REPUBLIC OF KENYA

MINISTRY OF HEALTH

Kenya Malaria Behaviour Survey - 2022

REPUBLIC OF KENYA

MINISTRY OF HEALTH

Kenya Malaria Behavior Survey 2022

Final Report
Ministry of Health

Division of National Malaria Programme
Nairobi, Kenya

April 2023

PMI U.S. PRESIDENT'S MALARIA INITIATIVE LED BY USAID FROM THE AMERICAN PEOPLE CDC

KNBS KENYA NATIONAL BUREAU OF STATISTICS *Keeping you informed*

NATIONAL MALARIA CONTROL PROGRAMME MINISTRY OF HEALTH KENYA

Breakthrough ACTION FOR SOCIAL & BEHAVIOR CHANGE

The 2022 Malaria Behavior Survey in Kenya was implemented by the Ministry of Health through the Division of the National Malaria Program and the Kenya National Bureau of Statistics. Funding for this survey was provided by the United States Agency for International Development (USAID) through the U.S. President's Malaria Initiative. Technical support was provided by the Breakthrough ACTION project, a USAID-funded project for social and behavior change. Data collection was undertaken by Innovation for Poverty Action in collaboration with the Division of the National Malaria Program.

Additional information about the 2022 Malaria Behavior Survey may be obtained from the Division of the National Malaria Program of the Ministry of Health, P.O Box 19982-00202, Kenyatta National Hospital, Nairobi, Kenya, Email: *malaria@health.go.ke*; Website: www.nmcp.or.ke or by visiting https://malaria behavior survey.org/

Data from the Malaria Behavior Survey in Kenya can be downloaded from the USAID Development Data Library. Please consult the "Country Datasets" section of the Malaria Behavior Survey website at https://malariabehaviorsurvey.org/all-resources/.

Recommended citation: Division of National Malaria Program [Kenya] and Breakthrough ACTION. Malaria Behavior Survey: Kenya 2022. Johns Hopkins Center for Communication Programs. March 2023. www.malariabehaviorsurvey.org

This report is made possible by the support of the American people through the United States Agency for International Development (USAID) under the Breakthrough ACTION Cooperative Agreement #AIDOAAA-17-00017. Breakthrough ACTION is based at the Johns Hopkins Center for Communication Programs. The contents of this report are the sole responsibility of Breakthrough ACTION and do not necessarily reflect the views of USAID, the United States Government, or Johns Hopkins University.

TABLE OF CONTENTS

Foreword vi
Preface vii
Acronym List viii
Executive Summary 1
Results 1
Sample Characteristics 1
Cross-Cutting Ideational Factors 2
Case Management for Fever in Children Under Five Years 2
Malaria in Pregnancy 3
Insecticide Treated Net (ITN) Use and Care 3
Indoor Residual Spraying (IRS) 4
Media Consumption and Message Recall 4
Recommendations 5
Management for Fever in Children Under Five Years 5
Malaria in Pregnancy 6
Mosquito Net Use and Care 6
Indoor Residual Spraying (IRS) 7
Media Consumption 7
Introduction 9
Context of Malaria in Kenya 9
Malaria Interventions in Kenya 10
Rationale for the Malaria Behavior Survey in Kenya 10
Goals and Objectives of the Malaria Behavior Survey 11
Conceptual Model of the Malaria Behavior Survey 11
Methodology 14
Survey Design 14
Sampling 14
Sample Size and Justification 14
Participant Inclusion and Exclusion Criteria 15
Cluster Selection 15
Household Selection 15
Participant Selection 16
Data Collection and Analysis 16
Data Collection Tools 16

Data Collection Procedures and Treatment 17
Data Analysis Procedures 17
Research Ethics 19
Results 21
Sample Description 21
Demographic Characteristics 21
Access to Health Services 22
Cross-Cutting Ideational Determinants 23
Knowledge of Malaria 23
Perceived Severity of Malaria 24
Interpersonal Communication with Spouse or Partner About Malaria 24
Interpersonal Communication with Friends/Family About Malaria 25
Malaria Case Management for Children Under Five Years Old 27
Ideational Variables Linked with Care-Seeking 27
Care-seeking Behaviors 30
Ideational Variables Linked with Malaria in Pregnancy, ANC, and IPTp 37
Factors Associated with ANC Intentions and Use 40
IPTp Intentions and Use 44
Insecticide-Treated Net Use 51
Ideational Variables Correlated with ITN Use 51
Household ITN Access and Individual Use 53
Net Care and Repurposing 55
Advanced Analysis 55
Indoor Residual Spraying 61
Ideational Variables Linked with Acceptance of IRS 61
Media Consumption and Message Exposure 65
Media Consumption 65
Message Exposure 66
Conclusions and Recommendations 70
Objective 1: Access to Appropriate Malaria Preventive Interventions 72
General Cross-cutting Ideational Factors 72
Malaria in Pregnancy 72
Ideational Factors Related to Malaria in Pregnancy 72
Insecticide-treated Nets (ITNs) 74
Indoor Residual Spraying (IRS) 76
Objective 2: Case Management 78

Cross-cutting Strategy: Social and Behavior Change 81
Key Findings 81
Recommendations 81
Implications for Future Research 83
Conclusion 84
Annex A: Data Tables for the 2022 Kenya MBS 85
A.2 Cross-Cutting Ideational Determinants 88
A.4 Malaria in Pregnancy 108
A.5 Insecticide-Treated Net Use 124
A.6 Indoor Residual Spraying (IRS) 138
A.7 Media Consumption and Message Exposure 144

List of Tables

Table 1. Socio-demographic Characteristics of Respondents 22

Table 2. Summary of Cross-Cutting Ideational Determinants 26

Table 3. Summary of Ideational Variables Related to Case Management for Children Under Age Five (N=2253) 33

Table 4. Location Where Care Was First Sought for a Child Under Five with Fever in the Two Weeks Preceding the Survey (n=238) 35

Table 5. Source of Artemisinin-based Combination Therapies (With or Without a Malaria Test) for Children Under 5 with Malaria-induced Fever in Two Weeks Preceding the Survey (n=133)* 35

Table 6. Logistic Regression Results for Factors Associated with Malaria Care-seeking for and Testing of Children with Fever in Two Weeks Preceding Survey 36

Table 7. Summary of Ideational Variables Related to Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) 46

Table 8. Reasons for Not Attending Early Antenatal Care (ANC) Among Women with a Live Birth in the Last Two Years (n=274) 48

Table 9. Factors Associated with Seeking Early Antenatal Care (ANC), Four or More ANC Visits, and Eight or More ANC Visits During the Next Pregnancy 49

Table 10. Summary of Ideational Variables Related to Insecticide-Treated Net (ITN) Use 57

Table 11. Household Members Who Slept Under an Insecticide-treated Net (ITN) the Night Preceding the Survey Among Household With Enough ITNs 58

Table 12. Care and Repurposing of Insecticide-treated Net (ITNs) 59

Table 13. Results of Multivariable Logistic Regression Examining Factors Associated with Nightly Insecticide-treated Net (ITN) Use Among Households with at Least One ITN 60

Table 14. Summary of Ideational Variables Related to Indoor Residual Spraying (IRS) 64

Table 15. Variables Related to Media Consumption and Malaria Message Exposure (N=2253) 67

Table 16. Characteristics of Mobile Phones (N=1783) 68

Table 17. Source of Malaria Message (N=1154) 68

Table 18. Sources of Exposure to Malaria-related Messages (N=1154) 69

List of Figures

Figure 1. Ideation Model of Strategic Communication and Behavior Change 13

Figure 2. Study Details at a Glance 21

Figure 3. Access to Health Services 22

Figure 4. Malaria-related Ideational Factors at a Glance 23

Figure 5. Interpersonal Communication with Spouse/Partner about Malaria 24

Figure 6. Ideational Factors at a Glance 27

Figure 7. Knowledge of Malaria Care-seeking and Treatment 28

Figure 8. Care-seeking Behaviors for Children under Five with Fever in Two Weeks Preceding the Survey 30

Figure 9. Care-seeking and Treatment for Child with Fever in Two Weeks Preceding the Survey 31

Figure 10. Logistic Regression of Socio-Demographic, Ideational, Structural, and Access Factors Associated with Seeking Prompt and Appropriate Care for Children with Fever in Two Weeks Prior to the Survey 32

Figure 11. Ideational Factors at a Glance 37

Figure 12. Antenatal Care Decision-making 40

Figure 13. Intentions Related to Future Antenatal Care (ANC) and Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Among Women Who Had a Live Birth in the Last Two Years 40

Figure 14. Antenatal Care (ANC) Attendance and Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) With Sulfadoxine Pyrimethamine Among Women With a Live Birth in the Last Two Years (N=514). 41

Figure 15. Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Seek Early Antenatal Care (ANC) in Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years 42

Figure 16. Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Attend Four or More Antenatal Care (ANC) Visits in the Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years 43

Figure 17. Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Attend Eight or More Antenatal Care (ANC) Visits in the Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years 44

Figure 18. Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Doses Received by Women During Their Last Pregnancy Among Women Who Gave Birth in the Two Years Preceding the Survey, by Urban/Rural Residence (n=514) 45

Figure 19. Source of Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Among Women with a Live Birth in the Two Years Preceding the Survey Who Received at Least One Dose of Sulfadoxine Pyrimethamine (n=459) 45

Figure 20. Ideational Factors at a Glance 51

Figure 21. Insecticide-treated Net (ITN) Ownership, Access, and Use 53

Figure 22. Net Characteristics and Use 54

Figure 23. Percentage of Net Procurement Sources 54

Figure 24. Significant (p<.05) Results of Logistic Regression of Consistent Net Use on Demographic and Ideational Factors 56

Figure 25. Ideational Factors at a Glance Among Full Sample 61

Figure 26. Ideational Factors at a Glance in Homa Bay and Migori Counties Where Indoor Residual Spraying (IRS) Program Is Implemented 61

Figure 27. Indoor Residual Spraying (IRS) Coverage Among Full Sample and Intervention Counties 63

Figure 28. Media Access and Consumption 65

Figure 29. Malaria Message Exposure and Recall 66

FOREWORD

The Kenya Ministry of Health through the Division of National Malaria Program continuously works to implement and promote malaria prevention and control strategies across Kenya. The malaria burden has continued to decrease. Currently, malaria affects 6% of the population in Kenya. The well-being of the most vulnerable, particularly children and pregnant women, is particularly at risk in areas with high malaria prevalence.

