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UNIVERSITY OF GHANA

DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL

MSc CLINICAL TRIALS

DISSERTATION

APPROPRIATENESS OF MALARIA TREATMENT PRACTICES AMONG HEAD PORTERS IN MADINA, ACCRA, GHANA.

BY

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DECLARATION

I, VERA ASABEA TAKYI DEGRAFT, certify that this dissertation is my work and that no previous submission for a degree has been made here or elsewhere. Also, works by others that served as sources of information have been duly acknowledged by referencing the authors where applicable.

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DEDICATION

This thesis is dedicated to the Almighty God for guidance, strength, and wisdom throughout this academic journey. I also lovingly dedicate myself to my late mother, **Glady Debrah**, whose unwavering love, sacrifices, and teachings continue to inspire me every day. Your legacy lives on in all that I do.

To my amazing husband, **Chezrie Nyarko Takyi Degraft**, your constant support, encouragement, and love have been my greatest source of strength. I am endlessly grateful to have you by my side.

To my wonderful children, **Samuel, Samuella, and Samuellis Takyi Degraft**, you are the light of my life and the reason I strive to be the best version of myself. Watching you grow brings me immense joy and pride.

And to my dear nephew, **Gabriel Kofi Owusu Junior**, your special presence adds so much love and happiness to our family. I am so blessed to have you in my life.

To my friends and mentors, who provided guidance and motivation, I am deeply grateful. Lastly, I dedicate this work to all head porters who, despite their daily struggles, continue to strive for better healthcare access and well-being.

This is for all of you—my heart and my greatest blessings

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I acknowledge the head porters in Madina, who willingly participated in this study and shared their experiences. Their openness and cooperation were essential in making this research possible. To my dear husband, Arc. Chezrie Nyarko Takyi Degraft, my children, Samuel, Samuella and Samuellis, my entire family and friends, thank you for your encouragement, prayers, and emotional support throughout this journey. Your unwavering belief in me has been a source of strength. Lastly, I appreciate the contributions of all individuals and organizations who, in one way or another, played a role in this study. May you all be blessed abundantly.

I remain forever grateful to all of you.

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LIST OF ABBREVIATIONS

ACT – Artemisinin-based Combination Therapy

CDC – Centers For Disease Control And Prevention

DALY – Disability-Adjusted Life Years

DHMTs – District Health Management Teams

EHR – Electronic Health Records

FDA – Food and Drugs Authority

GHS – Ghana Health Service

ISS – Integrated Supportive supervision

ITN – Insecticide-Treated Net

KAP – Knowledge, Attitude and practice

LLIN – Long-Lasting Insecticide Net

MIS – Malaria Indicator Survey

NHIS – National Health Insurance Scheme

NMCP – National Malaria Control Program

OTSS – Outreach Training, Supportive Supervision

PHC – Primary Health Care

PMI – President's Malaria Initiative

RDT – Rapid Diagnostic Test

SSA – Sub-Saharan Africa

WHO – World Health Organization

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TABLE OF CONTENTS

DECLARATION i
DEDICATION ii
ACKNOWLEDGEMENT iii
LIST OF ABBREVIATIONS iv
LIST OF TABLES viii
LIST OF FIGURES ix
ABSTRACT x
CHAPTER ONE 1
1.0 INTRODUCTION 1
1.1 BACKGROUND 1
1.2 PROBLEM STATEMENT 5
1.3 THE CONCEPTUAL FRAMEWORK 7
1.4 JUSTIFICATION 9
1.5 RESEARCH QUESTIONS: 10
CHAPTER TWO 12
2.0 LITERATURE REVIEW 12
2.2 MALARIA PREVENTION 14
2.4 SYMPTOMS OF MALARIA 17
2.5 VULNERABLE POPULATIONS AT HIGH RISK OF MALARIA 18
2.6 TREATMENT PRACTICES 20
2.7.1 Socioeconomic Factors 24
2.7.2 Knowledge and Awareness 24
2.7.3 Cultural Beliefs and Practices 25
2.7.4 Accessibility to Healthcare Facilities 25
2.7.5 Gender and Autonomy 26
2.8 TREATMENT SIDE EFFECTS AND DRUG REGIMEN 28
2.9 IMPACT OF SELF-MEDICATION AND TRADITIONAL TREATMENTS 30
2.9.1 Self-Medication and Use of Traditional Remedies 30
2.9.2 Prevalence of Self-Medication 30
2.9.3 Use of Traditional Remedies 32
CHAPTER 3 34
METHODOLOGY 34
3.0 Research Design 34
3.1 Study Site 34

University of Ghana http://ugspace.ug.edu.gh
3.2 Study Population 35
3.3 Inclusion criteria 35
3.4 Exclusion criteria 35
3.5 Sampling Frame 36
3.6 Sample Population 36
3.7 Sample Size 36
3.8 Sampling Technique 36
3.9 Variables 37
3.9.1 Independent variables 37
1. Clinical Indication 39
• Were you tested before treatment? (Testing ensures the treatment was indicated based on confirmed malaria diagnosis.) 39
2. Drug Choice 39
• Did you use the recommended antimalarial (Artemisinin-based Combination Therapy – ACT/ recommended herbal antimalarial drug)? (ACT is the WHO-recommended first-line treatment.) 39
3. Dosage and Duration 39
• Did you use the drug for three days, as recommended? 39
• Did you adjust the dosage (e.g., increased or reduced it contrary to prescription)? 39
• Did you change the timing for drug intake (e.g., skipped doses, took irregularly) 39
3.10 Data Collection Method 39
3.11 Instruments for Data Collection 40
3.12 Data Handling 41
3.13 Data Quality Assurance and Pretesting 41
3.15 Ethical Consideration 43
CHAPTER FOUR 44
4.0 RESULTS 44
4.1 Socio-demographic characteristics of head porters in Madina 44
4.2 Level of Knowledge and Awareness of Malaria Among Head Porters in Madina 45
4.4 Malaria Testing Before Treatment Across Age Groups of Participants 47
4.5 Malaria Testing Locations Among Head Porters in Madina 48
4.6 Appropriateness of Malaria Treatment Practices 49
4.7 Association between socio-demographic, socio-cultural, and socio-behavioral factors with the appropriateness of malaria treatment practice of head porters in Madina 50
Table 4.5: Association Between Independent Variables and Appropriateness of Malaria Treatment (n = 400) 50
4.8 Multivariable Logistic Regression Analyses 51
DISCUSSION 55
5.1 Summary of Key Findings 55

University of Ghana http://ugspace.ug.edu.gh

5.2 Comparison with Previous Studies 56
5.3 Study Implications 59
5.4 Study Limitations 60
CHAPTER SIX 61
CONCLUSION AND RECOMMENDATIONS 61
6.1 CONCLUSION 61
6.2 RECOMMENDATION 61
REFERENCES 64
APPENDIX 84

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LIST OF TABLES

Table 4. 1: Demographic characteristics of head porters in Madina 44

Table 4. 2: Knowledge and Prevention methods of Malaria of head porters in Madina…….45

Table 4.3: Malaria Testing Locations Among Head Porters in Madina 49

Table 4.4: Appropriateness of Malaria Treatment Practices 49

Table 4.5: Association Between Independent Variables and Malaria Treatment Appropriateness..50

Table 4.6: Multivariable Logistic Regression Analyses of socio-demographic, socio-cultural, and socio-behavioral factors with the appropriateness of malaria treatment practice of head porters in Madina 52

Table 4.7: Influence of Healthcare Provider Factors on the Appropriateness of Malaria Treatment Practices 54

University of Ghana http://ugspace.ug.edu.gh

LIST OF FIGURES

Figure 1.1: Conceptual Framework for Malaria Treatment 7

Figure 4.1: Types of antimalarial drugs used by participants …...46

Figure 4.2: Sources of antimalarial drugs……………………………………………………47

Figure 4.3: Malaria Testing Before Treatment Across Age Groups of Participants…………48

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ABSTRACT

Malaria remains a major public health concern in Ghana, particularly among vulnerable populations such as head porters (kayayei). This study assessed the appropriateness of malaria treatment practices among head porters in Madina, Ghana. A cross-sectional study design was employed, using structured questionnaires administered through face-to-face interviews with 400 head porters. Data were collected on socio-demographic characteristics, malaria knowledge and awareness, treatment-seeking behaviors, and sources of antimalarial drugs. Descriptive statistics, chi-square tests, and multivariable logistic regression analyses were used to examine associations between variables.

The findings revealed high levels of malaria knowledge (90.2%) and awareness of prevention measures (71.75%). Most respondents (78.5%) reported undergoing malaria testing before treatment, and 86.5% used artemisinin-based combination therapies (ACTs), although adherence to the correct dosage regimen was lower (64.5%). A smaller proportion (12.0%) used herbal treatments, with 1.5% relying on self-prepared remedies. Age group, income level, and access to healthcare were significantly associated with appropriate treatment practices ($p < 0.05$), while educational level, religion, and NHIS ownership were not. Drug affordability and experience of side effects also emerged as significant predictors of appropriate treatment behavior. Hospitals (53.2%) and pharmacies (39.2%) were the main sources of antimalarial drugs, although self-medication and the use of non-standard treatments persisted.

Despite encouraging levels of awareness and treatment-seeking behavior, a knowledge-practice gap remains, particularly in adherence to correct dosage and treatment timelines. These findings highlight the need for targeted health education campaigns, improved pharmacy regulation, and enhanced financial protection mechanisms. to promote appropriate malaria treatment among this vulnerable population.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

According to the World Health Organization (WHO), malaria is a common health problem that affects over half of the world's population and is most common in south-eastern Asia and Sub-Saharan Africa. An estimated 253 million cases of malaria were reported globally in 2024, with 627,000 fatalities as a result. A total of 95% of cases that were reported and 96% of deaths occurred in the African continent. Together with eleven other countries, Ghana is acknowledged as a high-burden country, accounting for more than 70% of the world's malaria infections and fatalities. With the largest absolute increase in malaria cases in 2018 compared to 2017, Ghana is one of the two nations in Africa with the highest malaria burden. (Heinemann et al., 2024).

Malaria remains a leading cause of illness globally and poses a significant public health issue in many developing countries, including Ghana (Appiah et al., 2022). In Ghana, and specifically in the Greater Accra Region, malaria continues to be a persistent health challenge (Amoah et al., 2022; Kawaguchi et al., 2022; Zieliński et al., 2023). According to Ghana's 2020 Anti-Malaria Medicines Policy, the disease is a major contributor to morbidity and mortality, particularly affecting children and pregnant women. The policy reported that in 2018, malaria was responsible for 34.5% of all outpatient visits and 21.8% of hospital admissions. Data from the 2016 Malaria Indicator Survey (MIS) showed an average malaria parasite prevalence of 20.6% among children aged 6 to 59 months, with regional differences ranging from 4.8% in the Greater Accra Region to 31.3% in the Central Region (Ghana Health Service, 2022).

Malaria is a major contributor to underdevelopment and imposes a significant socioeconomic burden on the entire population, as demonstrated by Ghana's health services and anti-malaria drug strategy. Furthermore, the strategy revealed that in Ghana, businesses lost roughly US$6.58 million in 2014 due to malaria, with 90% of those losses being direct expenses. It is estimated

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that malaria costs up to 6% of GDP due to the loss of approximately 10.6% of Disability Adjusted Life Years (DALYs) annually in economic burden (Anti-Malaria Medicines Policy Ghana Health Service., 2020). When someone is suffering from malaria, they cannot attend work, which can harm the economy.

According to the World Health Organization (WHO), malaria is treated worldwide and in Ghana using artemisinin-based combination therapy (ACT) (NMPC,2020; Tetteh et al., 2020). However, several home-based antimalarials are certified by the Food and Drugs Authority (FDA) and can be used at home as alternatives or complements to orthodox medications. These are finished herbal products made from locally known herbs that have been used in traditional areas for a long time as demonstrated by(Nortey et al., 2023) in their study in Greater Accra on herbs used in antimalarial medicines such as "Time herbal mixture", "Agbeve tonic", "Tabea herbal mixture" and a few others. Ghanaians prefer these products and use them frequently, especially those who believe that herbal medicines are more effective and have fewer toxic effects. Additionally, some of these products are relatively cheaper and more accessible in local communities than orthodox medications, which are equally effective.

It is interesting to note that the herbal products used as alternatives or complements to orthodox medications in Ghana are based on oral traditional knowledge of plants in various communities. This oral knowledge has been passed down from generation to generation, resulting in a wide variation in the plant compositions of these herbal products (Erhirhie et al., 2021; Nortey et al., 2023; Osei-Djarbeng et al., 2015;Willcox & Bodeker, 2004). As stated by (Aziato & Antwi, 2016; Wright, 2005) it's fascinating to see how the use of complementary and alternative medicine, such as herbal medicine, is gaining popularity in numerous countries worldwide. Ghana is no exception to this trend, and it's interesting to see how people are increasingly turning towards these alternative forms of medicine for their health and wellness needs. The issue of concern is

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the appropriateness of the use of these antmalarial drugs, be it orthodox or traditional. A study by (Tettey et al., 2021) revealed that a high proportion of the participants reported self-medication with non-prescribed antimalarial drugs. These antimalarials included both orthodox and herbal medications sourced from outlets such as community pharmacies, licensed chemical sellers, and home herbal preparations.

Therefore, there is a need to intensify monitoring, public health education on self-medication, and the training of staff of community pharmacies to ensure effective treatment and management of malaria at the community level. Furthermore (Adum et al., 2023; Malik et al., 2006) stated that poor outcomes of malaria were attributed to ineffective treatment, inadequate maternal knowledge of preventive measures, poor logistics systems leading to undersupply of drugs and diagnostics, issues with health workers, lack of self-efficacy of women to provide the treatment as required, socio-cultural determinants of health, and side effects management.

This study could assist in decision-making, monitoring, and evaluating malaria interventions in Ghana. The findings of this study could be crucial in stimulating further discussions and research on the appropriateness of the use of herbal antimalarials among head porters, and it is expected to generate new insights and conclusions that will contribute significantly to the National Malaria Elimination program and future revision of antimalarial medicine policy and even the traditional medicine policy.

Yaaba Baah-Ennumh et al., (2012) indicated that migration from northern to southern Ghana is driven by the perceived abundance of job opportunities in the south for the economically active population. Studies show that young girls and women who migrate to work as head porters, commonly known as kayayei, have been dominating this phenomenon lately (Kwofie et al., 2020; Opuni et al., 2023). The term "Kayayei" is derived from two local dialects in Ghana; Hausa and Ga. In Hausa, "Kaya" means luggage, goods, or loads, while in Ga, "Yoo" or "Yei" means woman or women respectively. Ga is the language of Greater Accra's indigenes, the capital of Ghana.

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According to their findings, most of the head porters in the south are children under the age of 18 who live in harsh and dangerous conditions. These conditions include inadequate housing, healthcare, nutrition, and water and sanitation. The authors(Jemes Adu Opare, 2003; Kwofie et al., 2020; Opuni et al., 2022) suggest that if youth policies focused on capacity building for head porters were implemented, it could help to reduce the number of young girls and women who feel compelled to work in this field.

The impact of malaria on mobile populations in sub-Saharan Africa is not well-documented. These populations are at a higher risk of contracting the disease due to their poor living conditions. Additionally, their mobile nature often causes them to miss out on malaria prevention programs. Diallo has indicated that mobile populations, including hawkers, long-distance truck drivers, and head porters, are all at risk for malaria and do not have access to protection against mosquitoes, such as long-lasting, insecticide-treated bed nets. (LLIN). (Diallo et al., 2017; Hill et al., 2015). This study aims to investigate how head porters manage their health when suffering from malaria, specifically whether they rely on conventional medication or herbal remedies and how they use antimalarial drugs appropriately.

