

Malaria Behavior Survey

Ghana 2022

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Acronyms

ACT	Artemisinin combination therapy
ANC	Antenatal care
aOR	Adjusted odds ratio
CCP	Johns Hopkins Center for Communications Programs
CHW	Community health worker
EA	Enumeration area
GHS	Ghana Health Service
GSS	Ghana Statistical Service
HRDD	Health Research and Development Division
IPTp	Intermittent preventive treatment of malaria in pregnancy
IPTp3	Three doses of IPTp
ITN	Insecticide-treated net
JHU	Johns Hopkins University
IRB	Institutional review board
IRS	Indoor residual spraying
MBS	Malaria Behavior Survey
MIS	Malaria Indicator Survey
NGO	Nongovernmental organization
NMEP	National Malaria Elimination Program
NMSP	National Malaria Strategic Plan
OR	Odds ratio
PI	Principal investigator
PMI	U.S. President's Malaria Initiative
SBC	Social and behavior change
SMC	Seasonal malaria chemoprevention
USAID	United States Agency for International Development
WHO	World Health Organization

Glossary of Terms

- **Perceived susceptibility** is the belief that one is likely to be affected by a health problem.
- **Perceived severity** is the perception that the consequences of a condition are severe.
- **Perceived response efficacy** is the belief that a recommended action will help a person avoid the threat.
- **Perceived self-efficacy** is belief in an individual's ability to take relevant actions.
- **Descriptive norms** are the perceptions of what other people normally do.
- **Injunctive norms** are the perceptions of what is approved or disapproved of by others.
- **Interpersonal communication** is the discussion with others regarding relevant topics.
- **Decision making autonomy** refers to a person's active involvement in relevant decisions.

Preface

Based on the World Malaria Report 2021, an estimated 241 million cases of malaria and 627,000 malaria deaths occurred globally. Compared to 2019, this indicated an increase of 14 million more malaria cases and 47,000 deaths, caused by disruptions resulting from the COVID-19 pandemic. The World Health Organization (WHO) African Region has a disproportionately high burden, 95% of malaria cases and 96% of malaria deaths. Children under five years accounted for an estimated 80% of all malaria deaths in the region. An enormous investment of US \$1.3 billion was invested for malaria in 2020, 79% in moderate and high transmission countries in the WHO African Region. About 11.6 million (34%) of the 33.8 million pregnancies were exposed to malaria infection in 2020. West Africa had the highest prevalence of malaria during pregnancy (39.8%), followed by Central Africa (39.4%), and 22% in East and Southern Africa. Malaria infection during pregnancy in these 33 countries resulted in 819, 000 children with low birth weight. If intermittent preventive treatment of malaria in pregnancy (IPTp) coverage was optimized to 90% of all pregnant women, 206,000 low birth weight births would be averted. Low birth weight is a strong risk factor for neonatal and childhood mortality, and averting low birth rates will save many lives.

Malaria is a major public health problem in Ghana. Ghana's entire 30.9 million population is at risk for malaria (4.9 million cases and over 11,000 deaths in 2019), and it accounts for 2% of global malaria cases and 3% of malaria deaths. The country is among the 15 countries in the world with the highest malaria burden. Ghana made significant progress in malaria control between 2016 and 2019 as malaria cases decreased by 32% (237 per 1,000 to 161 cases) and deaths decreased by 7% (0.4 per 1,000 to 0.37 per 1,000). Ghana has the highest rate of women who received two doses of IPTp in sub-Saharan Africa at 80.2% in 2019, but the rate of women receiving three doses of IPTp (IPTp3) was only 61%. The 2019 Malaria Indicator Survey (MIS)¹ showed that 74% of households owned at least one insecticide-treated net (ITN); net use among pregnant women was 49% and 54% of children under five years old used nets. Ghana recently increased coverage for seasonal malaria chemoprevention (SMC) from 1 million children aged three to 59 months in five regions in 2020 to approximately 1.3 million in seven regions. Additionally, the 2016 MIS showed a 0.64 use to access ratio for ITNs while the 2019 MIS noted a modest increase of use to access ratio to 0.65.^{1,2}

For the last few years, the Ghana Health Service through the NMEP has been implementing evidence-based interventions recommended by WHO to control and eliminate malaria in Ghana. Successful malaria prevention is dependent on effective implementation of ITN distribution, indoor residual spraying (IRS), SMC, and IPTp. Despite the ongoing efforts to implement these strategies, malaria incidence has not declined sufficiently, and there have been minimal efforts on social and behavior change (SBC).

Recent evidence has shown some gains in coverage for malaria interventions. Ownership of ITNs in households increased from 68% in 2014 to 74% in 2019 with ITN access for household population increasing from 59% to 67% within the same period. Use of ITNs has shown marginal increases; use among household population increased from 36% to 43%, ITN use

among children under five increased from 47% to 54%, and there was a similar increase in use among pregnant women (from 43% to 49%) during the same period.^{1,2}

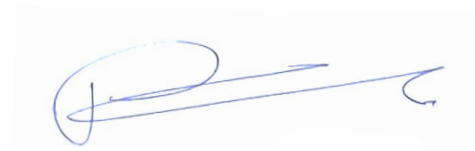
IPTp3 coverage almost doubled from 39% in 2014 to 61% in 2019; however, care-seeking for fever for children under five declined from 77% to 69% for the same period.^{1,2} The target of 80% universal access to malaria interventions was not achieved. The underlying behavioral risk factors were not adequately addressed, contributing to delays in appropriate care-seeking, low use of ITNs, low uptake of IPTp, and poor adherence to guidelines by health care personnel. SMC coverage for children was high with Ghana achieving 85% coverage for SMC with 765,746 of 904,939 targeted children receiving all four doses of SMC in seven regions.³ The 2021–2025 National Malaria Strategic Plan (NMSP) is focused on achieving a reduction in malaria mortality by 90%, reducing malaria case incidence by 50% (using 2019 as the base year), and achieving malaria pre-elimination in at least six districts. The plan focuses on building on the achievements gained in the last eight years and introducing new interventions and strategies with contributions from a broader range of stakeholders (research community, health partners, community members, academia, and nongovernmental organizations [NGOs]). Key objectives in the NMSP 2021–2025 are to ensure at least 95% coverage for at least one malaria preventive measure, and 95% of those with fever seek care within 24 hours of onset of symptoms by 2025.⁴ Hence barriers to behavior change need deeper appreciation and exploration if the country is to increase uptake of diagnostic, treatment, and prevention services. Multi-pronged strategies have been instituted to encourage the adoption of desired malaria prevention and treatment behavior at various levels. This includes advocacy with stakeholders for commitment to ensure malaria interventions are prioritized and supported, the use of mass media, strengthening community action for social mobilization, development of SBC materials to facilitate and complement communication and strengthening the capacity of health workers and stakeholders in both private and public institutions.

Recognizing the importance of strategic partnerships, the NMEP partnered with PMI/USAID through Breakthrough ACTION staff in Ghana to support implementation of SBC activities to improve malaria-related prevention and treatment behaviors. The successful implementation of theory-informed and evidence-based SBC activities necessitated the generation of data and an inclusion of non-communication based approaches to behavior change.

Breakthrough ACTION designed and executed the Ghana MBS in 2022. Members of the NMEP, PMI, USAID, GHS Research, GSS, University of Health and Allied Sciences, Regional Health Director Bono East, SAHA Consulting, and Breakthrough ACTION, created an advisory group that reviewed and adopted the MBS protocol and contributed to the preparation and planning of the MBS research. A research team from Breakthrough ACTION designed the research protocol, survey tools, consents, and recruitment scripts, the advisory group and key experts from NMEP reviewed them. The Breakthrough ACTION research team submitted the approved protocols and consents to the Ghana Ethics Research Committee and JHU IRB for approval. Partners appointed an independent consulting firm, SAHA Consulting, to develop the tablet data entry program. The Breakthrough ACTION team trained the enumerators, with the support of the NMEP team, in March 2022. The NMEP monitored and supervised the field data collection with funding from the Global Fund. The purpose of the MBS was both to understand the socio-demographic and

ideational determinants associated with the uptake of malaria interventions in Ghana and to determine appropriate program activities to address specific behavioral determinants of malaria. The report provides malaria-related contextual data in addition to behavioral determinants at both the community and individual levels; the data will inform further analysis and research on issues to be addressed by the program and other partners implementing malaria control interventions. This includes providing data for standard malaria indicators used to understand and validate evidence-informed priorities for development of malaria control interventions, including health messages, testing, treating, and tracking, and facilitating trend analyses of key behavioral outcomes. Key malaria interventions include ITNs, IPTp, SMC, and IRS in some regions, and malaria care-seeking for children under five. The MBS was conducted across the country in all three zones.

The NMEP is grateful to PMI, USAID, and the Global Fund for the financial support to the study, Breakthrough ACTION Ghana for their key role, John Hopkins University, HRRD GHS, the GSS, and all Ghanaians who participated in the successful implementation of the MBS. The result of this report will go a long way in supporting malaria SBC programming as well as future policy decisions.



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Executive Summary

The National Malaria Elimination Program (NMEP) continues to work in collaboration with major stakeholders including the United States Agency for International Development (USAID)/U.S. President's Malaria Initiative (PMI), Global Fund to fight AIDS, TB and Malaria, the World Health Organization (WHO), and the United Nations Children's Fund (UNICEF) to ensure proper malaria prevention and case management and distribution of critical malaria commodities in Ghana. Important interventions for the control of malaria in Ghana are intermittent preventive treatment of malaria in pregnancy (IPTp), the use of insecticide-treated nets (ITNs), indoor residual spraying (IRS), prompt care seeking for fever, testing with rapid diagnostic tests (RDTs), seasonal malaria chemoprevention (SMC) and appropriate treatment of confirmed, uncomplicated malaria with artemisinin combination therapy (ACT). Each of these interventions support malaria control and elimination efforts and depend to varying degrees on human behavior.

Understanding populations' malaria-related knowledge, attitudes, and practices can be useful for improving social and behavior change (SBC) programs to further the goals of the Ghana NMEP. The objective of the Malaria Behavior Survey (MBS) is to provide a better understanding of the sociodemographic and psychosocial factors associated with malaria-related behavioral outcomes in Ghana and to inform SBC activities designed to improve behavioral outcomes for malaria. The psychosocial factors measured by the MBS align with the ideation model of communication and behavior change and correspond to cognitive, emotional, and social factors. The more these factors are in place, the greater the support for positive behavior change. The MBS was implemented in all three zones of Ghana (Southern, Forest, and Northern), and 5,284 household heads, 1,706 men, and 5,376 females were interviewed. Key survey findings include the following:

Household Characteristics

- Households in Ghana had a median of 3.8 residents with an average of 1.9 people sleeping in a room.
- Ninety-one percent of households had electricity, while 77% of households were near a public health facility and about 87% were near a pharmacy. Households in the Northern zone had significantly lower proportion of households with electricity and a location close to public health facilities and pharmacies.
- Sixty-six percent of the households were in rural areas and over 95% of households owned a mobile phone. Differences between the three zones' household assets were significant in many categories with Northern zone having more assets related to agriculture such as land and livestock ownership.

Population Characteristics

- Slightly more respondents were women (51%), and most respondents were between 25 and 44 years old (70%).
- Most survey respondents were Protestant (71%) and married (85%), and more than half had a primary education (51%).

Cross-Cutting Ideational Determinants

- Most participants (90%) perceived equitable gender norms related to malaria prevention and treatment, and most respondents had an overall favorable perception of health care providers (83%).
- More than half of respondents perceived themselves as susceptible to malaria (58%) and that malaria was severe (61%).
- Interpersonal communication with partners about malaria was low with only 16% reporting that they had a discussion about malaria with their partner.

Malaria Case Management

- Eighty-five percent of respondents reported health care providers gave respectful care and 88% had favorable perceptions of health facilities.
- Eighty-eight percent of respondents had an intention to seek prompt care at a health facility if a child under five had a fever. At the same time, only about a half of respondents (52%) perceived that people seek prompt care for a child with fever.
- A key ideational factor for prompt care seeking was correct knowledge.

Malaria in Pregnancy

- Eighty percent of women perceived malaria in pregnancy as severe.
- Forty-eight percent of respondents had high comprehensive knowledge of IPTp recommendations and 44% of respondents perceived that the community approves of women taking IPTp.
- Ninety-two percent of respondents reported an intent to use IPTp for their next pregnancy

Insecticide-Treated Net Use

- Forty-four percent of respondents reported using a net consistently, with females more likely to report using an ITN the previous night. The key ideational factors associated with previous night net use include older age (45 or older), favorable attitudes towards ITNs, perceived response efficacy of ITN use, and self-efficacy to use ITNs.
- Only 9% of respondents reported that they perceive their community approves of ITNs use, and 49% of respondents perceived that their community consistently uses ITNs.

Seasonal Malaria Chemoprevention

- Respondents had high rates of favorable attitudes toward SMC (90%), perceived response efficacy of SMC (89%), and perceived self-efficacy of SMC (94%).
- Seventy-two percent of respondents had correct knowledge of SMC and recommended dosages, and 70% of respondents perceived that their community adhered to SMC recommendations.
- Only 48% of females reported participation in the decision making for SMC for children.

Indoor Residual Spraying

- Eighty-nine percent of respondents reported coverage of their household with IRS, and 93% percent of respondents were aware of the indoor residual spraying (IRS) program.
- Seventy-eight percent of respondents had positive attitudes toward IRS, and 79% of respondents had a perceived response efficacy of IRS.

Media Consumption

- Most respondents owned a mobile phone (88%) and watched television at least once a week (76%) while fewer respondents listened to the radio (59%) at least once a week
- While 43% of respondents had heard a malaria message in the past six months, much fewer could identify a malaria campaign logo (18%) or complete the Zero Malaria Starts with Me and You campaign slogan (11%).

Recommendations

In view of the malaria transmission trends, cases, and ongoing interventions, the MBS is a critical resource to inform programmatic and policy decisions using a socio-ecological framework. Key recommendations considering the current SBC/malaria programmatic and policy context in Ghana are summarized below:

Malaria Care Seeking and Treatment

- Position prompt and appropriate care-seeking as a regular and expected behavior in society.
- Increase trust in malaria testing.
- Increase the intensity and reach of SBC activities.
- Strengthen caregivers' plans to follow through on their intentions.
- Promote that IPTp is effective against malaria (response efficacy) and provide encouraging feedback to women who return for their doses.
- Increase the proportion of women with favorable attitudes toward ANC and IPTp.

Indoor Residual Spraying

- Increase the population's confidence in the effectiveness of IRS in reducing malaria, particularly among rural and Forest zone residents.
- Sustain and increase positive attitudes about IRS.

Seasonal Malaria Chemoprevention

- Continue to promote the high perceived effectiveness of SMC drugs in combination with an understanding of SMC as a three-day course to ensure equally high day two and three uptake.
- Show caregivers that participation in SMC is widespread.
- Increase female involvement in the decision making for SMC.

- Foster positive attitudes toward SMC.

ITN Use and Care

- Demonstrate how easy it is to use a ITN every night, in a variety of circumstances.
- Promote ITN care and repair.
- Promote positive attitudes toward ITNs.
- Increase access to ITNs.
- Remind communities that nets are valuable and that properly caring for nets ensures they continue to provide value.
- Boost people's trust in the effectiveness of ITNs.

Media

- A harmonized, scaled, well programmed national multi-media campaign combining mass media, mobile technology and health facilities is necessary.
- Mobile phone-based SBC activities should be considered as a reinforcement channel.
- Specific times for television by audience should be utilized to improve efficiency and effectiveness of SBC activities.
- Specific times for radio by audience should be utilized to improve efficiency and effectiveness of SBC activities.

Introduction

Context of Malaria in Ghana

Ghana is centrally located on the West African Coast. It has a total land area of 238,537 square kilometers, and it is bordered by three French-speaking countries: Togo on the east, Burkina Faso on the north and northwest, and Côte d'Ivoire on the west. The Gulf of Guinea lies to the south and stretches across the 560-kilometer coastline. Ghana is a lowland country except for a range of highlands on the eastern border. The highest elevation is Mt. Afadjato, 884 meters above sea level, found in the Akuapem-Togo ranges, west of the Volta River. Ghana can be divided into three ecological zones: the low, sandy coastal plains, with several rivers and streams; the middle and western parts of the country, characterized by a heavy canopy of semi-deciduous rainforests, with many streams and rivers; and a northern savannah, which is drained by the Black and White Volta Rivers. The Volta Lake, created by a hydroelectric dam, is one of the largest artificial lakes in the world.²

Ghana has a tropical climate with temperatures and rainfall patterns that vary according to distance from the coast and elevation. The eastern coastal area is comparatively dry, the southwestern corner is hot and humid, and the north of the country is hot and dry. The average annual temperature is about 26°C (79°F). There are two distinct rainy seasons in the southern and middle parts of the country, from April to June and September to November. The North, however, is characterized by one rainfall season that begins in May, peaks in August, and lasts until September. Annual rainfall ranges from about 1,015 millimeters (40 inches) in the North to about 2,030 millimeters (80 inches) in the Southwest. The harmattan, a dry, dusty desert wind, blows from the northeast and covers much of the country between December and March, lowering the humidity and visibility, and creating very warm days and cool nights in the North. In the South, the effects of the harmattan are felt mainly in January.

Malaria is hyperendemic in Ghana, with malaria prevalence rates in children varying throughout the country from 2% in Greater Accra region to 27% in Western region.¹ Although Ghana's entire population is at risk of malaria infection, children under five years of age and pregnant women are at higher risk of severe illness due to lowered immunity. Malaria contributes to poverty and low productivity escalating the burden on households and the economy.⁷ It is estimated that every malaria episode in Ghana results in an average of five workdays lost and 6.4% of income loss.^{8,9} Reducing the malaria disease burden is a high priority for the Ghana Ministry of Health. The 2021–2025 Ghana Malaria Strategic Plans aims to reduce malaria cases by 50%.⁴ Several concerted efforts have been launched in partnership with the World Bank, UNICEF, the Global Fund, USAID, and PMI with the GHS through the NMEP, for malaria prevention and control.

Evidence from the recent Ghana MIS showed improvements: nationwide malaria parasite prevalence in children six to 59 months of age (based on microscopy) declined from 28% in 2011 to 14% in 2019 (**Figure 1**). The MIS 2019 also showed 74% of households reporting possession of at least one ITN, 43% reporting ITN use the previous night of survey, a 0.65 use to access ratio, and 91% of pregnant women receiving at least one dose of IPTp-sulfadoxine pyrimethamine, at antenatal care (ANC) (**Table 1**).¹ Despite increased levels of coverage for

preventive measures, malaria transmission is still high, as major barriers impede the appropriate behavior and care-seeking practices. Although improvements were evident in ITN coverage since 2008, ITN use among those with access has remained at about 65% since 2016. ITN use among those with access is lower in urban areas than rural areas. The primary driver of ITN use remains ITN access, including cost; however, among those with access, net design, discrepancies in room design, local practices and perceptions, weather, and alternative uses of ITNs are cited as reasons for suboptimal use.⁸ Facility level care-seeking practices for prevention and treatment in pregnancy and childhood is also challenged with economic, facility, structural, and other barriers.^{11,12} Multidisciplinary research is warranted to explore the mediated behavioral factors to care-seeking for malaria to design context-appropriate programmatic interventions to achieve the goals of elimination by 2030.

Figure 1. Malaria prevalence by geographic area

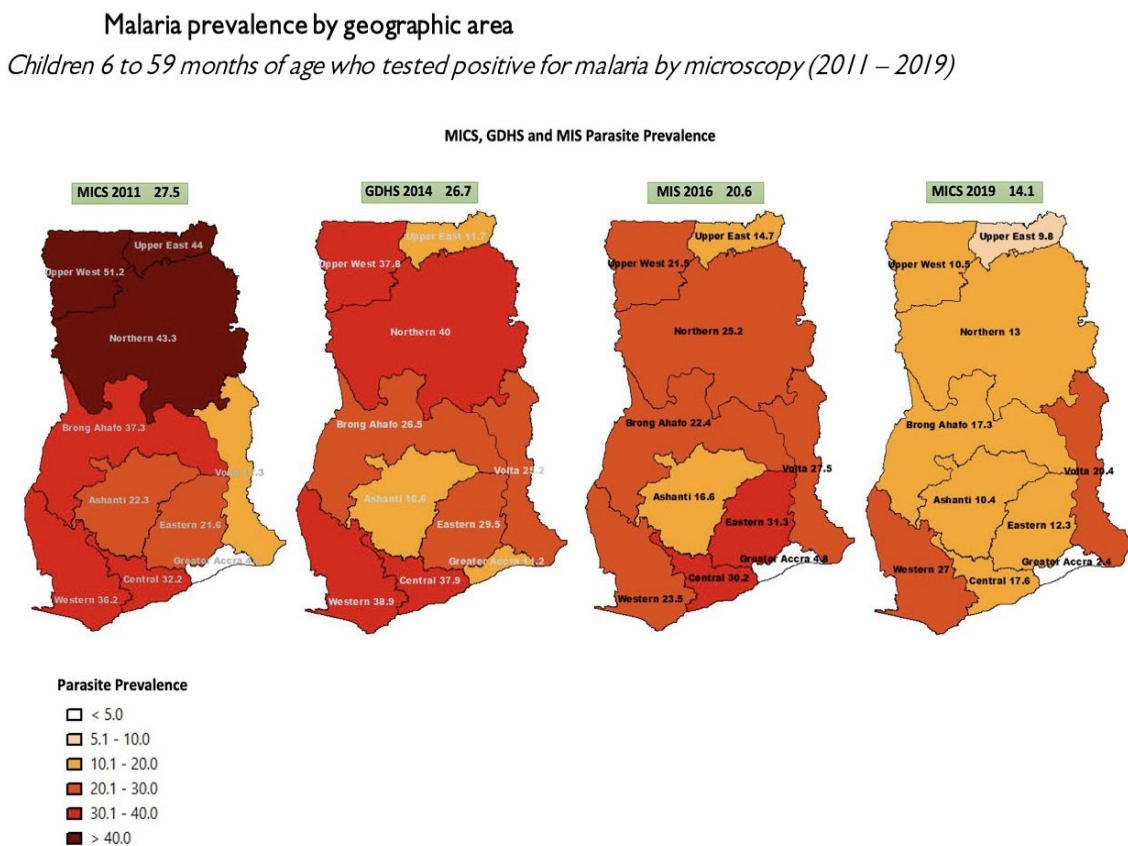


Table 1. Synopsis of malaria outcome indicators from MIS 2019 ¹	
Outcome Indicators	2019 MIS
Households with at least one ITN	74%
Households with at least one ITN for every two people	52%
Population with access to an ITN	67%
Population that slept under an ITN the previous night	43%
Children under five years of age who slept under an ITN the previous night	54%
Pregnant women who slept under an ITN the previous night	49%
Children under five years of age with a fever in the last two weeks for whom advice or treatment was sought	69%
Children under five years with a fever in the last two weeks who had a finger/heel stick	34%
Children receiving artemisinin combination therapy (ACT) among children under five years of age with a fever in the last two weeks who received any antimalarial drug	46%
Women who received ≥ 2 doses of IPTp during their last pregnancy in the last two years	80%
Women who received ≥ 3 doses of IPTp during their last pregnancy in the last two years	61%
Children under five years of age with parasitemia by microscopy	14%
Children under five years of age with parasitemia by rapid diagnostic test	23%
Children under five years of age with severe anemia (hemoglobin less than 8 g/dl)	4%

Malaria Service Delivery and Commodities

The Ghana health care and malaria service delivery system is composed mainly of public institutions managed by the GHS, and for-profit clinics and faith-based organizations. Public health care services and some services delivered by faith-based organizations are free to the patient. In Ghana, essential health care services including all basic malaria interventions are provided (in line with the Sustainable Development Goals) by the government at no cost, including rapid diagnostic tests, ITNs, treatment medications, and IPTp.

Public health institutions providing malaria services are classified as primary, secondary, and tertiary health facilities. Primary facilities such as community-based health planning services and health centers are the first point of malaria service delivery for most of the Ghanaian population. Here, patients can receive a malaria diagnosis as well as first-line treatment. At the health centers, pregnant women can access IPTp and ITNs at no charge. In catchment communities, health surveillance assistants provide outreach services to community members.

Secondary facilities are district-level facilities that operate on a referral basis and can provide more comprehensive care for complicated malaria. Lastly, tertiary facilities are the central hospitals and are used in severe cases of complicated malaria.

Malaria Interventions in Ghana

Since its establishment under the Disease Control Department of the Public Health Division of the GHS, the NMEP (formerly the National Malaria Control Program) has made significant strides toward reducing the burden of malaria in Ghana. The NMEP, with support from stakeholders including USAID/PMI, The Global Fund, and WHO conduct malaria prevention and control activities including vector control (e.g., distribution and support for use of ITNs, including to children under one during child welfare clinic visits and to pregnant women during ANC), case management (e.g., distribution of diagnostic and treatment commodities for uncomplicated and severe malaria, including appropriate treatment of malaria in pregnancy, training and supportive supervision for health workers), chemoprevention (e.g., distribution of commodities of IPTp, distribution of commodities for SMC), IRS, and monitoring and surveillance.

Ghana's NMSP 2021–2025 aims to achieve a reduction in malaria mortality by 90%, reduce malaria case incidence by 50% (2019 as the base year), and achieve malaria pre-elimination in at least six districts. The strategic plan builds on the achievements gained in the last eight years and introduces new interventions and strategies with contributions from a broader range of stakeholders, including health partners, community members, research community, academia, and NGOs. It defines strategies to be implemented to achieve the goal set for the NMEP in Ghana and guides its partners to re-strategize towards accelerated malaria control and pre-elimination in targeted areas of the country.⁴

In accordance with the NMSP 2021–2025, Ghana's objective is to ensure at least 95% of the population will use at least one malaria preventive measure, and 95% of those with fever seek care within 24 hours of onset of symptoms by 2025.⁴ Understanding and addressing the barriers to behavior change is a key strategy in Ghana's efforts to increase the uptake of diagnostic, treatment, and prevention services. Key behavioral risk factors that threaten the effort to interrupt onward transmission of malaria exist, including delays in care-seeking due to long distances to access health care, low use of ITNs, low uptake of IPTp, and poor adherence to guidelines by health care personnel. Ghana employs multi-pronged strategies to encourage the adoption of desired malaria

NMSP 2021–2025 Specific Objectives⁴

1. Protect at least 80% of the population at-risk with effective malaria prevention interventions by 2025.
2. Provide appropriate diagnosis to all suspected malaria cases and prompt and effective treatment to 100% of confirmed malaria cases in accordance with treatment guidelines by 2025.
3. Ensure at least 95% of the population will use at least one malaria preventive measure, and 95% of those with fever seek care within 24 hours of onset of symptoms, by 2025.
4. Strengthen and maintain capacity for governance and program management to achieve programmatic objectives at all levels of the healthcare system towards malaria control and pre-elimination by 2025.
5. Ensure timely and adequate supply of quality-assured malaria commodities to all service delivery points by 2025.
6. Improve mobilization of resources and maximize the efficient use of available resources for greater public health impact by 2025.
7. Strengthen malaria surveillance and monitoring and evaluation system towards the 2025 malaria goals.

prevention and treatment behavior at various levels.

The strategies include advocacy with stakeholders for commitment to ensure malaria interventions are prioritized and supported, the use of mass media, strengthening community action for social mobilization, development of SBC materials to facilitate and complement communication, and strengthening the capacity of health workers and stakeholders in both private and public institutions.

Recent evidence on the effectiveness of SBC interventions to improve positive health behaviors, including those related to malaria prevention and treatment provides is promising. To ensure effectiveness of SBC interventions, contextual considerations need to be made to address the specific perceptions and beliefs that influence individuals' decisions related to these behaviors. Exploratory studies using focus groups and other unstructured assessments have identified several attitudes and beliefs that influence these behaviors. These underlying factors are important for program planning, especially in the field of malaria prevention and treatment. Empirically designed surveys can help determine the independent and combined effect of specific ideational characteristics on behaviors. Population-based surveys can provide information on the relative prevalence of these characteristics either in the overall population or among specific population subgroups.

Rationale for the MBS Study

Research increasingly demonstrates the effective role of SBC programs in increasing the prevalence of positive health behaviors related to malaria prevention and treatment. SBC programs need to target the specific ideational factors that influence decisions related to malaria-related behaviors. Existing national and regional data, including Demographic and Health Surveys and MIS studies, largely focus on the prevalence of relevant behavioral indicators but provide limited information on behavioral determinants.

The MBS provides representative data at the zonal level with a focus on ideational barriers that are not included in large national surveys. Such data can be used to do the following:

- Estimate the prevalence of ideational antecedents of malaria behaviors.
- Estimate the independent and combined effects of ideational characteristics on behaviors.
- Identify ideational profiles based on underlying patterns across groups to examine how membership in ideational segments correlates to corresponding behaviors.

These analyses will help malaria programs and policy makers create and prioritize audience segments and develop customized context specific SBC activities that are evidence-based by understanding the demographic, psychosocial, and contextual factors associated with use and maintenance of ITNs, adoption of IPTp, prompt and appropriate care for fever in children, and acceptance of SMC and IRS. The data will also help to assess exposure to malaria-related SBC. The NMEP and partners are committed to using SBC-related activities in their public health interventions. The MBS will also provide feedback on the effectiveness and recall of such campaigns including tagline recognition and sources of information. Understanding these behaviors and perceptions is key to providing targeted interventions and informing future national strategies.