Successful malaria prevention depends on quality implementation of effective interventions like net distribution, indoor residual spraying, and intermittent presumptive treatment of malaria in pregnancy. Access to this preventive and curative services for malaria is necessary, but it is often not sufficient in isolation. Concerted efforts to include social and behavior change programming and interventions can aid in the uptake and sustainability of malaria prevention and control efforts in Kenya.

Kenya's Division of National Malaria Program supports and promotes the use of evidence-based social and behavior change to reduce the country's malaria burden. The Malaria Behavior Survey was conducted in all eight counties of Kenya's lake endemic region: Busia, Bungoma, Homa Bay, Kakamega, Kisumu, Migori, Siaya, and Vihiga. This report presents findings on important social and behavioral determinants of malaria-related behaviors at the individual, interpersonal, community, and facility levels. Key areas of focus for this study were use and care of insecticide-treated nets, intermittent preventive treatment in pregnancy, indoor residual spraying, and malaria case management for children under five. These findings will inform further analysis and research on malaria behavior in our population.

Results from the Malaria Behavior Survey provide a better understanding of the socio-demographic, ideational, and access-related factors associated with malaria-related behavioral outcomes in Kenya. It also informs social and behavior change strategies and activities designed to improve those outcomes. The results of this report will provide crucial information to best integrate social and behavior change into programs and policies aimed at addressing malaria prevention and treatment in Kenya.

Dr. Patrick Amoth, EBS

Ag. Director General for Health

PREFACE

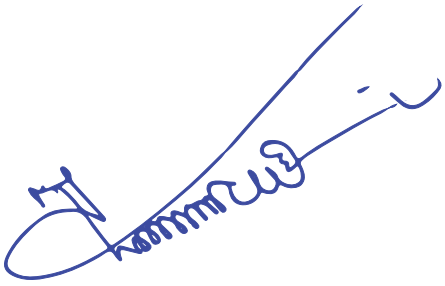
The Ministry of Health acknowledges the immense effort of various stakeholders in completing the 2022 Malaria Behavioral Survey Report. The Ministry of Health is grateful to the U.S. Agency for International Development and the U.S. President's Malaria Initiative for their financial and technical support that made the implementation of this study possible.

The Malaria Behavioral Survey was undertaken by the Division of National Malaria Program under the leadership of Dr. Ahmeddin Omar, in collaboration with the Breakthrough ACTION Project. We acknowledge technical support provided by the Advisory Group, which included the Kenya National Bureau of Statistics, U.S. Agency for International Development, U.S. President's Malaria Initiative, and Breakthrough ACTION Kenya, in facilitating the successful implementation of this study.

We are grateful to Johns Hopkins Bloomberg School of Public Health and Johns Hopkins Center for Communication Programs for technical support during implementation of the Malaria Behavioral Survey.

We also acknowledge the immense contribution of participants at the Kenya Malaria Behavioral Survey 2022 data interpretation workshop, who were instrumental in the interpretation of findings and crafting of this report. We thank the Division of National Malaria Program and the Kenya National Bureau of Statistics team for their valuable input into this report.

We acknowledge colleagues from Innovations for Poverty Action, the local research agency that led data collection, for their rigorous and high-quality work. We are also grateful to the Breakthrough ACTION Kenya team for their administrative and logistical support during the training, data collection, and analysis phases. Finally, we are grateful to the participants at the study sites who took the time to provide the information presented in this report.



Dr. Joseph Lenai

Ag. Head Directorate of Medical Services/Preventive & Promotive Health

ACRONYM LIST

ACT	Artemisinin-based combination therapies
ANC	Antenatal care
AOR	Adjusted odds ratio
CI	Confidence interval
IPTp	Intermittent preventive treatment of malaria in pregnancy
IRS	Indoor residual spraying
ITN	Insecticide-treated net
MBS	Malaria Behavior Survey
OR	Odds ratio
SBC	Social and behavior change
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

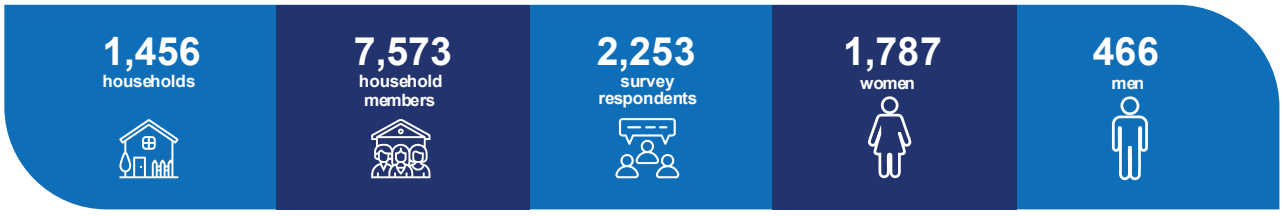
Kenya's Division of National Malaria Program continues to integrate and strategize effective malaria control and elimination interventions, supported by multiple implementing partners and donors, including the U.S. President's Malaria Initiative. Along with systemic interventions, malaria control and elimination depend in part on human behavior. Understanding populations' malaria-related knowledge, attitudes, and practices are key to optimize social and behavior change (SBC) programs. The goal of the 2022 Malaria Behavior Survey (MBS) was to provide a better understanding of the socio-demographic, ideational, and access-related factors associated with malaria-related behavioral outcomes in Kenya and to inform SBC strategies and activities designed to improve those outcomes.

The MBS was implemented in the lake endemic region in eight counties with a high malaria burden: Bungoma, Busia, Kakamega, Vihiga, Homa Bay, Kisumu, Migori, and Siaya. The study collected information from 1,456 households comprising 7,573 household members and 2,253 (1,787 female and 466 male) survey respondents. Key findings related to the sample characteristics, cross-cutting ideational factors, case management for fever in children under five years of age, malaria in pregnancy, mosquito net use and care, indoor residual spraying, and media consumption and message recall are summarized below.

Unless otherwise indicated, associations of interest highlighted in the text between key ideational and behavioral factors and residence, sex, age, residence, education, and household wealth are statistically significant ($p<.05$). For more information, see Annex A: Data Tables for the 2022 Kenya MBS.

RESULTS

Sample Characteristics



- The survey included 2,253 (1,787 female and 466 male) respondents.
- Most (72%) respondents resided in rural areas.
- Most respondents were between 25 and 44 years old (64% in urban areas and 57% in rural areas).
- Educational levels differed significantly between urban and rural areas: 43% from rural areas and 36% from urban areas had attained primary education, compared to 10% from rural areas and 21% from urban areas with a college or university education.
- Household wealth was significantly associated with rural versus urban residence. More than half of the households in rural areas were in the bottom two wealth quintiles (53%), compared to 76% of households in urban areas in the top two wealth quintiles.
- More than half (57%) of households surveyed were near a public health facility, and 47% were near a private health facility. Nearly three quarters (74%) were located near a pharmacy or chemist. Overall access to these three health services was lower in rural areas than in urban areas.

Cross-Cutting Ideational Factors

- The survey results showed variation in cross-cutting, malaria-related, ideational factors among respondents. Ideational factors with the highest prevalence were perceived equitable gender norms (98%), favorable perceptions of facility-based health providers (95%), and community-based health providers (82%). Overall, 81% of respondents reported that they or their children were at risk of contracting malaria (i.e., perceived susceptibility to malaria).
- In contrast, malaria-related ideational factors with lower prevalence included comprehensive knowledge of malaria (44%), high perceived severity of malaria (63%), interpersonal communication about malaria with spouse/partner (46%), and interpersonal communication about malaria with friends/family (40%).

Case Management for Fever in Children Under Five Years

- Ideational factors related to malaria case management for children under five years old were relatively high across respondents. Factors related to case management with the lowest prevalence were knowledge of malaria care-seeking and treatment (64%), high perceived response efficacy of malaria treatment (57%), perceived community norm that most people seek prompt care for children (71%), favorable perceptions of health facilities (71%), and favorable perceptions of community health workers (61%).
- Among caregivers, 33% reported that a child under age five had a fever in the two weeks preceding the survey. Among them, 80% sought advice or treatment (61% on the same or next day). For children under five with fever, 64% of caregivers sought appropriate advice or treatment from a health facility or community worker. Overall, 50% of children under age five with fever reportedly received both prompt and appropriate care-seeking.
- To explore socio-demographic, ideational, and structural factors related to prompt and appropriate care-seeking for children under five with fever, unadjusted and adjusted logistic regression models were used. Several of the strongest associations were ideational. After adjusting for socio-demographic characteristics, interpersonal communication about malaria with spouse/partner had an adjusted odds ratio (AOR) of 2.0 with a 95% confidence interval (CI) of 1.15–3.64 ($p<.05$) and favorable perceptions of community-health workers had an AOR of 1.9 with a 95% CI of 1.1–3.4 ($p<.05$). These characteristics were significantly and positively associated with seeking prompt and appropriate treatment for a child under five who had a fever in the two weeks prior to the survey. Table 6 in the report summarizes the results.
    - Less than half (46%) of respondents reported discussing malaria with a spouse or partner. A significantly larger percentage of men, older respondents, and more educated respondents reported interpersonal communication with a spouse or partner about malaria, compared to women, younger respondents, and those with lower education attainment.
    - Sixty-one percent of respondents had favorable perceptions of community-based health workers regarding malaria care-seeking and treatment, based on a series of questions related to respondents' perceptions that community-based health workers have malaria treatment medication and rapid diagnostic tests, they know how to treat malaria in children, or they make parents pay for medication or rapid diagnostic tests (Table A.3.9). These perceptions varied by respondent sex, with more women (64%) than men (57%) having favorable perceptions of community-based health workers. In particular, only 50% of respondents perceived community health volunteers in their community to always have a rapid diagnostic test to confirm if a person has malaria.

- Among caregivers of children under age five with a fever, 58% reported administering a malaria test to the child. Fewer tests were administered to children younger than 12 months (48%) than to children aged 12–13 months (67%) and 24 months or older (66%). Among those tested, 70% had confirmed malaria. Among those with fever caused by malaria, 86% received artemisinin-based combination therapy (ACT), 74% of whom received ACT promptly on the same or next day.