The research also aims to identify the factors that influence their choice of antimalarial medicine. It has been observed that many rural residents and low-income urban workers, such as head porters, find western or imported drugs too expensive and are unable to afford them. (Abbiw,1996; Nketia et al., 2022). The severity and frequency of malaria cases among head porters undoubtedly impact their reliance on herbal medicines. It's an unfortunate reality that they are forced to turn to such methods, but the fact remains that malaria is a serious and potentially deadly disease. It's imperative that we prioritize efforts towards researching and implementing effective treatments and prevention methods to reduce the burden on those affected by malaria. There is quiet some information on the health seeking behaviour but not on the appropriateness of the use of antimalarials hence the need for this study.

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Many people still rely on traditional herbal antimalarials due to their inability to afford or access effective drugs. This study intends to assess the socio-demographic, socio-economic, traditional beliefs, socio-behavioral, and healthcare accessibility factors associated with appropriate use of antimalarial drugs among head porters. Based on these factors, effective public health policies and interventions can be developed to promote the use of prescribed medications, supporting the National Malaria Elimination Program's goal of eliminating malaria.

1.2 PROBLEM STATEMENT

Head porters constitute the mobile population who are at an increasing risk of being infected with malaria. They face heightened vulnerability due to their transient lifestyles and exclusion from mainstream malaria intervention programs (Awuah et al., 2018; Diallo et al., 2017; Kwofie et al., 2020b; Ofori-Amoah et al., 2013; Yaaba Baah-Ennumh et al., 2012).

Malaria in Ghana accounts for 40% of all outpatient hospital visits, including street hawkers, long-distance drivers, children under five, and head potters, to mention a few (Awine, 2020; Diallo et al., 2017; Kwofie et al., 2020; Opuni et al., 2022).

The incidence of malaria infections per 1,000 population in Ghana, declined from 341 to 178, which was 47.8% from 2018 to 2022 (Ghana Health Service Annual, 2023). The Greater Accra region recorded the lowest incidence of 38.2 new cases per 1,000 population compared to the other regions, how be it a study by Opuni et al., (2022) found an alarming 100% malaria prevalence among head porters in Kumasi and Greater Accra.

Some of the factors that account for malaria infections among head porters who are children under age 18 years and women, is lack of access to adequate healthcare services, which exacerbates their vulnerability to malaria. Cultural beliefs, trust in healthcare systems, long

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waiting times, poor service delivery, and the cost of medicines further hinder their access to proper malaria diagnosis and treatment (Adum et al., 2023).

The consequences of inappropriate antimalarial drug use are severe. It leads to higher incidences of severe malaria, increased mortality rates, and the emergence of drug-resistant strains, which diminish the effectiveness of current treatments. Inappropriate prescriptions for uncomplicated malaria significantly threaten malaria management, imposing a substantial economic burden on the health system. These consequences highlight the critical need to ensure the appropriate use of antimalarial treatments to prevent serious complications in malaria control and elimination efforts (Blanco et al., 2021; Nonvignon et al., 2016; Nwaneri et al., 2017; Zieliński et al., 2023).

This study may fill the existing gap in understanding the healthcare-seeking behaviors and treatment practices of head porters, thereby contributing to more effective malaria control and elimination strategies in Ghana.

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1.3 THE CONCEPTUAL FRAMEWORK

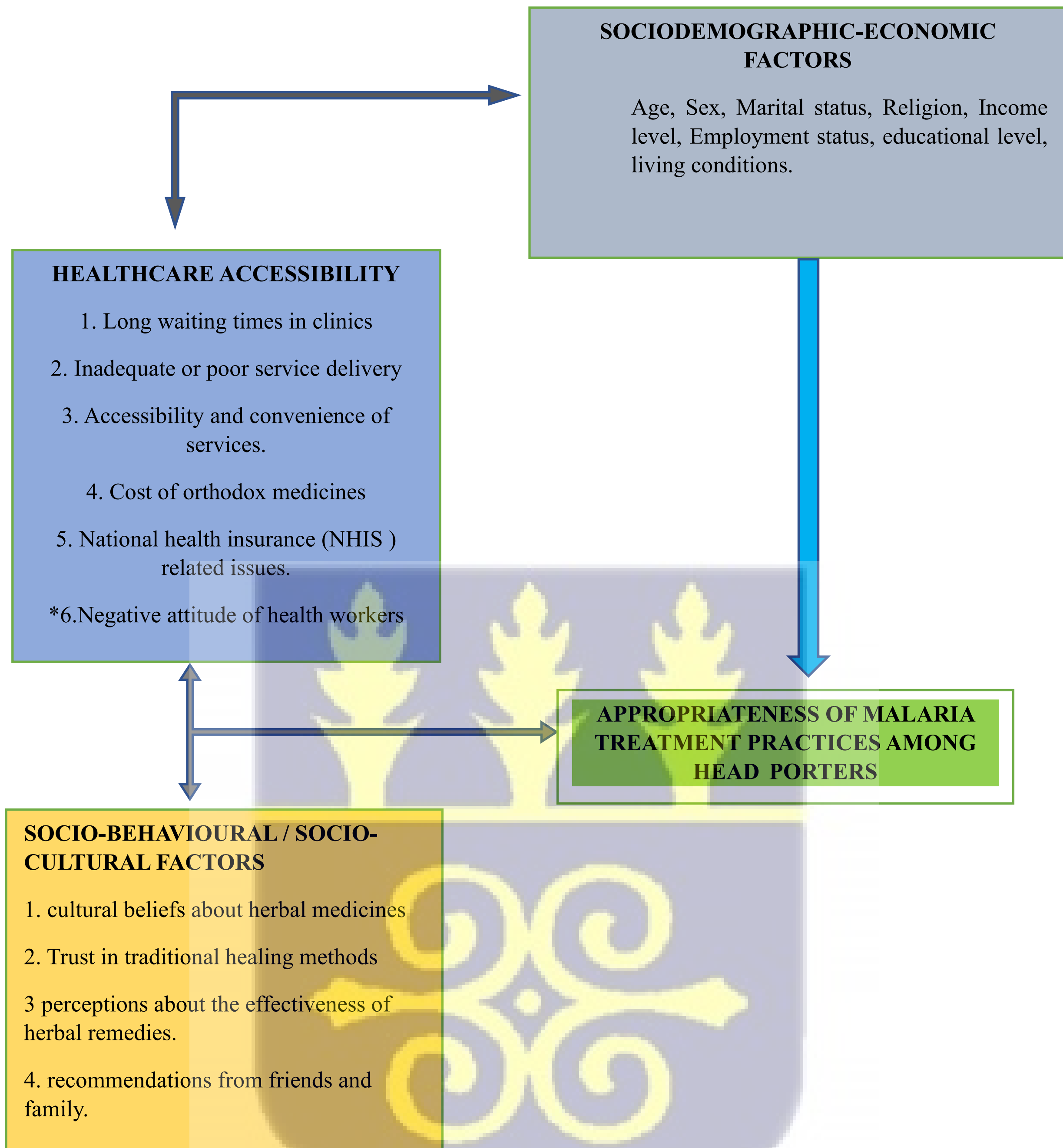

Figure 1:1 is a conceptual framework for the appropriateness of malaria treatment practices among head porters in Madina

INTEGRI PROCEDAMUS

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1.3.2 NARRATIVE OF THE CONCEPTUAL FRAMEWORK

The conceptual framework for this study revolves around understanding the factors associated with the appropriate use of antimalarial medicines among head porters in Madina. The framework is designed to explore the interplay between some factors. As demonstrated in Figure 1.1 above, the factors that influence the appropriate malaria treatment practices are categorized into 3 main groups; Sociodemographic-economic factors, Socio-cultural/socio-behavioural factors and Health facility factors.

Limited access to conventional healthcare facilities among head porters may drive them to seek alternative remedies. Accessibility and convenience of services ,negative attitudes from health providers, inadequate service, and long waiting times may lead to the indiscriminate use of herbal antimalarials and inappropriate malaria treatment practices (Atwine & Hjelm, 2016). National Health Insurance Scheme can enable underprivileged individuals to access treatment for malaria following the malaria treatment guidelines, or vice versa (.Owusu et al., 2008).

The availability and affordability of herbal medicines become crucial factors influencing their inappropriate usage ((Erhirhie et al., 2021; Osei-Djarbeng et al., 2015; Wright, 2005). The economic status of head porters influences their treatment practices. Financial constraints may lead individuals to opt for herbal remedies perceived as more affordable indiscriminately (Nortey et al., 2023), hence indulging in inappropriate malaria practices. Mothers' attitudes towards malaria treatment practices are influenced by their age, sex, marital status, education level, health education, occupation, access to healthcare, and religion (Abbiw, 1996). The low awareness of national malaria treatment guidelines underscores the need for better education on affordable preventive measures (Adum et al., 2023; Alga et al., 2024; Blanco et al., 2021).

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The malaria treatment practices involves personal decision, recommendation by friends and families based on their experiences. Cultural beliefs and socio-behavioral factors heavily influence malaria treatment practices, often leading to inappropriate care methods (Abbiw, 1996; Tettey et al., 2021).

1.4 JUSTIFICATION

This study can shed light on healthcare utilization patterns, especially among low-income individuals with limited access to formal healthcare. Determining the appropriateness of the use of antimalarials among head porters may inform public health interventions, reducing the malaria burden in urban areas. These findings may shape policies to enhance malaria control and healthcare access for vulnerable communities. Understanding factors influencing herbal use might guide policymakers in improving healthcare delivery and ensuring the safety of treatments. The study may establish the prevalence of antimalarial medication use among head porters, offering baseline data for future interventions including educational programs.

The study objective is to provide quantitative insights into head porters' appropriate reliance on antimalarial drugs for treatments of malaria. Investigating how healthcare, socioeconomic, and cultural factors influence their preference for antimalarials may fill gaps in understanding health-seeking behaviors among the head porters in urban communities in Ghana. Investigating the frequency and factors influencing head porters' appropriate use of antimalarial medications in Accra is essential for addressing health disparities and enhancing malaria management in urban areas.

Furthermore, this research may guide future efforts in policy, healthcare, and research, addressing key questions about the prevalence and influencing factors of appropriateness in the use of

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antimalarial drugs among head porters. promoting and publicizing the integration of traditional medicine into modern healthcare systems to improve the success of the National Malaria Elimination Program.

1.5 RESEARCH QUESTIONS:

1. How knowledgeable and aware are head porters about malaria and its treatment?

2. What types of antimalarial drugs do head porters use, and where do they obtain them?

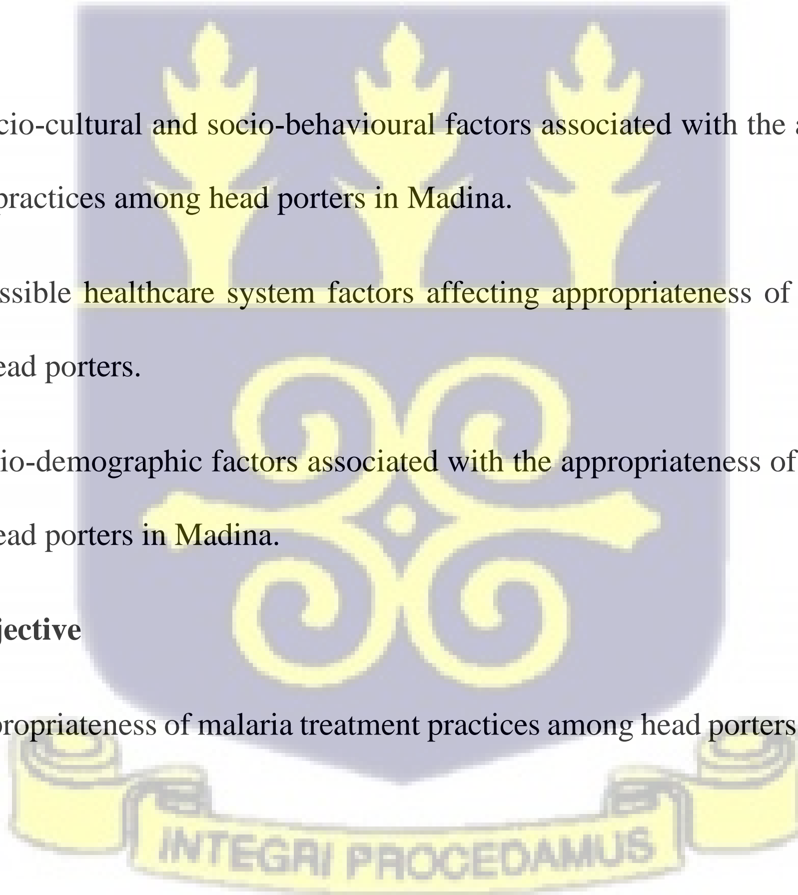
3. What are the proportions of head porters who were tested before treatment and those treated without testing?

4. What are the socio-cultural and socio-behavioural factors associated with the appropriateness of malaria treatment practices among head porters in Madina.

5.What are the possible healthcare system factors affecting appropriateness of malaria treatment practices among head porters.

6.What are the socio-demographic factors associated with the appropriateness of malaria treatment practices among head porters in Madina.

1.6 General Objective



To assess the appropriateness of malaria treatment practices among head porters in Madina, Accra, Ghana.

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1.7 Specific Objectives

1. To assess the level of knowledge and awareness about malaria and its treatment among head porters in Madina.

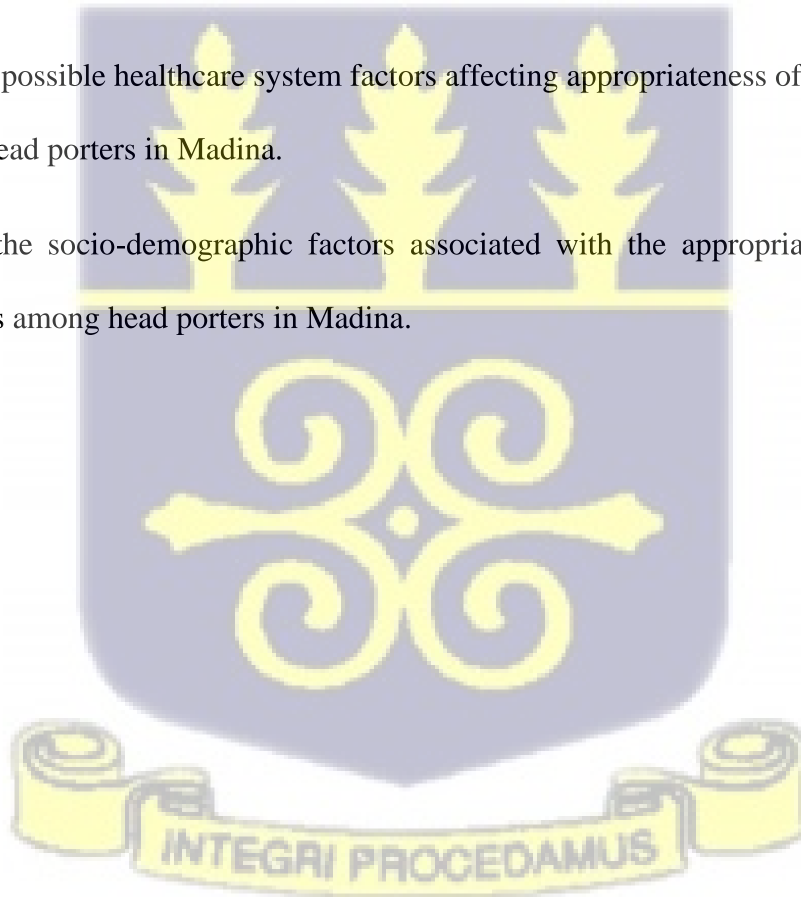
2. To identify the types and sources of antimalarial drugs used by head porters in Madina.

3. To determine the proportion of head porters who are tested before treatment and those treated without testing.

4. To assess the socio-cultural and socio-behavioural factors associated with the appropriateness of malaria treatment practices among head porters in Madina.

5. To examine the possible healthcare system factors affecting appropriateness of malaria treatment practices among head porters in Madina.