Goals and Objectives of the MBS

The goal of the MBS is twofold. It is designed to:

1. Provide a better understanding of the sociodemographic and ideational characteristics associated with malaria-related behavioral outcomes in Ghana.
2. Inform SBC activities designed to improve malaria-related ideational and behavioral outcomes to achieve these goals in Ghana.

Specific objectives of the MBS include:

- Determine the ideational factors related to utilization of treated bed nets, uptake of IPTp, and malaria care-seeking and case management in children.
- Understanding reasons for not adopting malaria prevention and treatment behaviors.
- Determining the focus of future programs designed to promote appropriate malaria prevention and treatment behaviors in Ghana.

Given the scope of this study, assessing the prevalence of malaria-related behaviors is also necessary. This assessment includes use of bed nets, uptake of SMC, IRS, and IPTp, and prompt and appropriate treatment of malaria in children. While the MBS is powered to detect the presence of these behaviors at a regional and national level, these behaviors are only measured to assess the impact of the ideational determinants and are not meant to be representative of the actual behavior prevalence in Ghana.

Ideational Model

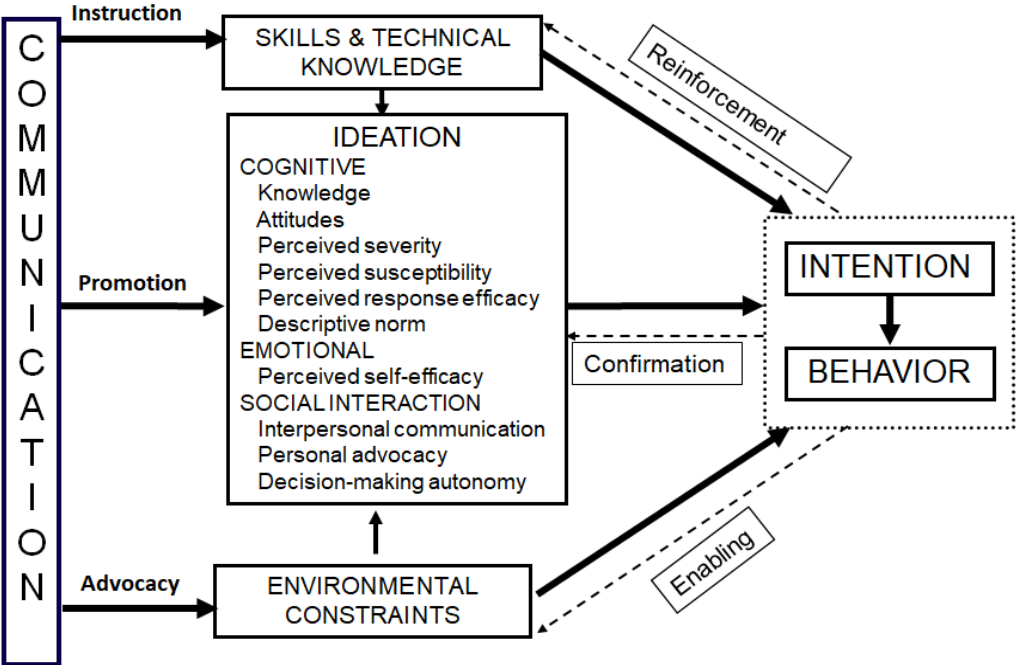
The conceptual framework of the MBS is the ideational model for strategic communication and behavior change, a predictive model of behavior change that focuses on the multiple, interrelated psychosocial variables that commonly influence individual behaviors.¹³ The ideation model (**Figure 2**) recognizes that most behavioral decisions are driven by multiple psychosocial factors, often simultaneously. The ideation model has three components, each of which comprises several elements: (1) cognitive elements, which include variables such as attitudes, beliefs, values, perceived risk, subjective norms, and self-image; (2) emotional elements, which include emotional response, empathy, and self-efficacy variables; and (3) social elements, including social support and influence, interpersonal communication, and personal advocacy variables. These variables function at varying degrees like risk factors for disease, but in a positive way: the more ideational variables that apply to a person, the more likely that individual is to adopt the behavior. These ideational variables are also influenced by communication, whether through social interaction, mass media, or interpersonal communication. The factors work both individually and synergistically to influence health outcomes. Research has demonstrated the relationship between ideation and malaria behavior, including ITN use, IPTp, and care-seeking for children under five.¹³

Methodology

This section describes methodological elements of the study, including the study design, sampling and data collection, analysis, and research ethics.

Survey Design

Figure 2. Ideational model, adapted from Kincaid (2000).¹³



The MBS is a cross-sectional survey of randomly selected household heads, women, and men interviewed using structured questionnaires (one for each group of study participants). The study was national in scope and conducted in the three zones; Northern/Savannah, Forest/Middle, and Southern/Coastal, which cover the 16 regions and 261 districts in Ghana. Each zone was further categorized into strata comprising urban or rural clusters. EAs were selected from each survey stratum with probability proportional to size. Surveyors selected participants through a multistep process consisting of (1) probability proportional to size selection of the EAs based on the population size; (2) a random selection of eligible households; and (3) selection of all eligible individuals within selected households. This process allows the study findings to be generalizable enough to inform programmatic activities to improve malaria-related ideational and behavioral outcomes.

Data from the recent MIS shows that female literacy, use of ITNs, and prevalence of fever in children vary by zones (Table 2).¹ The indicators are used in part to determine an appropriate sample size.

Table 2. Characteristics of geographic zones				
Zone	Regions	Population estimate 2019	% of women that used ITN ¹	% under-five children with fever ¹
Northern/ Savannah	Northern, Savannah, Northeast, Upper East, Upper West, Oti	6,063,421	72.1	30.5
Forest/ Middle	Eastern, Ashanti, Ahafo, Bono East, Bono, Western North	13,108,069	53.8	32.5
Southern/ Coastal	Western, Central, Greater Accra, Volta	11,783,714	45.7	25.7
Total		30,955,204		

Sampling

Sample Size and Justification

Study analysts estimated the sample size to measure relevant malaria-related outcomes related to net use, including caregivers' bed net use, net use among children, and prevalence of positive attitudes toward consistent use of bed nets. They calculated estimates for the indicators using data from the 2019 MIS.¹ The following formula was applied to estimate the required sample size.

$$n = d \times \frac{z_{1-\frac{\alpha}{2}}^2 \times p(1-p)}{\delta^2 \times R_h \times R_i}$$

- n is the required sample of individuals (e.g., women).
- z is the z value corresponding to the desired confidence level. The analyses assume $z = 1.96$, corresponding to the 95% confidence level.
- d is the design effect due to departure from simple random sampling (assumed to be 3.0, based on secondary analysis of the 2019 MIS).¹
- p is the estimated (expected) outcome indicator; for example, the proportion of women of reproductive age that slept under a net on the night before the survey or the proportion of under-five children that had fever in the last two weeks. For each outcome, study authors derived the required sample size under the assumption that $p = 0.5$ (for maximum variability).
- δ is the desired margin of error. Authors derived the various sample sizes with $\delta = 5\%$.
- R_h is the response rate for households, assumed to be 90%.
- R_i is the response rate for women in selected households, assumed to be 96%.

Table 3 presents the results of the sample size computations. Given the range of sample sizes required for each outcome, the study includes a total of 5,556 households. Interviewers conducted the survey with 5,556 heads of household and 5,556 women of reproductive age. In one-third of the households, interviewers targeted male spouses or partners (**Table 4**). This sample size considers the potential non-response at the household and individual levels, provides a representative sample at the zonal level, and allows valid estimation of key malaria behavioral and ideational indicators.

Table 3. Total required sample size by outcome and parameters				
Indicator	Zone			
	Northern/ Savannah	Forest/ Middle	Southern/ Coastal	Total
% of women of reproductive age sleeping under ITN	1,334	1,764	1,919	5,016
% of children with fever in last two weeks	1,131	1,170	1,019	3,320
% of women with positive attitudes towards consistent use of bed nets	1,334	1,334	1,334	4,002

zone	Women (15–49)	Men	Head of Household	Total Questionnaires
Northern/Savanna	1,185	395	1,185	2,765
Forest/Middle	2,075	692	2,075	4,842
Southern/Coastal	2,296	766	2,296	5,358
Total	5,556	1,853	5,556	12,965

The respondents were selected from a sample of households; 1,185 from the Northern zone, 2,074 from the Forest zone, and 2,295 from the Southern zone. The sampled households were selected from both urban and rural EAs.

Participant Inclusion and Exclusion

The following criteria was used for participant study inclusion and exclusion:

Inclusion

- Heads of household, who may be male or female, aged 18 years or above from the households selected for the study.
- Women aged 15–49 years living in selected households and men aged 18–59 years who are either partners or spouses of women who have been interviewed.
- Usual resident of the selected household. All household members who stayed the night before the day of the survey are considered a usual resident.
- Ability to communicate intelligibly.
- Ability to communicate in English, Dagbani, Ewe, Ga, or Twi.

Exclusion

- Below 15 years and above 49 years for women, and below 18 years and above 59 years for men (husbands/partners).
- Not a regular resident of the selected household.
 - Inability to consent to participate in the study.
 - Inability to understand the questions and/or respond intelligibly.

Multistage Stratified Sampling for Selection of Households

Study participants were selected through a multistage random selection process of EAs, households, and individuals (for men).

The study teams obtained the most recent list of EAs, EA maps, and household listings from the GSS. Each of the three zones was divided into urban and rural strata and EAs were selected based on probability proportional to size. The study included a total of 280 EAs in the final sample: 115 from the Northern zone, 105 from the Forest zone, and 60 from the Southern zone. The NMEP obtained prior permission to conduct the survey from the district directorate. Upon arrival, the study teams obtained permission from the community leaders using the community entry script approved by the GHS and JHU IRB and updated the household listing using the form. The household listing form included EA number, building/compound number, the nickname of the head of household, the household address or location description, the number of

women aged 15–49 and the number of men aged 18–59 years in the household. All households without an eligible woman 15–49 years of age were eliminated from the list. The study team selected 20 households from the list using a systematic sampling approach with a sampling interval proportional to the total number of households in the cluster. If a selected EA did not have the required number of households needed for the survey, the study team also mapped/listed households from an adjoining EA to make up the number. The household list was destroyed once data collection was finished in each cluster.

Selection of Survey Participants in Selected Households

Interviewers visited each of the 20 selected households per cluster. Recruitment scripts were used to provide basic information about the study to potential participants. If participants indicated interest in learning more about the study, interviewers read the consent form to obtain formal consent from the head of household before administering the household questionnaire. The head of household (either male or female) may also have been selected for the male or female surveys. The household questionnaire included a listing of all members of the household, questions on household characteristics and assets, and a net roster. Following the completion of the household questionnaire, the interviewer used the household listing to select all women ages 15–49 years for interview using the individual women’s questionnaire. The interviewers used the recruiting scripts and screening tool to determine eligible women’s interest before obtaining formal study consent. The screening tool included questions on age, whether the woman is a usual member of the selected household, and languages spoken. Following this process, the interviewer proceeded with the women’s questionnaire. In every one-third of the households where women were selected, the interviewer also selected the spouse/partner of the interviewed woman for surveying with the men’s questionnaire. The process was similar, where interviewers read the recruiting scripts to determine interest in the study, and then followed the formal consent process before conducting the interview.

Data Collection and Analysis

Data Collection Tools

The head of household instrument consists of household characteristics, ownership of assets, and a roster of all bed nets (used) in the house. Both women and men’s questionnaires included modules assessing net use, care, and disposal; perceptions of health services; and ideational factors including knowledge, perceived severity, perceived vulnerability, perceived efficacy of prescribed responses, attitudes, perceived self-efficacy, norms, social interactions and influence, and emotional response related to malaria behaviors. Both questionnaires also explored exposure to malaria-related SBC interventions. Of note, women’s questionnaires also explored ANC and receipt of IPTp among women who had a live birth within the past two years, as well as receipt of appropriate treatment for children who had a fever in the past two weeks. Given that study teams assessed ANC and IPTp outcomes among women with a pregnancy in the past two years, the MBS also included questions on future intentions to receive ANC and IPTp as intermediate outcomes. These can be linked with women’s current ideational characteristics as of the time of the survey.

Data Collection Procedures and COVID-19 Compliance Measures

The field survey team consisted of enumerators fluent in the local language of the participant and who received training in research ethics and interviewing, completed at least two years of college education, and had prior household survey experience.

Throughout the data collection, the survey team instituted appropriate COVID-19 prevention protocols in adherence to GHS guidelines, including:

- Daily temperature and COVID-19 symptom screening for all study staff during training and data collection.
- Ensuring all participants wore a face mask during data collection.
- COVID-19 symptom screening of all participants.
- Regularly disinfecting hands using hand sanitizer and ensuring physical distancing.

Data Analysis Procedures

The ideational factors explored included correct knowledge, attitudes, perceptions of threat (i.e., severity and susceptibility), efficacy (response efficacy and self-efficacy), supportive community or gender norms, service delivery (facility-based workers as well as health facilities in general), and interpersonal communication regarding malaria.

The study team defined comprehensive knowledge as having correct responses to all the relevant knowledge questions. For questions assessing attitudes or perceptions, the variables were recorded as +1 to reflect a positive perception, -1 for a lack of positive attitude, and 0 for “don’t know.” The team summed the scores for the questions to obtain an index for positive perceptions/attitudes. Respondents with a summative score greater than 0 were considered to have favorable perceptions or attitudes. Interpersonal communication was coded as “yes” if the respondent engaged in relevant discussions related to malaria with a spouse/partner or family/friends.

The study defines key outcomes as follows:

- ITN use: Whether the net was being used by a household member (from the household roster).
- ITN access: Dividing the potential ITN users from the number of nets in the household by the number of de facto members for each household and determining the overall sample mean of that fraction.
- Prompt care-seeking: The proportion of index children under five years old with fever in the past two weeks for whom treatment was sought the same day as fever onset or the next day.
- Appropriate care-seeking: the proportion of index children under five years old with fever in the past two weeks who were taken to a facility or community health worker (CHW) first.
- Attendance of four ANC visits (ANC4): The proportion of women who gave birth at least one child in the last two years who attended at least four ANC visits during their last pregnancy.
- Receipt of IPTp3: The proportion of women who gave birth to least one child in the last two years who received three or more doses of IPTp during the last pregnancy.

- ANC4 Intention: The proportion of women who intend to have a future pregnancy who intend to also attend four or more ANC visits in their next pregnancy.
- Early ANC Intention: The proportion of women who intend to have a future pregnancy who also intend to attend ANC within the first three months in their next pregnancy.
- Indoor spraying coverage: The proportion of households who report IRS in Northern and Forest zones in Ghana where the country implemented IRS.
- SMC: Proportion of children three to 59 months who received the first dose of the most recent cycle of SMC in the Northern zone.

Cross-tabulations and multivariable regression analysis examined the relationships between sociodemographic characteristics, ideational factors, and the outcomes of interest. Variables included in the regression models were based on a priori knowledge and included sociodemographic characteristics and variables informed by the ideation model.

The MBS yields a multi-stage stratified cluster sample, so this study weighted the data based on the probability of selection at each stage. A different weight is calculated based on respondents' sex, as women were sampled differently from men.

Research Ethics and Human Subjects Research Compliance

IRBs approved the study protocol, recruitment forms, consent forms, and tools at the Johns Hopkins Bloomberg School of Public Health (IRB# 17132) and the GHS Ethics Research Committee (Protocol# GHSERC: 022/08/21). All project staff received training on study objectives, protocols, research ethics and covid compliance regulations. Informed consent was obtained from all study participants after trained data collectors explained the purpose of the survey, the types of questions that would be asked, the potential risks associated with participating in the survey, and the actions the study team would take to protect the confidentiality of the participants. In addition, data collectors explained to the participants that they did not have to participate in the study, they could decide at any point to discontinue their interview, and they did not need to answer any questions they did not want to. To protect the identity of participants, nicknames were used, when possible, instead of legal names. The household listing sheet in each EA was destroyed when data collection was complete in the corresponding cluster. Signed consent/assent forms were stored in secure locations.

Results

As shown in **Figure 3**, the final sample included 5,284 households, and the survey team conducted interviews on 1,706 male and 5,376 female respondents. Summary results related to household characteristics, population characteristics, household assets and wealth quintiles, cross-cutting ideational factors, malaria case management, malaria in pregnancy, ITN use and care, SMC, IRS, and media consumption and message exposure are discussed.

Sample Description

Household Characteristics

Results show that, on average, each household contained 3.8 residents, with an average of two residents in each sleeping room. Proportion of urban and rural households were statistically significantly different between the zones (**Figure 4** and **Table A.3.1.1**). Significant differences between the three zones were evident for households with electricity (Southern 94.7%, Forest 90.8%, and Northern 79.1%), near (“near” is defined as within five kilometers, 30 minutes or less on foot, or 10 minutes or less by car) a public health facility (Southern 79.7%, Forest, 79.8%, and Northern 65.3%), near a private health facility (Southern 63.3%, Forest 51.8%, and Northern 27.1%), near a pharmacy/chemist (Southern 94%, Forest, 89.2%, and Northern 65.5%), finished floors (Southern 94.3%, Forest, 85.0%, Northern 60.2%), and finished walls (Southern 85.5%, Forest, 77%, Northern 56.2%). Households in the Southern and Forest zones compared higher than the Northern zones for almost all indicators. **Table A.3.1.1** provides a summary of the sample characteristics.




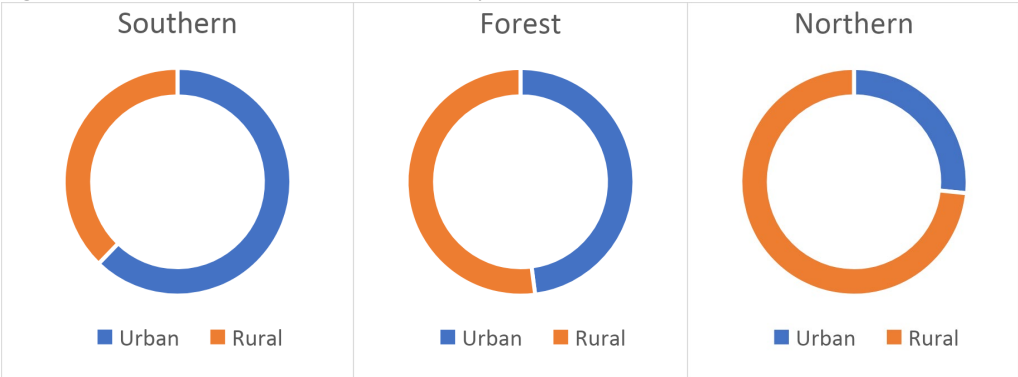
Figure 3. Study Sample	
	5,284 Households with 21,230 Members
	1,706 Male respondents
	5,376 Female respondents

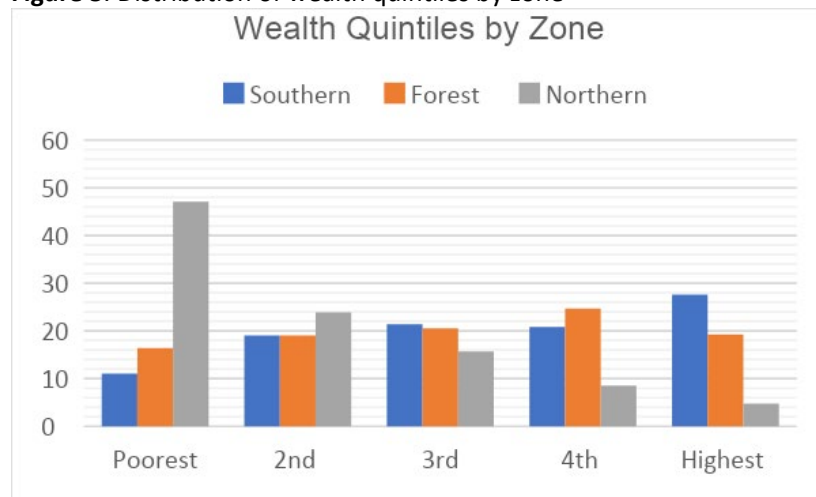
Figure 4. Urban versus rural households by zone



Household Assets and Wealth Quintiles

Significant differences between zones were evident for all reported assets. Radio ownership was higher in Forest zone than in the other two zones (Southern, 56.9%, Forest, 60.7%, Northern, 52.6%). Television ownership was highest in Southern zone (Southern, 82.1%, Forest, 78%, Northern, 57.0%), mobile phone ownership was above 95% in all zones (Southern, 96.4%, Forest, 94.7%, Northern, 94.8%), refrigerator ownership was highest in Southern, (Southern, 65%, Forest, 57.4%, Northern, 28.3%), and computer ownership was highest in Southern (Southern, 16.7%, Forest, 14.2%, Northern, 9.2%). Likewise, transport assets were significantly different between the three zones: bicycle (Southern, 13.3%, Forest, 11.2%, Northern, 56.9%) and motorcycle ownership (Southern, 9.1%, Forest, 11%, Northern, 60.5%) was highest for Northern, but car ownership was higher for Southern and Forest zones compared to Northern zone (Southern, 12.9%, Forest, 13.3%, Northern, 4.7%). Land (Southern, 13.4%, Forest, 33.8%, Northern, 68.5%) and livestock (Southern, 15%, Forest, 20.7%, Northern, 57.5%) ownership was significantly higher in the Northern region than in the Forest or Southern region. Wealth quintiles differed significantly between the zones. Twenty-eight percent of households in the Southern zone were in the highest quintile while 19.3% and 4.8% of households in Forest and Northern. Forty-seven percent of the households in the Northern zone were in the lowest wealth quintile, compared to only 11% and 16.4% in the Southern and Forest zones. Summary results are illustrated in **Figure 5** and **Table A.3.1.2**.

Figure 5. Distribution of wealth quintiles by zone



Population Characteristics

A total of 21,230 members were represented in the 5,284 households included in the survey. The average age of the household members was about 22 years (**Table A.3.1.3**). Sociodemographic profiles of the respondents showed that 51.1% were female and 48.9% male, (**Table 5**), with about 69% from urban areas and 31% from rural areas. Significant differences were evident between zones, in the educational distribution of the participants, with 42% reporting secondary or higher education in the Southern zone compared to 35.5% in Forest and 22.1% in Northern zones. Most of the respondents were Protestant (71.1%), while 9% were Catholic, 13.8% were Muslim, 2.7% were practiced traditional beliefs, and 3.4% declared no religious affiliation. A

significantly higher proportion (94.6%) of the respondents were married (or cohabitating) in the Northern zone compared to 82–85% in the other two zones.

Table 5. Sociodemographic and educational characteristics of respondents, by zone				
<i>Percent distribution of respondents by sociodemographic characteristics, by zone, Ghana 2022</i>				
Sociodemographic characteristic	Southern	Forest	Northern	Total
Sex				
Female	51.23	50.46	53.06	51.11
Male	48.77	49.54	46.95	48.89
Age**				
15–24	13.84	16.65	18.00	15.52
25–34	38.76	39.11	41.76	39.26
35–44	31.72	30.36	29.70	30.91
≥ 45	15.68	13.87	10.54	14.31
Residence***				
Urban	79.38	63.88	45.10	68.78
Rural	20.62	36.12	54.90	31.22
Level of education***				
None	7.78	8.24	42.39	12.00
Primary	50.28	56.28	35.51	51.12
Secondary or higher	41.94	35.48	22.10	36.88
Religion***				
Protestant	84.94	79.19	31.74	71.14
Catholic	5.60	8.62	10.88	9.01
Islam	6.47	8.87	49.17	13.81
Traditional	0.90	0.58	5.28	2.66
No Religion	2.09	2.74	2.93	3.38
Married (includes cohabitating) *	82.22	85.62	94.55	85.07
Total (N)	2,834	2,727	1,521	7,082
<i>Significant differences between zones: * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.1.1 Sample characteristics

Table A.3.1.1. Housing characteristics

Table A.3.1.2. Ownership of assets and wealth quintile






Table A.3.1.3. Characteristics of household members

Cross-cutting Ideational Factors

The cross-cutting ideational factors associated with malaria and malaria-related behaviors developed under the MBS global initiative were calculated for Ghana include general awareness and knowledge of malaria, perceived severity of and susceptibility to malaria, malaria-related interpersonal communication, perceptions of facility-based health care providers, and perceived gender norms related to malaria.

A summary of cross-cutting ideational factors is illustrated in **Figure 6**. At the national level, knowledge that fever is a symptom of malaria was significantly higher for older participants, those with a higher educational status and those from the highest quintile and urban residents (**Table A 3.2.2**). An overwhelming majority (> 95%) were aware that mosquitos caused malaria, irrespective of gender, type of residence, age, socioeconomic status, and level of education. Likewise, knowledge of at least one preventive measure for malaria was over 95%. However, differences appeared at the zonal level for all three knowledge elements by gender, age, socioeconomic status, and place of residence.

Based on the four items used to assess perceived susceptibility to malaria (**Table A.3.2.3**), only 58.1% of the respondents had perceived susceptibility to malaria. Perceived susceptibility was higher for residents from rural areas (69.4%), those with no education (74.0%) and those from the lowest wealth quintile (74.7%). More than one-half the respondents (55.2%) perceived that the consequences of malaria would be severe, and 85.6% perceived that a case of malaria could potentially lead to a fatality (**Table A.3.2.4**). Overall, composite perceived severity of malaria was reported by about three-fifths of the respondents.

	83.4% Overall favorable perceptions of health care providers
	58.1% Perceived susceptibility to malaria
	60.6% Perceived severity of malaria
	16.2% interpersonal communication with partner about malaria
	90.1% perceived equitable gender norms for malaria prevention and treatment

Few participants reported discussing malaria with a spouse or partner (16.2%) or with a friend or family member (17.7%) in the preceding six months prior to the survey (**Table A.3.2.5**). Older participants, those from rural settings, higher educational status, and males reported higher levels of malaria-related conversations with spouse and friends.

Most of the respondents (83.4%) reported favorable attitudes towards facility-based health care providers (**Table A.3.2.6**). Favorable attitude towards facility-based health care providers was significantly higher for those with secondary or higher educational levels and those from urban sites.

The composite perceived equitable gender norms for malaria prevention and treatment was high at 90.1% (**Table A.3.2.7**). Respondents who were between the ages of 25 and 34 were significantly more likely to have higher perceived positive gender norms.

A score card of ideational factors is illustrated in **Figure 6**. A green code indicates high performance, yellow illustrates at mid-level, and red highlights low levels of performance.

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.2.2. Knowledge of malaria

Table A.3.2.3. Perceived susceptibility to malaria

Table A.3.2.4. Perceived severity of malaria

Table A.3.2.5. Interpersonal communication regarding malaria

Table A.3.2.6. Perceptions of facility-based health workers

Table A.3.2.7. Gender norms related to malaria

Table 6. Summary of cross-cutting ideational factors related to malaria

	Correct Knowledge of Fever Symptoms	Perceived Susceptibility	Perceived Severity	Discussion with Spouse or Partner	Discussion with Friends or Family	Favorable Perception of Facility-based Health Providers	Perceived Equitable Gender Norms
Zone							
Southern	69.6	53.7	62.17***	17.13	17.07	83.8***	91.52
Forest	62.3	60.7	55.08	19.92	20.34	81.77	86.92
Northern	71.9*	84.9***	61.68	19.60	18.89	52.68	96.23***
Sex							
Female	66.91	60.78	60.38	15.56	17.44	78.47	89.64
Male	66.48	59.72	57.69	21.81***	19.99*	80.41	90.52
Age Group							
15–24	64.05	55.28	57.97	12.50	13.79	82.61***	84.80
25–34	66.41	59.61	58.10	17.21	17.21	72.43	91.83***
35–44	67.17	63.93***	59.34	19.54	18.25	75.70	91.10
≥ 45	67.62	58.13	60.52	21.98**	23.59***	79.31	88.45
Residence							
Urban	67.74	56.25	57.16	17.92	18.23	79.36	88.97
Rural	64.42	69.02***	63.23**	20.11	19.69	81.32	92.46
Level of education							
None	68.26	76.01***	60.03	13.56	13.95	66.40	88.59
Primary	62.85	63.23	61.11	17.27	18.63	79.76	90.00
Secondary or higher	69.90***	53.86	56.95	20.99**	19.81*	82.12***	90.47
Wealth quintile							
Lowest	67.26	75.06***	62.91	16.91	18.34	70.34	91.73
Second	59.86	68.23	63.44***	16.88	18.19	72.02	91.39
Middle	64.94	60.67	61.88	17.44	17.61	76.69	88.47
Fourth	66.00	58.14	61.04	18.28	19.66	84.47***	90.66
Highest	72.13**	51.51	51.83	21.25	19.00	84.41	89.37
Total (%)	66.7	58.14	60.04	16.16	18.61	84.47	90.66

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Malaria Case Management

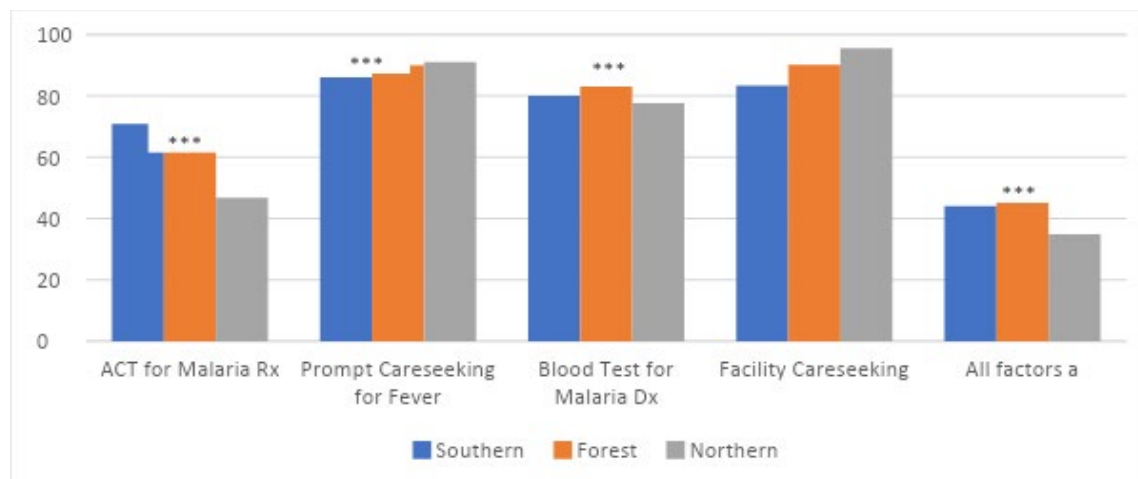
Several factors related to malaria care-seeking and management were addressed in this survey. These included knowledge and attitudes related to malaria care-seeking and treatment, perceived response efficacy of malaria testing and treatment, perceived gender and community norms related to malaria testing and treatment, perceptions toward health facilities and health care providers for malaria testing and treatment, decision making for malaria care and treatment. Here we report the intent for prompt and appropriate care-seeking for children with fever as data on actual care-seeking was not obtained due to a glitch in the data entry program. We defined appropriate care-seeking for fever as a facility visit, and prompt and appropriate care-seeking as a facility visit on the day or the next day after the onset of fever. This section summarizes results of the findings, and a comprehensive list of tables for each factor is provided in the Annex.