Malaria in Pregnancy

- Overall, most ideational factors related to malaria in pregnancy were high. Ideational factors with the lowest prevalence among respondents were comprehensive knowledge of intermittent preventive treatment of malaria in pregnancy (IPTp) (20%) and recent discussion of antenatal care (ANC) attendance with spouse or partner (16%).
- Among women with a live birth in the two years preceding the survey, 99% reported attending at least one ANC visit, 82% at least four ANC visits, and 13% at least eight ANC visits. Among these women, IPTp use ranged from 87% for the first dose to 48% for the third dose, with lower average rates among pregnant women in urban areas (53% for the first dose and 37% for the third) than in rural areas (69% and 50%, respectively). Attendance at ANC visits was significantly and positively associated with IPTp uptake.
- Among women with a live birth in the two years preceding the survey who intended to have more children, 70% planned to attend ANC early in their next pregnancy, 90% to attend four or more ANC visits, and 24% to attend eight or more ANC visits. Among these women, most (98%) intended to take IPTp. In urban areas, the percentage of women aged 35 and older with IPTp intentions was significantly lower (49%) than for women in other age categories (92% or higher).
- To explore socio-demographic, ideational, structural, and access factors related to intentions to attend future ANC check-ups among women with a live birth in the previous two years who intended to have more children, unadjusted and adjusted logistic regression models were used. Across adjusted models fit, the favorable IPTp attitudes factor was consistently and positively associated with intentions for early ANC, for four or more ANC visits, and for eight or more ANC visits. Other factors found to be statistically significantly associated with ANC intentions included exposure to malaria messages in the past six months, television or radio listenership, and basic knowledge of ANC/IPTp.
- Knowledge related to IPTp and favorable attitudes towards IPTp were significantly and positively associated with level of education, with a larger percentage of those with higher education attainment reporting comprehensive knowledge and favorable attitudes towards IPTp. A smaller percentage of younger respondents had comprehensive knowledge of IPTp (13% for those aged 15–19 vs. >20% for older age groups).

Insecticide Treated Net (ITN) Use and Care

- Generally, ideational factors related to ITN use and care were high across the full sample population. Factors with the lowest prevalence among respondents were perceived community norms favorable of ITN use (78%) and high perceived response efficacy of ITNs (84%).
- Although positive attitudes towards net use were high (92%), misconceptions about expensive nets being more effective than cheaper or free nets were unexpectedly high (31%). Respondents also reported the inconvenience of nets for couples trying to have children (17%), the smell of the insecticide in the ITN making it difficult to sleep (41%), and the tediousness of unfolding the net and covering the sleeping space (36%) as the most common negative perceptions they hold towards ITNs.

- Almost one third (31%) of available ITNs in the household were not used the night preceding the survey, and only 80% of individuals in households with sufficient access to ITNs (one ITN per two members) used them. Most respondents (87%) in households with at least one net reported consistent net use every night of the week.
- To explore socio-demographic, ideational, structural, and access factors related to consistent net use, unadjusted and adjusted logistic regression models were used. Several of the strongest associations with consistent net use among those in households with at least one net were ideational. Respondents with high perceived self-efficacy to use nets and favorable attitudes towards net use and care, as well as those who reported that they listen to the radio at least once weekly, had significantly increased odds of consistent net use. Age also played an important role in net use and care, with those in the older age groups having significantly higher odds of consistently using nets than those in the 15–19 age group. Individuals with higher rather than lower levels of education more commonly reported favorable attitudes towards nets.
- Net care practices were relatively poor among those in households with at least one net, particularly regarding hanging or tying up nets when not in use (42%), washing with detergent (32%) or a mix (16%), and drying washed nets outside in the sun (36%).

Indoor Residual Spraying (IRS)

- Knowledge of IRS was low across the sample population (39%) but relatively high within focal IRS intervention counties (84%).
- Most respondents with knowledge of IRS reported positive attitudes towards IRS (76%), though common misconceptions were cited, including the belief that IRS causes skin rashes (38%) and that walls in a home sprayed with IRS are not safe to touch even after drying (32%). Many (40%) also reported being bothered by having to leave possessions outside of their homes.
- Most (81%) perceived IRS as effective, and the responses did not differ across socio-demographic factors.
- In the two counties where Kenya's Division of National Malaria Program implements IRS, coverage among households approached by IRS service providers was moderately high (78%). Receipt of IRS services was reported more often by those in rural areas (80%) than those in urban areas (42%).
- Perceived self-efficacy was high among those with knowledge of IRS (87%), though this varied by residence, sex, and intervention area. Respondents in rural areas, men, and those living in intervention areas reported higher self-efficacy.
- Willingness to accept IRS was high (87%) in intervention counties.

Media Consumption and Message Recall

- Radio listenership and TV viewership in the week prior to the survey were 84% and 62%, respectively. Radio listenership was higher in rural areas compared to urban areas (85% vs. 77%). In contrast, TV viewership was higher in urban areas compared to rural areas (80% vs. 58%). Radio listenership and TV viewership varied by sex (men reported higher listenership and viewership rates than women) and by education and household wealth levels (those with higher educational attainment and from wealthier households reported higher rates of listenership and viewership).
- Overall, 81% of respondents owned a mobile phone or tablet, although urban dwellers were more likely than rural dwellers to own a mobile phone or tablet (91% vs. 79%). Men, older respondents, and those with higher education higher wealth also had greater ownership of mobile phones,

compared to women, younger respondents, and those with lower levels of education and wealth.

- Among the 53% of respondents who reported having heard or seen a malaria message in the six months prior to the survey (63% of men and 47% of women). A larger percentage of older respondents and those with higher levels of education had heard or seen a malaria message.
- Ability to identify the national malaria logo and slogan was low (10%). Recall of the campaign slogan was very low (6%), with highest rates among those with a college or university education (11%) and from higher wealth quintiles (9%).

RECOMMENDATIONS

The findings from the Kenya MBS inform key considerations for programming, policy, and research.

Management for Fever in Children Under Five Years

With only 50% of children under age five reportedly receiving both prompt and appropriate care for fever, it is necessary to focus on ideational factors shown to be significantly associated with care-seeking. SBC programs can do the following:

- **Focus on interpersonal communication about malaria with a spouse or partner to improve prompt and appropriate care-seeking.** In adjusted logistic regression models, this ideational factor was significantly associated with prompt and appropriate care-seeking of children with fever. Interpersonal communication can increase knowledge of malaria and foster other relevant ideational factors, such as positive attitudes and perceptions, response efficacy, and self-efficacy. SBC programs could support such communication by developing focused messages on interpersonal communication to be delivered via media campaigns aimed at both women and men, as well as community dialogues, modeling, and other male engagement approaches. Special emphasis should focus on women and youth, as fewer women (33%) than men (59%) and younger respondents aged 15–19 (33%) and 20–24 (41%) as compared to older respondents reported that they had interpersonal communication with their spouse or partner about malaria. Improving communication in these groups can include community initiatives involving stakeholder engagements or opinion leaders prompting interpersonal communication on malaria. Interpersonal communication also can be strengthened through programs specifically designed to incorporate interpersonal communication on malaria, such as call-in shows and mass media campaigns.
- **Foster favorable perceptions related to community health volunteers, specifically the belief that they always have rapid diagnostic test kits.** Perceptions that community health volunteers do not have the necessary supplies could be affected by real-world supply issues, previous interactions with community health volunteers, or other factors. These perceptions could be addressed through SBC approaches that work in parallel with supply-side interventions to improve interpersonal communication, quality of care, and trust in health workers.
- **Focus on barriers to seeking care promptly and to accessing appropriate sources of care.** A useful approach to this effort could be using the Three Delays Model[1] to identify factors affecting delays in decision-making around care-seeking, in getting to a health facility, and in provision of adequate care. Identified barriers can then be used to guide interventions.

[1] Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine*, *38*, 1091–1110. https://doi.org/10.1016/0277-9536(94)90226-7

- **Collaborate with service delivery partners to improve provision of ACT.** More than one quarter of children under five with malaria-related fever did not receive ACT promptly, indicating a need to ensure all suspected cases of malaria are appropriately tested and promptly treated following Kenya's national guidelines for malaria diagnosis, treatment, and prevention. In particular, access-related barriers to ACT must be addressed to promote use of this recommended first-line treatment.

Malaria in Pregnancy

Programs should build on the high levels of ANC attendance reported in the survey results by addressing ideational factors shown to be significantly associated with future ANC intentions. SBC programs can do the following:

- **Continue to foster favorable IPTp attitudes.** Most respondents had favorable IPTp attitudes, and this ideational factor was significantly associated with future ANC intentions. Given the strong link between ANC attendance and receipt of IPTp, continued maintenance of such favorable attitudes will be critical to improve ANC and IPTp uptake.
- **Improve knowledge of IPTp and ANC among pregnant women.** Knowledge of IPTp and ANC includes knowing that pregnant women should attend their first ANC appointment during the first trimester and they should attend four or more ANC appointments and receive at least three or more IPTp doses during pregnancy. Attention to ANC and IPTp knowledge is particularly important for younger age groups and those with lower levels of education. Only 41% of respondents knew the appropriate timing for the first ANC visit and 48% knew how many times during pregnancy a woman should receive IPTp. Malaria messages should focus on these topics. Additionally, community leaders can be engaged to address misconceptions related to malaria in pregnancy, particularly among younger age groups.
- **Engage community and other health workers as important sources of malaria messages.** A large percentage of respondents reported favorable attitudes towards community-based health workers, and the survey results showed associations between malaria message exposure and ANC intentions. These findings highlight an opportunity to engage community and other health workers as sources of malaria messages. Such efforts could include conducting household visits and dialogue and action days to foster favorable IPTp attitudes and improve knowledge of ANC and IPTp.
- **Develop a youth-focused campaign strategy and messages related to ANC and IPTp**. The observed age-related differences in ideational factors related to malaria in pregnancy indicate a need to focus on appropriate media channels for reaching youth and supporting youth-friendly service points. Evidence that television or radio listenership were significantly associated with ANC intentions suggests these media channels could be particularly useful for disseminating malaria messages. This campaign strategy could include engagement with audiences such as parents or spouses/partners of pregnant women to encourage discussions related to sexuality, as well as youth groups and youth champions.

