDAC) and the Edo State Public Health Department should monitor malaria-control interventions in tertiary institutions to ensure effectiveness.

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APPENDIX

QUESTIONNAIRE

ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES (KAP) TOWARDS MALARIA PREVENTION AMONG UNIBEN STUDENTS

Dear Respondent,

I am a final year student of Department of Clinical Pharmacy, University of Benin. I am conducting a study on the assessment of knowledge, attitudes and practices towards malaria prevention among UNIBEN students. Please kindly complete this questionnaire honestly and to the best of your knowledge. Your responses will be treated with strict confidentiality.

Instructions: Please tick (✓) the most appropriate answer or fill in the blank spaces as required.

Section A:

1. **Age** (in years): (a) 15-20 [] (b) 21-25 [] (c) 26-30 []
2. **Gender:** (a) Male [] (b) Female []
3. **Current Academic Level/Year of Study (UNIBEN):**(a) 100 Level [] (b) 200 Level [] (c) 300 Level [] (d) 400 Level [] (e) 500 Level (Higher Level) []
4. **Faculty/College (UNIBEN):** (a) Pharmacy [] (b) Law [] (c) English and Literature []
5. **Type of Residence during academic session in Benin City:**(a) On-campus hostel (UNIBEN hostels) [] (b) Off-campus rented apartment (e.g., Ekosodin, Osasogie, BDPA, etc.) [] (c) Other (Please specify): _____

Section B:

Please indicate your level of agreement with the following statements (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am familiar with the concept of malaria prevention.					
2. Using insecticide-treated mosquito nets is an effective way to prevent malaria					
3. I understand that stagnant water provides breeding grounds for mosquitoes.					
4. I know the importance of clearing bushes and tall grass around my home to prevent malaria.					
5. I am aware of the different types of antimalarial drugs used for prophylaxis (prevention).					

Section C:

Please indicate your level of agreement with the following statements (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Malaria prevention is important for performance and overall health as a UNIBEN student.					
2. Using insecticide-treated mosquito nets is an effective way to prevent malaria					
3. I believe reducing mosquito breeding sites around my UNIBEN residence is my responsibility.					
4. I feel that malaria prevention is a low priority for me compared to other health					

concerns					
5. Taking preventive measures against malaria is too much effort/a hassle for me as a student.					

Section D: Please tick (✓) the best applicable.

Statement	Always	Often	Sometimes	Rarely	Never
1. Do you regularly sleep under an insecticide-treated mosquito net (ITN) in your current residence					
2. How often do you use mosquito repellent (e.g., creams, sprays, coils, vaporizers) in your living area?					
3. How often do you or your housemates/family take steps to remove stagnant water or clear bushes around your residence to prevent mosquito breeding?					
4. How often do you take anti-malaria drugs for prevention while in session or during breaks					
5. How often do you seek medical advice or run diagnostic test when you develop symptoms suggestive of malaria (fever, headache, body aches, etc)					

Section E: Please indicate your level of agreement with the following statements (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I have a fear of sleeping under a mosquito net					
2. I am anxious about the safety of mosquito repellent (creams, sprays, coil, vaporizers)					
3. I am afraid of the side effects of preventive malaria medications					
4. I am afraid that the methods of malaria prevention are too complicated for me to follow correctly.					
5. I experience anxiety when I see a mosquito even when I am protected					

Thank you for your valuable time and participation!