Ideational Variables Linked with Care-Seeking for Malaria

The comprehensive knowledge score (i.e., correct responses to all four knowledge questions) was below 50% for all zones (**Figure 7** and **Table A.3.3.1**), though 88% of the respondents were aware of the recommendation for prompt care-seeking the same day or the next day following the onset of fever and 87.7% of respondents were aware of recommendations to seek appropriate care at a facility. Knowledge of ACT for treatment of malaria was significantly lower for the Northern zone (46.7%) than other zones. More than 75% of the respondents reported that blood tests were required for diagnosing malaria. Significantly higher knowledge was evident in male respondents, those from urban settings, those with secondary or higher education and those from the highest wealth quintile.

A vast majority (over 84% in all three zones), of the respondents had favorable attitudes with respect to malaria care-seeking and treatment (**Table A.3.3.2**). Significant differences were apparent between respondents in the three zones for perceived response efficacy for malaria testing (Southern 41.4%, Forest 28.4%, Northern 27.7%) with significantly higher responses among urban residents and those with secondary or higher education (**Table A.3.3.3**). However

Figure 7. Percentage of respondents with specific knowledge of malaria care-seeking and treatment. A Response to four indicators is correctly answered. Significant difference zonal level *** ($p < 0.001$).



perceived response efficacy for malaria treatment was much higher with values between 72.3 to 77.9% as illustrated in the tables in the Annex (**Tables A.3.3.4**). A summary of the key responses is also shown in **Figure 8**.

Perceived self- efficacy, an aggregate of six indicators, for testing and treatment for children was reportedly high at 97% (**Table A.3.3.5**).








No consistent pattern appeared within response efficacy for testing for age group, gender, level of education, and wealth quintiles for the three zones. Female respondents (31.4%) and those from urban areas (31.0%) had significantly higher response efficacy for testing for the Forest zone (**Table A.3.3.3**). For malaria treatment efficacy, female respondents in both the Southern (80.0%) and Forest zones (77.6%) had significantly higher responses than male respondents, 75.7% and 71.7% respectively (**Table A.3.3.4**).

Descriptive norms for prompt (same day or next day) care-seeking from a health provider for children with fever was 72.5% in the Northern zone, compared to 53.9% in Forest zone and 39.9% in Southern zone (**Table A.3.3.7**). About one-half (51.6%) of the respondents stated that most people in

the community approve of prompt care-seeking for children with fever, and 47.6% reported most children that are taken to a facility for fever receive a malaria test. This indicator was significantly higher in rural (55.8%) compared to urban (44.0%) areas.

An overwhelming 87.6% of the respondents had a favorable perception of health facilities for malaria care-seeking and treatment (**Table A.3.3.8**). This was based on an aggregate score of facilities always stocked with medication to treat malaria and always having supplies for testing kits for malaria. Favorable perception of health facilities was less common in the Southern zone (86.2%) compared to the other two zones (88.7% Forest, 88.8% Northern). Urban residents (89.0%) and female (89.4%) respondents reported significantly higher favorable perceptions. Although perceived respectful care and knowledge competency of providers was above 80% for all zones, perception that payment for blood test and medication for children was required was high, especially for respondents from the Southern and Forest zone (< 25%). Unsurprisingly, overall perceptions of facility-based health providers were extremely low at 39.2% (**Table A.3.3.9**). However, those in the lowest wealth quintile, and those who were between 15–24 years old had a significantly higher proportion of respondents with favorable perceptions. Female participation in decision making was significantly lower than males related to going the health

Figure 8. Summary of malaria care-seeking and treatment: ideational factors

	35.1% Perceived response efficacy for malaria testing
	75.9% Perceived response efficacy for malaria treatment
	97% Perceived self-efficacy for malaria testing and treatment for children
	51.6% Perceive most people seek prompt care for child with fever
	87.6% Favorable perception of health facilities, e.g., meds and test kit
	85% Health care providers give respectful care
	81.5% Involved in decisions to seek care when child has fever

facility when a child has malaria (females 76.2%, males 85.7), purchasing medication when a child is sick with fever (females 66.7%, males 82.7%), and what to do when they, themselves are sick (females 69.7%, males 83.4%) (**Table A.3.3.10**).

Intentions for prompt and appropriate care

Respondent's intent to seek prompt care at a health facility if a child under five had fever was 87.7% overall and significantly higher for the Northern zone (95.6%), compared to 83.4% for Southern and 90.2% for Forest zone (**Table A.3.3.11**). Participants in the lower wealth quintiles reported significantly higher intention for prompt and appropriate care-seeking (92%), than those in the higher wealth quintiles (82–87%). A slight but significantly higher proportion of male respondents reported intention to seek prompt care than female respondents (89.1% versus 86.2%), significantly higher proportion of rural (93.7%) compared to urban residents (84.9%). Logistic regression indicated that the odds were 2.3 times higher for respondents in the Northern zone and 1.2 times higher for Forest compared to the Southern zone for the intent to seek prompt and appropriate care (**Table 7**). Knowledge that ITNs prevent malaria was associated with a 7.5 times higher odds of reporting intention to seek prompt and appropriate care. Likewise, there was a strong positive association between prompt care seeking and exposure to malaria messages in the past six months (adjusted odds ratio [aOR] = 7.5). Other significant determinants of prompt care seeking were positive perception of health facilities for testing and treatment (aOR 1.2), wealth quintile (odds ratio [OR] = 1.83 for the middle wealth quintile compared to the lowest wealth quintile), descriptive norms for malaria testing (aOR = 1.99), knowledge that mosquito bites are a cause for malaria (aOR = 1.32), and positive perception of facility health providers in treating malaria (OR = 0.70).

Table 7. Logistic regression of factors associated with intent to seek prompt (same day or next day) and appropriate care (health facility) for child with fever

<i>Logistic regression of factors associated with prompt and appropriate care Ghana, 2022</i>		
	All zones	
	aOR	%95 CI
Zone		
Southern (ref)	1	—
Forest	1.23	0.94–1.62
Northern	2.30***	1.55–3.40
Age		
15–24(ref)	1	—
25–34	1.19	0.86–1.66
35–44	1.37	0.96–1.96
≥ 45	1.14	0.74–1.75
Level of education		
None(ref)	1	—
Primary	0.79	0.56–1.12
Secondary and higher	1.14	0.74–1.76
Residence		
Urban(ref)	1	—
Rural	1.02	0.79–1.33
Wealth quintile		
Lowest (ref)	1	—
Second	1.11	0.79–1.55
Middle	1.83**	1.23–2.71
Fourth	1.48	0.99–2.20
Highest	1.34	0.86–2.06
Perceived severity of malaria		
No (ref)	1	—
Yes	0.80	0.62–1.04
Perceived susceptibility of malaria		
No (ref)	1	—
Yes	1.00	0.78–1.27
Knowledge that bed nets prevent malaria		
No (ref)	1	-
Yes	7.48***	5.80–9.65
Attitudes towards malaria care-seeking		
No (ref)	1	-

Yes	0.58*	0.34–0.98
Community norms regarding malaria testing (care seeking norms)		
No (ref)	1	-
Yes	1.99***	1.49–2.67
Gender norms related to malaria treatment		
No (ref)	1	-
Yes	1.34	0.99–1.81
Knowledge of mosquito bites as malaria cause		
No (ref)	1	—
Yes	1.32*	1.05–1.67
Exposure to malaria message in the last six months		
No (ref)	1	—
Yes	7.48***	5.80–9.65
Positive perception of testing and treatment from health facilities (malaria test kits available and malaria medicines available)		
No (ref)	1	—
Yes	1.24	0.91–1.69
Positive perception of facility health providers		
No (ref)	1	—
Yes	0.70**	0.55–0.88
Pseudo R2		18.1
Number of Observations		3,504

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.3.1. Knowledge of malaria care-seeking and treatment

Table A.3.3.2. Attitudes towards malaria care-seeking and treatment

Table A.3.3.3. Perceived response efficacy of malaria testing

Table A.3.3.4. Perceived response efficacy of malaria treatment

Table A.3.3.5. Perceived self-efficacy for malaria testing and treatment

Table A.3.3.7. Perceived community norms regarding malaria care-seeking and treatment

Table A.3.3.8. Perceptions of health facilities regarding malaria care-seeking and treatment

Table A.3.3.9. Perceptions of facility health workers regarding malaria care-seeking and treatment

Table A.3.3.10. Decision making for malaria care and treatment











Table A.3.3.11. Intention to seek care and treatment for malaria for child under five years with a fever

Malaria in Pregnancy

This section describes findings on the ideational factors related to the prevention and treatment of malaria in pregnancy and the prevalence of relevant behavioral outcomes and intentions. Ideational factors related to prevention and treatment of malaria in pregnancy explored in the MBS include knowledge, favorable attitudes, perceived severity, perceived response efficacy, perceived self-efficacy, descriptive norms, perceived equitable gender norms as related to responsibilities for ANC visits, favorable perceptions of health workers, involvement in decision making, and interpersonal communication. Relevant outcomes explored include ANC attendance and receipt of IPTp. The specific behavioral intentions explored include intention to attend ANC or receive IPTp in a future pregnancy.

A summary of ideational factors related to malaria in pregnancy including ANC and IPTp are presented in **Figure 9**. About one-half of the respondents (47.5%) had correct knowledge of IPTp recommendations during pregnancy, with a significantly higher proportion in the Northern zone (54.1%). Comprehensive knowledge of IPTp and ANC (first ANC visit, number of ANC visits, and number of IPTp doses) however, was extremely low at 9.91% in the Forest zone; it was highest at 10.99% in the Southern and 7.68% in the Northern zones. Female respondents and those from rural areas had significantly higher knowledge (**Table A.3.4.1**). About three-quarters of the respondents (75.42%) had favorable attitudes toward IPTp safety and efficacy as well as the need to attend ANC, which was significantly different between the zones; the Northern region reported the highest level of favorable attitudes (81.4%) (**Table A.3.4.2**). In the Northern zone, proportionally more female than male respondents had favorable attitudes toward IPTp; the reverse was true in both Southern and Forest zones. Favorable attitudes related to IPTp and ANC differed based on age (more favorable among males), place of residence (more favorable among rural), and education across the three zones (more favorable among those with secondary or higher education).

Figure 9. Ideational factors of malaria during pregnancy

	47.6% Knowledge of IPTp recommendations
	75.4% Positive attitude toward IPTp/ANC recommendations
	92.4% Intent to use IPTp for next pregnancy
	80.3% Perceived severity of malaria in pregnancy
	92.1% Perceived response efficacy of IPTp
	96.4% Perceived self-efficacy for IPTp (women)
	43.7% Perceived community approval of women taking IPTp
	77.9% Perceived shared responsibility of ANC consultations
	89.3% Favorable perception of health care providers regarding malaria during pregnancy
	67.5% Respondents involved in decision making for ANC

Perceived severity of malaria in pregnancy, a composite indicator of the perceived serious effect of malaria on mother and fetus during pregnancy, and perceived increased likelihood of dying from malaria when pregnant was also significantly different between the zones, with respondents from the Northern region showing significantly higher perceived severity of malaria in pregnancy (**Table A.3.4.3**). Perceived response efficacy of IPTp was extremely high at 92.2% for all three zones, with significantly higher level for the Northern zone (95.2%) (**Table A.3.4.4**). Perceived self-efficacy, a composite index of six individual indicators for IPTp for women, was also over 96% for all three zones. (**Tables A.3.4.5a and b**).

About three-fifths of respondents reported that at least one-half of the women in the community go for at least four ANC visits during a pregnancy, and 56.4% indicated that at least one-half the women take malaria medications during pregnancy. However, only 43.7% reported that at least one-half of the people in the community approve of pregnant women taking medicines to prevent malaria during pregnancy (**Table A.3.4.6**).

Almost nine-tenths of the respondents in each of the three zones indicated favorable perceptions of health facility providers with respect to ANC and IPTp, a composite indicator based on four items: offer of IPTp to pregnant women, refusal to give IPTp medication if woman has not eaten, refusal of care if woman comes too early in pregnancy, and refusal of care if pregnant woman is not accompanied by her spouse. Female respondents had significantly higher positive perception than their male peers in Southern and Forest zones (**Table A.3.4.8**), but there was no consistent pattern for other demographic variables between the zones.

Significant differences were seen among the zones for joint decision making related to ANC, with the highest reported in the Forest zone (70.6%), followed by Southern (64.9%) and lowest in the Northern zone (62.2%). Respondents in the age group 15–24 years (62.7%) reported lower levels of participation in decision making compared to older respondents (**Table A.3.4.9**). Interestingly, only 2.3% (Southern zone), 3.4% (Forest zone) and 6.0% (Northern zone), reported discussing ANC attendance with their spouse or partner (**Table A.3.4.10**).

Seventy one percent of the women reported receiving an ITN during ANC, with the lowest in the ≥ 45 age group (60.1%), highest in the rural areas compared to urban areas (75.2% versus 64.1%), and different between the highest and lowest wealth quintile (60.2% versus 71.8%). Of those who reported a delivery in the last two years, 96.1% reported receiving at least one IPTp dose (**Table A.3.4.13**). The results presented did not include data on the number of IPTp doses received during pregnancy. However, a regression analysis of intent for IPTp3 during the next pregnancy indicated significant higher odds (aOR, 4.2) for respondents who had a positive attitude toward IPTp and perceived response efficacy of IPTp (aOR, 7.8) (**Table 8**).

Table 8. Logistic regression of factors associated with intent to receive IPTp3 for the next pregnancy		
<i>Logistic regression of factors associated with intent for IPTp3 Ghana, 2022</i>		
	All zones	
	aOR	%95 CI
Zone		
Southern	1	—
Forest	0.98	0.32–3.02
Northern	3.54	0.60–20.98
Age		
15–24(ref)	1	—
25–34	0.39	0.11–1.40
35 and more	0.74	0.11–4.78
Level of education		
None(ref)	1	—
Primary	0.34	0.06–1.88
Secondary and higher	0.25	0.03–1.86
Residence		
Urban(ref)	1	—
Rural	0.94	0.33–2.67
Wealth Quintile		
Lowest (ref)	1	—
Second	1.17	0.32–4.28
Middle	3.84	0.69–21.46
Fourth	3.54	0.65–19.24
Highest	7.04	0.80–61.60
Perceived severity of malaria		
No (ref)	1	—
Yes	0.71	0.22–2.34
Perceived susceptibility of malaria		
No (ref)	1	—
Yes	1.17	0.42–3.21
In the last six months, did you talk about malaria with your spouse or relations		
No (ref)	1	—
Yes	0.84	0.20–3.63
Complete knowledge of IPTp		
No (ref)	1	—
Yes	3.11	0.56–17.32
Attitudes toward IPTp		
No (ref)	1	—
Yes	4.16**	1.44–12.05
Perceived severity of malaria in pregnancy		
No (ref)	1	—
Yes	1.38	0.42–4.51

Perceived response efficacy of IPTp (consultations with health care providers during pregnancy ensures mother and baby are healthy, medicine to prevent malaria during pregnancy keeps mother and baby healthy, pregnant women should take medicine to prevent malaria even if they sleep under a bed net)		
No (ref)	1	—
Yes	7.84**	2.22–27.72
Perceived community norms regarding IPTp (most women in the community go for ANC when they are pregnant)		
No (ref)	1	—
Yes	0.78	0.16–3.73
Perceived community norms regarding IPTp (most women in the community take medicine to prevent malaria)		
No (ref)	1	—
Yes	1.21	0.27–5.40
Perceived community norms regarding IPTp (most people in the community would not call names if woman took)		
No (ref)	1	—
Yes	1.01	0.34–3.01
Gender norms regarding ANC		
No (ref)	1	—
Yes	2.14	0.68–6.75
Perceptions of CHWs		
No (ref)	1	—
Yes	2.46	0.82–7.40
Perceptions of facility-based health workers		
No (ref)	1	—
Yes	0.67	0.11–3.88
Decision making regarding ANC		
No(ref)	1	—
Yes	1.85	0.54–6.36
Interpersonal communication regarding ANC		
No(ref)	1	—
Yes	0.44	0.15–1.29
Exposed to malaria message		
No(ref)	1	—
Yes	1.05	0.38–2.87
Pseudo R2		23.8
Number of Observations		516

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.4.1. Knowledge of IPTp

Table A.3.4.2. Attitudes towards IPTp and ANC

Table A.3.4.3. Perceived severity of malaria in pregnancy

Table A.3.4.4. Perceived response efficacy of IPTp

Table A.3.4.5a. Perceived self-efficacy for IPTp (women)








- Table A.3.4.5b. Perceived self-efficacy for IPTp (men)
- Table A.3.4.6. Perceived community norms regarding IPTp
- Table A.3.4.8. Perceptions of facility-based health workers regarding malaria in pregnancy
- Table A.3.4.9. Decision making regarding antenatal care
- Table A.3.4.10. Interpersonal communication regarding antenatal care
- Table A.3.4.11. Intention to use IPTp
- Table A.3.4.12. Antenatal care attendance
- Table A.3.4.13. Use of IPTp by women during pregnancy

Insecticide-Treated Net Use and Care

This section describes the ideational factors related to ITN use and care. The MBS assessed knowledge about ITNs, attitudes toward ITN use and care, perceived response efficacy of ITNs, perceived self-efficacy to use and care for ITNs, descriptive norms around ITN use and care, and perceived equitable gender norms regarding ITN use. Outcomes explored included household-level net ownership, population-level net access and use, characteristics and use of existing nets, net care, and consistent net use. **Figure 10** illustrates the net use ideational factors at a glance.

Ideational Variables Linked with Mosquito Net Use

Many respondents (74%) knew that bed net use helps prevent malaria (**Table A.3.5.2**). Respondents in the Northern zone, those living in rural areas, and those with lower levels of education had significantly higher knowledge compared with their counterparts. Most respondents reported favorable attitudes towards mosquito nets (84%), with higher rates among rural residents (93%) and those in the lowest wealth quintile (94%) (**Table A.3.5.3a**). Perceived self-efficacy was higher at 72% (and significantly higher for females, those in rural areas, lowest wealth quintile and no education) but response efficacy was low at 63.1% (significantly higher for lower wealth quintiles and rural residents) (**Table A.3.5.4** and **A.3.5.5**). Nearly 80% (79.1%) of respondents reported perceived equitable gender attitudes related to bed net use (**Table A.3.5.6a**). Those respondents aged 35–44 reported the highest equitable gender attitudes (88%). About 49% of study participants perceived that at least half of their community members regularly used bed nets (descriptive norm) (**Table A.3.5.6b**). Agreement with the descriptive norm was higher among people in the Northern zone (75%) compared with the Forest

	74% Knowledge of ITN as a method of malaria prevention
	84% Favorable attitude towards ITN use
	72% Perceived self-efficacy for ITN use
	63.8% Perceived response efficacy of ITNs
	79% Perceived equitable gender norms for ITNs use
	49% Perceived community consistent use of ITNs
	9% Perceived community approval of ITN use

and Southern zones (49% and 35% respectively), and higher among younger aged respondents (55%), rural residents (58%), those with lower levels of education (65%) and females (52%). Only 9% thought their community would approve of their use of bed nets (injunctive norm). Agreement with the injunctive norm was higher in the Northern zone (16%), compared to the Forest zone (10%) and Southern zone (5%). Agreement was also higher among men (11%) and those with no formal education (15%).

Results of the analyses of the ideational variables linked to net use are summarized in **Figure 10** and **Table A.3.5.2 through Table A.3.5.6** including gender norms related to intrahousehold net allocation.

Household ITN Access and Individual Use

Overall, nearly 60% of households had at least one ITN, but only 48% of households had at least one net per two people within their household (**Table A.3.5.7**). The second poorest quintile had the highest access with 63% compared to only 37% of the highest wealth quintile. Urban dwellers had significantly higher access to ITNs within the household (overall 63%, Southern zone 70%, Forest zone 61%, and Northern zone: 60%) than rural dwellers (overall 41%, Southern zone 35%, Forest zone 46%, and Northern zone: 48%) (**Table A.3.5.8**).

Overall, 33% of children of up to four years old were reported to have slept under an ITN the previous night (Southern zone 32%, Forest zone 34%) (**Table A.3.5.9**). More females were reported to have slept under an ITN the previous night compared to males (overall 27%, Southern zone 24%, Forest zone 28%). Urban dwellers were more likely to have reported sleeping under an ITN the previous night than rural dwellers (overall 38%, Southern zone 48%, Forest zone 33%, and Northern zone 38%). Also, across the country, those from the lowest wealth quintile were the most likely to have reported sleeping under an ITN the previous net compared to the other wealth quintiles (overall 41%, Southern zone 50%, Forest zone 41%). Also, not surprisingly, those respondents with more than one ITN available for every two people within their household were more likely to have reported sleeping under an ITN the previous night (overall 61%, Southern zone 61%, Forest zone 63%, and Northern zone 57%).

Use:Access Ratio

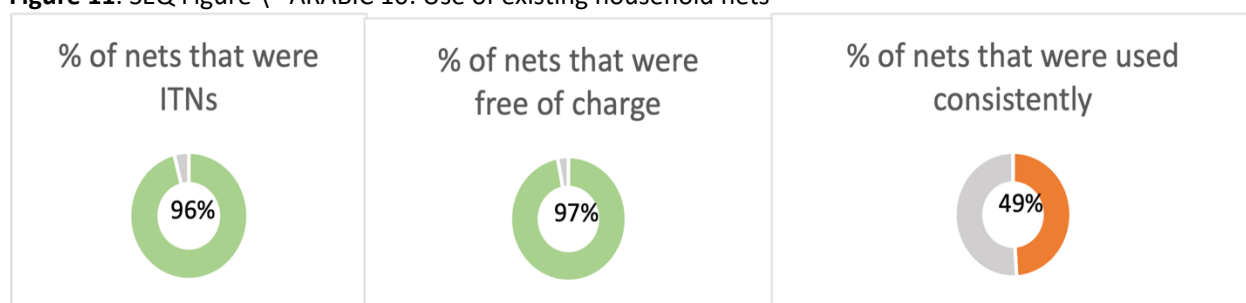
The use:access ratio reflects the ratio of ITN use to ITN access in the population. The indicator looks at the proportion of people who use bed nets among only those people who have access to bed nets. The indicator typically varies between 0.00 and 1.00, the latter of which would indicate that everybody who has access (assuming that two people sleep under a net) to a bed net in a household uses the net to which they have access. ITN use:access is greater than 1.00 when there is a tendency in the population for more than two people to sleep under a net. The use:access ratio is particularly useful in determining if non-use of bed nets is related more to behavioral factors or to access to sufficient ITNs. The analyses presented in this report use the methodology proposed by Koenker and Killian.¹⁴ Overall, the use:access ratio was 0.56 suggesting that a little more than one-half of people surveyed who have access to a net actually use it (Southern zone, 0.57, Forest zone, 0.55, and Northern zone, 0.55). For urban dwellers, the use:access ratio was overall 0.63 (Southern zone 0.72, Forest zone 0.58, and Northern 0.65) while rural dwellers reported lower use:access ratios (overall 0.50, Southern zone 0.50, Forest zone 0.52, and

Northern zone 0.44). Among wealth quintiles, the use:access ratios consistently fell from the poorest quintile to the richest quintile (overall the lowest quintile-0.72 to the highest quintile-0.39) (Table A.3.5.10).

Characteristics of Available Bed Nets

Most nets (96%) identified in the net roster were ITNs, and almost all (97%) were obtained free of charge (Figure 11) (Table A.3.5.12). Most (86%) were reportedly obtained from a mass ITN distribution, 8% during ANC visit, 5% from other sources, and 1% from immunization appointments according to respondents. Blue nets were most common (50%) followed by white nets (46%). Only 4% had been obtained three or more years prior to the survey. Less than one-half (49%) were reportedly used every night of the previous week.

Figure 11. SEQ Figure * ARABIC 10: Use of existing household nets



Consistent Net Use

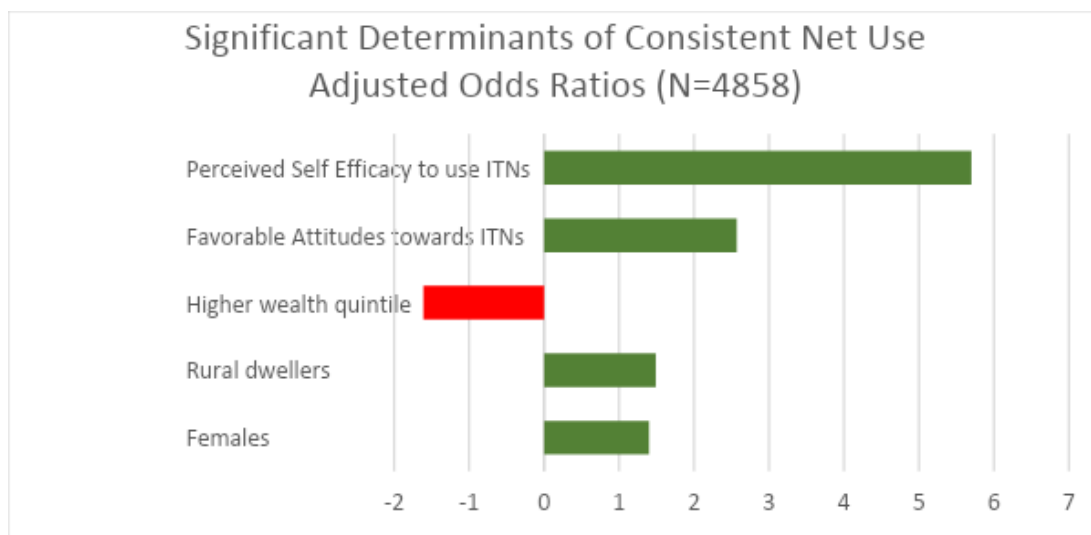
Of those nets reported identified in the survey, 44% of the nets were reported as used consistently (i.e., every night of the week preceding the survey) (Table A.3.5.11). Consistent use of a net was higher in urban (52%) compared to rural (40%) areas; in Forest zone (48%), compared to Southern zone (42%) and Northern zone (42%). It was also higher in the two lowest wealth quintiles (60% and 54%, respectively). About 55% of the existing nets were used the night prior to the survey with higher rates of previous night's use among nets in urban areas (63%), and the lowest two wealth quintiles (69% and 64%, respectively).

Multivariable logistic regression was applied to explore ideational, structural, and access factors related to consistent net use for those who reported at least one bed net in a household (Table 9). Variables that were statistically significant ($p < 0.2$) were included in the logistic regression. Importantly, several of the strongest associations with consistent net use are related to ideational variables. This study identified significantly higher aORs of consistent net use for the following factors:

- Being a female: Overall, 40% were more likely than males to use an ITN consistently; in the Southern zone, they were 56% more likely and in the Northern zone, they were 54% more likely; no significant difference in Forest zone.
- Age group: Respondents aged 25–34 years old were 22% more likely than those aged 15–24 years to report consistent use of ITNs.

- Place of residence: Overall, rural dwellers were 49% more likely than urban residents to use an ITN consistently. The positive association with rural residence was observed in Southern and Northern zones but not in the Forest zone.
- Wealth quintile: Those in the lower wealth quintiles were more likely to sleep under ITNs consistently than those in the higher wealth.
- Attitudes towards ITNs: Overall, favorable attitudes towards ITNs increased the odds of consistent ITN use by more than twofold. The odds were almost three times higher among those with favorable attitudes compared to their peers without favorable attitudes Southern and Forest zones; in Northern zone, the odds were 90% higher among those with favorable attitudes.
- Perceived self-efficacy to use ITNs: Overall, this ideational variable was associated with almost a sixfold increase in the odds of consistent ITN use (**Figure 12**).