6. To determine the socio-demographic factors associated with the appropriateness of malaria treatment practices among head porters in Madina.



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CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Burden of Malaria

Global Burden

Malaria remains one of the most severe global public health challenges, particularly affecting low- and middle-income countries. According to the World Health Organization (WHO, 2024), an estimated 263 million malaria cases and approximately 597,000 deaths occurred globally in 2023. Although substantial progress has been achieved since 2000 when malaria incidence and mortality rates were significantly higher, the pace of reduction has slowed in recent years due to emerging drug resistance, insecticide resistance, and disruptions in control programs (WHO, 2024; CDC, 2023). Nearly half of the world's population, approximately 3.5 billion people, live in areas where malaria transmission remains a risk (CDC, 2023).

Children under five years old continue to account for the majority of malaria deaths globally, reflecting persistent inequalities in access to preventive and curative interventions (WHO, 2023). The global malaria mortality rate has decreased from 28.5 per 100,000 population in 2000 to 13.7 in 2023 (WHO, 2024). Despite these gains, the global target to reduce malaria mortality and incidence by 90% by 2030 remains off track. Consequently, malaria continues to impose a heavy disease and economic burden on affected countries, limiting productivity and socio-economic development (Shretta et al., 2021).

Burden in Africa

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Sub-Saharan Africa (SSA) bears the overwhelming share of the global malaria burden. The WHO African Region accounted for 94% of malaria cases and 95% of malaria deaths worldwide in 2022 (WHO, 2023). High-burden countries such as Nigeria, the Democratic Republic of Congo,

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Uganda, and Mozambique collectively contributed to more than half of all malaria deaths globally (Oluwafemi, 2023). The dominance of Plasmodium falciparum in SSA explains the severity of disease manifestations and mortality in the region (Talapko et al., 2019).

Despite intensified interventions through insecticide-treated nets (ITNs), indoor residual spraying (IRS), seasonal malaria chemoprevention, and improved diagnostics, progress has plateaued due to funding gaps, resistance to insecticides, and climate variability (Kawaguchi et al., 2022; WHO, 2023). Conflict and population displacement have further impeded control efforts in parts of the Sahel and Horn of Africa (Ashley et al., 2018). The “High Burden to High Impact” (HBHI) initiative by WHO, launched in 2018, identified 11 priority African countries including Ghana, as critical to reversing the stagnation in malaria control outcomes (WHO, 2023).

The heavy malaria burden in Africa not only results in morbidity and mortality but also imposes significant economic losses. Malaria contributes to absenteeism in schools and workplaces, reduces productivity, and increases household health expenditures (Nonvignon et al., 2016). Sustained political commitment, regional collaboration, and private sector participation are essential to achieving elimination goals (Shretta et al., 2020).

Burden in Ghana

Ghana remains among the high malaria-endemic countries in sub-Saharan Africa, despite substantial progress in reducing transmission and mortality. The entire population of Ghana is at risk of malaria, with children under five and pregnant women being the most vulnerable groups (WHO, 2024). In 2022, Ghana reported more than 5.2 million confirmed malaria cases and 151 deaths, reflecting a marked decline from the 2,799 deaths recorded in 2012 (National Malaria Elimination Programme [NMEP], 2023). The parasite prevalence among children aged 6–59

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months declined from 20.6% in 2016 to 8.6% in 2023, demonstrating the effectiveness of sustained vector control, community case management, and preventive treatment strategies (NMEP, 2023; Awine et al., 2020).

Malaria, however, continues to impose a considerable burden on the Ghanaian healthcare system. It remains one of the top causes of outpatient department (OPD) attendance, accounting for nearly 30–40% of all hospital visits in some regions (Osei-Djarbeng et al., 2015; Shretta et al., 2020). The disease's economic impact is also substantial Nonvignon et al. (2016) estimated that malaria cost Ghanaian businesses US$6.58 million in 2014, primarily due to treatment expenses and productivity losses. Additionally, malaria contributes to school absenteeism and reduced learning outcomes among children (Awine, 2020).

Although Ghana is implementing a comprehensive National Malaria Elimination Strategic Plan (2024–2028), challenges such as inadequate funding, vector resistance, and socio-behavioral barriers persist (NMEP, 2023). Nonetheless, Ghana's commitment to malaria elimination is evidenced by its inclusion in the WHO HBHI initiative and ongoing efforts to expand access to the RTS,S/AS01 malaria vaccine nationwide (WHO, 2024).

2.2 MALARIA PREVENTION

Malaria prevention is a cornerstone of global malaria control and elimination strategies, combining individual, community, and national efforts to interrupt transmission and reduce disease burden. According to the World Health Organization (WHO, 2024), the primary preventive measures include the use of insecticide-treated nets (ITNs), indoor residual spraying (IRS), chemoprevention, vector control through environmental management, and prompt diagnosis and treatment of cases to prevent further transmission. ITNs remain one of the most cost-effective tools; their widespread distribution and proper use have been shown to significantly reduce malaria

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morbidity and mortality, especially among children and pregnant women (Bhatt et al., 2021). Similarly, IRS involves the periodic application of long-lasting insecticides on the interior walls of homes, targeting mosquitoes that rest indoors after feeding. This intervention provides community-wide protection when coverage exceeds 80% of households (WHO, 2023).

Chemoprevention, particularly intermittent preventive treatment in pregnancy (IPTp) using sulfadoxine-pyrimethamine, has been a key strategy in endemic regions to protect pregnant women and their unborn children from malaria-related complications (Tusting et al., 2020). In some countries, seasonal malaria chemoprevention (SMC) is implemented for children under five during high-transmission periods to reduce infection risk. Larval source management (LSM) and environmental sanitation, such as the removal of stagnant water and proper waste disposal, are also integral in reducing mosquito breeding sites. Additionally, health education and behavior change communication campaigns are vital in promoting community awareness about malaria prevention practices, encouraging consistent ITN use, and improving health-seeking behaviors (Flatie & Munshea, 2021; WHO, 2023).

Globally, the introduction of malaria vaccines marks a major advancement in prevention. The RTS,S/AS01 vaccine, recommended by WHO in 2021, has demonstrated significant efficacy in reducing severe malaria and hospitalizations among children in high-burden regions (WHO, 2023). Ongoing research and the recent approval of the R21/Matrix-M vaccine have further strengthened global malaria prevention strategies, particularly in sub-Saharan Africa (Draper et al., 2023). However, challenges such as insecticide and drug resistance, climate variability, and limited healthcare access continue to hinder progress toward malaria elimination.

In Ghana, malaria prevention follows a comprehensive, integrated approach guided by the National Malaria Elimination Strategic Plan (2024–2028). Key interventions include universal

INTEGRI PROCEDAMUS

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coverage of ITNs, targeted IRS in high-transmission districts, IPTp for all eligible pregnant women, and improved access to prompt diagnostic testing and effective treatment (National Malaria Elimination Programme [NMEP], 2023). The Ghana Health Service, through community-based health planning and services (CHPS) compounds, promotes household-level malaria prevention through community education, behavioral change campaigns, and distribution of ITNs during antenatal care and child welfare visits. Ghana has also been one of the early implementers of the RTS,S/AS01 malaria vaccine, initially piloted in 2019 and expanded nationwide in 2024, offering additional protection to children under five (WHO, 2024).

Furthermore, the Ghanaian government, in collaboration with international partners such as the Global Fund, USAID, and WHO, has strengthened vector surveillance and insecticide resistance monitoring to ensure the effectiveness of control measures (NMEP, 2023). Environmental management practices, including larval control and community cleanup campaigns, complement these biomedical interventions. Despite these achievements, sustained community engagement, proper use of ITNs, and continuous public education remain critical to achieving malaria elimination targets in Ghana.

2.3 THE CYCLE OF MALARIA TRANSMISSION

Malaria transmission follows a well-defined biological cycle involving both humans and female Anopheles mosquitoes. The process begins when an infected mosquito bites a human and injects Plasmodium sporozoites into the bloodstream. These sporozoites quickly travel to the liver, where they invade liver cells and develop into schizonts (Danso et al., 2024). Within a week or two, the schizonts rupture, releasing thousands of merozoites into the bloodstream, marking the start of the

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blood stage. The merozoites invade red blood cells, multiply asexually, and cause the cells to burst, leading to the characteristic symptoms of malaria such as fever, chills, and anemia. Some parasites differentiate into sexual forms known as gametocytes, which circulate in the blood and are essential for transmission (Williams et al., 2021).

When another female Anopheles mosquito bites an infected person, it ingests these gametocytes along with the blood meal. Inside the mosquito's gut, the gametocytes mature and fuse to form zygotes, which develop into ookinetes that penetrate the gut wall and form oocysts. The oocysts grow, divide, and release sporozoites that migrate to the mosquito's salivary glands, making it infectious. When this mosquito bites another person, the cycle repeats. This process takes about 10–21 days, depending on environmental conditions such as temperature and humidity (WHO, 2024; CDC, 2023). Interrupting any stage of this cycle through insecticide-treated nets, indoor residual spraying, or effective treatment remains crucial for malaria prevention and control.

2.4 SYMPTOMS OF MALARIA

Malaria diagnosis and treatment are central components of effective case management and control strategies, as outlined in the World Health Organization (WHO) guidelines. Accurate diagnosis is essential to ensure prompt and appropriate treatment, prevent complications, and reduce transmission. According to WHO (2023), all suspected malaria cases should be confirmed through either microscopy or rapid diagnostic tests (RDTs) before initiating treatment. Microscopy remains the gold standard, allowing identification of Plasmodium species and parasite density, while RDTs provide quick results and are particularly useful in resource-limited settings (CDC, 2023).

INTEGRI PROCEDAMUS

Classical symptoms of malaria typically appear 10–15 days after an infective mosquito bite and include fever, chills, headache, muscle pain, and malaise. As the disease progresses, additional symptoms such as sweating, nausea, vomiting, and diarrhea may develop. Severe malaria, most

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often caused by Plasmodium falciparum, can lead to anemia, jaundice, acute respiratory distress, seizures, or coma, which require urgent medical attention (WHO, 2023; CDC, 2023).

Treatment depends on the parasite species, disease severity, and local drug resistance patterns. For uncomplicated P. falciparum malaria, Artemisinin-based Combination Therapy (ACT) is the first-line treatment recommended by WHO, combining fast-acting artemisinin derivatives with a longer-acting partner drug such as lumefantrine or amodiaquine (WHO, 2024). In cases of severe malaria, intravenous artesunate is the treatment of choice, followed by a complete oral course of ACT once the patient can tolerate oral medication. Supportive management—such as fluid therapy, fever control, and management of anemia—is also critical to improve recovery and reduce mortality.

Early diagnosis and proper adherence to treatment protocols not only cure the infection but also help prevent drug resistance and interrupt transmission. Hence, strengthening laboratory capacity, ensuring the availability of quality-assured antimalarial drugs, and promoting health education are essential for effective malaria case management globally and in Ghana.

2.5 VULNERABLE POPULATIONS AT HIGH RISK OF MALARIA

Globally, malaria disproportionately affects vulnerable populations, particularly in sub-Saharan Africa, where social, economic, and environmental inequalities heighten exposure and limit access to healthcare. High-risk groups include pregnant women, children under five, migrants, refugees, people living in poverty, and those residing in remote rural or peri-urban settings (WHO, 2023). Pregnant women face an elevated risk due to lowered immunity during pregnancy, which can result in maternal anemia, stillbirths, and low birth weight infants (Desai et al., 2022). Children under

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five remain the most affected, accounting for nearly 80% of malaria deaths in the African Region (WHO, 2024). Similarly, displaced persons and mobile populations—such as migrant workers often live in unhygienic, mosquito-prone environments with limited access to preventive and curative measures (CDC, 2023).

In the African context, urbanization and internal migration have introduced new malaria vulnerability patterns. People moving from low-transmission to high-transmission areas, or vice versa, often lack acquired immunity, placing them at higher risk of infection and severe disease (Tiono et al., 2021). Informal workers, especially those in unstable or outdoor occupations, frequently experience inadequate housing and sanitation, limited healthcare access, and poor vector protection all of which increase exposure. These dynamics are particularly evident in Ghana, where marginalized groups in urban centers continue to bear a disproportionate burden of malaria despite national control efforts (NMCP, 2022).

Over the past decade, southern Ghana has witnessed an increasing number of young women and teenage girls migrating from the northern regions to urban centers like Accra and Kumasi to work as head porters, known locally as kayayei (Awumbila & Ardayfio-Schandorf, 2008; Pickbourn, 2018). These women engage in strenuous labor, transporting goods in markets under unsafe conditions. Lacking stable housing, they often sleep in open spaces, kiosks, or makeshift shelters near markets areas that are typically mosquito-infested and unsanitary. Their exposure to environmental hazards, poor access to healthcare, and lack of malaria prevention tools, such as insecticide-treated nets, heighten their susceptibility to infection (Kwofie et al., 2020; Ofori-Amoah et al., 2013).

Furthermore, the majority of these women have low literacy levels and limited health awareness, hindering their ability to seek timely and appropriate malaria treatment (Adu Opare, 2003;

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Kwankye et al., 2009). The Global Sisters Report (2017) notes that many kayayei are uneducated and unskilled young migrants some as young as seven who come from impoverished households in northern Ghana. Studies have shown that their precarious living conditions, combined with limited access to healthcare facilities and preventive measures, make them one of the most at-risk populations for malaria in urban Ghana (Opuni et al., 2023; Baah-Ennum et al., 2012).

Due to their mobility and exclusion from formal health systems, kayayei are often overlooked in malaria control programs. Their transient lifestyle limits the consistent use of bed nets and participation in health education campaigns, leading to persistent vulnerability even in areas with declining malaria prevalence. Addressing the health needs of such groups requires targeted interventions—including mobile health outreach, distribution of portable insecticide-treated nets, and community-based malaria education to ensure equitable access to malaria prevention and treatment services (Awuah et al., 2018; Alemu et al., 2011).

2.6 TREATMENT PRACTICES

Malaria treatment practices are deeply influenced by individual perceptions, health-seeking behaviors, accessibility of healthcare services, and socio-economic conditions. In most malaria-endemic areas, including Ghana, treatment-seeking behavior is shaped by how individuals recognize symptoms, attribute causes, and decide where and when to seek care. Many people initially respond to malaria symptoms with self-medication or traditional remedies before seeking formal healthcare, often due to convenience, cost, or previous experiences with the disease (Ahorlu et al., 2021; Baiden et al., 2016).

Self-treatment commonly involves purchasing drugs from pharmacies or chemical sellers without diagnostic confirmation, which may result in underdosing, misuse of medications, or delayed

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professional care (Boateng et al., 2020). Traditional herbs and concoctions are also widely used as part of community beliefs in the curative power of indigenous medicine. While such practices provide temporary relief, they may contribute to complications and hinder effective malaria control (Oppong et al., 2019).

Community members often distinguish malaria symptoms such as fever, chills, headache, and weakness from other febrile illnesses based on prior experiences rather than diagnostic testing (WHO, 2023). This symptom-based diagnosis frequently leads to presumptive treatment, even when symptoms could result from other diseases. To address this, the World Health Organization introduced the "Test, Treat, and Track" (T3) policy to ensure that all suspected malaria cases are confirmed using rapid diagnostic tests (RDTs) or microscopy before treatment is administered. The policy also emphasizes continuous monitoring to evaluate treatment effectiveness and disease trends (WHO, 2015; President's Malaria Initiative, 2023). Despite these guidelines, implementation gaps remain, particularly in informal settings and among marginalized populations such as head porters, who often lack access to diagnostic services and rely on self-medication or over-the-counter antimalarials.