Mosquito Net Use and Care

Mosquito Net Use

SBC programs should prioritize ideational factors shown to be significantly associated with consistent net use in the design of future messages:

- **Frame net use as an easy behavior to practice.** Aim to maintain self-efficacy of net users.
- **Maintain positive attitudes about net use**, particularly addressing negative attitudes and inaccurate perceptions, such as the belief that more expensive nets are more effective than free nets or that nets are not easy to sleep under.
- **Heighten focus of health education messages encouraging the use of nets by all household members in all sleeping spaces within the household**. Net hanging demonstrations by community health volunteers and health care workers, as well as education via radio messaging, may be useful in achieving increased net use.
- **Conduct further research exploring the high rates of net being stored and not used** and why those with adequate nets are not using them. This research may help distribution and SBC programs understand how they may collaborate to improve access to ITNs and ensure distributed ITNs are used.
- **Continue to explore what motivates youth, particularly those aged 15–19, to use nets consistently**. Survey respondents in older age groups were more likely to use nets consistently. A study powered and designed to examine this particular age group may help illuminate how to best promote net use among younger populations in the lake endemic region.

Mosquito Net Care

Programs should prioritize ideational factors shown to be significantly associated with consistent net use in the design of future messages. SBC programs can do the following:

- **Maintain positive attitudes about net care**, particularly addressing negative attitudes, such as perceptions that net care is tedious.
- **Focus on specific issues related to net care to complement existing efforts**. This messaging could include instructions to not wash ITNs with harmful products such as bleach and detergent, given the sizable percentage of respondents who reported such behaviors.

Indoor Residual Spraying (IRS)

SBC programs can do the following:

- **Address certain persistent misconceptions about IRS to improve acceptability and uptake**, including the beliefs that IRS causes skin rashes and that sprayed walls are not safe to touch even after drying. Concerns about leaving possessions outside of the home also should be addressed when discussing IRS implementation. Community-based resources, religious leaders, and government administrative officers can serve as IRS knowledge sources.
- **Undertake further research to understand why those approached about IRS service do not receive it**. This research should focus on urban and rural differences in IRS uptake and could include market analyses aimed at understanding supply-side factors affecting differences in IRS service use.

Media Consumption

Media consumption recommendations include the following:

- **A comprehensive mass media plan is needed to target messages to specific audiences and age groups, including vulnerable populations**. Based on survey response differences by sex, age, education, and wealth, a comprehensive media plan can adapt messages and media channels for specific audiences and ensure complementary messaging. Timing is important to ensure focal

audiences are reached when they are most likely to be listening to the radio or watching television.

- **Radio, television, mobile phones, and social media are recommended channels.** Weekly radio listenership was higher than weekly television viewership in rural areas, suggesting that radio may be a better communication channel in rural areas. In urban areas, weekly listenership and viewership rates were similar, suggesting that both radio and television would be useful channels. The high access to radio provides a good opportunity to maximize reach across participants with different socio-demographic characteristics. Similarly, high phone ownership, albeit higher in urban than rural areas, provides an opportunity to scale up the use of social media to disseminate key messages. Radio listenership was higher among those with lower levels of educational attainment, whereas television viewership and mobile phone ownership were higher among those with higher educational attainment and wealth. Older age groups reported higher weekly radio listenership and mobile phone ownership than did younger age groups. Based on the preferred times for TV watching reported in this study, TV spots in rural areas should air in the evenings for the best reach. Radio spots should air in the late evening (8 pm to 12 am) for best reach in both rural and urban areas
- **Men have higher radio listenership, TV viewership, and mobile phone ownership, indicating an opportunity to spread malaria messages to men at the household and community levels via these channels. Radio and mobile phones are the best channels for reaching women.** Messages on spousal/couple communication, the importance of ANC, consistent and correct ITN use, and men's role in supporting malaria prevention and treatment can be shared via these channels.
- **SBC programs should adapt their campaign strategies to recognize that youth access media and information differently**. Younger respondents had less access to phones, suggesting that other channels, such as friends, family, peer groups, and youth champions, may be most successful in reaching young people and making malaria relatable to them.
- **Efforts should be made to identify strategies to reach those with no formal or primary only education levels**. A gap in malaria message exposure was observed for females in rural areas, especially younger respondents aged 15–24 years and those aged 35–44 years. Further analysis and research are needed to better understand how to engage with these groups. Communication and education channels on the importance of appropriate net use at the community level should be designed to reach low-literacy audiences and boost community perceptions around net use and other key malaria-related behaviors.
- **Malaria campaigns can be strengthened by leveraging existing opportunities and building partnerships to sustain and achieve maximum impact**. Campaigns should be restructured to increase their intensity, frequency, and duration to target various household members. For example, media partnerships can help ensure that messaging is broadcast for longer periods, and the Zero Malaria Campaign Coalition can support the development of community-specific messages. Corporate social responsibility in the private sector also could include goals aimed at creating innovative approaches to encourage malaria social behavior change efforts.
- **Continued efforts should be made to build on the Kenya MBS findings related to exposure to malaria-related messages and campaigns**. Omnibus surveys can be conducted to assess the reach and impact of SBC messages and guide future message development and dissemination. Given the observed gaps in malaria message exposure among women in rural areas and especially among younger respondents, further analysis and research are needed to better understand how to engage with these populations.

INTRODUCTION

CONTEXT OF MALARIA IN KENYA

Malaria is a significant public health concern and among the top 10 causes of morbidity and mortality in Kenya from 2009 to 2019.[2,3] Children under five and pregnant women are the most vulnerable to malaria due to a variety of factors. Effects of malaria in pregnancy include maternal anemia, miscarriage, intrauterine growth restriction, perinatal mortality, low birth weight, and neonatal mortality. Malaria transmission and infection risk in Kenya are determined largely by altitude, rainfall patterns, and temperature, which together lead to considerable variation in malaria prevalence by season and across geographic regions.[4] The country is divided into four epidemiological zones:[5]

1. Epidemic-prone areas in the western inland highlands. Transmission is highly variable each year, which lowers malaria tolerance and makes people vulnerable to malaria-related morbidity and mortality.
2. Seasonal malaria transmission areas. Periods of high-transmission occur before the rainy season.
3. Low-risk areas. Low temperatures inhibit the life cycle of malaria.
4. Endemic areas in the lake and coastal regions. Transmission rates are high the entire year.

Approximately 70% of the 14 million people in endemic areas and 17 million in epidemic and seasonal areas are at risk for malaria.[6] Furthermore, of the approximately 1.5 million women who become pregnant each year in Kenya, 44% live in moderate to intense endemic areas.[7]

The lake endemic region is in western Kenya along Lake Victoria and comprises eight counties that were formerly part of Western Province (Bungoma, Busia, Kakamega, and Vihiga) or Nyanza Province (Siaya, Kisumu, Homa Bay, and Migori). At elevations between 0 to 1,300 meters above sea level, residents in these eight counties experience intense transmission of malaria year-round. Consistent temperature, humidity, and rainfall levels also allow for the continuous breeding of mosquitoes.[8]

Despite substantial declines in transmission rates and improved diagnostic and prevention methods such as insecticide-treated nets (ITN), Kenyans—particularly those in the endemic areas—remain at risk for malaria transmission. Furthermore, the COVID-19 pandemic is believed to have had a negative impact on progress in the fight against malaria in Kenya. Results from

---

[2] Institute for Health Metrics and Evaluation. (n.d.) *Kenya: How is the population forecasted to change?* http://www.healthdata.org/kenya

[3] GBD 2019 Diseases and Injuries Collaborators. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, *396*(10258), 1204–1222.

[4] National Malaria Control Program and Ministry of Health. (2018). *Kenya malaria strategy 2019–2023*. http://fountainafrica.org/wp-content/uploads/2020/01/Kenya-Malaria-Strategy-2019-2023.pdf

[5] National Malaria Control Program and Ministry of Health. (2018). *Kenya Malaria Strategy 2019–2023*. http://fountainafrica.org/wp-content/uploads/2020/01/Kenya-Malaria-Strategy-2019-2023.pdf

[6] Kenya National Malaria Control Program, Kenya National Bureau of Statistics, & ICF International. (2016). Kenya Malaria Indicator Survey 2015.

[7] Kenya National Malaria Control Program, Kenya National Bureau of Statistics, & ICF International. (2016). Kenya Malaria Indicator Survey 2015.

[8] Kenya National Malaria Control Program & Kenya Ministry of Health. (2019a). Kenya Malaria Strategy 2019—2023.

the 2020 Kenya Malaria Indicator Survey suggest reductions in critical malaria-related prevention indicators. For example, the percentage of households with at least one ITN decreased from 63% in 2015 to 49% in 2020, and the proportion of children under five years old who sleep under an ITN decreased from 56% in 2015 to 42% in 2020.[9,10] Research is critical to understand the factors that influence these malaria-related behaviors to inform future prevention and treatment efforts.

MALARIA INTERVENTIONS IN KENYA

Implementation of the U.S. President's Malaria Initiative in Kenya began in 2007. As outlined in the 2023 Malaria Operational Plan,[11] since 2013, this initiative has prioritized support for malaria prevention activities in the eight counties that make up the lake endemic region, where the malaria burden is highest. These activities include vector control; case management; supply chain management; malaria in pregnancy; social and behavior change; and surveillance, monitoring, and evaluation. These activities build on investments from other partners as outlined in the Malaria Operational Plan, including the Global Fund to Fight AIDS, Tuberculosis, and Malaria.

The U. S. President's Malaria Initiative operates in collaboration with the Division of National Malaria Program in Kenya. The Government of Kenya operates a devolved health system. At the national level, the Ministry of Health establishes the policy framework for all health interventions, which are implemented at the county level. The Division of National Malaria Program has committed to reducing malaria incidence and deaths by at least 75% of the 2016 levels by 2023, as defined in the Kenya Malaria Strategy 2019–2023.[12] This strategy outlines six national objectives to achieve by 2023:

1. Protect 100% of people living in malaria-risk areas through access to appropriate malaria preventive interventions.
2. Manage 100% of suspected malaria cases according to Kenya's malaria treatment guidelines;
3. Establish systems for malaria elimination in targeted counties.
4. Increase utilization of appropriate malaria interventions to at least 80%.
5. Strengthen malaria surveillance and use of information to improve decision-making for program performance.
6. Provide leadership and management for optimal implementation of malaria interventions at all levels to achieve all objectives.