Figure 12. Significant determinants of consistent net use



Net Care and Repurposing

Eighty percent of the respondents had adhered to positive net care standards (keeping away from children, keep away from pests, rolling or tying up nets when not in use, handle net with care, not soil with food, keep away from flame or fire, wash gently, wash with soap, wash only when dirty, inspect regularly for holes and repair small holes quickly), with higher rates among Northern and Forest zone residents (94% and 84% respectively) versus Southern zone (71%) (**Table A.3.5.13**).

About one-half (50%) the nets were ever washed, primarily with soap (72%) or detergent (24%). Less than one-half of nets were rolled or tied up when not in use (41%) and over one fifth (23%) of the nets found in the homes were stowed still in their packaging. Only 15% of respondents reported repurposing old nets.

Adjusted logistic regressions was performed to explore ideational, structural, and access factors related to net care (**Table 10**). Variables that were statistically significant ($p < 0.2$) were included in the logistic regression. Significantly higher aORs of net care were observed for the following factors:

- Age group: Those 45 years old and older were more likely to practice recommended net care behaviors (overall 2.77 more likely than those in other age groups, in the Southern zone, they were 2.18 times more likely; in Forest zone, 2.33; and in Northern zone, 8.03 times more likely to practice net care behaviors) than other ages.
- Favorable attitudes towards ITNs: Overall those with favorable attitudes towards ITNs were 3.62 times more likely to practice recommended net care behaviors compared to those that do not have favorable attitudes (2.35 times more likely in Southern zone; in Forest zone, 6.75 times more likely, and in Northern zone, 3.73 times more likely).
- Perceived response efficacy of ITNs: Overall, perceived response efficacy of ITN increased the odds of rolling/tying up nets when not in use by 20%. This positive association was also present in Southern and Northern zones.
- Perceived self-efficacy to use ITNs: Overall, those who reported high levels of perceived self-efficacy to use ITNs were 81% more likely to practice net care behaviors (in Southern zone: 2.14 times more likely, in Forest zone: 1.50 times more likely, in Northern zone: 1.84 times more likely).
- Exposure to malaria messages in the previous six months: The overall association was 1.06 and was inconsistent across zones. In the Southern zone, those exposed to malaria messages in the previous six months were 29% less likely to practice net care behaviors compared to those not exposed to malaria messages. In contrast, in the Northern zone exposure to malaria messages in the previous six months was associated with 63% greater odds of reporting rolling/tying up their nets when not in use.

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.5.2. Knowledge of malaria prevention using insecticide-treated nets

Table A.3.5.3a. Favorable attitudes towards mosquito nets

Table A.3.5.4. Perceived response efficacy of nets

Table A.3.5.5. Perceived self-efficacy for net use

Table A.3.5.6a. Perceived gender norms regarding nets

Table A.3.5.6b. Perceived community norms regarding nets

Table A.3.5.7. Household possession of treated or untreated mosquito nets

Table A.3.5.8. Access to a treated mosquito net

Table A.3.5.9. Use of ITN by persons in the household

Table A.3.5.10. ITN use:access ratio

Table A.3.5.11. Use of existing ITN

Table A.3.5.12. ITN characteristics

Table A.3.5.13. Net care and repurposing

Table 9. Logistic regression of factors associated with consistent net use: Residents of households with at least one ITN. Ghana, 2022								
<i>Results of the logistic regression exploring factors associated with use of ITN every night: residents of households with at least one ITN. Ghana, 2022</i>								
	Southern		Forest		Northern		All zones	
	aOR	%95 CI	aOR	%95 CI	aOR	%95 CI	aOR	%95 CI
Sex								
Male(ref)	1	—	1	—	1	—	1	—
Female	1.56**	1.18–2.06	1.22	0.94–1.59	1.54*	1.07–2.21	1.40***	1.19–1.65
Age								
15–24(ref)	1	—	1	—	1	—	1	—
25–34	1.09	0.76–1.56	1.17	0.84–1.62	1.43	0.97–2.09	1.22*	1.01–1.49
35–44	0.99	0.68–1.43	1.15	0.82–1.63	1.29	0.85–1.95	1.20	0.97–1.47
≥ 45	1.11	0.73–1.68	0.86	0.58–1.27	1.16	0.71–1.92	1.09	0.86–1.38
Level of education								
None(ref)	1	—	1	—	1	—	1	—
Primary	1.29	0.87–1.93	0.98	0.68–1.42	0.95	0.70–1.30	1.33**	1.10–1.60
Secondary and higher	1.20	0.77–1.87	1.00	0.66–1.53	1.05	0.70–1.56	1.27*	1.02–1.59
Residence								
Urban(ref)	1	N/A	1	N/A	1	N/A	1	N/A
Rural	1.58***	1.24–2.01	0.98	0.78–1.23	3.15***	2.25–4.43	1.49***	1.30–1.72
Wealth quintile								
Lowest (ref)	1	—	1	—	1	—	1	—
Second	0.52***	0.36–0.77	0.71	0.51–1.00	1.05	0.75–1.45	0.82*	0.68–0.99
Middle	0.36***	0.24–0.54	0.46***	0.33–0.65	0.90	0.60–1.34	0.58***	0.48–0.72
Fourth	0.34***	0.23–0.53	0.33***	0.23–0.47	0.95	0.55–1.62	0.50***	0.40–0.63
Highest	0.26***	0.17–0.42	0.26***	0.17–0.38	0.88	0.44–1.76	0.39***	0.30–0.50
Favorable Attitudes for ITNs								
No (ref)	1	—	1	—	1	—	1	—
Yes	2.74***	1.93–3.89	2.96***	2.23–3.94	1.90***	1.30–2.76	2.57***	2.14–3.09
Perceived severity of malaria								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.85	0.67–1.08	0.87	0.69–1.08	0.72	0.51–1.01	0.88	0.77–1.01
Perceived susceptibility of malaria								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.93	0.73–1.17	1.16	0.94–1.45	0.76	0.55–1.06	0.96	0.83–1.10
Talked about malaria with spouse/friends/family members								
No (ref)	1	—	1	—	1	—	1	—

Yes	1.10	0.74–1.63	1.37	1.00–1.88	0.79	0.23–2.76	1.13	0.90–1.42
Perceived response efficacy of ITNs								
No (ref)	1	—	1	—	1	—	1	—
Yes	1.98***	1.50–2.60	0.97	0.78–1.21	0.60**	0.43–0.84	1.05	0.91–1.21
Perceived self-efficacy to use ITNs								
No (ref)	1	N/A	1	N/A	1	N/A	1	N/A
Yes	5.52***	4.16–7.32	4.36***	3.29–5.78	10.56***	6.83–16.32	5.70***	4.79–6.79
Favorable perceived community norms regarding ITNs (people normally sleep under a bed net)								
No (ref)	1	—	1	—	1	—	1	—
Yes	1.38*	1.05–1.82	1.35**	1.08–1.68	0.74*	0.55–0.98	1.06	0.93–1.22
Favorable perceived community norms regarding ITNs (people don't call names if one sleeps under a bed net)								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.50***	0.40–0.63	0.81*	0.65–1.00	0.96	0.72–1.28	0.70***	0.62–0.80
Knowledge of mosquito bites as malaria cause								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.92	0.59–1.43	0.93	0.61–1.43	1.19	0.65–2.17	1.04	0.80–1.36
Exposed to malaria message in last six months								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.93	0.74–1.17	1.12	0.90–1.39	1.16	0.89–1.51	1.11	0.97–1.26
Nets to Populations Ratio								
Less than 1	1	—	1	—	1	—	1	—
1 or more	1.44**	1.13–1.82	2.29***	1.82–2.89	0.94	0.70–1.25	1.55***	1.35–1.78
Household Size	1.13***	1.06–1.21	1.13***	1.06–1.21	0.99	0.92–1.06	1.07***	1.04–1.12
Pseudo R2	21.3		15.4		17.2		21.8	
Number of Observations	1,819		1,846		1,193		4,858	

Table 10. Logistic regression of factors associated with net care; residents of households with at least one ITN. Ghana, 2022

Results of the logistic regression exploring factors associated with net care (Q218 = c): residents of households with at least one ITN. Ghana, 2022

	Southern		Forest		Northern		All zones	
	aOR	%95 CI	aOR	%95 CI	aOR	%95 CI	aOR	%95 CI
Sex								
Male (ref)	1	—	1	—	1	—	1	—
Female	1.27	0.91–1.77	1.24	0.91–1.69	1.02	0.70–1.48	1.18+	0.98–1.43
Age								
15–24 (ref)	1	—	1	—	1	—	1	—

25–34	1.27	0.90–1.78	1.20	0.87–1.66	1.11	0.74–1.66	1.24*	1.02–1.51
35–44	1.35	0.92–2.00	0.99	0.68–1.44	1.51	0.92–2.49	1.20	0.96–1.52
≥ 45	2.18***	1.67–2.84	2.33***	1.79–3.03	8.03***	5.21–12.37	2.77***	2.34–3.27
Level of education								
None(ref)	1	—	1	—	1	—	1	—
Primary	1.84**	1.26–2.68	1.18	0.84–1.67	0.87	0.63–1.18	1.15	0.97–1.38
Secondary and higher	1.78**	1.16–2.71	1.24	0.83–1.84	1.07	0.71–1.62	1.18	0.95–1.46
Residence								
Urban (ref)	1	—	1	—	1	—	1	—
Rural	0.90	0.72–1.13	1.37**	1.10–1.70	1.03	0.74–1.44	1.10	0.96–1.27
Wealth quintile								
Lowest (ref)	1	—	1	—	1	—	1	—
Second	1.02	0.74–1.41	1.10	0.80–1.51	1.63**	1.18–2.26	1.25*	1.05–1.50
Middle	1.02	0.71–1.46	1.07	0.77–1.47	0.91	0.60–1.37	1.12	0.92–1.36
Fourth	0.90	0.62–1.30	1.08	0.77–1.51	1.48	0.87–2.51	1.13	0.92–1.39
Highest	0.87	0.58–1.30	0.97	0.67–1.41	1.29	0.66–2.53	1.05	0.83–1.33
Favorable attitudes for ITNs								
No (ref)	1	—	1	—	1	—	1	—
Yes	2.35*	1.03–5.39	6.75**	2.05–22.22	3.73	0.76–18.28	3.62***	1.96–6.69
Perceived severity of malaria								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.89	0.72–1.11	1.13	0.91–1.39	1.36+	0.96–1.90	1.03	0.90–1.18
Perceived susceptibility of malaria								
No (ref)	1	—	1	—	1	—	1	—
Yes	1.11	0.90–1.38	1.10	0.89–1.35	2.05***	1.47–2.85	1.22**	1.07–1.39
Talked about malaria with spouse/friends/family members								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.82	0.57–1.19	1.10	0.81–1.48	0.30*	0.09–1.00	0.91	0.73–1.13
Perceived response efficacy of ITNs								
No (ref)	1	—	1	—	1	—	1	—
Yes	1.29*	1.00–1.66	1.08	0.87–1.33	1.56**	1.12–2.18	1.20*	1.04–1.37
Perceived self-efficacy to use ITNs								
No (ref)	1	—	1	—	1	—	1	—
Yes	2.14***	1.67–2.74	1.50**	1.16–1.93	1.84***	1.30–2.61	1.81***	1.55–2.12
Favorable perceived community norms regarding ITNs (Q620)								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.83	0.65–1.06	1.34**	1.09–1.65	0.42***	0.32–0.57	0.90	0.79–1.03
Favorable perceived community norms regarding ITNs (Q621)								

No (ref)	1	—	1	—	1	—	1	—
Yes	0.79	0.48–1.29	1.73*	1.01–2.98	0.53*	0.30–0.91	0.89	0.66–1.19
Knowledge of mosquito bites as malaria cause								
No (ref)	1	—	1	—	1	—	1	—
Yes	1.16	0.78–1.74	0.99	0.66–1.49	1.27	0.72–2.24	1.06	0.82–1.36
Exposed to malaria message in last six months								
No (ref)	1	—	1	—	1	—	1	—
Yes	0.71**	0.58–0.88	0.96	0.78–1.17	1.63***	1.25–2.14	0.99	0.87–1.11
Nets to populations ratio								
less than 1	1	—	1	—	1	—	1	—
1 or more	1.15	0.92–1.43	1.13	0.91–1.40	1.27	0.95–1.70	1.13+	0.99–1.29
Household Size	1.13***	1.06–1.20	1.11***	1.05–1.18	1.07+	1.00–1.15	1.10***	1.06–1.14
Pseudo R2	6.3		5.5		13.11		5.3	
Number of Observations	1,819		1,846		1,193		4,858	

Seasonal Malaria Chemoprevention

This section describes findings on the ideational factors related to SMC and the prevalence of relevant behavioral outcomes and intentions (**Figure 13**). Responses to SMC questions in the survey were restricted to areas where the intervention is being implemented. In Ghana, SMC is implemented mostly in the Northern zone of the country; as such, the team only interviewed respondents in the Northern zone on SMC related questions. Ideational factors related to SMC explored in the MBS include knowledge, favorable attitudes, perceived response efficacy, perceived self-efficacy, descriptive norms, and decision making. Relevant outcomes explored include presence of SMC program, receipt of SMC in households, and coverage of SMC. Comprehensive knowledge on SMC was a composite indicator defined as (1) having heard of the medicine given to children under five years to prevent malaria during the rainy season and (2) knowing how many days in the month the medication should be given during the rainy season. Most of the women respondents (91%) had heard of the medicine given to children under five years old to prevent malaria during the rainy season. More than two-thirds (72%) of the respondents had knowledge on medication dosage for malaria during the rainy season (**Table A.3.6.2**).

Respondents from the 15–24 age group had significantly lower knowledge (63.7%) compared to other age groups, while those in the second wealth quintile had the lowest knowledge score of 67.9%. Though knowledge of SMC increased slightly with increasing level of education, respondents in rural areas had a higher knowledge (73%) than those residing in urban areas (70%). No significant differences appeared between wealth quintile (**Table A.3.6.2**).

A vast majority (89.6%) of the women respondents expressed favorable attitude towards SMC with significant variations in age, place of residence and wealth quintile. Positive attitude

increased as age and wealth quintile increased (**Table A.3.6.3**). A majority (91.4%) of respondents said that healthy children need to take SMC during the rainy season, and 91.2% also agreed that giving their children all the doses of the medication left by the distributors is important. Respondents in urban areas had slightly higher favorable attitudes (89.5%) than those in rural areas (88.2%).

Perceived response efficacy of SMC, a composite indicator that indicates that respondents agreed that the SMC medication is effective in preventing malaria during the rainy season and that the medication will not work well if the child does not take all the doses was high (88.9%).

Perceived response efficacy of SMC was more common among women aged 35–44 years, those with secondary or higher education, (92.1%) and rural women (89.6%) (**Table A.3.6.4**).

Perceived self-efficacy regarding SMC, was 94% for respondents who said they would give all the SMC pills left by the distributor. Regarding descriptive norms about SMC, 70.2% of respondents perceived that at least one-half of the children in the community take the medication to prevent malaria during the rainy season.










While this measure of descriptive norm was higher among rural respondents (74%) compared to urban respondents, there were no differences by age group or level of education. However, significant variations appeared among respondents in the various wealth quintiles, with those in the middle wealth quintile perceiving lower community norms (**Table A.3.6.6**).

Less than one-half (48.3%) of the women respondents reported being involved in decision making regarding SMC. Decision making regarding SMC increased with increasing age, place of residence (urban), increasing level of education and generally with increasing wealth quintile (**Table A.3.6.8**).

Most women respondents (86.1%) noted the presence of the SMC program in their community, and this was slightly higher, but not significantly higher, among urban respondents (86.4%) compared with rural respondents (85.8%). Women aged 15–24, those with primary education, and those in the lowest wealth quintile were the least likely to report the presence of the SMC program in their community (**Table A.3.6.9**).

About 88.5% of women reported that they received a visit from an CHW distributing SMC to their household during the recent SMC round (**Table A.3.6.10**). This indicator was slightly higher among urban respondents (89.2%) than rural

Figure 13. SMC ideational factors

	71.9% Knowledge of SMC and recommended dosages
	89.6% Favorable attitude toward SMC
	88.9% Perceived response efficacy of SMC
	94% Perceived self-efficacy of SMC
	70.2% Perceived community norms for SMC adherence
	48.3% Female respondents involved in decision making regarding SMC
	86.1% Respondents reporting presence of SMC program in community
	88.5% Visit from the health worker to households for SMC
	82.6% Coverage of first dose of SMC

respondents (87.9%). Most of the households (90.3%) where respondents reported a visit by the SMC health worker had a child under five in the household (**Table A.3.6.10**). Overall, 82.6% of children three to 59 months received the first dose of SMC during the most recent distribution cycle. This coverage was higher in urban areas (85.6%) compared with rural areas (79.8%). No consistent pattern was observed among the different wealth quintiles (**Table A.3.6.11**).

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.6.2. Knowledge of SMC program

Table A.3.6.3. Favorable attitudes towards SMC

Table A.3.6.4. Perceived response efficacy of SMC

Table A.3.6.5. Perceived self-efficacy regarding SMC

Table A.3.6.6. Perceived Norms regarding SMC

Table A.3.6.8. Decision making regarding SMC

Table A.3.6.9. Presence of SMC program in communities

Table A.3.6.10. Receipt of SMC in households during the most recent rainy season

Table A.3.6.11. Proportion of children three to 59 months who received the first dose of the most recent cycle of SMC

Indoor Residual Spraying

IRS is a major vector control intervention implemented in Ghana mostly in the Northern zone and some selected districts in the Forest zone. During implementation of the MBS survey, the team restricted IRS questions to EAs where IRS is implemented. While the EAs selected in the Northern zone (eight EAs) comprised both rural and urban regions, those in the Forest zone (two EAs) were predominantly urban. This section describes findings on the ideational factors related to IRS and the prevalence of relevant behavioral outcomes and intentions (**Figure 14**). Ideational factors related to IRS explored in the MBS include awareness, positive attitudes, perceived response efficacy, and perceived self-efficacy. In addition, individuals were asked about their willingness to accept the intervention. The only outcome explored was household coverage of IRS.

Awareness of IRS program was high overall (97%) and in both the Forest (96.9%) and Northern (97%) zones. Awareness was also high among male respondents (100%) compared with female respondents (97.7%) and this pattern was observed in both the Forest and Northern zones. Low awareness was observed in the group aged 25–34 in the two zones, among urban residents in the Northern zone, respondents with primary education in the two zones, and respondents in the second and fourth wealth quintiles in the Forest and Northern zones respectively (**Table A.3.7.2**).







Respondents were considered to have positive attitudes (a composite indicator) if they disagreed that many people develop skin problems after spraying, agreed that touching the walls once spray has dried was safe, disagreed that people have problems with bugs after spraying, agreed that the benefits of having house sprayed was worth the effort needed to move belongings, disagreed that leaving possessions outside the house while walls were being sprayed is a bother, and agreed that spraying does not cause any health problems to household members. More than three-quarters of respondents (77.8%) demonstrated positive attitudes towards IRS, but this indicator was higher in the Northern zone (80.8%) than the Forest zone (72.9%). Positive attitudes to the IRS program were also higher among rural respondents (81.7%) compared to urban respondents (**Table A.3.7.3**).

Perceived response efficacy of IRS, a composite indicator that shows that spraying the inside walls of a house is an effective way to prevent malaria and people who live in houses that have been sprayed are less likely to get malaria was higher among respondents in Forest zone (94.5%) than the Northern zone (69.7%), with an overall prevalence of 79%. Significant differences arose in the responses for the two indicators across the two zones. Perceived response efficacy was also significantly lower among rural respondents (42.3%) compared with urban respondents (86.3%) (**Table A.3.7.4**).

Perceived self-efficacy, a composite index of two individual indicators for IRS (ability to prepare house for IRS and ability to sleep in house the same night that IRS is done), was also higher for the Forest zone (89.4%) compared with the Northern zone (83.7%). Approximately 90% and more respondents across the two zones indicated they could move all their furniture out to prepare the house for spraying (92.5%) or sleep in the house on the night it was sprayed (90.1%). Overall, perceived self-efficacy regarding IRS was higher among respondents in urban households (86.3%) compared with those in rural households (**Table A.3.7.5**).

Willingness to accept IRS was expressed 98.1% in the Forest zone compared to 90.6% in the Northern zone, there were no differences by residence (**Table A.3.7.6**). Household coverage of IRS was 89.2% in the two zones, with no significant difference between the Forest zone (89.9%) and the Northern zone (88.7%). Overall, coverage was significantly higher among urban households (98.8%) compared to rural households (87.1%) (**Table A.3.7.7**).

Figure 14. IRS ideational factors

	97% Awareness of IRS program
	77.8% Positive attitude towards IRS
	79% Perceived response efficacy of IRS
	85.8% Perceived self-efficacy of IRS
	93.4% Willingness to accept IRS
	89.2% Households reporting coverage with IRS

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Table A.3.7.2. Knowledge of IRS

Table A.3.7.3. Attitudes towards IRS

Table A.3.7.4. Perceived response efficacy of IRS

Table A.3.7.5. Perceived self-efficacy regarding IRS

Table A.3.7.6. Willingness to accept IRS

Table A.3.7.7: IRS coverage

Media Consumption and Message Exposure

Media Consumption




More than one-half (59%) of all participants listened to the radio at least once a week (**Figure 15**) (**Table A.3.8.1 and A.3.8.2**), with listenership reported significantly more by men (68%), Northern zone residents (65%) compared to Forest zone (60%) and Southern zone (56%) with no notable differences among urban/rural dwellers, education and income levels or age. TV viewing was much more common, with 76% of study participants reporting watching TV at least once a week (**Table A.3.8.3 and A.3.8.4**).

Viewership was statistically and positively associated with urban residence (83%), Southern zone residence (79%) and Forest zone (78%) and compared to Northern zone (87%), secondary education (85%), and increasing wealth (range: 82%–91%).

Table 12 and 13 at the end of this section and **Table A.3.8.6** summarize the variables related to media consumption and malaria messaging.

Most respondents (88%) owned a mobile phone or tablet. Men (91%), respondents 25–34 years old (86%), urban dwellers (91%), those in the two highest wealth quintiles (93% and 96% respectively), and those with at least a secondary education (93%) were statistically more likely to report such ownership (**Table A.3.8.5**).

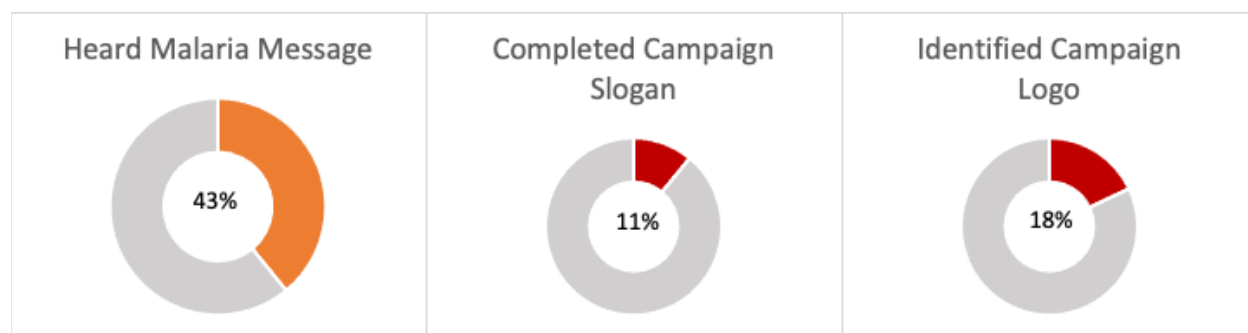
Figure 15. Media access and consumption at a glance

	Radio listenership	59%
	TV viewership	76%
	Mobile phone ownership	88%

Message Recall

Forty four percent of respondents stated they had seen or heard a malaria message in the six months prior to the survey (**Figure 16, Table A.3.8.6**). Among those who recalled malaria messages, the most common sources were television (overall 73%, Forest zone 77%), followed by radio (overall 35%) and health facility (overall 16%, Northern zone 40%); after that, sources were CHWs (overall 5%, Northern zone 77%), followed by friends and family (overall 3%, Northern zone 10%). The lowest wealth quintile and rural dwellers were significantly more likely to get malaria messages from the radio and CHWs. Meanwhile, females, those 15–24 years old, urban dwellers, those with secondary or higher education levels, and those in higher wealth quintiles were significantly more likely to get malaria messages from television. Males were significantly more likely to get malaria messages from friends and family (**Table 11 and 12**).

Figure 16: Exposure to malaria messaging in six months prior to survey



Malaria message exposure was higher among respondents living in the Forest zone (53%), compared to the Northern zone (40%), females (47%), and respondents aged 35–44 (48%). Recall was also positively and significantly associated with educational attainment (no education: 36%; secondary and above: 57%) and with wealth (lowest: 33%; highest: 49%). Overall, only 11% of respondents correctly completed the national malaria campaign slogan, *Zero Malaria Starts with Me and You Malaria 360, Everything Malaria Good Life, it's an Everyday Thing* (**Figure 16**). Correct responses were statistically more common among those living in the Forest zone (17%), those 15–24 years old (14%), those with a primary education (8%), and those in the highest wealth quintile (15%). Overall, 18% correctly identified the program logo with the same breakdown; respondents gave statistically significant correct results among those living in the Forest zone (22%), those 15–24 years old (21%), those with a primary education (15%), and those in the highest wealth quintile (22%).

Table 11. Variables related to media consumption

	Listens to radio at least once a week (%)	Watches TV at least once a week (%)	Owns mobile phone (%)	Completed a campaign slogan (%)	Seen or heard message about malaria in past six months (%)	Identified campaign logo (%)
Zone						
Southern	55.98	79.11***	89.22	6.07	35.87	13.85
Forest	59.66	78.16	89.96***	17.44***	53.18***	22.19***
Northern	65.69*	58.84	75.58	7.09	40.44	17.48
Sex						
Female	49.50	76.20	85.38	11.59	47.22***	18.60
Male	68.22***	76.73	90.81***	10.46	40.13	16.98
Age						
15–24	44.78	74.22	82.39	14.20***	40.64	20.94***
25–34	52.98	78.85	89.20	13.17	43.82	20.52
35–44	63.92	76.33	89.78***	11.20	47.29*	17.45
≥ 45	65.20***	74.21	86.29	6.33	39.93	13.05
Residence						
Urban	57.20	82.78***	91.19***	11.60	43.87	16.49
Rural	61.78	62.52	81.05	9.81	43.54	20.74
Education						
None	55.99	51.36	73.21	1.06	31.51	7.62
Primary	56.81	72.96***	84.98***	7.70***	44.18***	14.55***
Secondary or higher	60.89	85.37	94.19	16.37	46.17	23.11
Wealth quintile						
Lowest	54.47	21.68	70.76	3.72	32.42	12.71
Second	58.31	61.83	80.16	5.51	39.59	13.88
Middle	59.32	81.45	85.46	10.08	43.81	14.51
Fourth	57.20	88.68	93.46	13.83	45.08	20.52
Highest	61.08	90.88***	95.77***	14.91***	49.02***	21.74**
Total (%)						
	58.63	76.46	88.03	11.04	43.77	17.81
Total						
	6960	6958	6956	6944	6952	6944
<i>Notes: * p < 0.05; ** p < 0.01; *** p < 0.001</i>						

Table 12. Source of malaria message							
	Billboards or posters	Friends or family	Social media	Radio	TV	CHW	Health facility
Zone							
Southern	3.95	3.97	2.94	36.00	72.41	4.95	14.25
Forest	3.11	1.72	0.90	33.72	76.88***	2.99	13.84
Northern	1.87	9.53**	1.06	34.74	49.35	18.18***	39.95***
Sex							
Female	2.49	2.02	2.08	28.54	75.32**	4.69	17.39
Male	4.52	5.23*	1.14	43.67***	68.58	5.87	15.04
Age							
15–24	2.50	1.54	2.94*	21.38	77.74**	4.21	13.92
25–34	3.27	3.26	2.71	29.55	74.79	5.72	18.99
35–44	4.13	2.95	0.73	38.69	74.45	3.67	15.31
≥ 45	2.37	4.96	1.13	42.70***	63.11	7.38	15.42
Residence							
Urban	3.68	3.21	2.06	31.09	77.97***	2.92	14.69
Rural	2.51	3.58	0.90	42.77***	60.50	10.23***	20.37*
Education							
No education	1.46	3.52	0.00	39.84	46.82	14.43**	27.39**
Primary	2.46	2.78	0.58	34.69	70.30	5.02	14.28
Secondary or higher	4.32	3.76	2.92***	33.97	78.18***	4.00	16.78
Wealth quintile							
Lowest	1.75	6.37	1.40	53.69***	21.18	20.44***	24.04
Second	1.88	2.40	0.32	45.30	60.95	7.40	18.57
Middle	2.45	2.62	1.25	32.78	72.33	4.98	18.09
Fourth	3.11	2.56	1.03	29.35	84.52***	3.67	15.41
Highest	4.89	3.95	3.05*	31.40	79.98	2.10	13.70
Total							
	3.32	3.32	1.70	34.69	72.58	5.17	16.44
Total (N)							
	3137	3137	3137	3137	3137	3137	3137

Supplemental Data Tables

Additional information is presented in the following tables in [Annex A](#).