In Ghana, artemisinin-based combination therapies (ACTs) such as artesunate-amodiaquine (AS-AQ), artemether-lumefantrine (AL), and dihydroartemisinin-piperaquine (DHAP) are the first-line treatments for uncomplicated malaria (Ghana Health Service, 2021). However, studies indicate that many patients do not always adhere to the full treatment regimen or may obtain antimalarials from unqualified vendors (Adu-Gyasi et al., 2018). These practices increase the risk of treatment failure and the development of drug resistance. Although ACTs are covered under Ghana's National Health Insurance Scheme (NHIS) to promote affordability, barriers such as lack of

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awareness, poor health literacy, and mistrust of formal health services hinder appropriate use (Kweku et al., 2019).

Cultural and behavioral factors also play a significant role in malaria treatment practices. For instance, in low-income urban communities, including market areas where kayayei reside, treatment decisions are often influenced by peers, relatives, or market vendors rather than trained health professionals (Kwofie et al., 2020). The transient nature of these groups and their long working hours make visiting health facilities difficult. Consequently, self-treatment using leftover drugs, painkillers, or herbal mixtures becomes a common coping mechanism. Additionally, misconceptions about malaria causes—such as attributing it to excessive sun exposure or poor diet—further complicate treatment behaviors (Ahorlu et al., 2021).

Effective malaria case management requires not only the availability of quality-assured diagnostics and drugs but also community awareness and trust in the health system. Strengthening community education, regulating informal drug markets, and integrating community-based testing initiatives can significantly improve treatment outcomes. Ultimately, addressing malaria treatment practices at the community level, particularly among vulnerable populations like head porters, is critical to achieving equitable access to effective and rational malaria management in Ghana.

The cornerstone of malaria treatment, as outlined by the World Health Organization, is the use of artemisinin-based combination therapies (ACTs) for the treatment of uncomplicated malaria caused by Plasmodium falciparum.(Bonful et al., 2019; Ihesie et al., 2019; Nyeko et al., 2023). ACTs are designed to combine two drugs with different mechanisms of action. This innovative approach significantly reduces the likelihood of resistance developing, making it a powerful and effective treatment strategy.(Nwaneri et al., 2017; Zieliński et al., 2023). For cases of severe malaria, intravenous artesunate is recommended, followed by a full course of ACTs (WHO

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MALARIA REPORT 2021.) Extensive studies have unequivocally demonstrated that the rigorous implementation of these guidelines has led to a remarkable reduction in malaria-related mortality in high-burden countries.(Kaboré et al., 2022).

National malaria treatment guidelines are usually founded on WHO recommendations, but they may be adjusted slightly to suit local epidemiology and healthcare infrastructure. For example, in Ghana, the National Malaria Control Program (NMCP) follows WHO protocols but focuses on dealing with drug resistance, which is becoming a significant concern(Awuah et al., 2018a). Resistance to artemisinin has been observed in Southeast Asia, raising concerns about the potential spread of resistant strains to Africa(Ashley et al., 2018) . In response there is a global effort to rigorously monitor drug efficacy and promptly update treatment policies accordingly(Malaria-WHO 2022 REPORT.)

Adherence to treatment guidelines continues to pose significant challenges, especially in settings with limited resources. Factors such as lack of access to healthcare facilities, delayed diagnosis, and inadequate adherence to drug regimens contribute to inappropriate treatment(Alga et al., 2024; Nonvignon et al., 2016; Tettey et al., 2021). The use of substandard and counterfeit antimalarial drugs significantly worsens the problem of treatment failure, underscoring the urgent need for stringent measures to address this critical issue(Ofori-Amoah et al., 2013).Consequently, it is imperative to enhance healthcare access, bolster diagnostic capabilities, and guarantee the availability of high-quality medications to achieve effective malaria control. Malaria treatment guidelines have evolved significantly, emphasizing prompt diagnosis and the use of ACTs as first-line therapy. However, emerging drug resistance and adherence challenges emphasize the need for ongoing monitoring and updates in treatment protocols.

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2.7 FACTORS INFLUENCING TREATMENT-SEEKING BEHAVIOR

Understanding the factors that influence treatment-seeking behavior in malaria-endemic regions such as sub-Saharan Africa is crucial for assessing the appropriateness of malaria treatment practices among head porters (kayayei) in Madina(Ofori-Amoah et al., 2013).

2.7.1 Socioeconomic Factors

Socioeconomic status significantly influences treatment-seeking behavior. Research has consistently shown that individuals with limited financial resources are less likely to seek prompt treatment or access formal healthcare services(Alga et al., 2024; Awuah et al., 2018; Ihesie et al., 2019;). This is primarily due to the prohibitively high cost of healthcare, including consultation fees, medication, and transportation(Domapielle et al., 2023;Jang et al., 2020; Rathod et al., 2023). In populations such as head porters, characterized by low incomes and unstable jobs, this barrier is further intensified, resulting in delays or dependence on less effective over-the-counter medications or traditional remedies

2.7.2 Knowledge and Awareness

Understanding and recognizing malaria symptoms, as well as seeking timely treatment, are essential. Research by(Awuah et al., 2018; Flatie & Munshea, 2021) indicates that in certain communities, a lack of knowledge about malaria symptoms can cause delays in seeking appropriate treatment. Misconceptions, such as attributing symptoms to other causes, can deter individuals from seeking formal healthcare services(Kahissay et al., 2017). This lack of knowledge can significantly impact treatment-seeking behavior, particularly for head porters, many of whom are migrants with limited access to health education. Therefore, widespread public education,

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awareness, and access to places where antimalarial drugs are available are crucial for the proper use of these medications(Ofori-Amoah et al., 2013; Zieliński et al., 2023b) .

2.7.3 Cultural Beliefs and Practices

Cultural beliefs and factors play a crucial role in shaping how individuals seek treatment for illnesses (Kahissay et al., 2017). In many rural regions of Ghana and across the globe, traditional healing practices are often favored over biomedical treatments. This preference is attributed to factors like easier accessibility, lower costs, and the perceived effectiveness of traditional methods (Abbiw, 1996; Awuah et al., 2018). Such choices are driven by cultural values and differing views on health and disease (Amoah et al., 2014; Willcox & Bodeker, 2004). However, reliance on traditional medicine over formal healthcare can result in inappropriate treatments for conditions like malaria, particularly when traditional remedies prove ineffective or cause delays in accurate diagnosis and treatment (Awasthi et al., 2022).

2.7.4 Accessibility to Healthcare Facilities

According to Ofori-Amoah et al. (2013), access to healthcare and health-seeking behaviors among female head porters were found to be inadequate. The authors recommended expanding health facilities, particularly in impoverished urban areas, and promoting health-seeking education among this population. The proximity and accessibility of healthcare facilities are key determinants of treatment-seeking behavior, as demonstrated by Allen et al. (2017). Rizkianti et al. (2021) investigated the link between perceived barriers to healthcare access and the risk of pregnancy-related complications among women of reproductive age in Indonesia. Their findings revealed that women in the Sumatra and Maluku-Papua regions faced physical, cultural, and financial barriers to healthcare access. The study recommended addressing these barriers by

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developing healthcare infrastructure in rural and geographically isolated areas to improve service delivery. Similarly, Abdulai et al. (2022) and Tshivhase et al. (2024) highlighted challenges faced by individuals in urban areas, including overcrowded health centers, long waiting times, and a shortage of healthcare providers, all of which deter timely treatment-seeking. For head porters in urban areas such as Madina, their transient lifestyles and lack of stable housing further hinder their ability to access appropriate healthcare services (Kwofie et al., 2020).

2.7.5 Gender and Autonomy

In numerous instances, women's healthcare-seeking behavior is shaped by their level of autonomy in decision-making (Budü et al., 2020). A systematic review of studies from developing countries further identified various factors influencing women's autonomy in healthcare decision-making. These factors include age, educational attainment, employment status, partner's education, place of residence, household wealth, and cultural or religious norms. Understanding these determinants can help inform policies aimed at protecting women's rights and ensuring access to gender-sensitive healthcare. Policymakers are encouraged to prioritize health education initiatives and provide equitable services that enhance women's autonomy in healthcare decision-making (Idris et al., 2023). Several studies suggest that women, particularly those from lower-income backgrounds, often face limited decision-making power when it comes to seeking healthcare. For female head porters, this issue may be further exacerbated by social and economic dependencies on male partners or employers, which can delay or restrict their access to appropriate malaria treatment (Ofori-Amoah et al., 2021).

INTEGRI PROCEDAMUS

Socioeconomic status, knowledge and awareness of malaria, cultural beliefs, access to healthcare, and gender roles are key factors that significantly impact treatment-seeking behavior. These elements are essential for evaluating the appropriateness of malaria treatment practices among

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head porters in Madina, as they influence whether individuals pursue timely and effective treatment for malaria.

Access to healthcare is a crucial factor in determining health outcomes. In the past decade, numerous studies have investigated the obstacles and enablers to healthcare access, especially in low- and middle-income countries. Accessibility encompasses not only the physical availability of healthcare services but also their affordability, acceptability, and appropriateness to meet population needs (Akazili et al., 2017; Cu et al., 2021; Domapielle et al., 2023; Ofori-Amoah et al., 2013).

One significant barrier to accessing healthcare is financial constraints. According to Wagstaff et al. (2018), out-of-pocket payments continue to pose a significant obstacle to healthcare utilization, especially in low- and middle-income countries with underdeveloped health insurance systems. The lack of access to essential health services in sub-Saharan Africa, as highlighted by Tessema et al. (2022), leads to catastrophic health expenditures, pushing households into poverty. Less than 50% of the population has access to these crucial services, primarily due to economic barriers.

Geographical disparities also significantly affect access to healthcare. Rural populations are disproportionately affected by a lack of infrastructure and healthcare professionals(Basu, 2022). A study conducted by Yaya et al. (2017) revealed that the proximity to healthcare facilities significantly influences healthcare-seeking behavior. In areas with limited access to healthcare facilities, individuals are less likely to seek timely medical interventions, resulting in poorer health outcomes. Conversely, urban areas often experience high patient volumes, which can compromise the quality of care provided.

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Cultural influences significantly impact healthcare access, as noted by Latif (2020). As explained by (A Guide to Cultural and Spiritual Awareness; Leijen & van Herk, 2021; Shaw et al., 2012), health literacy, cultural competence among healthcare providers, and trust in medical institutions significantly influence healthcare utilization. Therefore, culturally sensitive approaches to healthcare delivery are essential in bridging these gaps.

As outlined by A Guide to Cultural and Spiritual Awareness, Leijen and van Herk (2021), and Shaw et al. (2012), factors such as health literacy, cultural competence of healthcare providers, and trust in medical institutions are crucial in determining healthcare utilization. Consequently, adopting culturally sensitive healthcare practices is vital for addressing these disparities and improving access to care.

Consideration of treatment options is vital. In many developing countries, patients may struggle to receive effective care due to the lack of essential medications, diagnostics, or treatment equipment, even when they can access healthcare facilities (Yenet et al., 2023). Recent work by (Ghaffar et al., 2021) highlighted impact of supply chain deficiencies on treatment outcomes in LMICs emphasizes the necessity for robust health systems to ensure the continuous availability of medications and resources. Access to healthcare and treatment is significantly impacted by a complex interplay of financial, geographical, cultural, and systemic factors. Effectively addressing these barriers necessitates implementing multifaceted approaches, including enacting policy reforms, actively engaging communities, and bolstering healthcare infrastructure.

2.8 TREATMENT SIDE EFFECTS AND DRUG REGIMEN

The side effects associated with certain antimalarial medications can deter patients from completing their treatment. According to(Amponsah et al., 2015) the adherence level to ACTs among patients is moderate. During the dispensing of antimalarials, counseling efforts should

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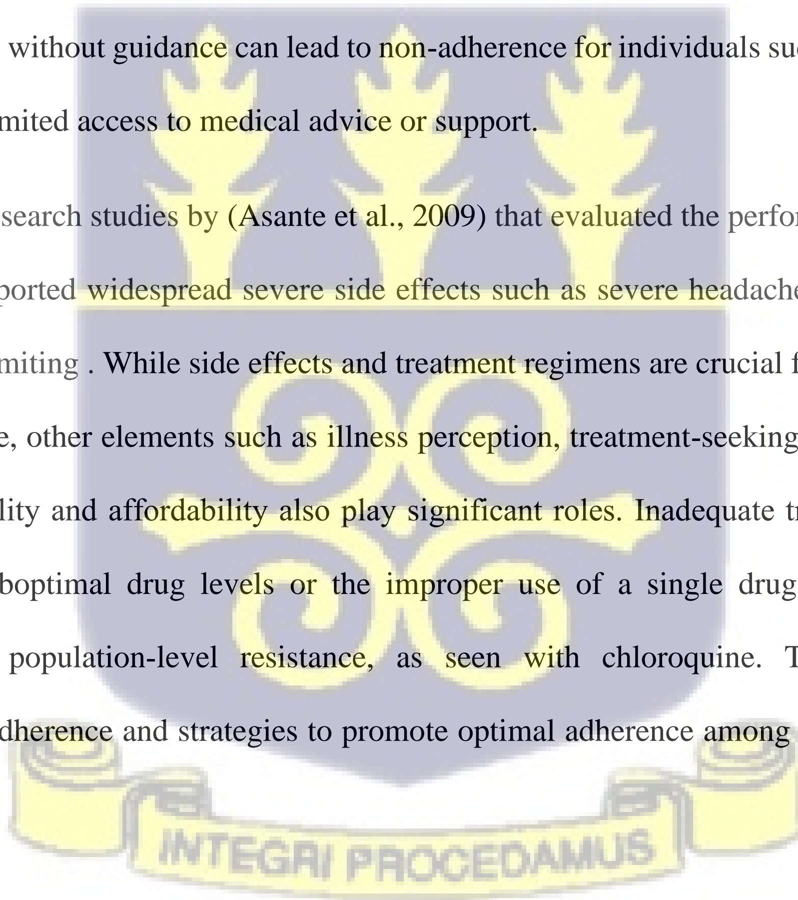
prioritize educating patients on the importance of completing their prescribed doses as noted by (Cohen & Saran, 2018; Hossain et al., 2023), as well as the correct dosage, efficacy, and potential side effects of the medication. Less emphasis should be placed on the causes, signs, symptoms, and prevention of malaria. A study by(Chatio et al., 2016) revealed that participants who took artesunate-amodiaquine to treat malaria reported various side effects, with general body weakness, dizziness, vomiting, and chest pains being the most common. Some linked these effects to poor eating before medication, while others blamed the drug's strong components. Rare cases included swelling of the body and testes, as reported by one participant. Health workers also noted complaints of dizziness, vomiting, poor vision, and hearing difficulties among patients. Managing these side effects without guidance can lead to non-adherence for individuals such as head porters, who may have limited access to medical advice or support.



Consequently, research studies by (Asante et al., 2009) that evaluated the performance of the new anti-malarials reported widespread severe side effects such as severe headache, body weakness, dizziness and vomiting . While side effects and treatment regimens are crucial factors influencing patient adherence, other elements such as illness perception, treatment-seeking behavior, and the drug's acceptability and affordability also play significant roles. Inadequate treatment practices can result in suboptimal drug levels or the improper use of a single drug as monotherapy, contributing to population-level resistance, as seen with chloroquine. Therefore, regular assessments of adherence and strategies to promote optimal adherence among target populations are essential.

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2.9 IMPACT OF SELF-MEDICATION AND TRADITIONAL TREATMENTS

Self-medication and the use of traditional remedies for malaria are common practices in many communities. Although some traditional treatments may offer symptomatic relief, they are often ineffective in eliminating the malaria parasite(Appiah et al., 2022; Ocan et al., 2023b). When head porters do not have consistent access to formal healthcare, reliance on these methods can lead to delayed or incomplete treatment, ultimately undermining the effectiveness of malaria control efforts.

The effectiveness of malaria treatment practices among head porters is influenced by a variety of factors. Key elements include drug availability, the accuracy of diagnostics, adherence to treatment protocols, and broader systemic healthcare challenges. It's crucial to address these barriers to enhance the appropriateness and outcomes of malaria treatment for this vulnerable population.