RATIONALE FOR THE MALARIA BEHAVIOR SURVEY IN KENYA

Research demonstrates the effective role SBC programs have in increasing the prevalence of positive health behaviors related to malaria prevention and treatment. Program messages must target specific ideational variables (e.g., knowledge, attitudes, intention, self-efficacy, and social

[9] Kenya National Malaria Control Program, Kenya National Bureau of Statistics, & ICF International. (2016). *Kenya Malaria Indicator Survey 2015*.

[10] Kenya Ministry of Health, Kenya National Bureau of Statistics, Demographic and Health Survey Program (2020, April). *Kenya Malaria Indicator Survey 2020 Key Indicators*.

[11] U.S. President's Malaria Initiative. (2022). Kenya malaria operational plan FY 2023. https://d1u4sg1s9ptc4z.cloudfront.net/uploads/2023/01/FY-2023-Kenya-MOP-1.pdf

[12] National Malaria Control Program and Ministry of Health. (2018). *Kenya Malaria Strategy 2019–2023*. http://fountainafrica.org/wp-content/uploads/2020/01/Kenya-Malaria-Strategy-2019-2023.pdf

norms) that influence decisions related to malaria-related behaviors, such as prompt care-seeking and use of ITNs. Representative data on the prevalence of relevant behavioral indicators in Kenya is outdated and mostly sourced from the 2014 Kenya Demographic and Health Survey and 2020 Malaria Indicator Survey.

The primary focus of this study is ideational, or *intermediate*, variables associated with malaria-related behaviors of interest. This study produced data focused on ideational antecedents that are not included in large, national surveys. Such data can be used to

- Estimate the prevalence of both behaviors and their ideational antecedents;
- Estimate the independent and combined effects of ideational characteristics on behaviors; and
- 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 policymakers create and prioritize audience segments and SBC messaging.

GOALS AND OBJECTIVES OF THE MALARIA BEHAVIOR SURVEY

The goal of the study is two-fold: to provide a better understanding of the socio-demographic and ideational characteristics associated with malaria-related behavioral outcomes in the lake endemic region of Kenya and to determine the appropriate focus of programmatic activities designed to improve these outcomes. The specific objectives of the study thus were to understand the socio-demographic, ideational, and contextual factors associated with

- Antenatal care (ANC) and intermittent preventive treatment in pregnancy (IPTp);
- Prompt and appropriate treatment of fever in children;
- Use and maintenance of insecticide-treated nets (ITNs); and
- Coverage and acceptance of indoor residual spraying (IRS).

Furthermore, this study aimed to assess exposure to malaria-related SBC programs to inform and design future programs to improve malaria-related behaviors in Kenya.

CONCEPTUAL MODEL OF THE MALARIA BEHAVIOR SURVEY

The conceptual framework of the Malaria Behavior Survey (MBS) is the ideational model for strategic communication and behavior change, which focuses on the multiple, inter-related psychosocial variables that commonly influence individual behavior.[13] As shown in Figure 1, the ideation model recognizes that most behavioral decisions are driven by multiple psychosocial factors, often simultaneously. Its three components each comprise cognitive elements (e.g., attitudes, beliefs, values, perceived risk, subjective norms, self-image); emotional elements (e.g., emotional response, empathy, self-efficacy variables); and social elements (e.g., social support and influence, spousal communication, and personal advocacy). These components function like risk factors for disease, but in a positive way: people with stronger ideational variables are more likely to adopt the behavior. For example, an individual is more likely to practice a behavior if they know about it, have positive

[13] HC3. (2015). *Ideation: A research primer*. http://www.healthcommcapacity.org/wp-content/uploads/2015/02/Ideation.pdf

attitudes about it, feel confident they can practice it, and have agency in the decision-making process about whether to practice it. These ideational variables are also influenced by social interaction, mass media, and interpersonal communication and work both individually and synergistically to influence health outcomes. For example, research has demonstrated a relationship between ideation and malaria behavior,[14] including ITN use, [15,16,17] intermittent presumptive treatment of malaria in pregnancy,[18] and care-seeking for children under five.[19]

Although included in the model, environmental constraints are often under-emphasized in SBC programming. The authors of this report recognize the central importance of social determinants of health (e.g., social class, income, race, ethnicity, education, occupation, gender, and access to health care according to the World Health Organization),[20] particularly in light of ongoing inequalities in malaria-related health outcomes.[21] These structural mechanisms create favorable or unfavorable conditions for behavior change. To the extent they are measured in this study, directly or by proxy, they are included in the Results section.

[14] Monroe, A., Olapeju, B., Moore, S., Hunter, G., Merritt, A. P., Okumu, F., & Babalola, S. (2021). Improving malaria control by understanding human behaviour. *Bulletin of the World Health Organization*, *99*(11), 837.

[15] Storey, J. D., Babalola, S. O., Ricotta, E. E., Fox, K. A., Toso, M., Lewicky, N., & Koenker, H. (2018). Associations between ideational variables and bed net use in Madagascar, Mali, and Nigeria. *BMC Public Health*, *18*(1), 1–15.

[16] Babalola, S., Kumoji, K., Awantang, G. N., Oyenubi, O. A., Toso, M., Tsang, S., Bleu, T., Achu, D., Hedge, J., Schnabel, D. C., Cash, S., Van Lith, L. M., McCartney-Melstad, A. C., Nkomou, Y. Dosso, A., Lahai, W., & Hunter, G. C. (2022). Ideational factors associated with consistent use of insecticide-treated nets: A multi-country, multilevel analysis. *Malaria Journal*, 21(1), 1–14. https://doi.org/10.1186/s12936-022-04384-3

[17] Kumoji, E. K., Awantang, G. N., Toso, M., Kamara, D., Bleu, T., Lahai, W., Sillah-Kanu, M. Dosso, A., Achu, D., & Babalola, S. (2022). Ideational factors associated with net care behaviour: A multi-country analysis. *Malaria Journal*, *21*(1), 53. https://doi.org/10.1186/s12936-022-04053-5

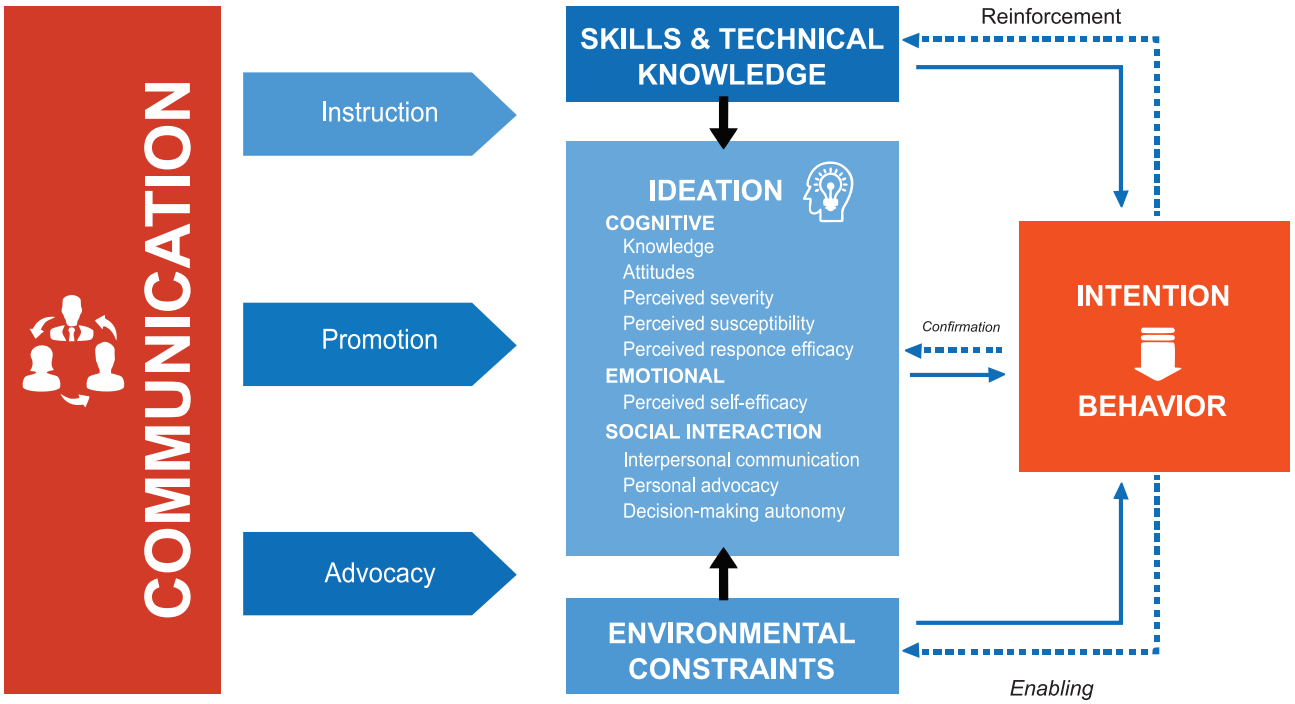
[18] Awantang, G. N., Babalola, S. O., Koenker, H., Fox, K. A., Toso, M., & Lewicky, N. (2018). Malaria-related ideational factors and other correlates associated with intermittent preventive treatment among pregnant women in Madagascar. *Malaria Journal*, *17*(1), 1–10.

[19] Do, M., Babalola, S., Awantang, G., Toso, M., Lewicky, N., & Tompsett, A. (2018). Associations between malaria-related ideational factors and care-seeking behavior for fever among children under five in Mali, Nigeria, and Madagascar. *PloS One*, 13(1), e0191079.

[20] Marmot, M., Allen, J., Bell, R., Bloomer, E., & Goldblatt, P. (2012). World Health Organization European review of social determinants of health and the health divide. *The Lancet*, *380*(9846), 1011–1029.

[21] Hosseinpoor, A. R., Bergen, N., Kirkby, K., Schlotheuber, A., Fuertes, C. V., Mac Feely, S., & Asma, S. (2022). Monitoring inequalities is a key part of the efforts to end AIDS, tuberculosis, and malaria. *The Lancet*, *399*(10331), 1208–1210.