Refer to Annex on Media Consumption and Message Exposure

Table A.3.8.1. Radio listenership at least once a week

Table A.3.8.2. Preferred time to listen to the radio

Table A.3.8.3. Television viewership at least once a week

Table A.3.8.4. Preferred time to watch television among those who watch at least once a week

Table A.3.8.5. Mobile phone or tablet ownership

Table A.3.8.6. Exposure to malaria messages

Conclusion and Recommendations





The Government of Ghana has made remarkable strides to achieve coverage for key evidence-based interventions to prevent and control the malaria burden. Despite these gains, malaria is a major contributor to illness and mortality in Ghana, with children and pregnant women accounting for 41% of suspected cases, 21% due to confirmed cases, and 18% of inpatient cases in 2020. On average, households spent an estimated US \$5.70–48.73 per episode and lost eight or nine workdays, which indicates the highest disease expenditure in the National Health Insurance Scheme.

The multi-pronged efforts of the Ghana National Malaria Elimination Program with ITNs, IRS, larval source management, IPTp, SMC, improved quality of case detection and management, and other support mechanisms for active surveillance and SBC led to significant reduction of malarial deaths from 2,799 in 2012 to 308 in 2020. However, to achieve the Zero Malaria Target, envisioned by the Government of Ghana, aggressive measures are warranted to ensure malaria prevention methods are consistently practiced—particularly around individual and community behavioral factors of knowledge, attitudes, and practices.

The findings from this research will provide key insights for program and policy reforms to ensure appropriate contextually designed interventions. The active engagement of communities and households to produce health may make the implementation of malaria interventions more financially feasible by reducing the cost to eliminate malaria in Ghana, which is currently projected to be US \$951 million.









The implications of the findings are summarized based on the ideational determinants and facilitators and barriers to malaria control.

Knowledge of Malaria Cause, Symptoms, Prevention, Perceived Susceptibility, and Severity

	66.7% were aware that fever was the main symptom of malaria
	95.5% were aware that mosquitos caused malaria
	97.8% knew at least one prevention measure
	68.5% knew ACT can effectively treat malaria
<p>Barriers: Only 66.7% were aware that fever was the caused by mosquitoes. Female respondents in the Southern zone had the lowest score. Efforts must be made to raise household and community awareness of the importance of recognizing fever as a symptom. Perceived susceptibility was also low at 58.1%. Educational messages must address the aspects of contracting malaria through the year and not just the rainy season.</p>	

Likewise, perceived severity also at 61% need to be addressed in the communications. Only 47.6% of the respondents knew the correct dose for IPTp during pregnancy.








Malaria Care-Seeking and Treatment and Perception of Health Care Providers and Facilities

	88.3% were aware that children under five with fever must receive prompt and appropriate care
	75.4% had favorable attitudes for IPTp during pregnancy
	92.2% agreed that IPTp should be taken even if a pregnant woman sleeps under an ITN every night to prevent malaria
	95.9% believed that they should take IPTp at least three times during pregnancy to prevent malaria
	92.4% reported intent to take IPTp for the next pregnancy
	96.1% reported at least one dose of IPTp during the previous pregnancy (for those reporting a live birth during the past two years)
	90% had favorable perceptions of facility-based health providers providing case management
	87.6% Had favorable perceptions of health facilities (medication and test kits)





A high proportion of respondents (88.3%) indicated a child should receive prompt (same or next day) and appropriate care at a health facility with the onset of fever for a child under five years old. Most respondents agreed that health providers are knowledgeable about treating their children for malaria, that facility providers (85.1%) providers treat their patients with respect, and that health facilities always have malaria test kits (89.6%) and medications (88.7%) to treat malaria.






Barriers: The composite score for favorable perception of health care providers for malaria case management for children was poor (39.2%), primarily because the respondents felt that payments were made for testing and treatment. Efforts must be made to ensure that malaria testing and treatment is provided freely for children under five. Apparently, some respondents held a misconception about taking IPTp during pregnancy on an empty stomach (14.4%), and messaging to address this needs to be emphasized during health education and communication campaigns.

Perceived Equitable Gender Norms, Decision Making, Self-Efficacy, and Response Efficacy for Malaria Treatment

	81.35% Perceived equitable gender norms regarding which child gets treated for malaria
	77.9% perceived that pregnant woman should feel comfortable enough to ask their spouse/partner to go to the health facility for a prenatal consultation
	81.5% Involved in decision to seek care for fever when child has malaria 75.7% Involved in decision to purchase medicine when child has fever
	75.9% Perceived response efficacy for malaria treatment
	97% Perceived self-efficacy for malaria testing and treatment for febrile children
	87.7% of the respondents indicated intent to receive prompt and appropriate care for febrile children under five
<p>Barriers: Low response efficacy for malaria testing (34.3%) raises concerns about the ability of parents to diagnose malaria by a person's symptoms as well as a blood test.</p>	
	77% in close proximity to a public health facility 51.2% in close proximity to a private health facility
<p>Barriers: A significantly lower proportion of residents in the Northern zone had poor access to a public health facility (65.3%), and 27.11% had poor access to a private health facility. Respondents from rural areas, and those in the lowest quintile had a higher response for prompt and appropriate care-seeking for febrile children under five.</p>	







ITN Use, Ownership, Perception, Self-Efficacy, and Response Efficacy

	74.3% knew about using bed nets (treated/untreated) to prevent malaria
	84.3% had favorable attitudes towards bed nets
	72.1% perceived self-efficacy to use bed nets
	85.6% perceived equitable gender norms toward net allocation






	<p style="text-align: center;">48.9% perceived consistent bed net use by community members</p>
<p>Barrier: Most respondents identified mosquito nets or ITNs as a major malaria prevention method with a highly significant difference between the zones (Northern 92.6%, Forest 76.7%, 67.6% Southern). Significant difference was observed in respondents' knowledge between urban (64.7%) and rural (78.4%) residents in the Southern zone and lowest knowledge in the higher wealth quintiles in the Southern and forest zone education). Most respondents reported favorable attitudes towards bed nets, but those in the highest wealth quintile (70.3%) and urban areas (73.9%) were less likely to have favorable attitudes. Those with a primary level of education (70%) and those aged 15–24 years (69%) were least likely to report equitable gender norms for net allocation. Residents from the Southern zone, urban residents, and those from the higher wealth quintiles had the lowest self-efficacy for ITN use. Perceived consistent bed net use every night by community members was very low, especially for the Southern (34.9%) and Forest zones (48.8%).</p>	
	<p style="text-align: center;">95.4% of the nets were ITN, and 96.8% were obtained freely 85.8% were obtained during the mass campaign</p>
<p>Barriers: Reported ownership of at least one ITN was extremely low (59.9%), and lowest for the Southern zone (51.1%), rural areas (50.73%), and the highest wealth quintile (44.91%). The proportion of households with at least one ITN for every person who stayed in the household the previous night was extremely low at 31.8%. Fifty percent of respondents reported washing the nets, and 71.6% use soap for washing the nets. In 22.8% of the households, the ITN was still stowed under packaging. 14.6% reported repurposing the nets.</p>	
	<p style="text-align: center;">43% Perceived response efficacy of bed nets</p>
<p>Most respondents agreed that sleeping under a mosquito net every night is the best way to avoid getting malaria (86%) and that using a mosquito net while sleeping outside would reduce the chances of getting malaria (89%). Only 33% disagreed with the statement, “My chances of getting malaria are the same whether or not I sleep under a mosquito net.”</p> <p>Barrier: Respondents from urban areas, high-transmission areas, and the highest two wealth quintiles were least likely to think mosquito nets are effective in preventing malaria.</p>	
	<p style="text-align: center;">43% Perceived co-worker approval of bed net use when working away from home</p>
<p>Barriers: Of those who reported working away from home, 62% thought their coworkers used a bed net every night when working away from home, but only 43% thought their coworkers would approve of their own consistent bed net use when working away from home.</p>	
	<p>60% of households had at least one ITN, but only 48% had at least one ITN per two people 63% in the poorest wealth quintile had ITN access, compared to 37% in the higher quintiles 33% of children four-years-old or under slept under an ITN the previous night 63% in the urban settings compared to 49% in the rural settings reported ITN use the previous night. 52% in the urban settings compared to 40% in the rural settings reported ITN consistent ITN use during the previous week.</p>
<p>Barriers: Urban dwellers had significantly higher ITN access, use, and consistent use than rural dwellers. The use:access ratio was 0.56 (Southern zone-0.57, Forest zone-0.55 and Northern zone-0.55) and much higher for urban, 0.63, (Southern zone 0.72, Forest zone 0.58, and Northern 0.44) than rural dwellers 0.50 (Southern zone</p>	

0.50, Forest zone 0.52, and Northern zone 0.44). Only 33% of children slept under an ITN the previous night is of major concern. Likewise, 23% of nets were still found in the package, and 15% of nets were repurposed. Consistent net use was significantly associated with female respondents, rural dwelling, lower wealth quintile, perceived self-efficacy, and favorable attitude to ITNs. Older respondents (≥ 45 years), high level of self-efficacy and response efficacy, and positive attitude to ITNs were significantly associated with positive net care behaviors.


SMC Knowledge, Attitude, Efficacy, and Coverage (Northern zone)

	<p>91% Aware of SMC for children and 72% aware of number of days for administering medicine 72% aware of dosage during rainy season</p>
<p>Barriers: Younger respondents (15–24 years), had significantly lower knowledge. Interestingly, those in the rural areas had higher knowledge: 73% than those in urban areas (70%). Increased knowledge was evident with increasing level of education.</p>	
	<p>89.6% favorable attitude to SMC</p>
	<p>88.9% perceived response efficacy and 94% self-efficacy of SMC</p>
<p>Barriers: 48.3% of female respondents reported being involved in decision making regarding SMC. Decision making increased with increasing age, place of residence (urban), increasing level of education, and generally with increasing wealth quintile</p>	
	<p>86.1% reported presence of SMC program in community</p>
	<p>88.5% reported SMC health worker household visit</p>
	<p>82.6% received first dose of SMC</p>
<p>Barriers: Higher coverage of SMC in urban (85.6%) than rural (79.8%) areas.</p>	

IRS Awareness, Attitude, Efficacy, and Coverage (Two EAs in the Forest Zone and Eight EAs in the Northern Zone)

	97% Aware of IRS program
	77.8% Positive attitude towards IRS
	79% perceived response efficacy and 85.8% self-efficacy of IRS
	93.4% willing to accept IRS
	89.2% household coverage of IRS
<p>Barriers: IRS was implemented in a very limited number of settings. Based on the sampling for the MBS survey, only two urban EAs in the Forest zone and eight EAs in the Northern zone received IRS. Some differences were evident for those aged 25–34, and urban residents in the Northern zone had lower awareness. Positive attitude to IRS was lower among urban respondents and those in the Forest zone. However, perceived response efficacy was significantly lower among rural respondents (42.3%) compared with urban respondents (86.3%)</p>	

Media Access and Consumption

	<p>44% had heard or seen a malaria message in the past six months</p> <p>11% could complete the malaria campaign slogan</p> <p>18% could identify the campaign logo</p>
<p>Barrier: Only 44% reported hearing or seeing a malaria message. The most common source was TV (73%), followed by radio (35%), health facility (16%), CHW (5%), friends and family (3%). Participants from the lower wealth quintiles and those in rural areas were more likely to receive messages from the radio or CHWs, while those from urban settings and higher wealth quintiles were more likely to hear messages from the TV. Men were more likely to get messages on malaria from their friends or family. Less than 20% of the respondents would complete the malaria slogan or identify the campaign logo. The lowest was in the Northern zone (40%) and those with no education (36%).</p>	

Recommendations and Implications for Future Malaria Implementation Strategies

Despite the gains made by the Government of Ghana to achieve full coverage of evidence-based interventions for malaria control, some gaps are still evident in operationalizing the program strategies against the backdrop of the varied transmission dynamics in the distinct epidemiological zones.¹⁵ The government has instituted aggressive efforts through its strategic action plan to achieve the goal of malaria elimination by 2030. Among the priorities, members of the Advisory Group and others who attended a results discussion suggested further multidisciplinary research to explore and address the various ideational determinants, applying a systems lens at the individual, household, community, and facility levels to address key barriers.

Malaria Care Seeking and Treatment

- **Position prompt and appropriate care-seeking as a regular and expected behavior in society.** The belief that prompt care-seeking after fever onset is the norm in one's community was associated with two-fold increased odds of intending to promptly seek care at a health center or CHW (aOR:1.99***, 95% CI: 1.49–2.67); however, only 52% of caregivers surveyed held this belief. SBC activities could feature testimonials from a wide range of community members attesting to their care-seeking behaviors and their benefits. SBC activities should create a cultural expectation that seeking prompt care or advice is a responsible and important action, and that delay should be avoided.
- **Increase the intensity and reach of SBC activities.** Respondents who had been exposed to malaria messages within 6 months of the MBS had 7.5 higher odds of intending to seek care for their febrile children under 5 than those who were not exposed to malaria messages (aOR:7.48***, 95% CI: 5.80–9.65). Radio and television broadcasts should be increased and aired based on media consumption patterns (see Media Habits below). Broadcasts should be pulsed to prevent listener fatigue.
- **Increase the intensity and reach of SBC activities.** Respondents who had been exposed to malaria messages within 6 months of the MBS were 7.5 fold more likely to intend to seek care for their small feverish children than those who were not exposed to malaria messages (aOR:7.48***, 95% CI: 5.80–9.65). SBC programs can increase the number of broadcasts of SBC radio and television materials at specific times based on target audience media consumption patterns (see Media Habits below). SBC programs should maximize their activities by ensuring that exposure will be highest and should pulse their broadcasts to prevent listener fatigue.
- **Strengthen caregivers' plans to follow through on their intentions.** Unlike habitual behaviors, such as net use and care, situations that require prompt and appropriate care-seeking arise infrequently, requiring more conscious intent and guidance.¹⁶ Implementation intentions are if-then plans that specify when, where, and how one would act when a certain situation arises and have been linked with small-to-medium changes in uptake for a range of health behaviors.¹⁷ SBC activities should use role models who express detailed plans for prompt and appropriate care when a child develops a fever and

encourage families to develop their plans/intentions. Interpersonal communication activities can also explicitly support caregivers with planning tools to help them identify situational cues that merit prompt care-seeking (such as fever onset), and where and how they would achieve the goal of seeking care promptly and from appropriate sources. Encouraging caregivers to testify of these plans in public and recognizing those who follow through will strengthen their commitment and normative perceptions.

- **Promoting the belief that IPTp is effective against malaria (response efficacy) and providing encouraging feedback to women who return for their doses.** Women who believed that IPTp is effective and that it should be taken even when a pregnant woman sleeps under a net every night were 7.8 times as likely to intend to take three or more doses of IPTp in their subsequent pregnancies (aOR: 7.84**, 95% CI: 2.22-27.72). Communication materials should provide clear information on the additive protective benefits of layering nets and IPTp. This can help women understand exactly how IPTp can help them and can increase their belief in the effectiveness of IPTp. In addition, SBC activities can feature testimonials from women who have had pregnancies with and without IPTp, and how they fared.

For provider-side interventions, SBC activities can guide providers to emphasize the effectiveness of IPTp. Facility-based providers can give returning clients encouraging feedback about their health and the growth of their child, framing them as a sign that the client is taking appropriate steps to prevent malaria. Finally, implementers at the community level can remind women to return for IPTp, reinforcing the perception of its efficacy.

- **Increasing the proportion of women with favorable attitudes toward ANC and IPTp.** Women who reported favorable attitudes toward ANC and IPTp had 4.2 higher odds of intending to get IPTp3 in their next pregnancy (aOR: 4.2**; 95% CI: 1.44–12.05). To facilitate the spread of favorable attitudes, SBC activities can feature women sharing positive perceptions of ANC and IPTp, debunking common misconceptions, and discussing how they benefited from accessing these services. In addition, people may be triggered to adopt positive attitudes toward a behavior when they feel that their current attitudes do not match their ideas of who they are and who they aspire to become (a situation called “cognitive dissonance”). To this end, SBC activities can use humor to trigger cognitive dissonance; by pointing out the irony between the priority individuals endow some things (such as getting a vehicle tune-up for a new taxi business), vs. ANC and IPTp, for example, can position ANC attendance and IPTp use as responsible things parents should do to give their children the best start possible.

Indoor Residual Spraying

- **Increase the population’s confidence in the effectiveness of IRS in reducing malaria, particularly among rural and Forest zone residents.** 8 in 10 of all eligible respondents expressed confidence in the effectiveness of IRS, but this was significantly more common among urban (87%) than rural respondents (43%*), and among Forest than Northern zone respondents (96% vs. 76%*). There is significant room to increase rural

residents' confidence that IRS is an effective intervention against malaria. SBC activities could talk about reductions in malaria caseloads in the area after the introduction of IRS and use testimonials from residents who have experienced fewer malaria episodes after their homes have been sprayed. Health authorities could raise trust in IRS, stating for example, that this approach “underwent rigorous testing” to receive “WHO prequalification,” and its ability to provide 8-10 months of protection.^{18,19}

- **Sustain and increase positive attitudes about IRS.** Although positive attitudes about IRS are already relatively high (78%), current SBC activities should be sustained and refined to address remaining concerns. Only 56% disagreed with the statement that many people develop skin problems after spraying, suggesting that 44% agree with this statement or do not know enough to have an opinion. This suggests that there is a need for more education about the safety of IRS. Opinion leaders can be invited to testify about positive experiences with IRS. These leaders should be coached to explain that side effects are rare, mild, and short-lived and that the reduction in malaria risk means that families are much safer overall. Similarly, 3 in 4 disagree with the statement that people have problems with bed bugs after spraying, suggesting that 1 in 4 (a substantial minority) agree that bed bugs are a problem associated with IRS or do not feel informed enough to have an opinion. The negative connection between IRS and bedbugs can be reframed; one of the new compounds in use (Actellic), for example, is approved for use against bed bugs.²⁰

Seasonal Malaria Chemoprevention

- **Continue to promote the high perceived effectiveness of SMC drugs in combination with an understanding of SMC as a three-day course to ensure equally high uptake on days two and three.** Nine (9) in 10 respondents believe that the medication given to children during the rainy season to prevent malaria is effective. However, only 72% of respondents knew how many days a month it should be given, and knowledge was significantly lower among women aged 15-24 (63% compared to 75% among women aged 45 and above). SBC activities can increase understanding of SMC as a three-day intervention during each month of the rainy season and reinforce the importance of administering the second and third days' doses. Peer-to-peer approaches involving young women and messaging that accounts for the social and cultural context that young women live in can improve knowledge levels among this group.
- **Show caregivers that participation in SMC is widespread.** The percentage of respondents who perceive that at least half of the children in the community take the medication to prevent malaria during the rainy season was only 70%, indicating that programs should reinforce the reality that most children in Northern Ghana do receive SMC. SBC activities can highlight the high participation rate to encourage the 17% (14% urban, 20% rural) who did not receive SMC to ensure their young children receive it during the next rainy season.
- **Increase female involvement in the decision making for SMC.** Less than half (48%) of women responded that they had been involved in deciding whether their child under five

would receive SMC. Although 94% of all respondents had the high perceived self-efficacy to be able to give all the SMC pills left by the distributor to their child, all women should be a part of the decision making process in their family's health decisions, especially since women are more likely to be responsible for administering the doses on days two and three for each SMC cycle. SBC materials can feature both men and women providing consent and administering the medication.

- **Foster positive attitudes toward SMC.** Despite high acceptance rates, only 5 in 10 disagreed with the statement that SMC can harm children, suggesting that about half of the respondents carry doubts about the safety of SMC. Future SMC campaigns should promote that the medication is very safe, that side effects are rare, and that any side effects that occur are usually very minor.

Most (7 in 10) disagreed that sleeping under ITNs is necessary when children take SMC, suggesting that the majority do not know of or do not see the importance of using ITNs when children take SMC. SBC activities should emphasize the additive protection of using both SMC and ITNs.

Finally, most respondents implied that they felt some level of duress. Only 2 in 10 disagreed with the statement that SMC distributors force parents to accept the medication, suggesting that 8 in 10 agreed or did not feel informed enough to say either way. Strengthening the interpersonal communication skills of distributors could mitigate this concern.

ITN Use and Care

- **Increase access to ITNs.** During the field survey, community members frequently demanded ITNs, declaring the lack of ITNs in the community. Overall ownership of ITNs needs to be increased. Additional SBC during mass ITN distributions as well as routine ITN distributions would support increased acquisition of ITNs. Both increasing the private sector market as well as encouraging participation in ITN distribution can help to increase access alongside additional structural interventions.
- **Demonstrate how easy it is to use a ITN every night, in a variety of circumstances.** Perceived confidence to use an ITN (self-efficacy) was associated with an almost sixfold increase in the odds of consistent ITN use (aOR: 5.70***, 95% CI: 4.79–6.79). To increase self-efficacy, SBC programs can model ITN use by people and situations with whom community members identify. For example, the population's confidence to use ITNs every night can be increased by promoting options for ITN hanging and use in more logistically complex situations such as outdoor sleeping, which is common in warm rural areas.²¹ Community health workers can assist the 23% of households who have not hung their ITNs to do so, and then encourage them and help them troubleshoot how to use their ITN every night. Additionally, the communities' agreement that ITN's prevent malaria and that there is a community norm to use ITNs is essential, especially in Forest and Southern zones. The highest exposure of messages in these regions can be attained

through mobile and TV. Campaigns through mass media channels to increase exposure as well as interpersonal communication campaigns to help reinforce changes are needed.

- **Promote ITN care and repair.** The lifespan of ITN can be expanded with proper care. As only about 45% of ITN that were hung were folded or tied up and more than 50% of ITN were dried in the sun, it would be beneficial to increase messaging on proper care for ITN.
- **Promote positive attitudes toward ITNs.** Attitudes are made up of cognitive and emotional responses toward an idea, and these responses can be positive or negative. Overall, having favorable attitudes toward ITNs was associated with more than two-and-a-half-fold increased odds of consistent ITN use (aOR: 2.57***, 95% CI: 2.14–3.09). In the Southern and Forest zones, respondents with favorable attitudes had 3 times higher odds of using ITNs consistently (aOR 2.74***, 95% CI: 1.93–3.89 and OR: 2.96***, 95% CI: 2.23–3.94); in the Northern zone, the odds were 90% higher (aOR: 1.90***, 95% CI: 1.30–2.76). Concerns about warm temperatures, the smell of the insecticide, the inconvenience of unfolding it over a sleeping space every night, and the belief that expensive ITNs were more effective than free ITNs were held by at least half of all respondents. SBC activities should show opinion leaders expressing positive attitudes toward ITNs. In addition to espousing the benefits of malaria prevention, non-malaria benefits such as a peaceful night's sleep; making a sleeping space look tidy, private, and attractive; and protection from nuisance biting can be promoted. Finally, SBC activities should not ignore or downplay common concerns about ITN use; they should acknowledge that minor inconveniences exist but the benefits outweigh them. Otherwise, they risk creating unrealistic expectations and ultimately undermining trust in ITNs and the health system.
- **Remind communities that nets are valuable and that properly caring for nets ensures they continue to provide value.** Overall, favorable attitudes towards ITNs increased the odds of positive net care behaviors by over three and a half times (aOR: 3.62***, 95% CI: 1.96–6.69). This result suggests that individuals who value ITNs are more likely to care for them.
- **Promote intergenerational communication.** Respondents over 45 years old were almost three times as likely to practice positive net care behaviors than other age groups (aOR: 2.77***, 95% CI: 2.34–3.27).¹⁶ SBC activities should feature those over 45 who are practicing positive net care behaviors as role models, along with how and why they practice those behaviors.
- **Boost people's trust in the effectiveness of ITNs.** The perception that ITNs are an effective way to prevent malaria is associated with a 20% increase in the odds of positive ITN care (aOR: 1.20*, 95% CI: 1.04–1.37). SBC activities should demonstrate the reduction in malaria that Ghanaian communities have experienced when more than 80% consistently and correctly used their ITNs. They should also feature characters or individuals who used to believe that ITNs are not effective and then realized that using

ITNs has improved the malaria situation in their own lives. Respected health authorities could also be featured in SBC activities reiterating ITN efficacy.

- **Increase self-efficacy to use ITNs.** Perceived confidence in using an ITN was associated with an almost twofold increase in the odds of positive ITN care (aOR: 1.81***, 95% CI:1.55–2.12). This suggests that ITN use and care behaviors are connected; the more confidence one has in using and handling nets, the better one is likely to care for them. As suggested above, SBC activities can demonstrate how easy it is to use a net every night, using a variety of circumstances that feel relevant to Ghanaians today.

Media

- **A harmonized, scaled, well programmed national multi-media campaign combining mass media, mobile technology and health facilities is necessary.** Given the level of ownership and access to television, radio and mobile phones in the study population, media alone has the potential to reach the majority of the population. A strategy that combines television, radio, mobile technology, and health facilities is indicated for all the study zones. Likewise, CHW and IPC activities should be implemented in a way that reinforces the messages being broadcast on multiple forms of mass media. More females (47%) than males (40%), more people in the age group 25-44 years old (48%) than those in other age groups and those in the highest wealth quintile (49%) than the lowest wealth quintile (32%) reported exposure to malaria messages. There were no statistically significant differences between urban and rural respondents. The most popular source of malaria messages was television (73%), followed by radio (35%) and health facility (16%). Exposure from billboards/posters, friends/family, social media and CHWs were extremely low (all 5% and under). There was large variation between zones. In the Northern zone, 40% of respondents reported exposure to malaria messages from the health facility while exposure from television was only 50% while the Forest zone respondents reported 77% exposure from television and only 13% by health facilities.
- **Mobile phone-based SBC activities should be considered as a reinforcement channel.** There is a high level of mobile phone or tablet ownership (88%) with significant differences by zone and socio-demographic factor. Mobile phone-based SBC activities should be considered as a reinforcement channel.
- **Specific times for television by audience should be utilized to improve efficiency and effectiveness of SBC activities.** Although late evening is overall the most popular time (44%) to watch television, there is a large variation by residence and socio-demographic factors. Overall, respondents preferred to watch television in the late evening (8 pm to 12 am-43%). Those in the middle wealth quintile overwhelmingly preferred watching television in the late morning, afternoon, and early evening (8 am-8 pm) compared to the other wealth quintiles. Females tended to prefer watching television earlier in the day (8 am-8 pm) than males who significantly preferred watching in the late evening (8 pm-12 am) compared to females. The Southern zone preferred watching TV in the early evening more than the Forest and Northern zones but in general placing malaria messages

between 4 pm-12 am has the highest chance of reaching the majority of people in these zones. Specific recommendations on airing times for television and radio by target audience are available in the full report.

- **Specific times for radio by audience should be utilized to improve efficiency and effectiveness of SBC activities.** Likewise, although early morning is overall the most popular time (35%) to listen to the radio, there is a large variation by residence and socio-demographic factors. Overall, 35% of those who listen to the radio regularly prefer to listen in the early morning (4-8 am). In the Forest zone, by far the most preferred time to listen to the radio was early in the morning (44%) while the Southern zone preferred late morning (8 am-12 pm-34%). The Northern zone preferred early in the evening (4-8 pm-28%) and late evening (8 pm-12 am-24%). Those with no formal education, the youngest age group (15-24 years old) and those in the lowest wealth quintile most preferred to listen in the early evening (4-8 pm) while those in the oldest age group (45+ years old) and in the highest education and wealth quintile preferred to listen to the radio in the early morning (4-8 am).

The study team also acknowledges the limitations of this research. With seasonal variations in parasitological prevalence, with a single high peak between June and October in the Northern zone and two peaks in the Forest and Southern zones surveys must be planned during these peak seasons to determine actual care-seeking behaviors. Due to several delays resulting from the changes in research elements, survey teams collected the data during April 2022, a five month delay from the original timeline. The survey instruments included variables on child care-seeking for fever and IPTp3; however, surveyors could not retrieve this information, and instead, the analysis includes intent to seek care and one IPTp dose. Future national surveys on malaria behavior and outcomes research need to integrate these outcome variables.

In conclusion, the findings of this study provide valuable evidence of the strategic contributions of the NMEP, through its partnerships with USAID, PMI, the Global Fund, and other stakeholders. To achieve the goal of zero malaria in Ghana, future efforts require additional implementation research and contextually relevant strategies.