2.9.1 Self-Medication and Use of Traditional Remedies

Self-medication and the use of traditional remedies are widespread practices in many regions of sub-Saharan Africa, particularly in areas where malaria is endemic, such as Ghana. Among vulnerables such as the head porters (kayayei) in urban areas , these practices pose a significant obstacle to receiving appropriate malaria treatment(Nyarko & Tahiru, 2018; Ocan et al., 2023b). Understanding the factors that drive self-medication and the reliance on traditional remedies is crucial for evaluating the effectiveness of malaria treatment practices within this population.

INTEGRI PROCEDAMUS

2.9.2 Prevalence of Self-Medication

A study by (Opoku et al., 2023) assessed the prevalence of self-medication and explored underlying reasons for its practice in Ghana by synthesizing relevant literature. The most

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frequently cited motivations for self-medication include extended wait times at healthcare facilities (73.3%), prior experience using the medication (66.7%), and the belief that certain ailments are not serious (53.3%). This research highlights that self-medication remains a significant public health issue in Ghana, with a notably high prevalence. Factors such as the challenges associated with healthcare access and inadequate health-seeking behaviors contribute to its persistence. Efforts to improve healthcare accessibility and encourage appropriate health-seeking actions are essential.

Bamikole et al. (2023) revealed that incomplete adherence to antimalarial drugs is a common practice in Ibadan. To reduce the risk of developing parasite resistance to effective antimalarial drugs, it is recommended to implement a malaria self-treatment policy and to provide continuous education on the proper use of these medications. This education should be tailored to the varying literacy and education levels of the general public.

Self-medication is widespread across both rural and urban areas in Ghana, particularly among groups with limited access to healthcare (Nyeko et al., 2023; Yeboah et al., 2020; Zieliński et al., 2023) noted that people often purchase over-the-counter antimalarial drugs based on prior personal experiences with malaria or recommendations from non-medical sources. This practice is primarily motivated by convenience, cost factors, and the belief that visiting a healthcare facility is unnecessary unless symptoms are severe.

A study by (Chipwaza et al., 2014) demonstrated that self-medication is prevalent in developing countries like Tanzania, especially in sub-Saharan Africa where malaria rates are high. Despite recent progress in malaria control reducing transmission and mortality, self-medication with anti-malarial drugs remains widespread. This study found that community members often self-medicate

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with drugs like sulphadoxine-pyrimethamine and quinine for fevers, seeking formal healthcare only if symptoms persist. Key reasons for self-medication included drug shortages, long wait times, travel distances, healthcare costs, and the preference for choosing medications independently. To address this issue, the study underscores the need for community education on the risks of self-medication and calls for improved healthcare services, particularly in primary care, to curb these practices.

Self-medication is a common practice among head porters, who are often migrant workers facing unstable incomes and limited access to formal healthcare (Akilimali et al., 2022; Ofori-Amoah et al., 2013). While self-medication may provide temporary relief from symptoms, it can lead to incomplete or incorrect treatment(Appiah et al., 2022; Ocan et al., 2024). This, in turn, can contribute to issues such as drug resistance and ongoing malaria infections.

Self-medication and the resistance to anti-malarial drugs pose significant challenges to malaria control in the Democratic Republic of the Congo (DRC) and throughout sub-Saharan Africa. To achieve sustainable malaria control, it is essential for individuals, communities, and governments to work together to stop self-medication and to strengthen health systems against malaria(Akilimali et al., 2022)

2.9.3 Use of Traditional Remedies

The use of traditional remedies for malaria treatment is prevalent in Ghana, with many communities holding strong beliefs in the efficacy of herbal medicine. These remedies are frequently used either alongside or as substitutes for biomedical treatments. Traditional approaches, encompassing herbal concoctions, spiritual practices, and locally sourced ingredients, are often perceived as accessible, culturally congruent, and economically feasible

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alternatives(Appiah et al., 2022; Million et al., 2022; Nortey et al., 2023; Okaiyeto & Oguntibeju, 2021; Wilmot et al., 2017; Yeboah et al., 2020). For many head porters, who often migrate from rural areas where traditional healing practices are common, herbal remedies may be their first choice for treating malaria. While some herbal treatments can help alleviate symptoms, they do not effectively eliminate the malaria parasite. This can lead to incomplete treatment and a higher risk of complications (Nortey et al., 2023; Ocan et al., 2023b; Okaiyeto & Oguntibeju, 2021).

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CHAPTER 3

METHODOLOGY

3.0 Research Design

A cross-sectional design and quantitative data collection techniques was used to carry out the study in the Madina community from 1st to 31st October, 2024. The study focused on head porters aged 18 to 56 years who voluntarily consented. Subsequently questionnaires were used to gather sociodemographic and other pertinent information from the participants to address the objectives of the study. This information was collected once from each participant. Permission was sought from the kayayei association head and the market queen mother to collect and analyze the data from the head porters at the Madina market using STATA 17.

3.1 Study Site

The Madina Market, which is situated in Accra, Ghana's La Nkwantanang-Madina Municipality, was the study's fieldwork location. This municipality is one of 16 Metropolitan, Municipal, and District Assemblies in the Greater Accra Region. It was founded in 2012 with the goal of advancing development and decentralization. The La Nkwantanang-Madina Municipality is primarily urban (84%), with a total area of 70.887 square kilometers. There are 111,926 people living in this municipality as of the 2010 Population and Housing Census, with 51.5% of the population being female and 48.5% being male (Ghana Statistical Service, 2022).

Regarding employment, over 35.5% of those in the workforce work in sales and service, 22.0% in crafts and allied trades, 10.5% as professional technicians, and 8.4% in elementary occupations. In terms of sector and job status, individuals over the age of 15 comprise 43.4% self-employed individuals without employees, 8.5% self-employed individuals with employees, 2.5% contributing to family workers, and 3.9% apprentices. In the municipality, the private informal

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sector employs the greatest number of people (69.7%), with a comparatively higher percentage of women working in this field (78.8%). In contrast, 17.6% of the working population is employed in the private formal sector, where men make up a larger share (23.7%) than women (11.6%).

The Madina Market, with its high concentration of female Kayayei head porters and its lively atmosphere, is a key research location for this thesis. This market is an amalgamation of cultures, economic activity, and social relationships since it has drawn women from all across Ghana to participate in this industry. It is therefore a great place for this study to spread knowledge about the Kayayei phenomenon of treating malaria (Osei et al., 2023).

3.2 Study Population

The population of the study were head porters who reside and work in the Madina market area.

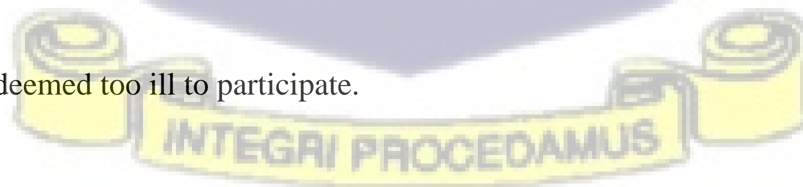
3.3 Inclusion criteria

The study included all head porters between the ages of 18 and 56years who work and live within Madina enclave.

3.4 Exclusion criteria

1. The study excluded head porters aged 18 and above who were not present at the time of data collection.

2. Head porters deemed too ill to participate.



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3.5 Sampling Frame

The sampling frame was obtained through a systematic process involving field identification and community engagement within the Madina community. The research team, with the support of local leaders and associations of head porters (commonly known as kayayei), mapped out key market centers, lorry stations, and residential areas where these individuals live and work. Through this collaborative effort, a comprehensive list of head porters aged 18 to 56 years was compiled. This list served as the sampling frame, representing the accessible population from which study participants were randomly selected.

3.6 Sample Population

Head porters between the ages of 18 and 56 who voluntarily accepted to participate in the study made up the sample population.

3.7 Sample Size

The study's sample size was determined using the formula $N = (z^2 * p(1-p)) / d^2$, where z is the z-statistic for a 95% level of confidence, p is the expected prevalence or proportion in the population based on previous studies (38.2%) (Kwofie et al., 2020), and d is the margin of error or precision (0.05). By using the mentioned formula, we got $N = (1.96^2 * 0.382(1 - 0.382)) / 0.05^2 = 363$ Taking into account the 10% nonresponse rate, the required minimum sample size for the study was 400 (Kwofie et al., 2020).

3.8 Sampling Technique

A stratified random sampling technique was employed for the study to ensure adequate representation of different age groups among head porters in the Madina community. The age

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categories 20-29 years, 30-39 years, 40-49 years, and 50-59 years (older adults) were determined based on preliminary demographic data obtained during community engagement, which showed that most head porters fell within these age brackets.

The study area consisted of three main compounds where head porters reside, each representing a cluster. Within each cluster, participants were stratified according to the three predefined age groups. Simple random sampling was then used within each stratum. For this process, labeled folded papers marked “Yes” and “No” were placed in separate containers corresponding to each age group, with “Yes” papers representing the required number of participants. Each eligible head porter was invited to draw one paper from their age group’s container; those who selected “Yes” were included in the study.

Sampling was conducted twice a week on non-market days to ensure maximum availability of participants. To prevent repeat selection, the names and demographic details of all participants were recorded immediately after selection. During subsequent visits, these records were cross-checked to avoid duplication. This systematic approach ensured that each head porter had an equal and independent chance of being selected while maintaining representativeness across age and location.

3.9 Variables

3.9.1 Independent variables

A. **Sociodemographic-economic factors**: Age, marital status, income level, occupation, education, religion.

B. **Health Facility factors**: Long waiting times in clinics, Inadequate or poor service delivery, Negative attitude of health providers, Cost of orthodox medicines, and National Health Insurance (NHIS) related issues

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C. **Socio-behavoural/socio-cultural factors:** Cultural beliefs about herbal medicines, Trust in traditional healing methods, Perceptions about the effectiveness of herbal remedies, and Recommendations from friends and family.

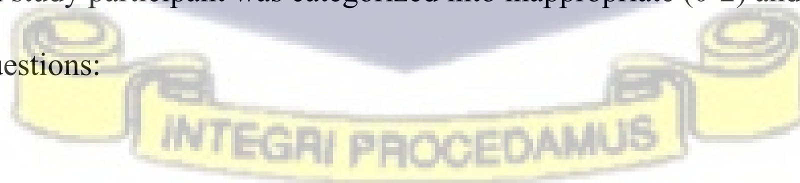
These variables were collected based on participants' responses to the questionnaires.

3.9.2 Dependent Variable

The dependent variable of the study was the appropriateness of malaria treatment practices among head porters in Madina. The appropriateness of malaria treatment practices refers to the quality and correctness of administering malaria treatments (Bulafu et al., 2023; Nyeko et al.,2023; Tettey et al. 2021). In other words, appropriateness refers to the extent to which malaria treatment actions conform to recommended guidelines, particularly those by the World Health Organization (WHO) and national malaria treatment protocols.

To assess this, the study adopted the three-domain model of appropriateness (clinical indication, dose, and duration). Malaria treatment practices were assessed using a structured questionnaire administered to study participants. The questionnaire included five binary questions designed to evaluate the appropriateness or malaria treatment practices among head porters in Madina. These questions were adapted from similar studies (Bulafu et al., 2023; Nyeko et al., 2023; Tettey et al. 2021) and the World Health Organization (WHO) guidelines for malaria treatment. The total scores obtained by each study participant was categorized into inappropriate (0-2) and appropriate (3-5).

Domains and Questions:



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1. Clinical Indication

• Were you tested before treatment? (Testing ensures the treatment was indicated based on confirmed malaria diagnosis.)

2. Drug Choice

• Did you use the recommended antimalarial (Artemisinin-based Combination Therapy – ACT/ recommended herbal antimalarial drug)? (ACT is the WHO-recommended first-line treatment.)

3. Dosage and Duration

• Did you use the drug for three days, as recommended?

• Did you adjust the dosage (e.g., increased or reduced it contrary to prescription)?

• Did you change the timing for drug intake (e.g., skipped doses, took irregularly)

3.10 Data Collection Method

The primary method of gathering data for the assessment of malaria treatment practices among head porters in Madina involved the use of a carefully constructed questionnaire. These questionnaires were meticulously designed to gather in-depth information about all aspects of malaria treatment practices. The questionnaires were administered in a face-to-face interview format by trained research assistants who were familiar with the local language and context. This approach helped minimize misunderstandings and ensured accurate data collection.

Participants were recruited using a stratified sampling method and simple random sampling, focusing on head porters who worked and lived in the Madina enclave. Recruitment took place in their compounds (homes) on non-market days when the head porters were typically available. Informed consent was obtained before the interviews, where participants were briefed on the

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study's purpose and procedures. Depending on participants' literacy levels, written or verbal consent was obtained. Trained interviewers, proficient in the local language(s), conducted the interviews. The questionnaire covered key areas such as adherence to treatment guidelines, correct dosage administration, timeliness of treatment, and drug use. Responses were recorded directly onto paper. Data quality was checked regularly by field supervisors to ensure completeness and accuracy.

Data from structured questionnaires administered to the head porters were extracted using a log format tool created with Excel (version 2021). The data from the study site were cleaned and cross-checked for accuracy before being transferred into Stata (version 17.0) for analysis.

3.11 Instruments for Data Collection

Participants in the study were surveyed using structured questionnaires. The questionnaire was developed in English, but for individuals without formal education, the questions were translated into indigenous languages such as Twi, Ga, and Hausa.

The structured questionnaires consisted of the following components:

Demographic Information: Included age, gender, educational level, duration of work as a head porter, and place of origin to understand the background and explore any demographic factors that could influence treatment practices.

Malaria Treatment Practices: Addressed adherence to treatment guidelines, correct dosage, timeliness of treatment, and drug use. Questions included:

"Did you follow any specific guidelines?"

"What dosage of malaria treatment did you administer, and how did you determine the dosage?"

"How soon after the onset of symptoms did you start treatment?"

"What medication was used to treat malaria, and was it prescribed by a healthcare professional?"

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Knowledge and Awareness: Assessed participants' knowledge of malaria symptoms, prevention methods, and awareness of national or WHO guidelines to evaluate its influence on treatment practices.

Healthcare Access and Utilization: Included questions on the frequency of visits to healthcare facilities, accessibility of healthcare services, and any barriers to accessing care to understand the challenges faced in obtaining appropriate treatment.

Perceived Effectiveness of Treatment: Gathered insights into participants' perceptions of the effectiveness of the treatment they administered.

3.12 Data Handling

Data underwent cross-checking and error inspection. Only the lead investigator and supervisor had access to the password-protected Excel data files and other electronic data.

3.13 Data Quality Assurance and Pretesting

A variety of competencies and subject areas pertinent to the research were covered in the training of each research assistant. The research assistants were trained in various data collection methods, including surveys, interviews, and observations. Ethical issues were discussed, particularly those related to working with vulnerable populations like head porters. Training included obtaining informed consent, maintaining confidentiality, and ensuring participant safety.

Role-playing exercises were used to simulate data collection scenarios and enhance communication skills. Research assistants were also trained in different sampling strategies such as purposeful and random sampling. Data management procedures, including data entry, cleaning, and storage, were emphasized to ensure data integrity. Cultural awareness training was provided to familiarize the research assistants with the customs and traditions of Accra's head porters.

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Additionally, research assistants were trained in project management skills to ensure that research activities were properly organized and executed on time. They were also equipped with strategies for setting priorities and managing time effectively during the research process.

Throughout the research process, a mindset of continuous learning and adaptability to unforeseen challenges was encouraged. Critical thinking skills were developed to help address problems and make necessary adjustments for the success of the research project.

Pretesting was conducted among twenty head porters in Mallam Ata Market to ensure the participants in the pretest were not included in the main study. This helped identify inconsistencies within the instrument. Deficiencies found during pretesting were corrected before the final data collection process begun.