Figure 1.
Ideation Model of Strategic Communication and Behavior Change



Terms used in the Malaria Behavior Survey:

- **Perceived susceptibility**: the belief that one is likely to be affected by malaria
- **Perceived severity**: the perception that the consequences of malaria are severe
- **Perceived response efficacy**: the belief that recommended actions (e.g., prompt care-seeking, use and care of ITNs, acceptance of IRS, uptake of IPTp) will help avoid a threat
- **Perceived self-efficacy**: belief in one's ability to take relevant actions to prevent or seek prompt treatment for malaria
- **Descriptive norm**: perception of what other people do
- **Injunctive norm**: perception of what others approve or disapprove of
- **Interpersonal communication**: discussion with others about malaria topics (e.g., prevention, care-seeking, and treatment)
- **Decision-making autonomy**: active involvement in decisions related to malaria

METHODOLOGY

This section describes the key methodological elements of the survey study in Kenya, including details on study design, sampling, data collection, data analysis, and research ethics.

SURVEY DESIGN

The MBS used a cross-sectional design with a randomly selected sample of male and female individuals interviewed at one point in time using a structured questionnaire. Respondents were selected through a multi-stage random process that yielded samples representative of the lake endemic epidemiological region level, focusing on eight counties with high malaria burdens: Bungoma, Busia, Kakamega, Vihiga, Homa Bay, Kisumu, Migori, and Siaya. To determine sample size, these eight counties were clustered into one geographic zone, which was then divided into urban or rural clusters (enumeration areas). Enumeration areas were selected from within each survey stratum with probability proportional to size.

SAMPLING

Sample Size and Justification

Each relevant malaria-related outcome (i.e., caregivers' bed net use, incidence of fever among children under five, and prevalence of positive attitudes towards consistent use of bed nets) was estimated to determine the required survey sample size. Estimates for these indicators with a design effect of 2.0 at the regional level were based on data from the 2015 and 2020 Malaria Indicator Surveys. The following formula was applied to estimate the required sample size:

$$n = d * \frac{z^2_{1-\frac{\alpha}{2}} * p(1-p)}{\delta^2 * R_h * R_i}$$

In this equation, *n* is the required sample size for each group (e.g., women, heads of household). *Z* is the Z value corresponding to the desired confidence level. In the analyses, the research team assumed a *Z* of 1.96, corresponding to a 95% confidence level. *d* is the design effect due to departure from simple random sampling. We assumed this to be 1.6 based on a secondary analysis of the 2017 Malaria Indicator Survey Final Report. *p* is the estimated (expected) outcome indicator (e.g., the proportion of women of reproductive age who slept under a net on the night before the survey or the proportion of children under five who had a fever in the two weeks prior to the survey). For each outcome, the research team derived the required sample size assuming that p=.05 for maximum variability. δ is the desired margin of error. The research team derived the various sample sizes with δ = 5%. R_h is the response rate for households. The research team assumed 90% for this parameter. Finally, R_i is the response rate for women in selected households. The research team assumed 95% for this parameter.

Given the range of sample sizes required for each outcome, the research team anticipated a sample frame of 1,489 households (rounded to 1,500), 1,533 (rounded to 1,550) female respondents, and 506 (rounded to 525) male respondents (depending on the design effect determination). Data were collected from every woman in the household to ensure inclusion of pregnant women and caregivers

of children under age five. The total target sample size was estimated to be 2,039 and rounded up to 2,075 respondents, or 1,500 households to account for non-response rates at the household and individual levels and provide a representative sample at the zonal level, thereby allowing valid estimation of key malaria behavioral and ideational indicators. The final MBS included 75 clusters comprising 1,456 households and 2,253 respondents (1,787 women and 466 men) in the lake endemic region.

Participant Inclusion and Exclusion Criteria

Individuals were eligible to participate in the study if they met the following inclusion criteria:

- Aged 15 to 49 years;
- Usual resident of the selected household; and,
- Ability to communicate in English, Swahili, Kuria, Luhya, Teso, or Luo.

Participants were excluded if they had at least one of the following characteristics:

- Inability to consent to participate in the study;
- Inability to understand the questions or respond intelligibly;
- Ill at the time of data collection; or
- Refusal to complete or provide information on COVID-19 precaution checks, such as temperature checks, illness history, and exposure.

Cluster Selection

Study participants were selected using a multi-stage process of successively and randomly selecting clusters, households, and individuals. The study team obtained a comprehensive list of clusters (enumeration areas) from Kenya's National Bureau of Statistics. This list served as the sampling frame for the sample selection. Each zone was divided into two strata: urban and rural. From each stratum, a number of enumeration areas were selected with probability proportional to size. For each of the 75 enumeration areas selected for inclusion, the study team obtained sketch maps from Kenya's National Bureau of Statistics. Upon arriving in a selected cluster and after obtaining the necessary permissions from community leaders, the study team updated the sketch map, adding new structures and deleting non-existent ones.

Household Selection

For the purpose of this survey, a household was defined as a group of people living in the same dwelling and sharing meals. The study team conducted a census of households in each enumeration area using a household listing form containing the cluster number, building or compound number, nickname of the head of household, address or location description, number of female members aged 15–49 and number of male members aged 18–59 years. As there were approximately 100 households per enumeration area, the team enumerated approximately 7,500 households. To obtain the necessary information, the study team approached a responsible adult in each building or compound, briefly introduced the study using a prepared introduction script, and asked if they were willing to provide the necessary information.

The study team then selected 20 households from the completed household listing forms using a systematic sampling approach with a sampling interval proportional to the total number of households in the enumeration area. If a selected enumeration area did not have the required number of households, the study team mapped or listed households from an adjoining enumeration area to reach a sufficient number. The household list was destroyed once data collection was finished in each cluster.

Participant Selection

Interviewers visited each of the 20 selected households per cluster. They first screened for COVID-19 symptoms and illness and skipped any household where someone was symptomatic or ill. Suspected cases were required to be reported to the authority close to the site of data collection via COVID-19 monitoring committees established in each county. The local institutional review board also required survey and community engagement projects to carry educational materials (e.g., fliers, leaflets) on preventive measures for COVID-19 to further enhance community knowledge of the pandemic, and the Government of Kenya organized COVID-19 testing through local district and regional health offices. The informational materials carried by the data collection team had information on these local testing and treatment centers, and the research team coordinated with the local district and regional health officers to link people to care in the event of a suspected COVID-19 case.

If no one was symptomatic or ill, a consenting adult in the household was administered the household questionnaire, comprising a list of all household members, questions on household characteristics and assets, and a bed net roster.

Upon completion of the household questionnaire, the interviewer used the household member list to select all female members aged 15–49 years for interviews using the individual women's questionnaire. After determining their eligibility, the interview used the screening tool to ask their age, whether they were a usual member of the selected household, and their spoken languages. Those who met the eligibility criteria were asked to provide consent and then given the individual questionnaire. The research team expected refusal rates to be negligible at this stage.

While compiling the household list, every third household was marked by the study team, and in every third household that agreed to participate in the survey, the fieldwork team identified a male spouse or partner of one woman and sought to interview him using the individual men's questionnaire. In households with multiple eligible women, the interviewer randomly selected one male spouse or partner for inclusion. All participants gave consent before administering the individual questionnaire.

DATA COLLECTION AND ANALYSIS

Data Collection Tools

The household questionnaire explored household characteristics, ownership of assets, and bed net use. Women's and men's questionnaires included modules assessing

- Net use, care, and disposal;
- Perceptions of health services;
- 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; and
- Recall of or participation in malaria-related communication interventions.

The women's questionnaires further explored

- ANC and IPTp among women who had a live birth within the past two years; and
- Care-seeking and receipt of appropriate treatment for children who had a fever in the past two weeks.

Data Collection Procedures and Treatment

Recruited participants who gave consent were interviewed individually by a trained fieldworker using the appropriate closed-ended questionnaire, allowing 35 minutes for the household questionnaire, 50–60 minutes for the women's questionnaire, and 35 minutes for the men's questionnaire. Field supervisors spot checked 10% of interviews using a 10-question data quality assurance form to confirm that interviews took place with the designated individuals. The Kenya Division of National Malaria Program and Kenya National Bureau of Statistics independently conducted spot checks of about 5% of respondents. No respondent had more than one callback visit. The research team added the possibility of a second visit to the adult consent, parental permission, and minor assent forms. Aside from these interactions, there were no participant procedures.

Up to three visits were made to contact household members or individuals selected for interviews. A household questionnaire was administered once, and each selected member of the household was interviewed once. This contact took place in or near the participant's home. Interviews were conducted out of hearing range of others, such as a separate room or outside the home, but within sight of the house. As noted above, a subset of interviewed respondents were visited a second time by a study supervisor or by the Division of National Malaria Program or Kenya National Bureau of Statistics staff to confirm that the interviews occurred.

Specific precautions were taken to protect participants and data collectors from exposure to possible COVID-19 infection during data collection. The principal investigator and co-investigators worked with the Breakthrough ACTION Kenya staff and the entire data collection team to ensure that community members, study participants, and data collectors were safe and protected from potential exposure to COVID-19. The research team complied with local regulations to prevent the spread of COVID-19. In advance of survey implementation, the president's office, regional administration, and local government informed local and county leaders where and for what time period data would be collected. The Kenya-based co-investigator, who is the designated principal investigator for the Kenyan institutional review board application, coordinated this communication. The research team inquired about the health of any data collector or study participant with respiratory symptoms (e.g., cough, cold, congestion), fever, body aches, or general malaise. Safety measures were communicated to study participants before each interaction. Data collectors maintained a 2-meter distance from participants during interviews and wherever possible, held outdoor meetings. Participants were provided with hand sanitizer, and all participants and study team members were required to wash their hands with soap under running water before and after each data collection interaction. If running water was not available, hand sanitizer was used by participants and study team members. Disposable face masks were provided to all data collectors and study participants for use during the data collection interactions.