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Annex A: Data Tables

A.3.1 Sample Characteristics

Table A.3.1.1. Housing characteristics (weighted)				
<i>Distribution of selected household characteristics by zone (administrative unit), Ghana 2022</i>				
Background characteristic	Southern	Forest	Northern	Total
Average number of residents per household	3.44	3.82	5.41	3.80
Average number of sleeping rooms***	1.66	1.93	2.74	1.89
Number of people per sleeping room	2.16	1.99	1.94	2.03
Percentage of households with electricity***	94.73	90.81	79.10	91.43
Percentage of households near a public health facility ^a ***	79.68	79.83	65.34	77.01
Percentage of households near a private health facility ^a ***	63.25	51.77	27.11	51.82
Percentage of households near a pharmacy/chemist ^a ***	94.00	89.15	65.54	86.66
Percentage of households with finished floors***	94.29	85.04	60.23	86.82
Percentage of households with finished roofs*	98.12	96.87	92.08	96.95
Percentage of households with finished walls***	85.47	77.04	56.18	78.84
Total (N)	2,185	2,092	1,007	5,284
^a Located 5 kilometers or less, less than 30 minutes on foot, or less than 10 minutes by car				
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.1.2. Ownership of assets and wealth quintile

<i>Distribution of household assets and wealth quintile by zone, Ghana 2022</i>				
	Southern	Forest	Northern	Total
Percent of households with assets				
Radio*	56.87	60.71	52.64	58.01
Television***	82.12	77.97	57.03	77.72
Mobile phone	96.39	94.70	94.82	95.52
Refrigerator***	64.96	57.37	28.29	57.90
Clock***	65.12	72.04	32.55	64.51
Bicycle***	13.33	11.17	56.92	17.10
Motorcycle***	9.11	11.00	60.54	15.39
Car***	12.91	13.25	4.70	12.18
Computer*	16.70	14.15	9.16	14.84
Land ***	13.35	33.80	68.51	27.72
Livestock ***	14.98	20.70	57.46	21.89
Wealth Quintile				
Lowest	11.03	16.44	47.07	20.04
Second	19.08	19.02	23.93	19.98
Third	21.42	20.55	15.69	19.98
Fourth	20.82	24.71	8.54	20.02
Highest	27.64	19.26	4.77	19.97
Total (N)	2,185	2,092	1,007	5,284
<i>Significant of differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.1.3. Characteristics of household members

<i>Sociodemographic characteristics of household members by zone, Ghana 2022</i>				
Sociodemographic characteristic	Southern	Forest	Northern	Total
Sex				
Female	57.51	56.47	50.46	56.00
Male	42.49	43.53	49.54	44.00
Residence				
Urban	77.68	60.57	50.21	66.38
Rural	22.32	39.43	49.79	33.62
Age Distribution				
0–4	12.83	15.18	18.12	14.62
5–17	32.24	32.76	36.11	33.05
≥ 18	54.93	52.05	45.77	52.34
Average age*	23.31	22.74	20.78	22.69
Total (N)				
	7,933	8,057	5,240	21,230
* Significant differences ($p < 0.05$)				

A.3.2 Cross-Cutting Ideational Determinants

Table A.3.2.3. Perceived susceptibility to malaria				
<i>Distribution of respondents with specific perceived susceptibility to malaria by zone, Ghana 2022</i>				
	Southern	Forest	Northern	All zones
Percent of respondents who				
Disagreed that people in this community only catch malaria during the rainy season***	40.39	39.67	29.62	38.88
Agreed that almost every year, a person from his/her community catches severe malaria (perception of severe malaria)***	54.84	57.84	67.48	57.55
Agreed that when his/her child has fever, he/she is almost always afraid it's malaria***	67.84	79.05	87.20	74.84
Agrees that during the rainy season, he/she is afraid almost every day that a member of his/her family will suffer from malaria***	52.28	52.46	87.33	56.28
Percent of respondents who perceive susceptibility to malaria ^a				
Sex				
Female	53.82	60.89	87.58*	60.78
Male	53.60	60.59	81.87	59.72
Age				
15–24	50.60	50.59	84.38	55.28
25–34	52.51	59.96	84.63	59.61
35–44	57.74	64.76***	86.54	63.93***
≥ 45	51.07	60.89	83.03	58.13
Residence				
Urban	49.30	59.43	87.54	56.25
Rural	70.03***	63.06	82.65	69.02***
Level of education				
None	63.36***	72.68***	88.11	76.01***
Primary	61.63	60.85	85.43	63.23
Secondary or higher	45.96	58.77	80.19	53.86
Wealth quintile				
Lowest	65.73***	69.55***	87.27	75.06***
Second	64.23	65.15	83.90	68.23
Middle	55.82	60.11	83.06	60.67
Fourth	55.74	58.09	79.31	58.14
Highest	45.40	57.40	88.98	51.51
Total (%)***	53.71	60.74	84.90	58.14
Total (N)	2,834	2,727	1,521	7,082
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A.3.2.4. Perceived severity of malaria

Percent of respondents with perceived severity of malaria by zone, Ghana 2022				
	Southern	Forest	Northern	All zones
Percent of respondents				
Disagreed that he/she is not afraid of malaria, because it can be treated easily***	32.15	41.89	21.88	35.12
Disagreed that weak children can die of malaria***	30.39	23.40	32.87	27.70
Agreed that each case of malaria can potentially lead to death***	84.96	87.66	80.41	85.59
Disagreed that when someone they know has malaria, he/she usually expects them to recover completely within a few days***	81.71	81.23	92.83	82.79
Percent of respondents who perceive malaria severity^a				
Sex				
Female	64.70*	54.33	65.43*	60.38
Male	59.52	55.85	57.44	57.69
Age				
15–24	61.10	52.72	67.01	57.97
25–34	61.30	53.62	61.60	58.10
35–44	64.40	54.52	57.92	59.34
≥ 45	60.76	59.33	64.46	60.52
Residence				
Urban	61.23	51.78	57.46	57.16
Rural	65.65*	60.92***	65.27***	63.23**
Level of education***				
None	60.91	62.36	57.71	60.03
Primary	64.78	55.78	72.34	61.11
Secondary or higher	60.26	53.22	55.58	56.95
Wealth quintile				
Lowest	53.30	64.97***	67.61***	62.91
Second	62.73	64.02	63.62	63.44***
Middle	67.38***	56.07	63.88	61.88
Fourth	66.60	56.51	52.41	61.04
Highest	57.40	45.01	35.62	51.83
Total (%)***	62.17	55.08	61.68	61.04
Total (N)	2,834	2,727	1,521	7,082
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A 3.2.5. Interpersonal communication regarding malaria

Respondents reporting interpersonal communication regarding malaria by zone (administrative unit), Ghana MBS 2022

Background characteristic	Southern		Forest		Northern		All Zones	
	% who talked about malaria with their spouse/partner in the previous six months	% who spoke of malaria with a friend or family member in the previous six months	% who talked about malaria with their spouse/partner in the previous six months	% who spoke of malaria with a friend or family member in the previous six months	% who talked about malaria with their spouse/partner in the previous six months	% who spoke of malaria with a friend or family member in the previous six months	% who talked about malaria with their spouse/partner in the previous six months	% who spoke of malaria with a friend or family member in the previous six months
Sex								
Female	13.44	15.57	16.92	19.39	18.93	17.71	15.56	17.44
Male	21.02***	18.66	22.98**	21.31	20.36	20.24	21.81***	19.99*
Age								
15-24	7.23	10.81	16.10	16.74	15.09	12.04	12.50	13.79
25-34	15.09	15.33	18.44	18.62	20.87	19.37	17.21	17.21
35-44	18.00	15.71	20.89	19.88	20.48	22.25*	19.54	18.25
45 and above	22.14***	23.36**	22.54	25.41	18.68	16.83	21.98**	23.59***
Residence								
Urban	15.31	15.65	21.52	21.91	16.97	16.49	17.92	18.23
Rural	23.89***	22.33***	17.08	17.55	21.84	20.94	20.11	19.69
Level of education								
None	9.38	12.26	15.94	12.63	15.14	16.23	13.56	13.95
Primary	17.77**	19.08	16.34	18.06	19.98	19.53	17.27	18.63
Secondary or higher	17.71	16.15	24.25**	23.89*	24.85*	21.61	20.99**	19.81*
Wealth quintile								
Lowest	16.24	14.04	12.53	16.42	21.87	23.36	16.91	18.34

Second	16.21	16.64	18.31	21.61	15.04	13.61	16.88	18.19
Middle	17.41	19.02	18.80	18.20	11.81	9.28	17.44	17.61
Fourth	15.86	16.00	20.27	22.98	21.94	22.49	18.28	19.66
Highest	18.45	17.57	24.03**	20.06	37.32***	31.75*	21.25	19.00
Total (%)	17.13	17.07	19.92	20.34	19.60	18.89	18.61	18.68
Total (N)	2,832	2,832	2,721	2,721	1,506	1,506	7,059	7,059

*Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)*

Table A.3.2.6. Perceptions regarding facility-based health workers

<i>Percent distribution of perceptions of facility-based health workers, Ghana 2022</i>				
Indicator	Southern	Forest	Northern	All zones
Positive general perceptions towards health workers***	79.94	88.46	93.60	85.14
Positive perceptions towards health workers providing case management**	88.68	90.47	92.48	89.88
Positive perceptions towards health workers providing seasonal malaria chemoprevention**	88.43	89.42	90.08	89.04
Positive perceptions towards health workers providing care for malaria in pregnancy**	85.54	91.10	93.26	88.80
Percent of respondents with favorable perceptions regarding facility-based health workers				
Sex				
Female	86.05**	79.64	44.58	78.47
Male	81.44	83.93*	61.84***	80.41
Residence				
Urban	86.49***	83.00	53.72	82.61***
Rural	73.85	79.60	51.80	72.43
Age				
15–24	78.86	79.64	53.39	75.70
25–34	83.28	83.26	51.15	79.31
35–44	85.57	80.10	50.17	79.36
≥ 45	83.91	83.28	59.19	81.32
Level of education				
None	72.53	84.74	48.79	66.40
Primary	82.29	82.45	50.79	79.76
Secondary or higher	86.63**	80.59	59.70*	82.12***
Wealth quintile				
Lowest	76.23	82.48	82.48	70.34
Second	76.92	76.92	76.92	72.02
Middle	78.21	81.40	81.40	76.69
Fourth	87.84***	85.21	85.21	84.47***
Highest	87.76	81.37	81.37	84.41
Total (%)***	83.80	81.77	52.68	84.47
Total (N)	2,834	2,727	1,521	7,082
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.2.7. Gender norms related to malaria, Ghana 2022

Percent of respondents	Southern	Forest	Northern	All zones
Disagree that when there are not have enough nets, it is more important that female children sleep under the available nets rather than male children***	89.23	62.36	90.49	79.13
Disagree that when there are not have enough nets, it is more important that male children sleep under the available nets rather than female children***	89.58	71.26	93.19	82.18
Disagree that when there is not enough money, it is more important that male children with fever get medicine rather than female children***	88.48	70.56	92.99	81.35
Disagree that when there is not enough money, it is more important that female children with fever get medicine rather than male children***	88.56	62.13	92.63	77.75
Agree that a pregnant woman should feel comfortable asking her husband/spouse to go to the health facility for a prenatal consultation***	83.07	76.69	71.56	79.03
Percent of respondents who perceive positive gender norms related to malaria^a				
Sex				
Female	91.29	86.61	94.19	89.64
Male	91.75	87.24	98.54***	90.52
Age				
15–24	86.58	81.36	91.43	84.80
25–34	93.81	88.59	95.60	91.83***
35–44	94.06***	86.56	97.29	91.10
≥ 45	86.92	87.91	98.84***	88.45
Residence				
Urban	89.50	87.06	95.45	88.97
Rural	98.98	86.67	96.90	92.46
Level of education				
None	85.07	82.58	95.53	88.59
Primary	93.73**	85.41	96.64	90.00
Secondary or higher	90.66	89.17*	96.71	90.47
Wealth quintile				
Lowest	96.29	84.00	84.00	91.73
Second	97.36***	83.66	83.66	91.39
Middle	92.65	82.69	82.69	88.47
Fourth	91.11	89.58	89.58	90.66
Highest	88.29	90.39***	90.39	89.37
Total (%)***	91.52	86.92	96.23	90.66
Total (N)	2,834	2,727	1,521	7,082
^a The score of the sum of all five indicators should be at least 1. Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

A.3.3 Malaria Case Management for Children Under Five Years Old

Table A.3.3.1. Knowledge of malaria care seeking and treatment				
<i>Knowledge of malaria care-seeking and treatment, according to background characteristics, Ghana 2022</i>				
	Southern	Forest	Northern	All zones
Aware that ACT can be used to effectively treat malaria***	70.93	72.22	46.68	68.75
Aware that when child under five years develops fever it must have advice or treatment for the fever the same day or next day*	86.07	89.99	91.11	88.30
Blood test is the best way to know if someone has malaria	80.00	83.08	77.56	81.04
Aware that the health facility is the best place to go if an individual thinks he/she has malaria***	83.37	90.23	95.64	87.67
Percent of respondents with comprehensive knowledge of malaria care-seeking and treatment^a				
Sex				
Female	41.16	49.03	34.01	43.67
Male	47.84***	55.36*	35.84	49.77***
Age				
15–24	42.22	53.41	36.78	46.76
25–34	45.71	53.67	36.16	47.84
35–44	45.39	50.16	32.90	46.14
≥ 45	42.17	52.35	34.54	45.58
Residence				
Urban	46.86*	55.58***	31.99	49.18*
Rural	35.26	46.10	37.37	41.04
Level of education				
None	30.60	48.58	23.69	32.99
Primary	37.62	47.90	33.90	42.15
Secondary or higher	51.92***	57.10***	49.84***	53.94***
Wealth quintile				
Lowest	28.93	49.34	37.60	39.77
Second	33.77	41.71	26.19	35.76
Middle	40.28	48.07	31.57	42.86
Fourth	49.03	54.74	40.36	51.25
Highest	49.81***	59.46***	47.10	53.52***
Total (%)***	44.41	52.14	34.87	46.64
Total (N)	2,801	2,695	1,487	6,983

^a Response to four indicators is correctly answered.
*Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)*

Table A.3.3.2. Attitudes towards malaria care-seeking and treatment

<i>Attitudes towards malaria care-seeking and treatment by zone, Ghana 2022</i>				
Percent of respondents	Southern	Forest	Northern	All zones
Agree that the health provider is always the best person to talk to when the child may have malaria	97.31	96.82	97.99	97.18
Disagree that one does not need to continue taking all the medicine doses against malaria if the patient is already cured	77.16	63.95	49.86	68.48
Disagree that a parent should ask for an injection from the health provider if they think his/her child has malaria*	56.08	47.10	50.58	51.63
Disagree that that child should receive the medicine to treat malaria by injection rather than swallow it***	42.93	35.17	45.15	39.86
Agree that a person should only take malaria medicine if a health provider says that his/her fever really is caused by malaria	88.16	89.33	89.29	88.79
Disagree that if a health provider says a person does not have malaria, the patient should ask for a malaria medication just in case he/she needs it***	79.07	77.74	58.83	76.25
Disagree that when child has a fever, it is better to start by giving him any malaria medicine they have at home*	54.51	48.14	44.99	50.73
Agree that it is important to take all the antimalaria pills prescribed to ensure a complete recovery*	93.40	97.22	95.44	95.26
Disagree that when child has a fever, they do not go directly to the health facility, but first go elsewhere to buy him/her medicine***	50.71	44.05	60.75	48.99
Percent of respondents with favorable attitudes towards malaria care-seeking and treatment ^a				
Sex				
Female	87.06	85.55***	83.70	86.03*
Male	85.92	79.44	80.97	82.60
Age				
15–24	89.39	79.41	82.88	83.82
25–34	86.10	84.76	82.35	85.08
35–44	86.77	81.86	81.48	84.06
≥ 45	85.67	81.97	83.76	84.00
Residence				
Urban	85.29***	85.33*	79.39	84.86
Rural	91.00	77.64	85.02	83.25
Level of education				
None	83.33	70.42	80.00	78.32
Primary	86.78	82.35	82.44	84.33
Secondary or higher	86.73	84.64*	85.41	85.76*

Wealth quintile				
Lowest	85.47	76.14	81.35	80.47
Second	90.04	78.27	79.07	83.11
Middle	84.67	78.53	83.00	81.71
Fourth	87.04	86.71	85.36	86.79*
Highest	86.08	86.28	90.69	86.31
Total (%)	86.50	82.55	82.41	84.36
Total (N)	2,832	2,718	1,496	7,046

^a The score of the sum of all nine indicators should be at least 1.

*Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)*

Table A.3.3.3. Perceived response efficacy of malaria testing

Percent distribution of specific response-efficacy of malaria testing by zone, Ghana 2022				
Percent of respondents	Southern	Forest	Northern	All zones
Agree that a blood test for malaria is the only way to know if someone really has malaria or not***	82.69	75.31	74.02	78.58
Disagree that parents can diagnose malaria by a person's symptoms just as well as a blood test for malaria***	39.49	30.81	29.16	34.64
Percent of respondents with a high perceived response-efficacy of malaria testing ^a				
Sex				
Female	40.69	31.36***	27.73	35.24
Male	42.14	25.00	27.76	33.24
Age				
15–24	43.55	29.14	39.61*	36.23
25–34	40.63	29.31	23.38	33.79
35–44	39.08	27.24	28.13	32.72
≥ 45	44.72	27.75	27.79	36.32
Residence				
Urban	41.09	31.02*	24.82	35.88*
Rural	42.55	23.31	30.28	30.71
Level of education				
None	26.42	20.27	22.58	23.15
Primary	40.55***	26.43	32.35*	33.22
Secondary or higher	44.22	31.35	29.34	37.75***
Wealth quintile				
Lowest	37.76	19.21	26.81	26.80
Second	42.99	20.48	29.93	31.15
Middle	37.27	27.59	29.57	32.07
Fourth	37.04	31.91	29.95	34.23
Highest	46.70	32.55*	18.25	40.23*
Total (%)***	41.40	28.24	27.74	34.26
Total (N)	2,832	2,717	1,495	7,044
^a Total score is ≥ 1 for both indicators				
Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

Table A.3.3.4. Perceived response-efficacy of malaria treatment

Percent distribution of specific response-efficacy of malaria treatment by region, Ghana 2022				
Percent of respondents that agree/disagree with the following statements	Southern	Forest	Northern	All zones
Disagree that a person should still take malaria medicine even if the malaria test result says that the fever is not due to malaria ***	74.82	69.87	59.70	71.03
Agree that malaria drugs obtained from the health facility are effective in treating malaria	93.41	96.19	94.45	94.71
Disagree that the malaria medicines that are purchased in the market are as good as the ones distributed at the health facility	35.48	30.59	37.50	33.62
Percent of respondents with a high perceived response-efficacy of malaria treatment				
Sex				
Female	80.03*	77.62***	72.06	78.09***
Male	75.70	71.68	72.51	73.64
Age				
15–24	76.21	74.92	72.77	75.15
25–34	75.71	73.63	70.13	74.16
35–44	79.96	73.89	72.44	76.50
≥ 45	78.69	77.50	75.75	77.94
Residence				
Urban	75.49	75.09	68.53	74.81
Rural	86.87***	74.03	75.53	78.36
Level of education				
None	72.57	66.13	71.93	70.47
Primary	80.40	75.76	76.83	77.92*
Secondary or higher	76.68	74.95	67.97	75.32
Wealth quintile				
Lowest	85.81	63.12	72.13	72.32
Second	86.83*	72.78	72.12	78.27
Middle	77.36	74.78	80.95*	76.57
Fourth	75.19	79.65	66.27	76.80
Highest	75.64	74.95	61.62	74.92
Total (%)	77.91	74.70	72.27	75.92
Total (N)	2,832	2,716	1,494	7,042
^a Total score is ≥1 for all three indicators. Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$) differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

Table A.3.3.5. Perceived self-efficacy for malaria testing and treatment for febrile children

<i>Percent distribution of perceived self-efficacy for malaria testing and treatment by zone, Ghana 2022</i>				
Percent of respondents that believe they could:	Southern	Forest	Northern	All zones
Find the money to take your child to the health facility at the first sign of malaria.*	90.38	93.78	91.89	92.00
Get permission from your husband or other family member to take your child to the health facility/health provider when your child has fever***	93.52	93.42	97.27	93.89
Take your child to the health facility the same day or next day s/he develops a fever***	88.25	92.63	95.39	90.91
Request a blood test at the health facility when you think your child might have malaria***	85.93	76.22	82.08	81.36
Make sure your child takes the full dose of medicine that s/he is prescribed for malaria*	96.52	96.78	98.21	96.82
Find the money to pay for the medication the health provider recommends to treat malaria*	93.05	96.05	92.60	94.28
Percent of respondents with perceived self-efficacy for malaria testing and treatment ^a				
Sex				
Female	97.00	96.48	97.25	96.81
Male	97.96	99.57***	97.52	98.60***
Age				
15–24	95.52	93.75	96.57	94.82
25–34	98.77*	98.51	96.93	98.43***
35–44	98.05	98.54	98.23	98.29
≥ 45	95.68	98.59***	97.30	97.00
Residence				
Urban	97.33	98.40	96.42	97.69
Rural	97.97	97.28	98.21	97.67
Level of education				
None	95.43	94.53	98.36	96.30
Primary	96.40	97.34	95.96	96.81
Secondary or higher	98.63***	99.21***	97.62	98.80***
Wealth quintile				
Lowest	93.12	95.83	98.89	94.17
Second	96.93	94.09	98.14	94.70
Middle	95.73	98.61	92.50	96.50
Fourth	98.34	99.00	97.50	97.96
Highest	98.74	99.38***	100.00*	98.98
Total (%)	97.09	96.78	97.27	96.98
Total (N)	2,832	2,716	1,493	7,041

^aTotal score is ≥ 1 for all six indicators.

Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table A.3.3.7. Perceived community norms regarding malaria testing and treatment			
<i>Distribution of perceived community norms regarding malaria testing and treatment -Ghana 2022</i>			
Percent of respondents with perceived norms regarding malaria testing and treatment	Agreed that at least half of the people in the community take their children to a health provider on the same day or day after they develop a fever	Agreed that at least half of the children in the community taken to a health facility with fever get tested for malaria	Agreed that at least half of the people in the community approve of prompt care seeking for children with fever
Zone			
Southern	39.91	38.96	52.95
Forest	53.92	50.32	49.29
Northern	72.59***	73.68***	54.79***
Sex			
Female	49.34	46.92	50.95
Male	49.71	48.44	52.27
Age			
15–24	52.51	47.93	47.72
25–34	51.21	50.22	54.14
35–44	47.42	45.74	49.67
≥ 45	48.82	46.69	52.48
Residence			
Urban	45.15	43.98	51.72
Rural	59.15***	55.77***	51.32
Level of education			
None	62.33***	60.55***	47.15
Primary	49.87	47.65	51.03
Secondary or higher	46.29	44.75	53.12***
Wealth quintile			
Lowest	60.47***	59.13***	52.97
Second	53.72	50.30	50.95
Middle	50.52	48.28	47.63
Fourth	50.19	48.36	54.09
Highest	41.99	40.96	52.09
Total (%)	49.52	47.66	51.59
Total (N)	7,041	7,041	7,041
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>			

Table A.3.3.8. Perceptions towards health facilities regarding malaria care-seeking and treatment

<i>Percent of respondents favorable perceptions of health facilities by zone, Ghana 2022</i>				
Percent of respondents	Southern	Forest	Northern	Total
Agree that health facilities always have the medication to treat malaria	86.93	90.06	91.18	88.74
Agree that health facilities in their community always have the blood test kit to tell if a person has malaria***	92.10	85.81	94.14	89.64
Percent of respondents with favorable perceptions of health facilities regarding malaria care-seeking and treatment ^a				
Sex				
Female	88.90*	89.66	90.21	89.38***
Male	83.42	87.61	87.22	85.63
Age				
15–24	86.48	85.23	90.79	86.46
25–34	86.48	89.85	90.13	88.33
35–44	91.39***	89.71	85.04	89.98*
≥ 45	78.98	86.99	91.34	83.35
Residence				
Urban	86.91	91.65***	89.04	88.95*
Rural	83.69	83.37	88.61	84.47
Level of education				
None	84.93	87.34	87.08	86.47
Primary	86.55	88.70	91.70	87.99
Secondary or higher	86.14	88.81	87.95	87.39
Wealth quintile				
Lowest	77.59	86.60	88.58	84.96
Second	77.38	82.87	87.53	81.51
Middle	88.79***	87.96	90.42	88.59
Fourth	91.24	90.85	88.42	90.90***
Highest	85.95	90.87*	90.12	88.01
Total (%)	86.22	88.66	88.81	87.55
Total (N)	2,832	2,715	1,493	7,040
^a Total score is ≥1 for both indicators Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

Table A.3.3.9. Perceptions towards facility-based health workers regarding malaria care-seeking and treatment

<i>Percent distribution of perceptions of facility health workers by zone, Ghana 2022</i>				
Percent of respondents that perceive that:	Southern	Forest	Northern	All zone
Agree that health providers in health facilities in their community treat patients with respect***	79.92	88.53	93.15	85.06
Agree that health providers at the health facilities in their community know about how to treat malaria in children	92.43	93.44	94.03	93.04
Disagree that health providers in the health facility located in their community make parents pay for the medication to treat malaria in children under five years***	14.66	19.14	59.99	21.61
Disagree that health facility providers in the health facility located in their community make parents of children under five years pay for the blood test to see if the child has malaria***	14.48	16.95	51.16	19.61
Percent of respondents with favorable perceptions of health facility workers regarding malaria care-seeking and treatment ^a				
Sex				
Female	30.96	39.42	73.80*	39.54
Male	32.17	37.08	66.55	38.03
Age				
15–24	40.44*	42.44	73.58	45.93***
25–34	34.55	39.21	72.47	41.18
35–44	29.63	37.14	71.31	37.38
≥ 45	27.02	36.49	62.93	34.26
Residence				
Urban	27.38	37.88	70.82	34.84
Rural	46.94***	38.95	70.01	47.45***
Level of education				
None	37.09	29.07	72.10	48.92*
Primary	32.44	36.70	70.67	37.62
Secondary or higher	30.04	41.34*	67.89	37.54
Wealth quintile				
Lowest	43.26***	31.68	67.14	47.70***
Second	40.54	34.84	74.01	44.29
Middle	35.99	35.03	65.82	38.73
Fourth	26.63	38.41	77.13	34.98
Highest	27.40	44.99	75.29	35.85

Total (%)***	31.07	38.99	72.69	39.19
Total (N)	2,832	2,715	1,493	7,040
^a Total score is ≥ 1 for all four indicators. <i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.3.10. Decision making for malaria care and treatment

Percent distribution of decision making for malaria care and treatment by zone, Ghana 2022			
Percent of respondents involved in decision making regarding malaria care-seeking and treatment	Decisions to go to the health facility when their child has malaria	Decisions to purchase medicine when their child is sick with fever	Decisions about what to do when the respondent themselves are sick
Zone	***	***	***
Southern	85.09	80.67	83.50
Forest	80.95	73.77	75.00
Northern	71.64	65.53	64.72
Sex			
Female	76.19	66.72	69.70
Male	85.69***	82.72***	83.35***
Age			
15–24	73.30	60.21	65.52
25–34	77.94	71.43	73.39
35–44	84.15***	78.59	79.42
≥ 45	83.79	80.00***	81.67***
Residence			
Urban	82.79*	76.52	79.91***
Rural	78.94	74.02	72.14
Level of education			
None	75.36	68.39	69.79
Primary	81.68	76.14	76.37
Secondary or higher	82.95***	77.17***	80.16***
Wealth quintile			
Lowest	79.00	73.06	73.92
Second	78.58	72.11	72.95
Middle	82.63	76.16	75.68
Fourth	83.71	78.26	79.30
Highest	81.40	76.05	80.39*
Total (%)	81.52	75.70	77.36
Total (N)	5,332	5,332	5,332
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>			

Table A.3.3.11. Intention to seek prompt care and treatment for malaria for children under five years with a fever

Percent intending to seek prompt (same day or next day) advice or treatment first from a health facility, Ghana 2022

Zone	
Southern	83.37***
Forest	90.23
Northern	95.64
Sex	
Female	86.28
Male	89.13***
Age	
15–24	87.23
25–34	87.81
35–44	87.73
≥ 45	87.56
Residence	
Urban	84.93
Rural	93.69***
Education	
None	88.14
Primary	88.72
Secondary or higher	86.59
Wealth quintile	
Lowest	92.76*****
Second	92.00
Middle	89.36
Fourth	87.43
Highest	82.55
Total (%)	87.67
Total(N)	7,047
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>	

A.3.4 Malaria in Pregnancy

Table A.3.4.1: Knowledge of IPTp				
<i>Distribution of respondents with specific knowledge of IPTp by zone, Ghana 2022</i>				
Percent of respondents that correctly answer the following questions	Southern	Forest	Northern	All zones
When should a pregnant woman go for pregnancy care for the first time? ***	32.43	19.47	15.95	25.05
How many times should a woman receive check-up during one pregnancy? ***	58.46	68.60	74.34	64.56
How many times during her pregnancy should a woman receive medicine to keep her from getting malaria? ***	41.23	52.65	54.16	47.56
Percent of respondents with comprehensive knowledge of IPTp/ANC ^a				
Sex				
Female	15.40***	11.49**	11.05***	13.24***
Male	6.38	7.09	3.87	6.41
Age				
15–24	7.68	4.74	9.87	6.59
25–34	11.89	11.72**	7.93	11.33***
35–44	13.70***	9.48	7.46	11.18
≥ 45	7.42	7.93	6.20	7.51
Residence				
Urban	9.79	8.70	5.35	9.02
Rural	15.45***	10.43	9.69*	11.87*
Level of education				
None	14.11***	9.12	10.67	11.32
Primary	13.69	12.43***	6.46	12.50***
Secondary or higher	8.38	6.15	5.18	7.21
Wealth quintile				
Lowest	13.15	10.07	10.68***	11.09
Second	13.75	10.27	9.53	11.53
Middle	9.55	13.66	4.87	10.91
Fourth	10.80	7.76	3.98	8.99
Highest	10.58	6.61	1.25	8.72
Total (%)	10.99	9.32	7.68	9.91
Total (N)	2,832	2,719	1,502	7,053
^a Total score of all three indicators is 3.				
Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

Table A.3.4.2. Attitudes towards IPTp and ANC

<i>Respondents with specific attitudes towards IPTp/ANC by zone, Ghana 2020</i>				
Percent of respondents that agree with the following statements	Southern	Forest	Northern	All zones
Agree that it is okay for pregnant women to take the medicine to prevent malaria on empty stomach***	10.99	14.77	26.67	14.36
Disagree that even if a woman thinks she may be pregnant, she should wait a few months before she sees a health provider*	62.47	56.28	55.68	59.07
Disagree that a woman who has given birth before does not need to see a health provider as soon as she thinks she might be pregnant*	72.80	69.27	63.42	70.25
Agree that the medications given to pregnant women to prevent them from getting malaria are safe for them and their babies*	91.69	95.15	94.27	93.46
Agree that a pregnant woman must take several doses of the medicine to prevent malaria during pregnancy***	55.13	68.76	85.98	64.40
Percent of respondents with favorable attitudes towards IPTp/ANC^a *				
Sex				
Female	69.67	76.06	82.53	73.87
Male	75.34*	78.31	79.36	77.05*
Age				
15–24	70.85	71.11	85.44	72.92
25–34	74.97	77.35	79.57	76.53
35–44	71.34	77.62	81.30	75.16
≥ 45	71.15	79.35	80.60	75.35
Residence				
Urban	71.04	78.42	79.45	74.60
Rural	77.64*	74.96	82.42	77.23
Level of education				
None	61.15	74.62	82.79	73.61
Primary	67.76	74.09	80.10	71.76
Secondary or higher	77.82***	80.74*	79.83	79.19***
Wealth quintile				
Lowest	69.09	74.88	81.65	75.83
Second	71.39*	68.67	82.72	72.28
Middle	67.00	80.72*	76.62	74.24
Fourth	70.74	76.80	80.73	74.16
Highest	77.49	80.07	84.52	78.72
Total (%)***	72.44	77.17	81.04	75.42
Total (N)	2,832	2,719	1,499	7,050

^a Total score of all five indicators is ≥ 1 .

Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table A.3.4.3. Perceived severity of malaria in pregnancy

<i>Respondents with specific perceived severity of malaria in pregnancy by zone, Ghana 2022</i>				
Percent of respondents who perceive that:	Southern	Forest	Northern	All zones
Agree that when a pregnant woman gets malaria, the effect on her and her unborn child is very serious***	93.25	93.61	97.57	93.89
Agree that pregnant women are more likely to die from malaria compared to women who are not pregnant (agree). ***	68.63	79.00	89.23	75.36
Percent of respondents with perceived severity of malaria in pregnancy ^a				
Sex				
Female	77.69***	83.83	90.22	81.74*
Male	70.00	85.62	89.55	78.83
Age				
15–24	71.55	78.35	83.71	76.38
25–34	77.36	84.38	90.15	81.86
35–44	78.03**	85.26	90.50	82.53*
≥ 45	64.87	87.63	92.38	76.65
Residence				
Urban	72.47	85.35	92.45*	79.09
Rural	79.32*	83.58	87.70	83.03*
Level of education				
None	77.97	88.95	91.34	86.43**
Primary	76.28	83.57	87.18	80.62
Secondary or higher	71.46	85.23	90.94	78.65
Wealth quintile				
Lowest	75.74	87.55	87.93	84.61
Second	80.21	79.37	89.93	81.60
Middle	71.82	86.00	91.20	80.31
Fourth	76.39	84.47	90.98	81.01
Highest	70.89	85.74	93.92	77.46
Total (%)	73.93	84.71	89.91	80.32
Total (N)	2,832	2,719	1,499	7,050
^a Total score of both indicators is ≥ 1. Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				

Table A.3.4.4. Perceived response efficacy of IPTp				
Percent respondents who believe in the relevance of IPTp by zone, Ghana 2022				
Percent of respondents that believe:	Southern	Forest	Northern	All zones
Agree that consulting health facility providers during pregnancy is a way to make sure the baby and mother are healthy	97.34	97.42	96.88	97.33
Agree that the medicine given to pregnant women to prevent malaria works well to keep the mother healthy**	92.59	96.32	93.80	94.32
Agree that pregnant women should still take the medicine that is meant to keep them from getting malaria even if they sleep under nets every night**	90.38	93.31	95.16	92.16
Percent of respondents who believe in the relevance of IPTp when a woman sleeps under an ITN ^a				
Sex				
Female	92.04	92.80	94.57	92.65
Male	88.63	93.85	95.83	91.65
Age***				
15–24	85.05	85.35	91.31	86.02
25–34	91.38	95.16**	95.13	93.42
35–44	93.32***	93.93	96.05	93.88
≥ 45	87.04	93.76	96.19	90.60
Residence				
Urban	89.14	93.02	95.60	91.17
Rural	94.93***	93.83	94.78	94.36*
Level of education				
None	90.60	96.90	95.57	94.38
Primary	90.93	92.72	93.63	92.00
Secondary or higher	89.89	93.37	96.24	91.81
Wealth quintile				
Lowest	87.72	93.12	93.98	92.03
Second	90.89	92.53	96.90	92.66
Middle	90.04	92.55	94.24	91.62
Fourth	93.09	94.15	93.51	93.61
Highest	88.97	93.59	100.00***	91.14
Total (%)	90.38	93.31	95.16	92.16
Total (N)	2,832	2,718	1,499	7,049
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A.3.4.5a. Perceived self-efficacy for IPTp (women)

<i>Respondents with perceived self-efficacy for IPTp among women by zone, Ghana 2022</i>				
Percent of women that believe they can:	Southern	Forest	Northern	All zones
Go for antenatal care as soon as I think I might be pregnant ***	89.20	91.47	95.00	90.83
Convince my spouse to accompany me to the health facility for antenatal care	85.19	81.93	80.75	83.30
Go to at least four antenatal care appointments at the health facility	95.26	95.42	96.73	95.50
Go for antenatal care even if my religious leader does not agree**	95.81	91.00	94.95	93.67
Take the medicine to prevent malaria at least three times during pregnancy	96.29	95.56	96.13	95.96
Request the medicine that helps to prevent malaria when I go for antenatal care	81.61	78.08	80.66	80.00
Percent of women with perceived self-efficacy for IPTp				
Age				
15–24	94.59	92.30	94.05	93.49
25–34	97.40*	97.50	97.14	97.41
35–44	97.05	97.98*	98.57*	97.61***
≥ 45	91.40	97.17	94.37	94.01
Residence				
Urban	96.43	98.09**	96.82	97.11**
Rural	94.65	94.18	96.67	94.83
Level of education				
None	91.93	93.72	98.47**	95.12
Primary	96.17	96.36	93.76	96.07
Secondary or higher	96.76	98.00*	98.39	97.37*
Wealth quintile				
Lowest	91.82	95.35	97.00	94.98
Second	94.84	90.83	96.59	93.43
Middle	93.21	97.68	95.86	95.36
Fourth	97.98**	98.22	97.74	98.08***
Highest	97.86	98.51**	96.50	98.07
Total (%)	96.07	96.68	96.74	96.40
Total (N)	2,131	2,044	1,179	5,354
<p>^a Total score of all six indicators is ≥ 1. <i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i></p>				

Table A.3.4.5b. Perceived self-efficacy for IPTp (men)

<i>Respondents with perceived self-efficacy for IPTp among men by zone, Ghana 2022</i>				
Percent of men that believe they can:	Southern	Forest	Northern	All zones
Support his spouse/partner to go for antenatal care as soon as she thinks she might be pregnant***	95.31	94.56	98.92	95.37
Accompany his spouse to the health facility for antenatal care	82.04	84.10	86.97	83.46
Support his spouse/partner to go for at least four antenatal care appointments at the health facility during pregnancy	84.41	79.84	86.82	82.71
Support his spouse/partner to go for antenatal care even if his religious leader does not agree	94.04	93.87	94.13	93.98
Support his spouse/partner to take the medicine to prevent malaria at least three times during pregnancy*	93.67	93.48	97.12	93.96
Support his spouse/partner to request the medicine that helps to prevent malaria when she goes for antenatal care	93.07	88.65	91.62	91.01
Percent of men with perceived self-efficacy for IPTp				
Age				
15–24	89.06	92.70	94.52	91.87
25–34	97.80*	93.74	95.80	95.90
35–44	96.73	97.50	98.42	97.26**
≥ 45	89.79	92.86	95.99	91.63
Residence				
Urban	93.44	96.61*	98.10	95.05
Rural	96.96	91.91	95.48	94.19
Level of education				
None	91.62	89.02	95.37	92.36
Primary	90.46	93.60	94.92	92.37
Secondary or higher	96.24*	96.27	98.89	96.45**
Wealth quintile				
Lowest	94.19	97.06**	98.15	96.77
Second	91.42	82.83	95.26	88.59
Middle	91.80	93.94	92.62	92.93
Fourth	96.15	98.74	100.00*	97.56**
Highest	94.91	96.83	100.00*	95.81
Total (%)	94.22	94.90	96.72	94.78
Total (N)	701	674	320	1,695
<p>^a Total score of all six indicators is ≥ 1. <i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i></p>				

Table A.3.4.6. Perceived community norms regarding IPTp

Percent of respondents with perceived community norms regarding IPTp by zone, Ghana 2022			
Percent of respondents that perceive that:	Believed that at least half the women in their community go to antenatal care at least four times when pregnant	Believed that at least half the women in their community take medicine to prevent malaria when pregnant	Believed that at least half the people in their community approve of pregnant women taking the medicine to prevent malaria
Zone			
Southern	49.01	43.98	31.06
Forest	58.24	50.90	28.23
Northern	80.44***	78.74***	38.15***
Sex			
Female	59.08***	54.52***	53.37***
Male	53.70	46.92	6.78
Age			

15–24	57.34	48.75	40.07
25–34	59.22	53.84	37.71
35–44	54.59	49.65	27.67
≥ 45	54.83	49.09	20.65
Residence			
Urban	52.70	47.18	30.64
Rural	64.72***	58.81***	30.66
Level of education			
None	69.38***	66.71***	34.87
Primary	57.93	51.96	37.95***
Secondary or higher	52.15	46.13	23.00
Wealth quintile			
Lowest	66.96***	61.05***	34.23
Second	56.75	51.45	33.55
Middle	58.43	52.74	28.66
Fourth	58.90	54.86	30.44
Highest	48.85	41.84	29.40
Total (%)	61.27	56.41	43.69
Total (N)	7,049	7,048	7,048
Most male respondents responded, “don’t know.”			
Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)			

Table A.3.4.8. Perceptions of health facility providers regarding malaria in pregnancy

<i>Respondents with specific perceptions of health facility providers, by zone, Ghana 2022</i>				
Percent of respondents	Southern	Forest	Northern	All zones
Agree that health providers at the health facility in their community always offer the medicine to prevent malaria in pregnant women***	81.66	90.09	92.67	86.48
Disagree that health providers at the health facilities in their community always give pregnant women the medicine to prevent malaria only if she's eaten beforehand***	7.48	3.37	16.13	6.69
Disagree that if a woman goes to the health facility during the first two months of her pregnancy, the health providers will send her away	86.71	87.28	87.38	87.02
Disagree that if a pregnant woman goes to the health facility without her husband/partner, the health providers will send her away	88.69	90.05	89.01	89.31
Percent of respondents with favorable perceptions of health facility providers^a				
Sex				
Female	90.05*	93.42**	90.80	91.57***
Male	86.14	86.98	90.43	86.96
Age				
15–24	83.06	84.04	85.70	83.87
25–34	89.31	90.19	91.03	89.89
35–44	90.92**	92.21*	92.77	91.69***
≥ 45	84.72	90.51	89.39	87.48
Residence				
Urban	87.60	90.59	91.74	89.09
Rural	90.13	89.68	89.65	89.82
Level of education				
None	86.13	89.43	89.10	88.25
Primary	89.78	91.50	88.80	90.51
Secondary or higher	87.11	89.11	94.40	88.47
Wealth quintile				
Lowest	90.43	92.15	86.89	89.80
Second	88.52	90.02	89.03	89.24
Middle	87.05	89.79	92.77	88.90
Fourth	89.09	90.16	97.05*	90.03
Highest	87.55	90.16	96.84	88.87
Total (%)	88.14	90.26	90.62	89.32
Total (N)	2,832	2,715	1,493	7,040

^a Total score of all four indicators is ≥ 1 .

Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table A.3.4.9. Decision making for antenatal care				
<i>Respondents involved in joint decision making regarding antenatal care by zone, Ghana 2022</i>				
Percent of respondents involved in decision making regarding attending antenatal care	Southern	Forest	Northern	All zones
Sex				
Female	91.32*	91.48***	59.22	87.42
Male	83.38	80.50	85.94**	82.26
Age				
15–24	88.62	85.27	70.88	84.44
25–34	87.71	85.23	62.68	82.78
35–44	90.33	85.95	82.07	87.11
≥ 45	80.87	85.62	82.23*	83.49
Residence				
Urban	86.69	85.78	74.75	84.75
Rural	88.04	85.28	71.84	84.43
Level of education				
None	95.15***	86.37	68.86	79.61
Primary	86.68	89.49	79.35	87.64*
Secondary or higher	86.23	81.93	76.31	83.08
Wealth quintile				
Lowest	82.72	85.70	75.72	81.80
Second	91.62	92.09	82.71	90.00**
Middle	86.74	79.68	73.78	81.23
Fourth	90.02	86.72	56.65	85.61
Highest	84.17	86.10	73.28	84.62
Total (%)***	87.06	85.59	73.80	84.64
Total	1,032	1,333	468	2,833
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.4.10. Interpersonal communication regarding antenatal care

Distribution of respondents who discussed attending antenatal care with their spouse/partner by zone, Ghana 2022

Percent of respondents (married or cohabiting) who discussed antenatal care with their spouse or partner in the last six months	Southern	Forest	Northern	All zones
Sex				
Female	4.58	6.24	13.28	6.49
Male	6.37	5.56	11.07	6.56
Age				
15–24	12.07***	9.92***	13.73	11.13***
25–34	6.27	8.37	19.50	9.24
35–44	6.71	5.85	7.93	6.41
≥ 45	1.15	1.51	4.22	1.65
Residence				
	*		**	
Urban	4.01	5.67	16.16**	6.31
Rural	9.69*	6.21	3.72	6.96
Level of education				
None	1.87	8.52	10.36	7.88
Primary	4.77	5.40	13.83	5.77
Secondary or higher	6.79*	5.99	13.09	6.89
Wealth quintile				
Lowest	4.62	2.94	6.88	4.61
Second	7.86	6.44	16.46	9.01
Middle	2.82	4.07	8.04	4.19
Fourth	5.48	5.97	9.14	6.03
Highest	6.26	7.73	26.77	8.03
Total (%)	5.54	5.87	12.08	6.52
Total (N)	1,046	1,344	471	2,861
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.4.11. Intention to use IPTp

Among women who intend to have more children, percent of respondents who intend to use IPTp in next pregnancy by zone, Ghana 2022

Percent of respondents who intend to use IPTp in next pregnancy*	Southern	Forest	Northern	All zones
Age				
15–24	89.43	88.12	93.38	89.52
25–34	90.22	94.31	96.87	93.28
35–44	94.46	93.44	95.28	94.28
≥ 45	80.85	100.00***	100.00*	92.72
Residence				
Urban	90.26	93.93	96.04	92.79
Rural	90.74	89.95	95.44	91.75
Level of education				
None	96.56	93.56	97.86	96.40
Primary	91.78	91.06	93.32	91.69
Secondary or higher	87.79	94.13	96.60	92.10
Wealth quintile				
Lowest	79.19	83.71	94.65	88.74
Second	90.13	88.35	97.40	91.53
Middle	92.33	95.84	97.06	94.84
Fourth	95.14	91.15	95.60	93.10
Highest	87.37	96.61	91.45	92.28
Total (%)	90.40	92.46	95.72	92.40
Total (N)	437	492	462	1,391
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.4.12. Antenatal care attendance

<i>Antenatal care attendance among women with a live birth in the past two years, Ghana 2022</i>				
Background characteristic	≥ 1 antenatal visit	≥ 4 antenatal visits	≥ 1 antenatal visit and at least 1 antenatal visit accompanied by their spouse	≥ 1 antenatal visit and receiving an ITN
Age				
15–24	97.58	91.93	37.24	71.85
25–34	99.03	95.11	40.87	67.04
35–44	99.50	96.05	36.06	69.15
≥ 45	98.64	98.21	29.04	60.83
Residence				
Urban	99.05	96.05*	40.26	64.09
Rural	98.53	92.69	36.16	75.48***
Zone			***	
Southern	99.15	95.78	35.84	68.26
Forest	98.56	93.50	35.05	68.07
Northern	99.03	96.20	54.71***	69.78
Wealth quintile				
Lowest	98.06	90.38	39.62	71.79
Second	99.11	93.53	33.07	76.94***
Middle	98.14	92.91	29.53	72.20
Fourth	98.68	96.40	43.13	64.49
Highest	100.00***	98.65***	46.14***	60.19
Percentage of women	98.76	94.02	39.93	71.98
Total (N)	1,857	1,739	1,738	1,738
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.4.13. Use of IPTp by women during pregnancy.	
Background characteristic	Percentage who received at least 1 dose of sulfadoxine pyrimethamine/Fansidar
Age	
15–24	92.56
25–34	96.48
35–44	98.56
≥ 45	88.68
Number of ANC visits	
1–3	95.07
4+	96.75
Residence	
Urban	96.70
Rural	95.08
Zone	
Southern	97.64
Forest	94.44
Northern	97.27
Education	
No education	94.42
Primary	96.73
Secondary	95.08
More than secondary	96.94
Wealth quintile	
Lowest	96.89
Second	95.21
Middle	95.12
Fourth	96.27
Highest	96.96
Total (%)	96.07
Number of Women	1,857
Note: percent of women with two or more doses is missing, due to a skip error	

A.3.5 Insecticide-Treated Net Use

Table A.3.5.2. Knowledge of malaria prevention using bed net or ITN				
<i>Percentage of respondents that know bed nets or ITNs are a method of malaria prevention, according to background characteristics, Ghana 2022</i>				
Background characteristics	Southern	Forest	Northern	All zones
Sex				
Female	65.41	76.94	92.53	73.48
Male	69.92	76.54	92.73	75.24
Age				
15–24	65.13	75.03	95.08	73.82
25–34	68.11	78.73	94.15	75.77
35–44	66.30	77.06	93.61	73.95
≥ 45	69.55	74.28	86.49	73.08
Residence				
Urban	64.70	75.32	90.74	70.89
Rural	78.38***	79.27	94.22	81.88***
Level of education				
None	66.63	79.09	92.78	80.62
Primary	69.58	76.48	91.81	74.71**
Secondary or higher	66.15	76.66	93.27	72.54
Wealth quintile				
Lowest	78.14***	85.61*	85.61	86.32***
Second	74.94	78.39	78.39	79.83
Middle	72.70	78.46	78.46	77.20
Fourth	66.38	74.97	74.97	71.85
Highest	61.37	73.53	73.53	67.21
Total (%) ***	67.60	76.75	92.62	74.34
Total (N)	2,812	2,707	1,500	7,019
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A.3.5.3a. Favorable attitudes towards ITNs				
<i>Respondents with specific attitudes towards mosquito nets by zone, Ghana 2022</i>				
	Southern	Forest	Northern	All zones
Agree that it is easier to get a good night's sleep when I sleep under a mosquito net***	61.78	74.33	90.77	70.43
Disagree that it is not easy to sleep under a net because every night you have to unfold it and cover the sleeping space***	55.14	50.38	38.04	51.18
Disagree that I do not like sleeping under a mosquito net when the weather is too warm	22.59	24.41	29.11	24.11
Disagree that sleeping under a net is an inconvenience for a couple that wants to make children*	61.07	57.45	65.99	60.06
Disagree that the smell of the insecticide makes it uncomfortable for me to sleep under a mosquito net***	42.38	42.66	56.75	44.11
Agree that mosquito nets are generally easy to use for sleeping***	70.65	81.96	90.41	77.73
Agree that ITNs do not pose a risk to one's health***	59.11	66.44	70.31	63.52
Agree that mosquito nets are very useful***	89.93	96.34	97.05	93.49
Disagree that more expensive mosquito nets are more effective than cheaper or free mosquito nets	54.57	51.33	54.85	53.21
Agree that there are actions I can take to help my mosquito net last long***	78.40	84.85	94.12	82.94
Agree that I can protect my family against malaria by taking care of my mosquito net***	80.75	90.55	95.55	86.63
Agree that other people in this community fix holes in their mosquito nets***	39.56	53.65	66.22	48.61
Percent of respondents with favorable attitudes towards ITNs^a				
Sex				
Female	79.66	88.46	91.57	84.80
Male	76.89	88.94	92.00	83.79
Age				
15–24	80.95	88.93	93.49	86.45
25–34	76.19	86.77	90.75	82.45
35–44	82.78*	89.75	92.47	86.90*
≥ 45	74.22	89.74	91.39	82.22
Residence				
Urban	73.92	87.14	87.91	80.27
Rural	94.54***	91.45*	95.06	93.10***
Level of education				
None	82.55	87.38	93.14	88.20***
Primary	83.03**	90.96*	91.34	87.51
Secondary or higher	73.90	86.54	90.47	80.44

Wealth quintile				
Lowest	92.52***	94.66	93.51	93.68***
Second	89.47	91.44	94.68	91.25
Middle	81.47	90.38	89.07	86.32
Fourth	78.65	87.37	81.27	82.93
Highest	70.13	84.75	96.41	76.73
Total (%)***	78.31	88.70	91.77	84.30
Total (N)	2,834	2,727	1,521	7,082

^a Total score of all 12 indicators is ≥ 1 .

Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)

Table A.3.5.4. Perceived self-efficacy to use ITNs				
<i>Respondents with specific self-efficacy to use ITNs by zone, Ghana 2022</i>				
	Southern	Forest	Northern	All zones
Agree that they could sleep under a mosquito net for the entire night when there are lots of mosquitoes***	85.84	89.44	95.47	89.28
Agree that they could sleep under a mosquito net for the entire night when there are few mosquitoes***	71.33	81.72	91.08	79.54
Agree that they could sleep under a mosquito net every night of the year***	53.35	60.32	71.30	59.86
Agree that they could get all of your children to sleep under a mosquito net every night of the year ***	71.22	77.23	77.50	74.88
Percent of respondents with perceived self-efficacy to use ITNs ^a				
Sex				
Female	63.52***	73.60*	79.73**	73.53***
Male	55.43	68.56	70.98	67.58
Age				
15–24	59.82	70.75	81.84	74.86
25–34	58.19	71.87	70.70	71.30
35–44	63.71	70.58	79.35	72.80
≥ 45	55.84	70.99	74.51	70.06
Residence				
Urban	55.24	68.31	70.06	65.71
Rural	75.59***	76.03*	80.35	78.27***
Level of education				
None	68.23***	75.92**	77.40	77.67***
Primary	65.23	74.41	76.08	74.19
Secondary or higher	53.78	66.91	72.85	66.42
Wealth quintile				
Lowest	78.75***	81.30**	76.63	81.83***
Second	73.30	76.21	79.81*	79.12
Middle	66.77	72.17	78.41	72.46
Fourth	57.53	70.74	70.78	67.02
Highest	49.13	63.76	56.94	59.77
Total (%)	66.06	73.85	80.21	72.10
Total (N)	2,834	2,727	1,521	7,082

^a Total score for the three indicators should be ≥ 1 .

*Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)*

Table A.3.5.5. Perceived response efficacy of ITNs				
<i>Respondents with specific perceived response efficacy by zone, Ghana 2022</i>				
Percent Respondents	Southern	Forest	Northern	All zones
Disagree that mosquito nets only prevent mosquito bites when used on a bed***	31.61	39.10	55.10	37.46
Disagree that the chances of getting malaria are the same whether or not I sleep under a mosquito net***	54.90	49.18	71.75	54.32
Agree that sleeping under a mosquito net every night is the best way to avoid getting malaria ***	86.57	91.97	95.16	89.86
Percent of respondents with perceived response efficacy of ITNs ^a				
Sex				
Female	61.40	62.81**	79.02	64.06
Male	63.54	56.28	80.97	62.26
Age				
15–24	56.56	59.61	72.74	60.24
25–34	60.78	60.74	80.94	63.25
35–44	64.83	58.63	79.63	63.69
≥ 45	63.57	59.31	83.32	63.68
Residence				
Urban	57.18	57.63	79.78	59.07
Rural	81.89***	63.00	80.07	72.16***
Level of education				
None	62.78	54.80	79.32	67.20
Primary	67.69**	59.97	79.20	64.96
Secondary or higher	58.18	59.90	81.50	60.60
Wealth quintile				
Lowest	80.70***	58.33	80.55	72.29***
Second	73.06	58.89	78.81	68.17
Middle	65.69	59.17	78.18	64.07
Fourth	57.99	59.64	80.31	59.99
Highest	56.79	61.31	85.67	59.49
Total (%)***	62.44	59.57	79.94	63.18
Total (N)	2,834	2,727	1,521	7,082
^a Total score for the three indicators should be ≥ 1.				
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A 3.5.6a Perceived gender norms regarding ITNs

Respondents with perceived equitable gender norms regarding ITN use by region (administrative unit), Ghana 2022

Background characteristic	Southern		Forest		Northern		All zones	
	When there are not enough nets, disagree that it is more important that female children sleep under the available nets rather than male children.	When there are not enough nets, disagree that it is more important that male children sleep under the available nets rather than female children	When there are not enough nets, disagree that it is more important that female children sleep under the available nets rather than male children.	When there are not enough nets, disagree that it is more important that male children sleep under the available nets rather than female children	When there are not enough nets, disagree that it is more important that female children sleep under the available nets rather than male children.	When there are not enough nets, disagree that it is more important that male children sleep under the available nets rather than female children	When there are not enough nets, disagree that it is more important that female children sleep under the available nets rather than male children***	When there are not enough nets, disagree that it is more important that male children sleep under the available nets rather than female children***
	% disagreed	% disagreed	% disagreed	% disagreed	% disagreed	% disagreed	% disagreed	% disagreed
Sex								
Female	87.19	89.48	59.03	70.86	89.53	92.67	78.89	85.26
Male	87.32	90.46	61.74	74.96*	94.69**	98.42***	79.91	86.82*
Age								
15-24	80.20	81.66	54.06	67.46	86.55	89.06	73.74	80.65
25-34	90.00	92.39	58.07	71.58	90.93	94.38	79.82	86.28
35-44	91.13***	92.52**	61.66	74.17	93.07	97.07	81.33***	87.34**
45 and above	81.02	86.32	65.01	75.59	95.45**	98.41**	78.34	85.47
Residence								
Urban	85.63	88.05	58.72	72.35	91.90	94.88	77.00	83.53
Rural	93.26***	97.04***	63.30	73.83	91.97	95.78	81.21	87.68

Level of education								
None	80.04	82.75	58.51	65.24	91.12	94.62	83.04	86.76
Primary	89.82*	91.89*	57.08	72.21	93.28	95.26	78.24	85.38
Secondary or higher	86.21	89.43	64.06*	74.76	91.56	96.39	78.66	85.49
Wealth quintile								
Lowest	93.12**	95.71**	59.19	68.43	90.92	95.15	82.52	88.51
Second	91.12	94.00	58.17	70.98	92.48	94.97	80.22	86.18
Middle	87.67	91.17	57.09	67.23	91.84	94.21	78.48	84.68
Fourth	88.32	89.93	62.43	77.42	93.94	96.55	78.02	84.94
Highest	83.86	86.87	61.67	75.10	91.93	97.71	76.34	83.73
Total (%)	89.23	92.37	62.36	73.81	90.49	94.36	79.13	85.63
Total (N)	2,832	2,832	2,715	2,715	1,493	1,490	7,040	7,037
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>								

Table A 3.5.6b Perceived community norms regarding ITNs

Respondents with perceived norms regarding ITN use by Zone (administrative unit), Ghana 2022

	Southern		Forest		Northern		All	
Background characteristic	Agree that at least half of the community members who have nets use them nightly	Agree that at least half of the community members approve of using a net every night	Agree that at least half of the community members who have nets use them nightly	Agree that at least half of the community members approve of using a net every night	Agree that at least half of the community members who have nets use them nightly	Agree that at least half of the community members approve of using a net every night	Agree that at least half of the community members who have nets use them nightly	Agree that at least half of the community members approve of using a net every night
Sex								
Female	37.09***	5.09	49.62***	9.82	77.90***	16.41	52.28***	8.68
Male	22.99	7.98	37.08	12.25	55.37	19.05	38.19	10.61**
Age								
15-24	37.71	5.92	52.05**	15.08	76.79	18.09	55.24***	11.05*
25-34	29.24	4.38	45.22	9.36	67.97	15.96	49.94	7.66
35-44	28.50	4.73	43.56	11.62	68.66	18.89	47.58	9.17
45 and above	31.14	11.81**	36.11	10.44	58.08	18.41	43.39	10.62
Residence								
Urban	27.49	7.02	37.27	9.23	59.37	18.09	39.75	7.45
Rural	40.33***	4.55	54.34***	14.20	74.21***	17.27	57.77***	10.79
Level of education								
None	42.30***	5.01	50.45***	16.84	73.74*	24.32**	65.15***	14.61**
Primary	33.87	6.59	48.54	11.26	64.91	13.93	48.34	8.06
Secondary or higher	25.57	6.64	37.00	9.87	61.87	13.09	42.23	8.25
Wealth quintile								
Lowest	41.49	7.38	58.32***	14.34	70.61	15.52	58.42***	12.96**
Second	42.63***	5.74	46.81	14.26	67.29	18.34	48.83	11.60
Middle	32.95	8.41	47.20	14.97*	58.48	17.18	42.13	12.32