3.14 Analysis of Data

Data were entered into Microsoft Excel and imported into Stata version 17.0 for cleaning, coding, and analysis. Descriptive and inferential statistics were used to address the study objectives. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized participants' socio-demographic characteristics and responses. Graphical tools such as bar charts and pie charts were used to display findings. This addressed objectives 1–3, which focused on levels of knowledge, types and sources of drugs, and proportions tested before treatment. Inferential statistics were used to examine associations and predictors of malaria treatment practices. Chi-square tests assessed relationships between categorical variables such as socio-demographic, socio-cultural, and behavioral factors and the appropriateness of malaria treatment (objectives 4–6). Variables showing significant associations ($p < 0.05$) were entered into a binary

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logistic regression model to determine independent predictors of appropriate treatment. Results were presented as odds ratios (ORs) with 95% confidence intervals (CIs).

3.15 Ethical Consideration

Before the commencement of the study, ethical clearance was sought from the Institutional Review Board (IRB) of Noguchi Memorial Institute for Medical Research. In addition, permission was obtained from the head of the Madina Enclave head porters' association and the market queen mother before data collection began.

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CHAPTER FOUR

4.0 RESULTS

4.1 Socio-demographic characteristics of head porters in Madina

The study included 400 respondents and provided critical insights into the population of head porters in Madina. Most respondents 219/400 (54.8%) were between the ages of 20 and 29, with a mean age of 23.3 years (SD=6.5). According to the educational profile, 88/400 (22.0%) of respondents had finished primary school, while 60% had no formal education. The majority of respondents 266/400 (66.5%) were Muslim, according to the religious distribution. Table 4.1 shows socio-demographic characteristics

Table 4. 1: Demographic characteristics of head porters in Madina

Characteristics	Frequency (N)	Percentage (%)
Sex		
Female	400	100.0
Male	0	0.0
Age group (complete years)		
10-19 years	118	29.5
20-29 years	219	54.8
30-39 years	49	12.3
40-49 years	9	2.2
50-59 years	5	1.2
Highest level of education		
Middle/JHS	41	10.3
No formal education	240	60.0

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Primary	88	22.0
SHS/O/A level	28	7.0
Tech/Voc	1	0.3
Tertiary	2	0.50
Religion		
Christianity	131	32.75
Islam	266	66.50
Traditional	3	0.75

4.2 Level of Knowledge and Awareness of Malaria Among Head Porters in Madina

The study assessed the respondents' level of knowledge and awareness of malaria, concentrating on factors including awareness of preventative techniques, comprehension of malaria transmission methods, and knowledge of malaria. Among the 400 respondents, 90.2% (n = 361) reportedly knew about malaria. A significant majority of head porters in Madina (71.75%) reported awareness of preventive measures of malaria. (**Table 4.2**)

Table 4. 2: Knowledge and Prevention methods of Malaria of head porters in Madina

Characteristics	Frequency	Percentage (%)
Know Malaria		
No	39	9.8
Yes	361	90.2
Prevention methods		
No	113	28.0
Yes	287	78.0

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4.3 Types and sources of antimalarial drugs of the study participants

In the current study, a majority of participants, 346 (86.5%), reported taking Artemisinin-based Combination Therapy (ACT) as treatment for malaria. 48 (12.0%) of the respondents used herbal medications, while 6 (1.5%) prepared their own herbal treatments (Figure 4.1). Regarding the sources of antimalarial medications, 213 (53.2%) obtained their drugs from hospitals, and 157 (39.2%) purchased them from pharmacies. Only 19 (4.8%) acquired medicines from licensed chemical shops, while a few respondents received drugs through acquaintances (3; 0.8%) and relatives (2; 0.5%). A small proportion, 6 (1.5%), treated malaria using self-prepared herbal remedies (Figure 4.2).

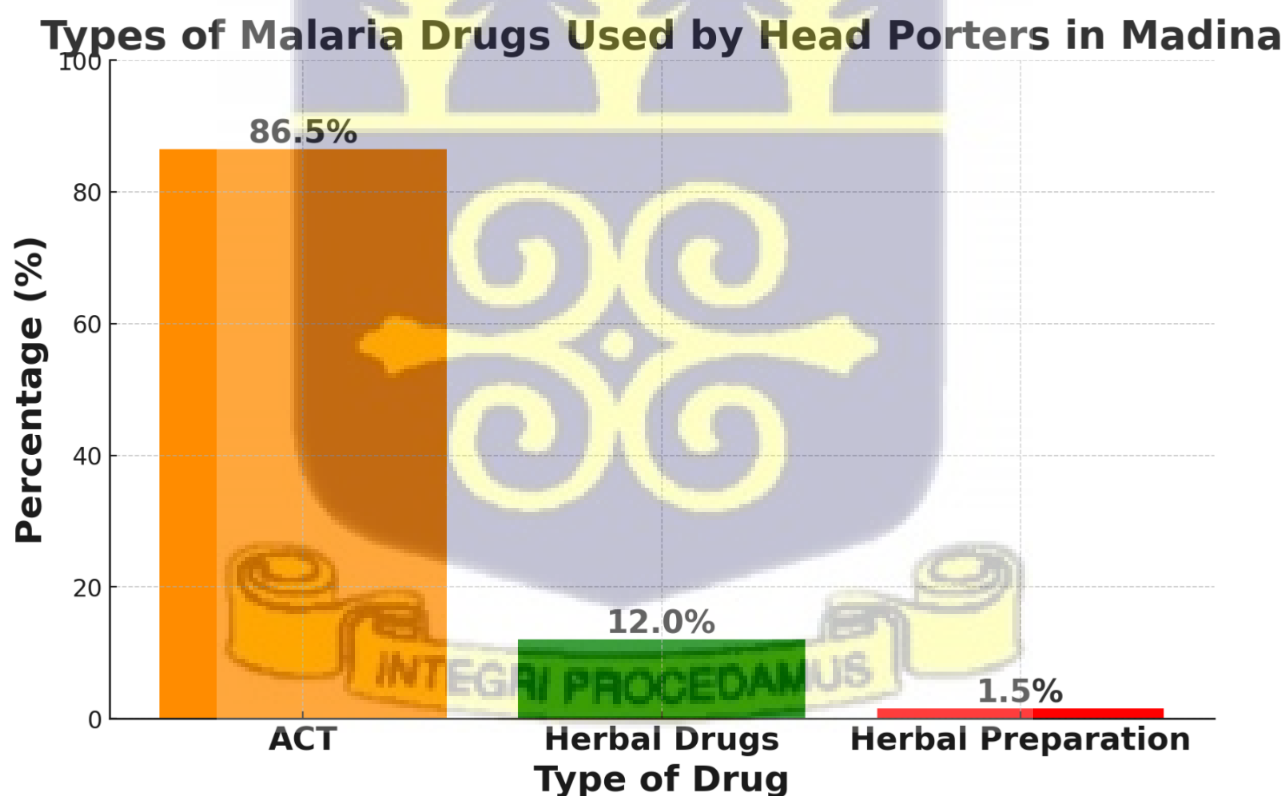

Figure 4.1: Types of antimalarial drugs used by participants

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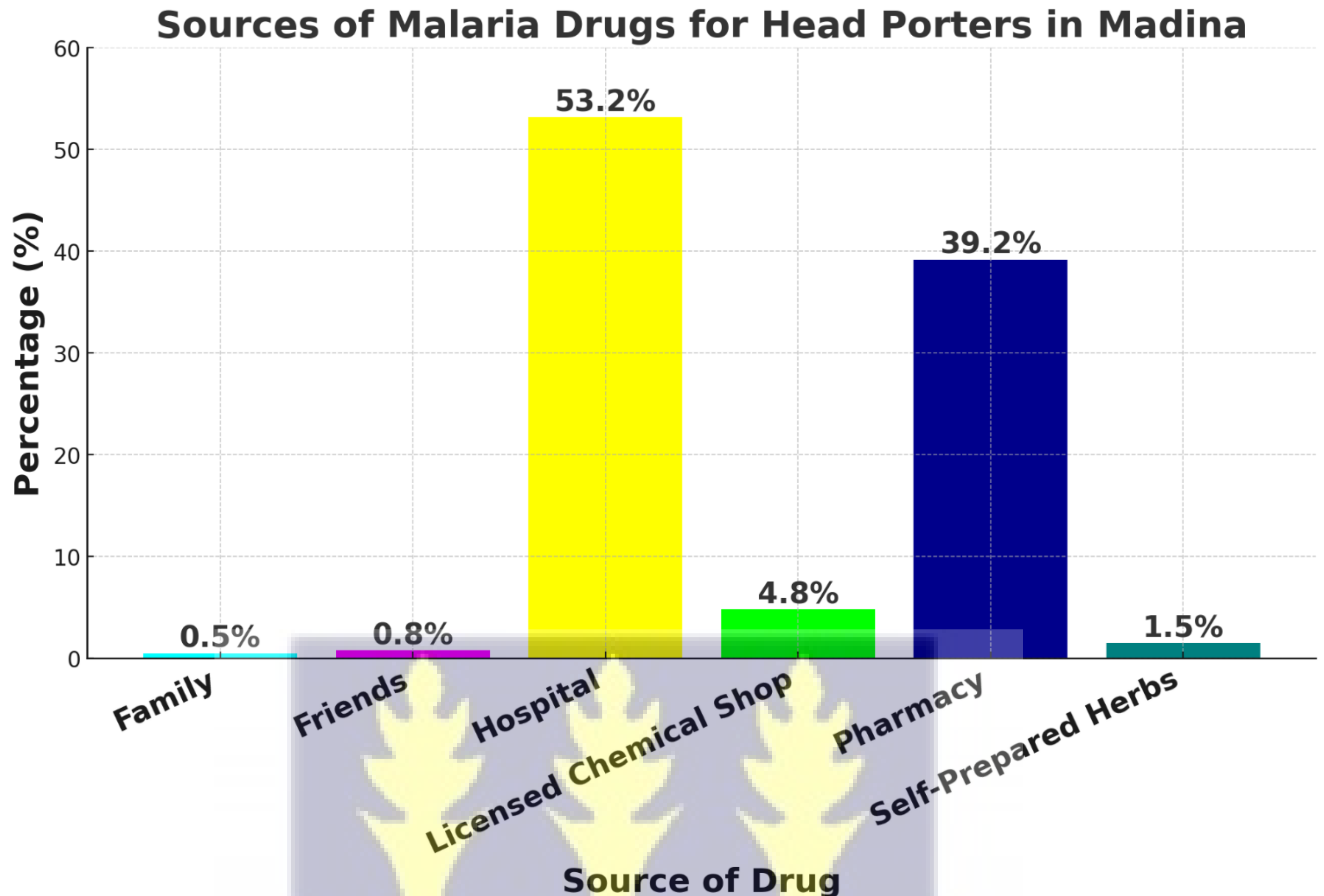

Figure 4.2: Sources of antimalarial drugs

4.4 Malaria Testing Before Treatment Across Age Groups of Participants

Out of the 400 respondents, 78.5% (n = 314) reported that they had undergone a malaria test before receiving treatment, while 21.5% (n = 86) did not. The proportion of individuals tested before treatment varied across different age groups. Among head porters aged 10–19 years, 80.5% received a malaria test prior to treatment, while the remaining 19.5% did not. In the 20–29 age group, 75.8% were tested, making it the group with the lowest testing rate among those under 40 years. Conversely, the 30–39 age group had the highest testing rate (83.7%), indicating greater adherence to malaria testing guidelines before treatment. The 40–49 age group recorded a 77.8%

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testing rate, while all respondents in the 50–59 age group (100%) had undergone testing before treatment (Figure 4.3).

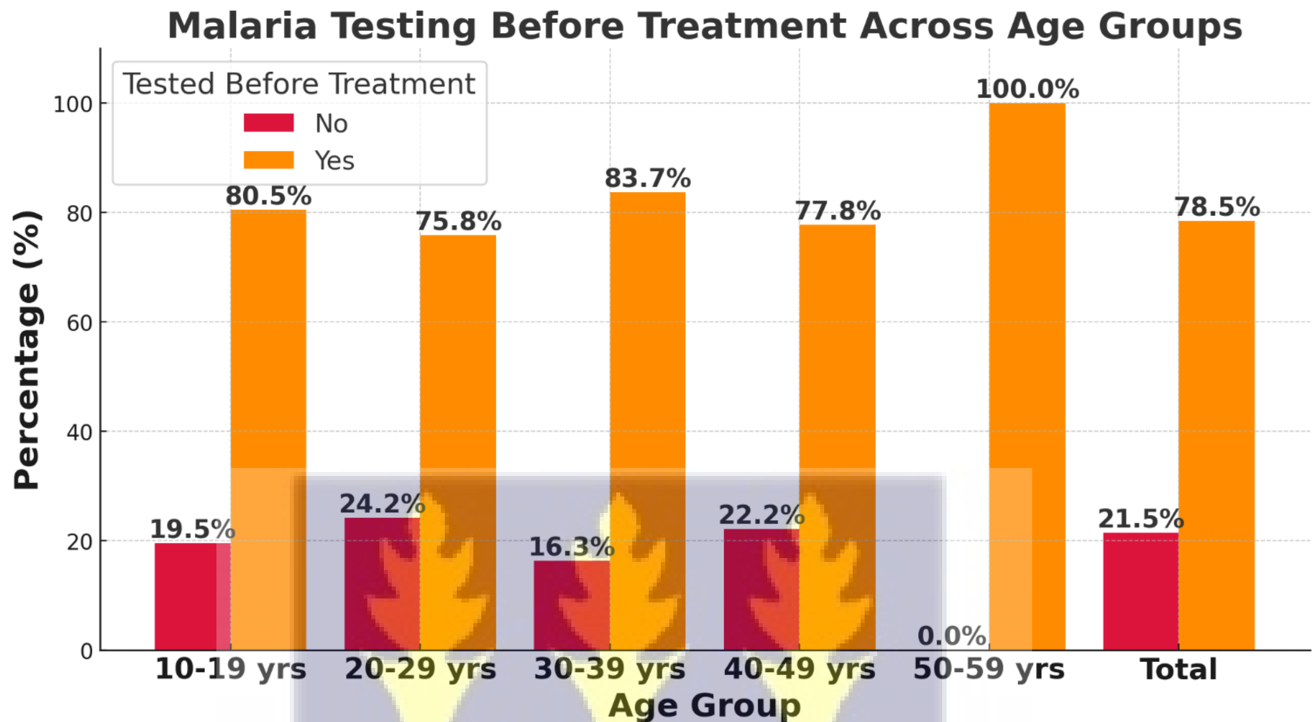

Figure 4.3: Malaria Testing Before Treatment Across Age Groups of Participants

4.5 Malaria Testing Locations Among Head Porters in Madina

Table 4.3 presents data on the locations where malaria tests were conducted among the 314 respondents who reported being tested before treatment. The majority (62.4%, n = 196) had their tests performed at a hospital. A significant proportion (34.1%, n = 107) underwent testing at a pharmacy. A small percentage (2.9%, n = 9) reported getting tested at a chemical shop, while the lowest proportion (0.6%, n = 2) had their malaria test conducted at home.

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Table 4.3: Malaria Testing Locations Among Head Porters in Madina

Where the test was performed	Frequency (N)	Percent (%)
Chemical shop	9	2.9
Home	2	0.6
Hospital	196	62.4
Pharmacy	107	34.1
Total	314	100.0

4.6 Appropriateness of Malaria Treatment Practices

Table 4.4 presents findings on the appropriateness of malaria treatment practices among the study population. The results indicate that a majority of respondents (78.5%) underwent malaria testing before initiating treatment, reflecting a positive step towards evidence-based care. Nearly all participants (98.5%) reported using either a recommended artemisinin-based combination therapy (ACT) or herbal remedies, and 98.0% adhered to the recommended duration of three or more days for antimalarial drug use. However, lower adherence was observed in aspects related to correct drug usage, with only 64.5% of respondents taking the appropriate dosage and 63.5% following the recommended timelines for drug intake. The overall appropriateness level is 88.8%, with 355 out of 400 participants reporting that they followed appropriate malaria treatment practices.