Data Analysis Procedures

The MBS is based on the Johns Hopkins Center for Communication Program's experience measuring ideational factors related to malaria prevention and treatment in Côte d'Ivoire, Liberia, Madagascar, Tanzania, Zambia, and other African countries. In addition to the usual questions on socio-demographic characteristics, the survey included questions on bed net access and use, IRS, IPTp, fever among children under age 5, and actions taken to treat the fever. In addition, consistent with the study's focus on ideation, questionnaires asked about knowledge, perceived severity, perceived vulnerability, perceived efficacy of prescribed responses, attitudes, perceived self-efficacy, norms, social interactions and influence, and emotional response related to each behavioral outcome of interest. Questions about exposure to relevant communication interventions focusing on malaria

prevention and treatment also were included.

Measures of malaria-related ideational variables (e.g., attitudes, perceived self-efficacy, perceived response-efficacy) were derived based on relevant questions from the women's and men's questionnaires. Similar to the analytic procedure described in the Malaria Social and Behavior Change Communication Indicator Reference Guide,[22] responses for each item were scored, scores for items measuring the same construct added together, and the resulting sum collapsed into dichotomous measures.

Most ideational variables were measured by asking respondents to indicate their level of agreement or disagreement with statements such as, "A blood test for malaria is the only way to know if someone really has malaria or not." Agreement or disagreement was measured using a Likert scale, with scores based on responses. For example, if agreement with a statement corresponded to a favorable response, responses were scored -1 for disagree, 0 for don't know/not sure, and 1 for agree. If disagreement with a statement corresponded to a favorable response, scoring was reversed. An index score reflecting overall responses to a set of questions related to an ideational construct was calculated as the sum of individual question scores across all questions for that ideational factor. A binary variable was then created by splitting the index score at 0 to distinguish between those with and without the favorable ideational characteristic.

Descriptive analyses of ideational factors and key outcome behaviors included the following:

- Use of a bed net the previous night by all household members, including children, youth, and adults;
- Receipt of IPTp among women who were pregnant in the two years prior to the survey;
- Receipt of appropriate treatment for fever among children who had a fever in the two weeks and six months prior to the survey;
- Perceptions of malaria threat, perceived effectiveness of bed nets and treatment, attitudes towards outcome behaviors, perceived self-efficacy for adopting these behaviors, and perceptions of social norms associated with these behaviors; and
- Exposure to messages promoting malaria prevention and treatment behaviors.

Bivariate analyses examined the following:

- Differences in ideational factors and key outcome behaviors by urban and rural residence; and
- Socio-demographic characteristics associated with key outcome behaviors and ideational factors.

Bivariate analyses are presented in tables throughout this report. Statistical tests of association were based on interpretation of the corrected and weighted Pearson chi square statistic for use with complex survey data.

In addition to presenting the prevalence of recommended malaria behaviors and their psychosocial determinants, this report also presents the results of bivariate and multivariable logistic regression models to examine unadjusted and adjusted associations between outcomes of interest and relevant socio-demographic and ideational factors. The results presented show the relationship between a behavioral outcome, such as prompt and appropriate care-seeking, and associated explanatory variables, expressed as odds ratios (ORs). The multivariable regression models are useful to identify influencing factors that programs could focus on to change behavioral outcomes.

To inform the development of multivariable models, the research team first conducted bivariate

[22] RBM Partnership to End Malaria. (2017). *Malaria social and behavior change communication indicator reference guide* (2nd ed). RBM.

logistic regression analyses to examine unadjusted associations between socio-demographic factors and priority outcomes of interest. Statistically relevant variables (wherein p≤.2) were retained and included for consideration in final multivariable models to ensure final models were parsimonious. Collinearity of covariates in adjusted models was examined by looking at correlation matrices and variance inflation factors and removing variables highly collinear with other covariates from final adjusted models. Model fit was assessed using Hosmer-Lemeshow goodness-of-fit tests. All final models presented here had good fit with the data (p>.05).

All analyses were conducted using STATA17. Survey weights are included in all tables presenting descriptive and bivariate associations.

RESEARCH ETHICS

We took appropriate steps to minimize emotional discomfort to participants, including providing appropriate human subjects' training for interviewers, conducting individual face-to-face interviews in a private location without third parties, replacing paper questionnaires with handheld electronic devices to collect data directly from participants, and emphasizing the voluntary nature of participation in the survey. The research team also took appropriate steps to protect confidentiality of information provided by the respondents by not recording their full names on electronic data collection instruments, by securing household identification maps and lists during fieldwork, by destroying the lists upon completion of fieldwork in each cluster, and by preventing people outside the survey team from accessing completed questionnaires. For ease of completion of the household questionnaire, the interviewer asked for the first name of each household member, and these names were deleted from the dataset prior to analysis and sharing.

Data were kept on computers with firewall security features, and a disaster recovery strategy was in place. All data on computers, electronic devices, and servers were encrypted to adhere to 128-bit advanced encryption standards, such as TrueCrypt 7.1a.

Breakthrough Action implemented multiple levels of scrutiny to ensure fieldworkers followed the protocol and properly recorded and stored data collection forms. Supervisors oversaw interviewers responsible for directly interacting with study participants and reported directly to study coordinators, who made spot checks in the field and provided guidance. In addition to these layers of scrutiny, Ms. Mugwang'a and Mr. Leting, of Breakthrough ACTION Kenya, made unannounced visits to the field to monitor field procedures.

Before obtaining any information from a potential participant, informed consent was obtained in a face-to-face meeting (in the language the participant was comfortable speaking) in a quiet place in the respondent's home or another place of the respondent's choosing. The consent process occurred after recruitment using assent and consent forms approved by the Johns Hopkins Bloomberg School of Public Health and the African Medical and Research Foundation institutional review boards in Kenya. The forms described the focus of the survey, the general types of questions to be asked, risks involved in participation in the survey, and steps that the study team will take to protect participants' confidentiality. The forms included contact information for one of the study co-investigators so that participants could share any questions or concerns. The forms also contained contact information for the African Medical and Research Foundation institutional review board in Kenya.

For adults (≥18 years) and emancipated minors (female participants aged 15–17 years who were married, pregnant, or had children), participant consent was obtained. Consent discussions took place in a quiet place in the home of the respondent or any other place of the respondent's choosing. For female participants under age 18 who were not considered emancipated, interviewers obtained

assent. Before approaching female youth aged 15–17 years, interviewers first recruited and asked permission from the youth's parent or legal guardian using the parental permission form. Then, following receipt of parental permission, the female youth were approached for the assent discussion.

The interviewer read the consent script and asked respondents if they would like to participate in the study. Those who agreed gave written informed consent using a signature or thumbprint. Signatures or similar marks were recorded on both the digital copy and hard copy. Thumbprints were recorded on hard copies only. A hard copy of the signed consent form was provided to all respondents. Digital copies for recordkeeping were kept separate from and not linked to a given respondent's data.

RESULTS

SAMPLE DESCRIPTION

This section presents the characteristics of households and individuals participating in the MBS to provide context for interpreting results. Information described includes household, residence, and socio-demographic characteristics of respondents. Figure 2 summarizes the study details at a glance, including the number of households participating, total household members in participating households, total nets present in those households, total participating women (adults and emancipated minors), total caregivers of children under five, and the total participating male partners.

Figure 2.
Study Details at a Glance

Demographic Characteristics

The results cover 1,456 households with 7,573 household members (54% women and 46% men). Nearly half (48%) were 18 years or older. See Table A.1.3 for a disaggregation of household member characteristics. Out of 2,253 total survey respondents (1,787 women and 466 men), most (72%) resided in rural areas, and the rest (64%) in urban areas. Most (57%) in rural areas were aged 25–44 (Table 1).

Education

Forty-three percent of respondents from rural areas and 36% from urban areas had attained at least a primary level of education. Educational levels differed significantly between urban and rural areas ($p<.001$), as shown in Table 1.

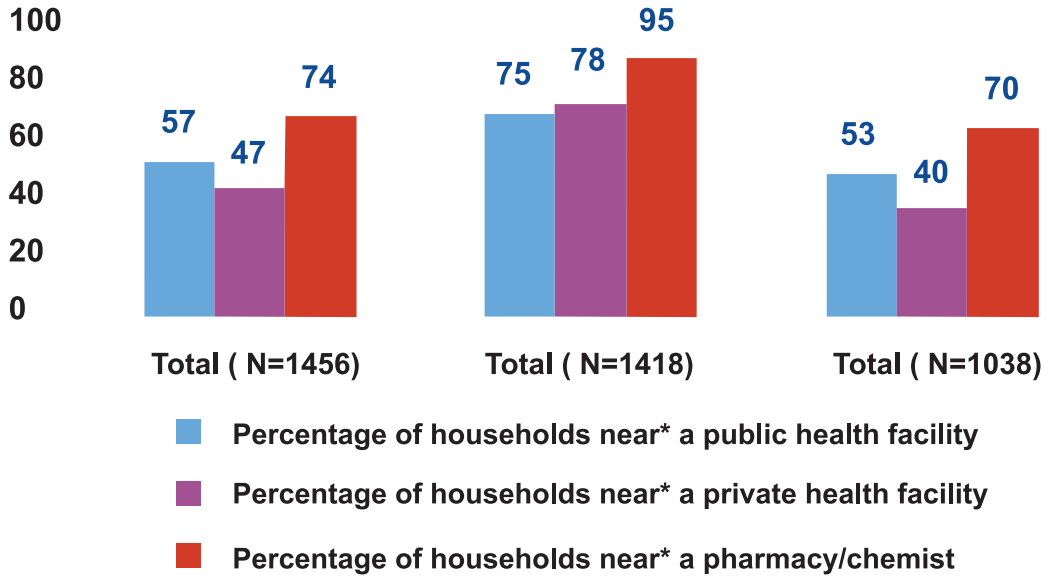
Household Wealth Quintile by Residence

Household wealth was significantly associated with rural/urban residence ($p<.001$). More than half of the households in rural areas were in the lowest and the second lowest wealth quintiles (53%), whereas 76% in urban areas were in the fourth and highest wealth quintiles. Generally, radio ownership did not vary by residence (71%). TV ownership was higher in urban (71%) versus rural areas (44%; $p<.001$). Overall, 83% of respondents owned a mobile phone, with slightly higher ownership in rural areas (85%) than in urban areas (79%; $p<.05$). See Table A.1.2 for details.

Access to Health Services

More than half (57%) of households were located near a public health facility and 47% near a private health facility. Nearly three quarters (74%) were located near a pharmacy or chemist. Most households in urban areas were near a public health facility (75%), and slightly more than half (53%) of households in rural areas were near a public health facility (Figure 3).