Fourth	29.17	5.84	41.37	10.24	72.10	18.54	37.30	8.62
Highest	23.41	6.05	34.81	5.79	66.65	24.53	29.27	6.54
Total (%)	34.92	4.91	48.84	9.97	75.30	15.65	48.89	9.15
Total (N)	2,832	2,832	2,719	2,719	1,502	1,502	7,053	7,053
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>								

Table A.3.5.7. Household possession of mosquito nets		
Background characteristic	Percentage of households with at least one ITN	Percentage of households with at least one ITN* for every two persons who stayed in the household last night
Zone		
Southern	51.18	27.13
Forest	65.10	37.66***
Northern	78.67***	29.86
Residence		
Urban	80.95***	45.67***
Rural	50.73	25.77
Wealth quintile		
Lowest	80.21***	41.36
Second	77.04	44.76***
Middle	61.63	34.91
Fourth	54.14	27.51
Highest	44.91	21.66
Total (%)	59.89	31.78
Total (N)	5,284	5,267
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>		

Table A.3.5.8. Access to an ITN

Percentage of the de facto population with access to an ITN in the household, according to background characteristics, Ghana 2022

Percentage of the de facto population with access to an ITN	Southern	Forest	Northern	Total
Residence				
Urban	70.04***	60.84***	60.13*	63.34***
Rural	34.98	45.94	48.40	40.67
Wealth quintile				
Lowest	63.12	62.11	58.29	60.99
Second	65.39***	63.07***	56.71	62.52***
Middle	45.00	54.34	47.92	49.21
Fourth	36.05	47.66	50.31	42.91
Highest	31.26	41.91	51.39	36.52
Total (%)**	42.89	51.87	54.21	48.34
Total (N)	8,087	8,244	5,320	21,677
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.5.9. Use of ITN by persons in the household

Percentage of the de facto household population who slept the night before the survey under an insecticide-treated net (ITN) the night before the survey, according to background characteristics, Ghana 2022

Percentage who slept under an ITN last night	Southern	Forest	Northern	Total
Age				
0–4	32.42***	33.57***	30.39	32.54***
5–14	24.44	27.32	28.02	26.23
15–24	18.15	21.44	34.09	21.68
25 and above	21.38	25.72	30.07	24.31
Sex				
Female	24.34**	27.68*	31.69	26.74***
Male	21.71	25.65	28.16	24.43
Residence				
Urban	47.59***	32.96***	37.80*	38.27***
Rural	16.12	22.71	22.24	19.31
Wealth quintile				
Lowest	49.93***	41.24***	34.88	41.24***
Second	43.20	35.23	36.05*	38.39
Middle	22.69	29.87	26.49	26.15
Fourth	18.32	20.89	16.54	19.40
Highest	11.25	17.88	22.71	14.47
Number of ITNs in household				
< 1 net per 2 people	17.05	22.94	25.71	20.72
≥ 1 net per 2 people	60.47**	63.30***	56.68***	61.37***
Total (%)	23.21	26.78	29.78	25.69
Total(N)	8,087	8,244	5,320	21,677
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A.3.5.10. ITN use:access ratio

<i>ITN use:access ratio, according to background characteristics, Ghana 2022</i>				
ITN use:access ratio	Southern	Forest	Northern	Total
Residence				
Urban	0.72	0.58	0.65	0.63
Rural	0.50	0.52	0.44	0.50
Wealth quintile				
Lowest	0.86	0.73	0.61	0.72
Second	0.71	0.61	0.65	0.66
Middle	0.51	0.57	0.50	0.54
Fourth	0.56	0.48	0.36	0.50
Highest	0.37	0.41	0.41	0.39
Total	0.57	0.55	0.55	0.56
Number of households	2,180	2,081	1,004	5,265

Table A 3.5.11 Use of existing ITNs

Percentage of ITNs used the previous night and every night, by background characteristics, Ghana 2022

Background characteristic	Southern		Forest		Northern		Total	
	% of ITNs used the previous night	% of ITNs used every night of the previous week	% of ITNs used the previous night	% of ITNs used every night of the previous week	% of ITNs used the previous night	% of ITNs used every night of the previous week	% of ITNs used the previous night*	% of ITNs used every night of the previous week
Residence								
Urban	63.35***	52.58***	61.21*	50.46	68.18***	53.72***	63.25***	51.78***
Rural	45.04	36.93	54.23	46.20	48.48	27.85	49.32	39.94
Wealth quintile								
Lowest	74.41***	68.26***	69.22***	61.42***	65.45	50.21	69.46***	59.78***
Second	63.03	54.21	64.69	54.23	61.75	50.43***	63.53	53.59
Middle	48.77	39.31	56.86	45.35	55.62	38.69	53.13	41.92
Fourth	45.49	34.45	52.53	43.97	48.24	23.13	49.38	38.46
Highest	38.02	29.88	47.62	40.06	54.25	26.05	43.25	34.02
% of nets used	50.96	41.99	57.30	48.07	59.57	42.42	55.02	44.79
Total (%)	2,878	2,878	3,240	3,240	1,783	1,783	7,901	7,901
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>								

Table A.3.5.12. ITN characteristics

<i>Percentage of nets with specific characteristics, by region Ghana 2022</i>				
Background characteristic	Southern	Forest	Northern	All zones
% of nets that are ITN***	95.77	94.22	98.50	95.43
% of ITNs obtained for free	97.05	96.39	97.73	96.84
Source of ITN				
Mass distribution campaign	83.50	86.69	88.43	85.76
Prenatal consultation (PNC)	8.96	7.39	10.06	8.39
Immunization	1.53	1.36	0.61	1.31
Other	6.01	4.56	0.90	4.55
% of ITNs ≥ 3 years old***	4.70	4.40	1.32	4.05
Color of ITN				
White	54.56	40.03	40.84	45.61
Blue	42.26	56.39	50.85	50.24
Green	0.60	1.04	1.48	0.94
Black	0.00	0.02	0.00	0.01
Other color	2.51	2.34	6.04	2.97
Total (N)	2,878	3,240	1,783	7,901
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

Table A.3.5.13. ITN care and repurposing

<i>Care and repurposing of ITNs, by region Ghana 2022</i>				
Background characteristic	Southern	Forest	Northern	All zones
Location of ITN				
Suspended at sleeping place	9.97	20.68	18.14	16.26
Suspended, folded, and tied	42.14	38.65	43.44	40.69
Not suspended but not stowed	8.57	3.79	11.47	6.75
Unpacked but stowed	13.67	11.91	18.33	13.54
Still stowed under packaging	25.66	24.96	8.63	22.76
% ITNs ever washed***	48.80	36.96	73.54	49.65
Product used to wash ITN				
Soap	67.91	66.88	85.63	71.65
Detergent	27.22	27.47	11.36	23.62
Bleach	0.02	1.07	0.20	0.46
Mix	3.65	1.97	2.39	2.73
Nothing	1.19	2.61	0.42	1.54
Where ITN was dried				
Out in the shade	38.64	47.05	54.41	45.47
Out in the sun	59.82	51.63	40.62	52.27
Inside	1.26	0.93	4.92	1.99
Other	0.27	0.39	0.05	0.26
% of respondents who practice net care behavior***	71.00	83.55	94.41	79.64
% of respondents who repurpose nets	15.39	12.41	16.64	14.57
<i>Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)</i>				

A.3.6 Seasonal Malaria Chemoprevention

Table A.3.6.2. Knowledge of SMC program	
<i>Percent of respondents with knowledge of the SMC program by zone (administrative unit), Ghana 2022</i>	
Background characteristic	Northern Zone
Percent of respondents who:	
Have heard of the medicine given to children under five years old to prevent malaria during the rainy season	91.42
Knows how many days a month in the rainy season the medication should be given to prevent malaria	71.92
Age	
15–24	63.73
25–34	75.06
35–44	71.41
≥ 45	75.81*
Residence	
Urban	70.57
Rural	73.09
Level of education	
None	71.45
Primary	72.27
Secondary or higher	72.31
Wealth quintile	
Lowest	72.91
Second	67.92
Middle	68.25
Fourth	79.47
Highest	79.47
Total (N)	1,156
<i>Significant differences * ($p < 0.05$)</i>	

Table A.3.6.3. Favorable attitudes towards SMC

Percent of respondents that agree with the following statements	Northern Zone
Agree that leaders in the community support the distribution of the medication that prevents malaria in children during the rainy season.	86.87
Disagree that the community health workers who distribute the medication that prevents malaria in children in my community force parents to accept the medication.	15.87
Disagree that healthy children do not need to take the medication to prevent malaria in children during the rainy season.	91.36
Disagree that the medication given to prevent malaria during the rainy season can harm children.	52.92
Agree that one does not pay for the medications that prevent malaria in children during the rainy season.	80.15
Disagree that when children take SMC, sleeping under ITNs is no longer necessary to prevent malaria	73.23
Agree that it is important to give their child all the doses of the medication that prevents malaria during the rainy season left by the distributors.	91.23
Percent of respondents with favorable attitudes towards SMC^a	
Age	
15–24	85.1
25–34	88.28
35–44	90.25
≥ 45	95.34*
Residence	
Urban	89.51
Rural	88.28
Level of education	
None	88.83
Primary	88.58
Secondary or higher	89.36
Wealth quintile	
Lowest	87.01
Second	89.99
Middle	90.78
Fourth	91.41
Highest	91.41
Total (%)	89.62
Total (N)	1,156
^a Total score of all seven indicators is ≥ 1. Significant differences * ($p < 0.05$)	

Table A.3.6.4. Perceived response efficacy of SMC

Percent of respondents that note the following statements	Northern
Agree that the medication given to children to prevent malaria during the rainy season is effective in preventing malaria	94.21
Agree that the SMC medication will not work well if my child does not take all of the doses	86.67
Percent of respondents with perceived response efficacy of SMC^a	
Age	
15–24	85.91
25–34	89.35
35–44	90.92
≥ 45	86.67
Residence	
Urban	88.18
Rural	89.58
Level of education	
None	89.69
Primary	86.24
Secondary or higher	92.11
Wealth quintile	
Lowest	89.78
Second	89.58
Middle	84.72
Fourth	89.77
Highest	89.77
Total (%)	88.93
Total (N)	1,156
^a Total score of all two indicators is ≥ 1.	

Table A.3.6.5. Perceived self-efficacy regarding SMC

Table A.3.6.5. Perceived self-efficacy regarding SMC	
Northern	Give my child all the SMC pills left with me by the distributor
Background characteristics	
Age	
15–24	90.67
25–34	94.68
35–44	94.97
≥ 45	94.93
Residence	
Urban	93.33
Rural	94.64
Level of education	
None	95.94
Primary	91.16
Secondary or higher	95.05
Wealth quintile	
Lowest	94.80
Second	96.33
Middle	92.78
Fourth	89.82
Highest	89.82
Total %	94.03
Total (N)	1,156

Table A.3.6.6. Perceived norms regarding SMC

Northern Zone	Percent of respondents that perceive that at least half of the children in the community take the medication to prevent malaria during the rainy season
Background characteristics	
Age	
15–24	64.15
25–34	70.94
35–44	70.48
≥ 45	78.94
Residence	
Urban	65.79
Rural	74.01
Level of education	
None	70
Primary	65.92
Secondary or higher	78.26
Wealth quintile	
Lowest	72.08*
Second	70.83
Middle	57.14
Fourth	74.52
Highest	74.52
Total (%)	70.2
Total (N)	1,156
<i>Significant differences * ($p < 0.05$)</i>	

Table A.3.6.8. Decision making regarding SMC (women)

Northern	Percent of respondents involved in decision making regarding SMC
Background characteristics	
Age	
15–24	46.89
25–34	46.95
35–44	48.33
≥ 45	59.36
Residence	
Urban	49.26
Rural	47.47
Level of education	
None	44.25
Primary	50.10
Secondary or higher	54.70
Wealth quintile	
Lowest	49.34
Second	43.61
Middle	53.09
Fourth	55.63
Highest	55.63
Total (%)	48.33
Total (N)	1,043

Table A.3.6.9. Presence of SMC program in communities

Northern		Percent of women noting presence of the SMC program in their communities
Background characteristics		
Age		
15–24		77.22
25–34		89.41*
35–44		88.62
≥ 45		80.14
Residence		
Urban		86.43
Rural		85.81
Level of education		
None		87.52
Primary		83.7
Secondary or higher		87.31
Wealth quintile		
Lowest		85.45
Second		88.03
Middle		86.16
Fourth		86.47
Highest		86.47
Total (%)		86.1
Total (N)		1167
<i>Significant differences * ($p < 0.05$)</i>		

Table A.3.6.10. Receipt of SMC in households during the most recent rainy season	
Northern	Percent of respondents
Child under five present in the household	
Yes	90.32***
No	38.48
Percent of respondents with child under five reporting SMC health worker visits	
Residence	
Urban	89.21
Rural	87.86
Wealth quintile	
Lowest	88.63
Second	84.63
Middle	88.01
Fourth	92.16
Highest	92.16
Total (%)	88.51
Total (N)	769
<i>Significant differences *** ($p < 0.001$)</i>	

Table A.3.6.11. Proportion of children three to 59 months who received the first dose of the most recent cycle of SMC	
Northern	Proportion of children three to 59 months who received the first dose during the most recent cycle of SMC
Residence	
Urban	85.57
Rural	79.78
Wealth quintile	
Lowest	87.86
Second	80.97
Middle	79.25
Fourth	80.46
Highest	80.46
Total (%)	82.62
Total (N)	548

A.3.7 Indoor Residual Spray

Table A.3.7.2. Knowledge of IRS			
<i>Respondents with awareness of the IRS program by zone, Ghana 2022</i>			
Background characteristic	Forest† (Percent of respondents who know about the IRS Program)	Northern‡ (Percent of respondents who know about the IRS Program)	All zones (Percent of respondents who know about the IRS Program)
Sex			
Female	98.41	97.30	97.74
Male	100.00	100.00	100.00
Age			
15–24	100.00	96.75	98.17
25–34	97.15	96.17	96.56
35–44	100.00	100.00	100.00
≥ 45	100.00	100.00	100.00
Residence			
Urban	99.07	98.38	98.69
Rural	No rural EAs	99.15	99.15
Level of education			
None	100.00	99.57	99.60
Primary	97.23	96.93	97.08
Secondary or higher	100.00	97.88	99.06
Wealth quintile			
Lowest	100.00	100.00	100.00
Second	59.56	100.00	98.14
Middle	100.00	97.69	98.78
Fourth	100.00	90.84	95.89
Highest	100.00	100.00	100.00
Total (%)	96.88	96.97	96.95
Total (N)	64	198	262
† IRS data applies to two EAs in the forest zone.			
‡ IRS applies to eight EAs of the north.			

Table A.3.7.3. Attitudes towards IRS

<i>Respondents with positive attitudes towards IRS by Zone, Ghana 2022</i>			
Percent of respondents that agree with the following statements	Forest	Northern	All zones
Disagree that many people develop skin problems (rashes, itching) after the walls inside their houses are sprayed with insecticide	45.81	63.68	57.04
Agree that after spraying the interior walls of a household with insecticide, a person can touch the walls safely once the spray has dried	87.05	70.94	76.93
Disagree that people have problems with bugs/bed bugs after the walls are sprayed*	65.03	83.24	76.47
Agree that the benefits of having my house sprayed is worth the effort needed to move my belongings out so it can be sprayed*	98.14	89.38	92.63
Disagree that it's a bother to leave their possessions outside of my house while walls are being sprayed.	39.29	57.35	50.64
Agree that spraying the inside walls of a house to kill mosquitoes does not cause any health problems for the people living in the house*	97.20	79.23	85.92
Percent of respondents with positive attitudes towards IRS			
Residence			
Urban	72.88	80.44	77.07
Rural	No rural EAs	81.67	81.67
Total (%)	72.88	80.77	77.83
Total (N)	64	197	261
^a Total score of six indicators is < 1.			

Table A.3.7.4. Perceived response efficacy of IRS

<i>Percent distribution of respondents with perceived response efficacy of IRS by zone, Ghana 2022</i>			
Percent of respondents that agree with the following statements	Forest	Northern	All zones
Spraying the inside walls of a house is an effective way to prevent malaria*	96.76	85.35	89.61
People who live in houses that have been sprayed are less likely to get malaria*	95.83	76.27	83.59
Percent of respondents with perceived IRS efficacy (%)^a			
Residence			
Urban	94.46	79.59	86.26*
Rural	No Rural EAs	42.29	42.29
Total (%)	94.46	69.69	78.96
Total (N)	96	150	256
^a Total score of two indicators is ≥ 1 <i>Significant differences * (p < 0.05)</i>			

Table A.3.7.5. Perceived self-efficacy regarding IRS			
<i>Percent of respondents with perceived self-efficacy of IRS by region, Ghana 2022</i>			
Background characteristic	Forest	Northern	All zones
Percent of respondents that can do the following			
Move all my furniture out of my house to prepare the house for spraying	96.27	90.25	92.50
Sleep in my house on the night it is sprayed	91.27	89.53	90.18
Percent of respondents with perceived self-efficacy regarding IRS			
Residence			
Urban	89.41	83.83	86.33
Rural	No Rural EA	83.21	83.21
Total (%)	89.41	83.67	85.82
Total (N)	96	159	255

Table A.3.7.6. Willingness to accept IRS			
<i>Percent distribution of individuals willing to accept IRS, Ghana 2022</i>			
Characteristic	Forest	Northern	All
Residence			
Urban	98.14	89.42	93.31
Rural	No rural EAs	94.07	94.07
Willingness to accept IRS	98.14	90.66	93.44
Total (N)	96	163	259

Table A.3.7.7. IRS coverage			
<i>Percent of households with IRS coverage by zone, Ghana 2022</i>			
Household characteristics	Forest	Northern	All zones
Residence			
Urban	89.85	98.84***	98.84***
Rural	No rural EAs	84.80	87.05
Total percent of households receiving IRS (%)	89.85	88.74	89.15
Total (N)	44	149	193
<i>Significant differences *** ($p < 0.001$)</i>			

A.3.8 Media Consumption and Message Exposure

Table A.3.8.1. Radio Listenership at Least Once a Week

Percent distribution of radio listenership at least once a week among all respondents and respondents in households with a radio by zone (administrative unit), Ghana 2022

Characteristic	Southern		Forest		Northern		Total	
	All respondents	Respondents in households with a radio	All respondents	Respondents in households with a radio	All respondents	Respondents in households with a radio	All respondents*	Respondents in households with a radio***
Sex								
Female	45.04	64.60	51.86	66.47	57.76	75.85	49.41	66.61
Male	67.33***	77.03***	67.60***	77.09***	74.21***	83.62*	68.18***	77.64***
Residence								
Urban	53.81	69.58	59.22	70.18	68.97	78.51	57.11	70.38
Rural	63.63*	77.52*	60.37	75.28	62.42	80.43	61.78	76.91***
Age								
15-24	38.10	58.89	48.24	60.99	51.40	71.26	44.67	61.50
25-34	51.91	67.74	50.44	63.25	64.62	78.54	52.84	66.95
35-44	58.53	70.63	68.12	79.89***	68.64	82.48	63.84***	75.82
45 and above	63.92***	79.46**	65.83***	75.19	70.74**	80.88	65.33	77.83***
Level of education								
None	53.48	69.33	53.23	68.79	59.72	79.43	55.88	72.67
Primary	54.05	70.25	58.84	73.50	60.43	73.12	56.85	71.98
Secondary or higher	57.73	72.35	61.45	71.06	77.82***	86.16	60.76	72.68
Wealth quintile								
Lowest	48.31	74.65	53.84	76.51	59.59	79.50	54.47	77.21

Second	56.98	73.41	59.67	74.62	58.09	76.72	58.31	74.51*
Middle	56.70	73.87	59.38	74.22	69.89	76.10	59.32	74.25
Fourth	52.33	68.69	59.79	72.77	76.86	80.02	57.20	71.25
Highest	59.10	70.73	61.87	68.30	87.17***	90.23	61.08	70.33
Total (%)*,***	55.90	71.29	59.63	71.99	65.45	79.58	58.57	72.39
Total (N)	2,834	1,739	2,727	1,636	1,521	812	7,082	4,187
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>								

Table A.3.8.2. Preferred time to listen to radio

<i>Preferred time to listen to radio Ghana 2022</i>						
Background Characteristic	Early in the morning	Late morning	Afternoon	Early in the evening	Late evening	Night
Zone						
Southern	31.78	34.16***	15.11	12.50	6.05	0.41
Forest	43.84***	19.34	14.34	13.06	8.25	1.17
Northern	17.98	16.31	12.40	28.34***	23.84***	1.13
Sex						
Female	33.40	23.44	16.81**	15.45	10.10	0.80
Male	37.13	26.93	12.61	14.03	8.44	0.86
Residence						
Urban	36.71	27.69***	14.38	11.95	8.56	0.71
Rural	32.97	20.63	14.58	20.30***	10.43	1.10
Age						
15-24	27.16	19.86	21.15	20.05**	10.22	1.56
25-34	31.22	26.99	13.62	17.14	10.73	0.29
35-44	38.62	24.48	13.88	13.52	8.60	0.90
45 and above	38.77***	26.55	14.10	11.63	7.79	1.16
Education						
No education	21.45	18.97	14.76	27.26***	15.46*	2.10
Primary	35.85	26.07	15.54	13.73	8.27	0.53
Secondary	34.24	28.10*	14.50	14.01	8.37	0.79
More than secondary	45.99***	22.45	11.34	10.29	9.02	0.90
Wealth quintile						
Lowest	26.49	18.46	16.69	21.25***	15.52**	1.60
Second	33.37	21.19	13.68	19.55	11.99	0.22
Middle	35.06	28.06**	12.36	15.40	7.62	1.50

Fourth	38.24*	24.85	14.57	13.80	8.20	0.34
Highest	35.73	27.02	15.14	12.64	8.71	0.76
Total (%)	35.50	25.41	14.44	14.65	9.16	0.84
Total (N)	1,485	1,063	604	613	383	35
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>						

Table A.3.8.3. Television Viewership at Least Once a Week

Television viewership at least once a week, among all respondents and respondents in households with a television, Ghana 2022

Background Characteristic	Southern		Forest		Northern		All	
	All respondents	Respondents in households with a television	All respondents	Respondents in households with a television	All respondents	Respondents in households with a television	All respondents***	Respondents in households with a television
Sex								
Female	80.12	91.76***	78.18	90.98*	52.68	83.44	76.13	90.74***
Male	78.14	84.23	77.79	86.95	65.06***	91.64*	76.60	85.99
Residence								
Urban	83.71***	88.70*	83.04**	89.26	73.95***	89.51	82.71***	88.97*
Rural	62.31	84.12	68.99	88.20	45.11	84.27	62.35	86.40
Age								
15-24	76.54	90.96	77.19	88.37	53.85	89.37	73.83	89.54
25-34	79.54	87.00	82.36*	94.05**	63.85	87.11	78.82	89.99*
35-44	79.26	87.50	77.63	86.96	57.16	89.71	76.19	87.41
45 and above	79.44	88.93	72.48	84.55	53.52	82.95	74.20	86.77
Level of education								
None	57.15	72.66	52.34	81.95	45.26	81.14	51.06	78.23
Primary	75.28	88.15	74.19	88.84	51.78	83.10	72.83	88.20
Secondary or higher	85.40***	89.38**	85.87***	89.71	81.86***	95.16***	85.34***	89.87***
Wealth quintile								
Lowest	21.01	83.95	22.05	68.20	21.79	80.15	21.68	76.49
Second	55.91	74.33	65.18	81.86	67.19	84.11	61.83	79.75
Middle	80.33	86.48	81.78	86.94	84.64	87.55	81.45	86.81

Fourth	88.14	88.68	89.55	91.29	85.87	88.33	88.68	89.89
Highest	90.34***	90.69***	91.29***	91.36**	95.63***	95.63*	90.88***	91.11***
Total (%)	79.16	87.95	77.98	88.93	58.48	87.43	76.36	88.34
Total (N)	2,834	2,182	2,727	2,070	1,521	735	7,082	4,987
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>								

Table A.3.8.4. Preferred time to watch television

<i>Preferred time to watch television Ghana 2022</i>						
Background Characteristic	Early in the morning	Late morning	Afternoon	Early in the evening	Late evening	Night
Zone						
Southern	4.12	12.86***	6.91	33.36***	42.48	0.27
Forest	6.93	9.53	9.25***	31.92	41.51	0.87
Northern	10.97*	9.02	4.08	23.52	50.86	1.55
Sex						
Female	5.39	11.72	9.54***	34.69**	38.17	0.48
Male	6.55	10.36	5.82	28.96	47.50***	0.81
Residence						
Urban	5.83	11.57***	7.49	31.17	43.28***	0.66
Rural	6.34	9.57	8.30	33.82	41.38	0.59
Age						
15-24	7.36	11.64	10.16	31.88	37.58	1.39**
25-34	4.74	11.57	6.99	33.58	42.30	0.82
35-44	5.93	10.51	7.39	31.99	44.09	0.09
45 and above	7.22	10.82	8.14	29.07	43.89	0.87
Education						
No education	8.35	9.40	11.52	27.84	41.78	1.11
Primary	4.89	13.00***	8.30	31.68	41.75	0.37
Secondary	6.29	9.40	7.88	31.05	44.43***	0.96
More than secondary	6.83	10.36	4.48	35.34***	42.49	0.49
Wealth quintile						
Lowest	8.27	7.55	8.55	25.96	47.13***	2.53
Second	9.13***	9.30	8.56	34.03	37.62	1.36
Middle	5.75	11.80***	9.10***	34.19***	38.46	0.70
Fourth	5.50	10.94	7.87	30.77	44.71	0.22
Highest	5.06	11.37	6.31	30.87	45.86	0.53
Total (%)	5.96	11.05	7.70	31.86	42.79	0.64
Total (N)	291	539	375	1,554	2,087	31
<i>Significant differences * (p<0.05), ** (p<0.01), *** (p<0.001)</i>						

Table A.3.8.5. Mobile phone or tablet ownership				
Percent of respondents reporting personal ownership of mobile phone or tablet by zone, Ghana 2022				
Background Characteristic	Southern	Forest	Northern	All zones
Sex				
Female	87.67	86.04	72.70	85.25
Male	90.58*	94.20***	78.85*	90.92***
Residence				
Urban	91.16	93.36***	79.26	91.15***
Rural	81.41	84.22	72.37	81.09
Age				
15–24	86.00	83.52	67.67	76.52
25–34	90.09	91.60*	77.46	85.66***
35–44	92.55**	90.81	73.31	84.81
≥ 45	84.30	90.06	80.84*	82.59
Level of education				
None	79.89	79.23	63.48	68.71
Primary	84.18	86.88	77.99	81.46
Secondary or higher	94.35***	95.05***	88.13***	93.28***
Wealth quintile				
Lowest	71.00	70.23	71.15	70.76
Second	82.02	79.31	78.01	80.16
Middle	82.69	90.54	75.32	85.46
Fourth	93.02	95.37	80.81	93.46
Highest	95.76***	96.99***	80.89	95.77***
Total (%)***	89.09	90.07	75.57	88.02
Total (N)	2,834	2,727	1,521	7,082
<i>Significant differences * (p < 0.05), ** (p < 0.01), *** (p < 0.001)</i>				

Table A.3.8.6. Exposure to malaria messages

Percentage of respondents exposed to malaria messages in the last six months, by background characteristics, Ghana 2022

Background Characteristic	Southern	Forest	Northern	All zones
Sex				
Female	39.64***	56.68***	41.91	47.16***
Male	31.94	49.43	38.52	40.26
Residence				
Urban	34.87	55.98	40.59	43.75
Rural	39.64	47.98	40.09	43.88
Age				
				**
15–24	30.31	50.41	35.03	40.21
25–34	34.37	55.12	40.48	45.87
35–44	40.06*	56.56	41.58	47.81**
≥ 45	34.32	46.08	41.28	40.49
Education				
No education	34.18	31.86	29.08	35.69
Primary	36.61	52.12	39.18	43.41
Secondary	34.77	53.34***	46.55***	47.97***
More than secondary	37.03	66.19	71.07	56.99
Wealth quintile				
Lowest	28.01	30.75	37.40	32.42
Second	33.66	45.95	37.83	39.59
Middle	33.78	55.74	34.63	43.81
Fourth	34.79	55.55	43.84	45.08
Highest	39.86	60.79***	69.30***	49.02***
Total (%)***	35.89	53.10	40.33	43.79
Total (N)	2,834	2,727	1,521	7,082
Significant differences * ($p < 0.05$), ** ($p < 0.01$), *** ($p < 0.001$)				