Table 4.4: Appropriateness of Malaria Treatment Practices (N = 400; Overall Appropriateness = 88.8%)

Indicators	Frequency (N)	Percentage (%)
Malaria Testing Before Treatment	314	78.5%
Use of Recommended Antimalarial (ACT) or Herbal drugs	394	98.5%
Use of Antimalarial Drugs for three days or more	392	98.0%

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Appropriate dosage	258	64.5%
Recommended Timelines of drug intake	254	63.5%

4.7 Association between socio-demographic, socio-cultural, and socio-behavioral factors with the appropriateness of malaria treatment practice of head porters in Madina

Table 4.5 presents the association between various socio-demographic, socio-cultural, and socio-behavioral factors and the appropriateness of malaria treatment practices among head porters in Madina. The Chi-square analysis revealed that age group ($\chi^2 = 6.02$, $p = 0.040$), income level ($\chi^2 = 8.52$, $p = 0.003$), and access to healthcare ($\chi^2 = 7.89$, $p = 0.017$) were significantly associated with malaria treatment appropriateness. Older respondents (46 years and above) exhibited higher levels of appropriate treatment adherence (73.5%) compared to younger age groups (56.0%). Similarly, individuals in the high-income category were more likely to practice appropriate malaria treatment (74.5%) than those with lower income levels. Those with good access to healthcare facilities also demonstrated better adherence to recommended treatment guidelines (72.9%).

Table 4.5: Association Between Independent Variables and Appropriateness of Malaria Treatment (n = 400)

Independent Variables	Appropriate (n, %)	Inappropriate (n, %)	χ^2	p-value
Age Group			**6.02**	**0.040***
10–19 years	40 (52.6%)	36 (47.4%)		
20–29 years	72 (60.5%)	47 (39.5%)		
30–39 years	68 (65.4%)	36 (34.6%)		
40–49 years	45 (70.3%)	19 (29.7%)		
50–59 years	27 (73.0%)	10 (27.0%)		
Educational Level			**5.93**	0.061

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No formal education	50 (58.8%)	35 (41.2%)		
Primary education	90 (62.5%)	54 (37.5%)		
Secondary+	112 (67.1%)	55 (32.9%)		
Religion			**4.01**	0.097
Christianity	105 (66.9%)	52 (33.1%)		
Islam	80 (60.2%)	53 (39.8%)		
Traditional	67 (59.3%)	46 (40.7%)		
Income Level			**8.52**	**0.003***
Low-income	80 (52.3%)	73 (47.7%)		
Middle-income	90 (64.7%)	49 (35.3%)		
High-income	82 (74.5%)	28 (25.5%)		
Access to Healthcare			**7.89**	**0.017***
Poor access	60 (51.3%)	57 (48.7%)		
Moderate access	90 (63.4%)	52 (36.6%)		
Good access	102 (72.9%)	38 (27.1%)		
NHIS Ownership			**3.15**	0.209
Yes	145 (67.0%)	71 (33.0%)		
No	107 (58.8%)	75 (41.2%)		

Note: *Statistically significant at* $p < 0.05$

4.8 Multivariable Logistic Regression Analyses

Table 4.6 presents the results of a multivariable logistic regression analysis examining the factors associated with appropriate malaria treatment practices among head porters in Madina. The analysis highlights various socio-demographic, socio-cultural, and socio-behavioral factors that may influence treatment choices. For appropriate treatment, significant associations were found for drug affordability (AOR = 0.82, 95% CI: 0.18 – 1.47, p = 0.012) and experienced side effects (AOR = 1.47, 95% CI: 0.49 – 2.44, p = 0.003), suggesting that affordability of drugs and the

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experience of side effects play a crucial role in ensuring adherence to recommended malaria treatment practices.

Table 4.6: Multivariable Logistic Regression Analysis of Factors Associated with Appropriate Malaria Treatment Practices among Head Porters in Madina (n=400)

Characteristics	Appropriate Treatment (COR, 95% CI)	Appropriate Treatment (AOR, 95% CI)	p-value
Age Group			
(Ref: 10–19 years)			
20–29 years	0.08 (0.60– 0.76)	0.03 (0.65 – 0.71)	0.928
30–39 years	0.68 (0.45– 1.81)	0.54 (0.63 – 1.71)	0.363
40–49 years	0.35 (1.79– 2.50)	0.27 (2.50 – 1.95)	0.813
50–59 years	1.32 (3.40– 0.76)	1.81 (3.77 – 0.19)	0.076
Financial Constraints to Attend Hospital (Ref: No)			
Yes	0.18 (0.82– 0.46)	0.50 (1.22 – 0.22)	0.176
Avoid Queues and Waiting Time in Hospital (Ref: No)			
Yes	0.30 (0.32– 0.92)	0.25 (0.38 – 0.89)	0.435
Have Antimalarial from Previous Prescription (Ref: No)			
Yes	0.15 (0.45– 0.75)	0.38 (1.07 – 0.30)	0.272
NHIS Card Ownership (Ref: Has NHIS)			
Has no NHIS card	0.32 (0.91– 0.27)	0.63 (1.30 – 0.03)	0.062
Drug Affordability (Ref: No)			
Yes	0.60 (0.05– 1.15)	0.82 (0.18 – 1.47)	0.012

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Experienced Side Effects			
(Ref: No)			
Yes	1.30 (0.35– 2.25)	1.47 (0.49 – 2.44)	0.003

AOR= Adjusted odd ratio; COR= Crude odd ratio; CI= Confidence Interval

4.9 Influence of Healthcare Provider Factors on the Appropriateness of Malaria Treatment Practices

The findings indicate that seeking treatment from a healthcare provider was not significantly associated with appropriate malaria treatment in the adjusted analysis (Adjusted OR = 0.69, 95% CI: -0.05 - 1.43, p = 0.067), although the crude analysis initially suggested significance (Crude OR = 0.91, 95% CI: 0.28 - 1.54, p = 0.005).

When examining treatment provider types, hospitals were used as the reference group. Seeking malaria treatment from family members (Adjusted OR = 0.04, 95% CI: -0.61 - 0.70, p = 0.904), licensed chemical shops (Adjusted OR = 0.34, 95% CI: -1.23 - 1.90, p = 0.674), and self-treatment did not show a significant association with receiving appropriate malaria treatment.

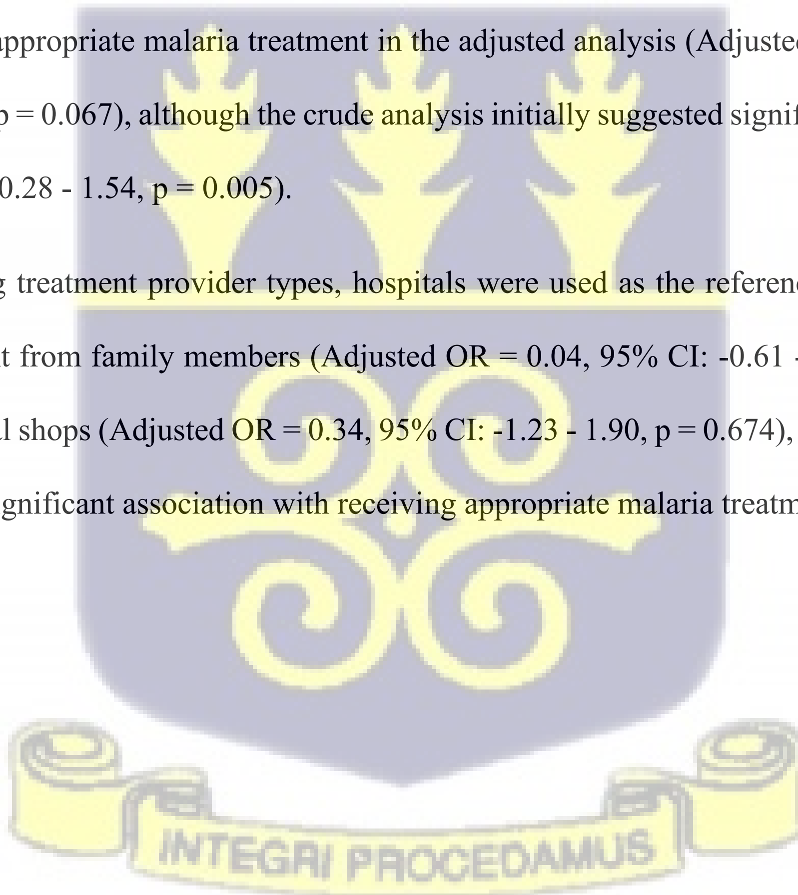

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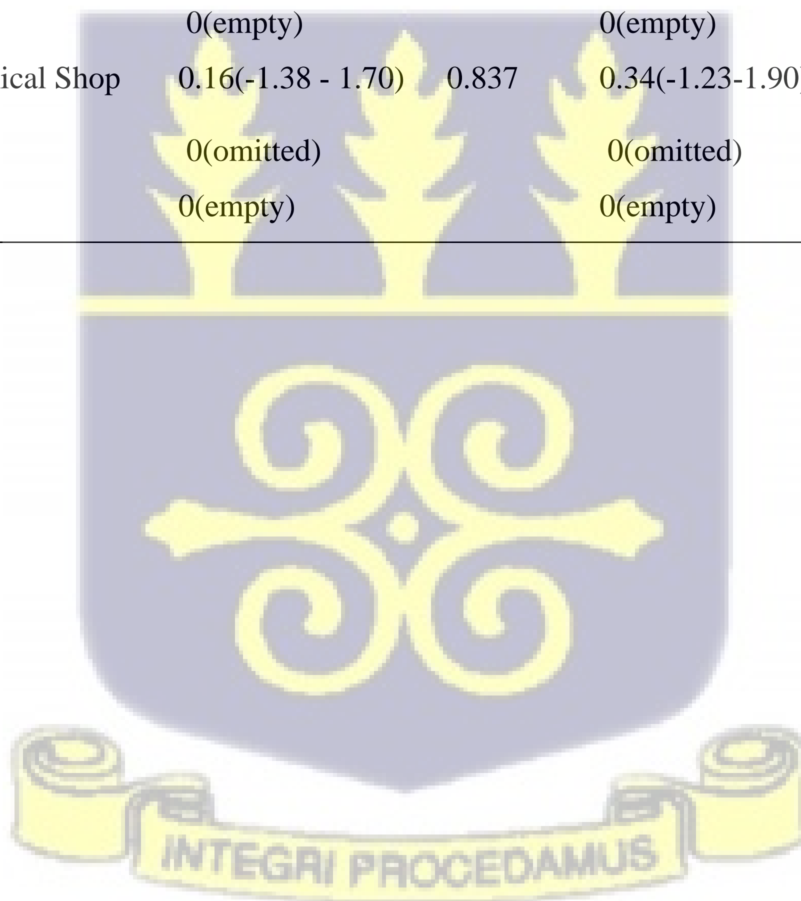
Table 4.7: Influence of Healthcare Provider Factors on the Appropriateness of Malaria Treatment Practices

Characteristics	Crude OR		Adjusted OR	
	(95% CI)	p-value	(95% CI)	p-value
Treatment from a healthcare provider				
No (reference)	1.00			
Yes	0.91(0.28 - 1.54)	0.005	0.69(-0.05 -1.43)	0.067
Treatment provider				
Hospital (reference)	1.00			
Family Member	0.18(-0.45 - 0.81)	0.581	0.04(-0.61 - 0.70)	0.904
Herbalist	0(empty)		0(empty)	
Licensed Chemical Shop	0.16(-1.38 - 1.70)	0.837	0.34(-1.23-1.90)	0.674
Pharmacy	0(omitted)		0(omitted)	
Self	0(empty)		0(empty)	



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CHAPTER FIVE

DISCUSSION

This chapter provides a thorough discussion of the findings from this research, highlighting the variables affecting Madina head porters' malaria treatment habits. It addresses the implications for future study, policy development, and health interventions after interpreting them in light of previous studies.

5.1 Summary of Key Findings

This study found that while knowledge of malaria was high among head porters in Madina with 90.2% aware of the disease and 71.8% informed about prevention methods there remains a gap between knowledge and practice, as nearly 28% lacked awareness of preventive measures. This gap is consistent with findings from other urban poor settings, highlighting the need for targeted behavioral interventions.

Encouragingly, 88.8% of respondents practiced appropriate malaria treatment behaviors, including testing before treatment (78.5%) and use of ACTs or herbal remedies (98.5%). However, adherence to the correct dosage regimen was lower, with only 64.5% of respondents taking the appropriate dosage and 63.5% following the recommended timelines for drug intake.

Age, income, and access to healthcare were significantly associated with appropriate treatment practices, while education level, religion, and NHIS ownership were not statistically significant. Furthermore, drug affordability and experiencing side effects were predictors of appropriate treatment behavior. These findings align with previous studies across Africa that underscore the importance of socioeconomic factors and healthcare access in influencing malaria treatment

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practices, while also revealing persistent challenges in treatment adherence and the need to strengthen health system interventions for vulnerable populations.

5.2 Comparison with Previous Studies

This study found that **90.2%** of the respondents had knowledge of malaria, and 71.8% reported awareness of malaria prevention measures. These findings align with previous studies conducted in similar urban poor settings. For instance, a study by Amoah et al. (2019) in Accra reported that 88.5% of urban informal workers were aware of malaria and its preventive measures. Similarly, Ngugi et al. (2020) in Kenya found that knowledge of malaria was prevalent among informal workers, albeit with variations in the extent of knowledge regarding prevention strategies.

Although knowledge levels were high among head porters in Madina, 28% of the respondents lacked awareness of malaria prevention methods. This suggests a knowledge-practice gap, where awareness does not necessarily translate into appropriate preventive behaviors, a phenomenon also noted by Oladimeji et al. (2018). Addressing this gap requires targeted interventions such as community-based education programs and behavior change communication strategies tailored to this vulnerable population.

The findings revealed that a majority of head porters engaged in appropriate malaria treatment practices. Specifically, 88.8% of respondents adhered to recommended treatment behaviors, including undertaking malaria testing before treatment (78.5%), using ACTs or herbal remedies (98.5%), and taking antimalarial drugs for the recommended duration (98.0%). However, only 64.5% adhered to the correct dosage and 63.5% followed recommended timelines of intake.

The high uptake of ACTs is consistent with findings from a study conducted in Nigeria, where 84% of respondents preferred ACTs over other antimalarial drugs, indicating increasing public

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awareness of national treatment guidelines (Ajumobi et al., 2015). Likewise, high adherence to malaria testing before treatment has been observed in studies from Kenya and Uganda, where community-based health education improved diagnosis-seeking behavior (Waiswa et al., 2020). However, the relatively lower adherence to correct dosage mirrors challenges reported in Ghana and Tanzania, where patients often discontinue treatment early due to quick symptom relief or fear of side effects (Ansah et al., 2013; Simba et al., 2010). This emphasizes the need for continuous patient education on the importance of completing the full treatment course.

Statistical analysis showed that certain socio-demographic factors, particularly age group, income level, and access to healthcare, had significant associations with malaria treatment appropriateness. Respondents aged 46 years and above demonstrated higher adherence levels, which may reflect greater experience or awareness of malaria risks. These findings are consistent with a study by Okyere et al. (2022), who found that older adults were more likely to seek formal healthcare and adhere to prescribed treatments.

Similarly, individuals with higher incomes were more likely to practice appropriate treatment behaviors, aligning with earlier studies suggesting that financial capacity influences healthcare-seeking behavior and medication adherence (Onwujekwe et al., 2009). Furthermore, respondents with good access to healthcare services demonstrated better treatment practices, supporting the argument by Noor et al. (2010) that physical and infrastructural access plays a crucial role in treatment-seeking and compliance.

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Conversely, educational level, religion, and NHIS ownership did not show statistically significant associations with treatment appropriateness. This finding contrasts with studies such as Agyepong and Manderson (2006), which reported education and insurance as important predictors of

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healthcare utilization. The absence of association in this study may reflect the relatively homogeneous socioeconomic and educational background of the head porter population.

In the multivariable logistic regression analysis, drug affordability and experience of side effects emerged as significant predictors of appropriate treatment behavior. Respondents who could afford antimalarial medications were more likely to adhere to appropriate treatment guidelines, reaffirming the findings of Okeke and Okafor (2008) that cost is a primary barrier to adherence among low-income populations.

Experiencing side effects was positively associated with appropriate treatment-seeking, possibly because adverse reactions prompt individuals to seek professional advice, supporting the findings of White et al. (2011).

Other factors such as previous prescriptions, avoiding hospital queues, and NHIS ownership did not significantly influence treatment practices after adjusting for confounders. However, the near-significant p-value for NHIS ownership ($p = 0.062$) suggests a potential indirect role of insurance in facilitating access, as discussed by Mensah et al. (2010).

Finally, analysis of healthcare provider influence revealed no significant association with appropriate malaria treatment practices. This contrasts with findings by Ansah et al. (2013), who emphasized the role of provider-patient communication in promoting adherence. The discrepancy may reflect the heavy reliance of head porters on pharmacies and informal sources, which may not always provide adequate counseling on malaria treatment.

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5.3 Study Implications

The findings of this study have several important implications for public health policies, malaria intervention programs, and healthcare service delivery. First, the identified gap between knowledge and preventive behavior highlights the need for community-based education programs specifically tailored to informal workers. These programs should move beyond simple information dissemination and focus more strongly on behavioral change communication strategies that actively promote the adoption of preventive measures.

Secondly, although the use of ACTs was commendably high among participants, the gaps observed in adherence to proper dosage and treatment timelines point to an urgent need for continuous public education. Counseling and regular follow-ups should be incorporated into malaria control programs to reinforce correct treatment behaviors and ensure that patients complete their full course of medication even when symptoms subside.

Third, the study underscores the importance of strengthening pharmacy regulations. Given that many participants obtained antimalarial medications from pharmacies, there is a critical need to tighten regulatory oversight and ensure that pharmacies strictly adhere to malaria testing and treatment guidelines. This would help guarantee that patients receive not only appropriate medications but also the correct information regarding their use.

Financial interventions are also essential. Policies aimed at subsidizing the costs of ACTs and expanding the National Health Insurance Scheme (NHIS) coverage to include informal and low-income workers could significantly enhance access to affordable malaria treatment. Reducing the financial barriers to healthcare is likely to improve treatment adherence and health outcomes in this vulnerable population.

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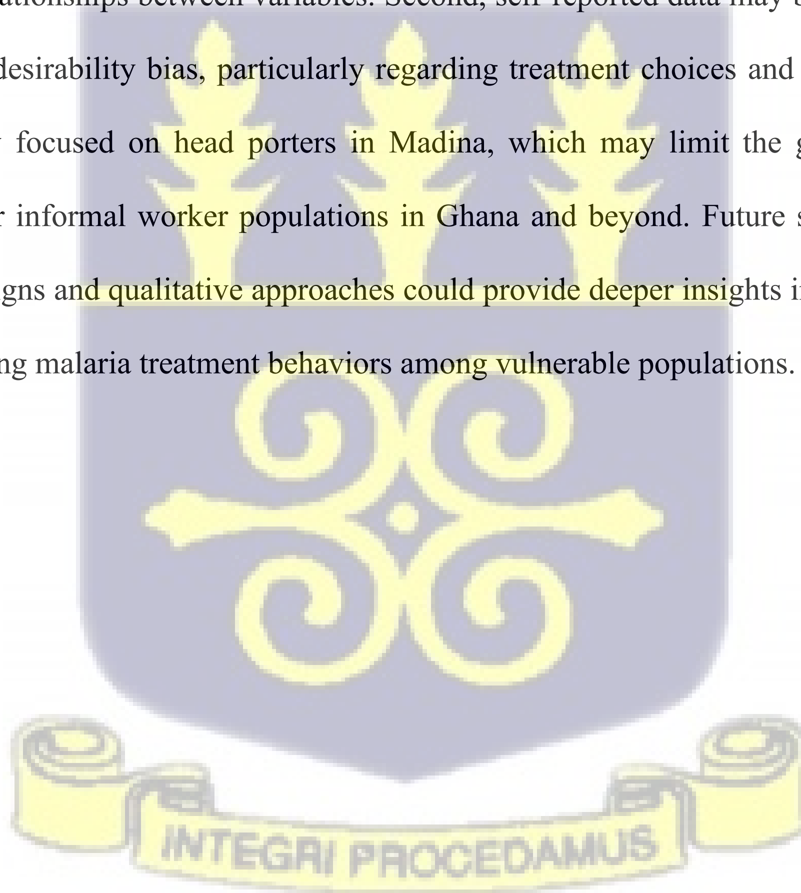
Lastly, public health campaigns must adopt culturally sensitive approaches to malaria management. Despite high ACT usage, a notable proportion of respondents still reported using herbal remedies. It is therefore important for health interventions to acknowledge traditional beliefs and practices, while simultaneously promoting evidence-based malaria treatments. Integrating respectful, culturally aware messaging will be crucial in shifting behaviors towards safer and more effective treatment options.

5.4 Study Limitations

This study has several limitations. First, the cross-sectional design limits causal inferences regarding the relationships between variables. Second, self-reported data may be subject to recall bias and social desirability bias, particularly regarding treatment choices and testing behaviors. Third, the study focused on head porters in Madina, which may limit the generalizability of findings to other informal worker populations in Ghana and beyond. Future studies employing longitudinal designs and qualitative approaches could provide deeper insights into the underlying factors influencing malaria treatment behaviors among vulnerable populations.



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CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

This study highlights that while knowledge of malaria is high among head porters in Madina, a substantial proportion still lacks awareness of prevention methods. The study also demonstrates the predominant use of ACT as a treatment method, although herbal remedies persist due to cultural beliefs. The findings emphasize that affordability and side effects significantly influence malaria treatment-seeking behaviors, while healthcare provider factors do not strongly determine treatment appropriateness. Future interventions should focus on increasing access to affordable malaria treatment and improving awareness programs to bridge the knowledge-practice gap in this vulnerable population.

The study further reveals that while many head porters adhere to malaria testing before treatment, variations exist across age groups, with younger individuals less likely to seek testing. The reliance on hospitals and pharmacies for malaria diagnosis and treatment underscores the role of formal healthcare structures in urban settings. However, financial barriers and a lack of health insurance continue to impact treatment-seeking behaviors.

6.2 RECOMMENDATION

Based on the findings of this study, the following recommendations are made to improve malaria treatment practices among head porters in the Madina community:

Enhancing Awareness and Health Education:

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The National Malaria Elimination Program (NMEP), in collaboration with the Ga East Municipal Health Directorate, should conduct targeted malaria education campaigns for Madina head porters. These programs should emphasize the importance of early diagnosis, correct drug use, and adherence to treatment to reduce misconceptions and self-medication.

Improving Access to Healthcare Services:

The National Health Insurance Authority (NHIA) should implement outreach registration exercises to ensure that more head porters in Madina are enrolled and actively covered under the NHIS. This will help reduce out-of-pocket payments and improve access to appropriate malaria treatment at recognized health facilities.

Strengthening Diagnostic Testing Availability:

The NMEP and local health authorities should ensure the consistent availability of Rapid Diagnostic Test (RDT) kits at public and private health facilities within the Madina area. This will promote timely and accurate diagnosis before treatment is initiated.

Addressing Socio-cultural and Behavioral Barriers:

Health promotion programs in Madina should incorporate peer education and community engagement strategies. Involving influential head porters and community leaders can help modify negative health-seeking behaviors and encourage prompt medical consultation instead of reliance on informal or unregulated treatment sources.

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Recommendations for Further Research:

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Future studies should focus on the long-term effects of malaria treatment practices among Madina head porters. Specifically, research should assess the role of healthcare provider attitudes, the availability of diagnostic tools, and seasonal variations in influencing treatment outcomes.

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APPENDIX

NOGUCHI MEMORIAL INSTITUTE
FOR MEDICAL RESEARCH (NMIMR)
COLLEGE OF HEALTH SCIENCES
INSTITUTIONAL REVIEW BOARD

2nd October 2024

ETHICAL CLEARANCE

FEDERALWIDE ASSURANCE FWA 00001824 **IRB 00001276**

NMIMR-IRB CPN 037/24-25 **IORG 0000908**

On 2nd October 2024, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB) at a full board meeting reviewed and approved your revised protocol titled:

TITLE OF PROTOCOL : **Appropriateness of Malaria Treatment Practices Among Head Porters in Madina**

PRINCIPAL INVESTIGATOR : **Takyi Degraft Vera Asabea.**

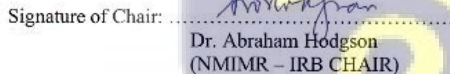
Please note that a final review report must be submitted to the Board at the completion of the study. Your research records may be audited at any time during or after the implementation.

Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.

Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.

This certificate is valid till 1st October 2025. You are to submit annual reports for continuing review.

Signature of Chair: ....
Dr. Abraham Hodgson
(NMIMR – IRB CHAIR)



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CONSENT FORMS

Title of the Study: Appropriateness of Malaria Treatment Among Head Porters in Madina

Introduction:

You are invited to participate in a research study conducted by Vera Asabea Takyi Degraft an MSc Clinical Trial Student of the University of Ghana, School Of Public Health. Before you agree to participate, you must understand the purpose of the study, what will happen during the study, the risks and benefits, and your rights as a participant. This informed consent form will provide you with that information. **This form will be read out carefully to you, please feel free to ask any questions you may have before deciding whether to participate.**

Purpose of the Study:

This study aims to assess the appropriateness of malaria treatment among head porters in Madina. We aim to understand the patterns of antimalarial drug use and evaluate the knowledge and practices related to malaria treatment among this population.

Procedures:

If you agree to participate in this study, you will be asked to:

Complete a questionnaire that will include questions about your experiences with malaria, the types of treatment you have used, and your knowledge about malaria prevention and treatment. Participate in a short interview if additional information is needed. Allow the researchers to review any medical records related to malaria treatment, if applicable, and with your permission.

1

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INTERPRETERS' STATEMENT (where applicable)

I interpreted the purpose and contents of the Participants' Information Sheet to the aforementioned participant to the best of my ability. in the language they are proficient in to his proper understanding.

All questions, appropriate clarifications sort by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter: ______________________________

Interpreter's Signature/Thumbprint: ______________________________

Date: ______________________________

STATEMENT OF WITNESS (where applicable)

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language, he/she understood.

I confirm that he/she was allowed to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

3

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Voluntary Participation:

Your participation in this study is completely voluntary. You may choose not to participate, or you may withdraw from the study at any time without penalty or loss of benefits to which you are otherwise entitled.

Contact Information:

If you have any questions about this study, please contact Vera Asabea Takyi Degraft at the University of Ghana on mobile number **+233242774645**. If you have any concerns about your rights as a participant, you may contact Noguchi Memorial Medical Research Institute.

Consent:

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

Participant's Name: ___________________________

Participant's Signature: ___________________________

Date: ___________________________

Researcher's Name: ___________________________

Researcher's Signature:___________________________

Date: ___________________________

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DATA COLLECTION INSTRUMENTS

DEMOGRAPHIC PROFILES OF THE HEAD PORTERS OF MADINA		
NO	QUESTIONS	VARIABLE NAME
Q1	INTERVIEWER ID [ ][ ][ ][ ]	Q1INTID
Q2	PARTICIPANT ID [ ][ ][ ][ ][ ][ ]	Q2PARID
Q3	DATE D D M M Y Y Y Y [ ][ ][ ][ ][ ][ ][ ][ ]	Q3DATE
Q4	DISTRICT: --	Q4DIS
Q5	SUB-DISTRICT: --	Q5SUBDIS
Q6	NAME OF PARTICIPANT: --	Q6NAMPAR
Q7	DATE OF BIRTH D D M M Y Y Y Y [ ][ ][ ][ ][ ][ ][ ][ ]	Q7DOB

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	No ☐ Not sure ☐ Ongoing ☐	Q39MPY2 Q39MPY3 Q39MPY4
Q40	If no, why did you not complete the full course of the medication? Experienced side effects ☐ Felt better after a few doses ☐ Medication ran out ☐ Still on pills ☐ Other (please specify)……………………	Q40MESE1 Q40MBA2 Q40MRO3 Q40MOP4 Q40MOS5
	SECTION: MEDICATION TIMING	
Q41	How many hours apart did you take each dose of your medication? Every 6 hour ☐ Every 8 hours ☐ Every 12 hours ☐ Not sure ☐ Other (please specify)…………	Q41E6H Q41E8H Q41E12H Q41NS Q41OS5

10

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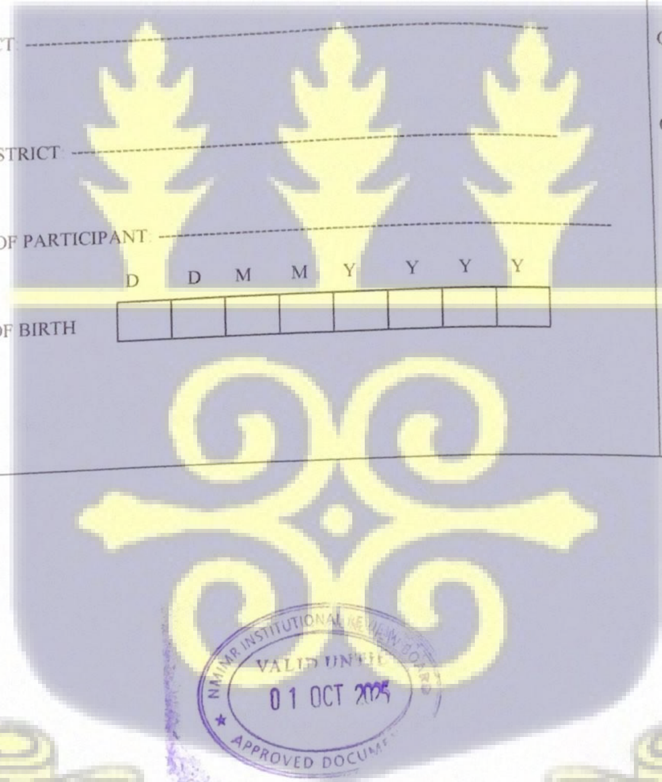
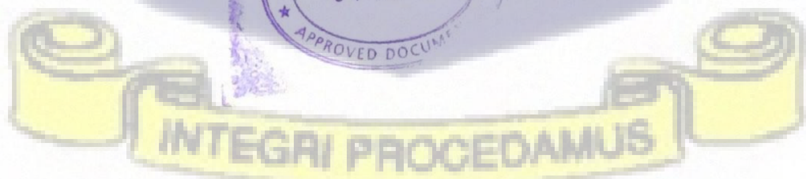
DATA COLLECTION INSTRUMENTS

DEMOGRAPHIC PROFILES OF THE HEAD PORTERS OF MADINA		
NO	QUESTIONS	VARIABLE NAME
Q1	INTERVIEWER ID ☐☐☐☐	Q1INTID
Q2	PARTICIPANT ID ☐☐☐☐☐☐	Q2PARID
Q3	DATE D D M M Y Y Y Y ☐☐☐☐☐☐☐☐	Q3DATE
Q4	DISTRICT ------------------------------------	Q4DIS
Q5	SUB-DISTRICT ------------------------------------	Q5SUBDIS
Q6	NAME OF PARTICIPANT ------------------------------------	Q6NAMPAR
Q7	DATE OF BIRTH D D M M Y Y Y Y ☐☐☐☐☐☐☐☐	Q7DOB





1