Figure 3.
Access to Health Services



Note: *location within 5 kilometers, 30 minutes on foot, or 10 minutes by car

Table 1.
Socio-demographic Characteristics of Respondents

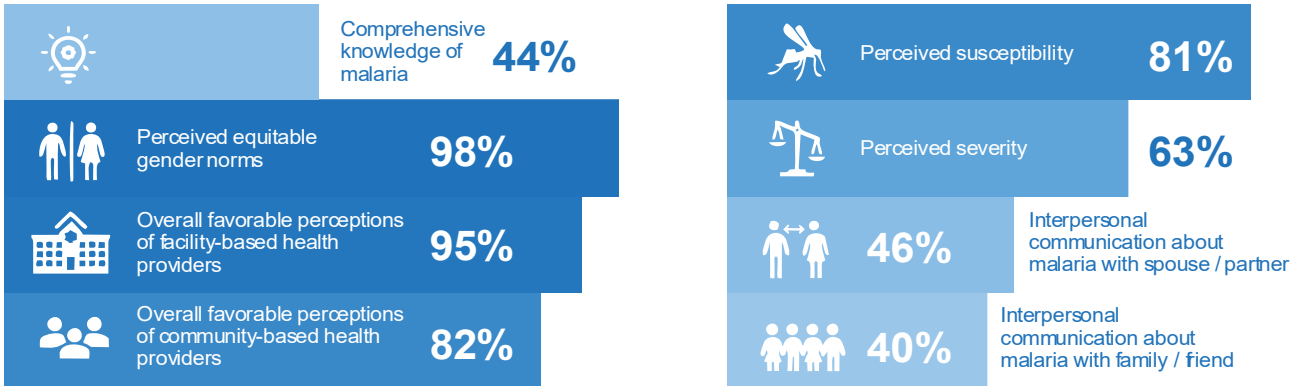
	Urban (n=631)	Rural (n=1622)	Total (N=2253)
Sex			
Female	61	61	61
Male	39	39	39
Age* **			
15–19	10	12	12
20–24	17	13	13
25–34	37	29	30
35–44	27	28	28
≥45	10	19	17
Education* **			
None	14	29	26
Primary	36	43	42
Secondary	29	18	20
College/university	21	10	12

Note: Asterisks signify significant differences in distributions by urban/rural residence based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

CROSS-CUTTING IDEATIONAL DETERMINANTS

This section presents results for cross-cutting ideational factors related to malaria, including general knowledge, attitudes, perceived threat (i.e., severity and susceptibility), and interpersonal communication. Figure 4 presents a snapshot of cross-cutting malaria-related ideational factors.

Figure 4.
Malaria-related Ideational Factors at a Glance



In light of the lower prevalence of certain malaria-related ideational factors, including knowledge, perceived severity, interpersonal communication with spouse or partner, and interpersonal communication with friends or family, the sections below focus exclusively on in-depth findings related to these four cross-cutting ideational factors. Table 2 and Annex A.2 provide further details for all cross-cutting ideational factors.

Knowledge of Malaria

Respondents were asked about their knowledge of the causes and symptoms of malaria (Annex Table A.2.1), and 82% knew that fever was the main symptom of malaria and 56% that only a mosquito bite could cause malaria and not any other cause. Knowledge was statistically significantly higher among those in urban (65%) versus rural (55%) areas (p<.05).

Comprehensive Knowledge of Malaria

Comprehensive knowledge of malaria was defined as knowing that fever is the primary symptom of malaria, knowing that mosquitos are the sole cause of malaria, and knowing at least one way to prevent transmission.[23] Among respondents in urban areas, 54% reported comprehensive knowledge of malaria, compared to 43% in rural areas (p<.05). Compared to those with no formal education (32%), individuals with a college/university education (66%) were more likely to have comprehensive knowledge of malaria (p<.001). Similarly, analysis by wealth quintiles revealed that 62% of individuals in the highest quintile had comprehensive malaria knowledge, compared to 35% in the lowest quintile (p<.001). See Table 2 for results.

[23] Respondents were considered to have comprehensive knowledge of malaria if they 1) did not mention any incorrect cause of malaria, 2) named fever as a primary symptom of malaria, and 3) mentioned at least one major proven preventative measure (e.g., sleeping under a net or ITN, preventative medication, or IRS).

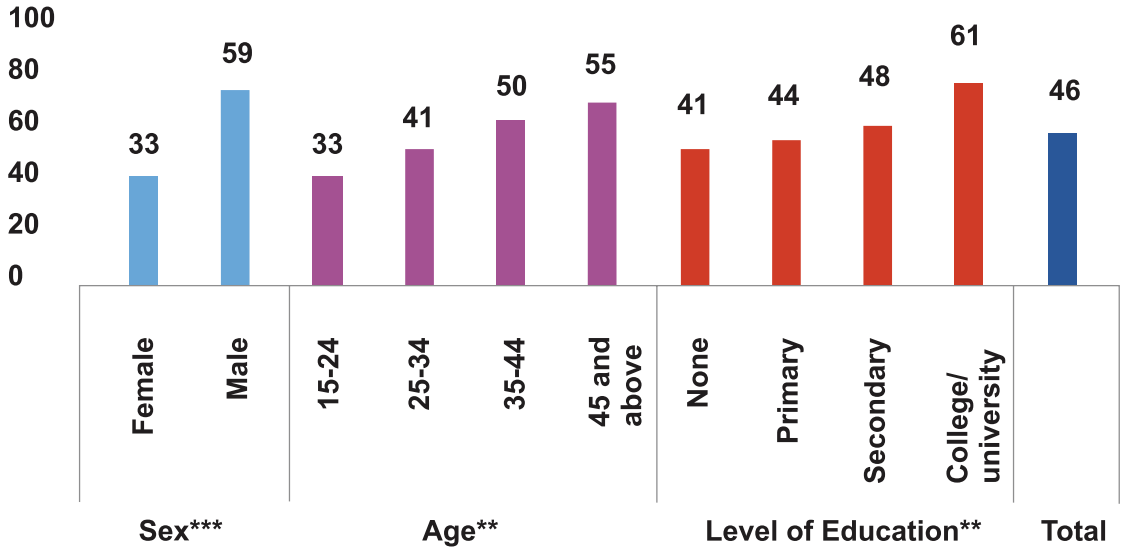
Perceived Severity of Malaria

Perceived severity of malaria was defined based on agreement or disagreement with several statements.[24] Results varied by participants' level of education and household wealth. A smaller percentage of those with no formal education (56%) versus primary (63%), secondary (70%), or college/university (68%) reported high perceived severity of malaria (p<.01). Household wealth had a significant positive association with perceived severity of malaria, with lower rates among those in the lowest (54%) versus the highest (69%) wealth quintile (p<.01). Perceived severity did not vary significantly by residence, sex, or age. Also see Table A.2.3.

Interpersonal Communication with Spouse or Partner About Malaria

Among respondents, 46% reported discussing malaria with a spouse or partner (Table 2). Figure 5 shows associations between self-reported interpersonal communication with spouse/partner about malaria by participant sex, age, and education. Over half of the male respondents (59%) reported discussing malaria with a spouse or partner, compared to 33% of female respondents (p<.001). Such discussion increased with age and education. For example, 33% of respondents aged 15–24 reported talking with a spouse or partner about malaria, compared to 55% of those aged 45 years and older (p<.01). Similarly, 41% of those with no formal education reported malaria-related interpersonal communication, compared to 61% of those with a college/university education (p<.01).

Figure 5.
Interpersonal Communication with Spouse/Partner about Malaria



[24] Statements were as follows: 1) I am not afraid of malaria because it can be treated easily; 2) only weak children can die of malaria; 3) each case of malaria can potentially lead to death; and 4) when someone has malaria, they should recover completely in a few days.

Interpersonal Communication with Friends/Family About Malaria

Overall, 40% of respondents discussed malaria with friends or family (Table 2), with more males (48%) than females (35%) reporting such discussion ($p<.001$). Respondents 45 years and older (50%) and 35–44 years old (49%) reported such interpersonal communication more than did those in younger age groups ($p<.001$). Similarly, a larger percentage of those with college/university education discussed malaria with friends/family (55%) than those with less education ($p<.001$).

Table 2.
Summary of Cross-Cutting Ideational Determinants

-	Had comprehensive knowledge of malaria (%) (N=2253)	Perceived susceptibility to malaria (%) (N=2253)	Perceived severity of malaria (%) (N=2253)	Reported interpersonal communication regarding malaria with spouse/ partner (%) (n=1599)	Reported interpersonal communication regarding malaria with friends/ family (%) (N=2253)	Had favorable attitude towards facility-based health workers (%) (N=2253)	Had favorable attitude towards community health workers (%) (N=2253)	Perceived equitable gender norms related to malaria (%) (N=2253)
Residence	*							**
Urban	54	83	68	48	40	97	79	99
Rural	43	81	62	46	40	95	82	98
Sex		**		***	***	*	***	
Female	46	79	62	33	35	96	84	99
Male	43	86	65	59	48	94	78	97
Age		***		***	***			
15–19	47	61	57	26	17	97	82	98
20–24	46	77	60	35	27	94	81	98
25–34	43	82	62	41	40	95	80	98
35–44	43	88	65	50	49	96	83	99
≥45	46	88	68	55	50	95	82	98
Education	***		**	***	***			
None	32	82	56	41	37	94	81	97
Primary	44	79	63	44	39	95	82	97
Secondary	49	84	70	48	37	97	81	99
College/university	66	85	68	61	55	96	83	99
Wealth Quintile	***		**					
Lowest	35	77	54	43	36	94	80	98
Second	41	82	62	42	38	95	81	98
Middle	40	80	67	47	41	97	79	98
Fourth	52	86	67	51	43	95	85	98
Highest	62	83	69	51	44	96	85	99
Total	44	81	63	46	40	95	82	98

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant. For example, “Residence” is statistically significantly associated with reported comprehensive knowledge of malaria and perceived equitable gender norms related to malaria ($p<.05$). Significance is based on results from design-based tests of association using survey-weighted data. *$p<.05$; **$p<.01$; ***$p<.001$

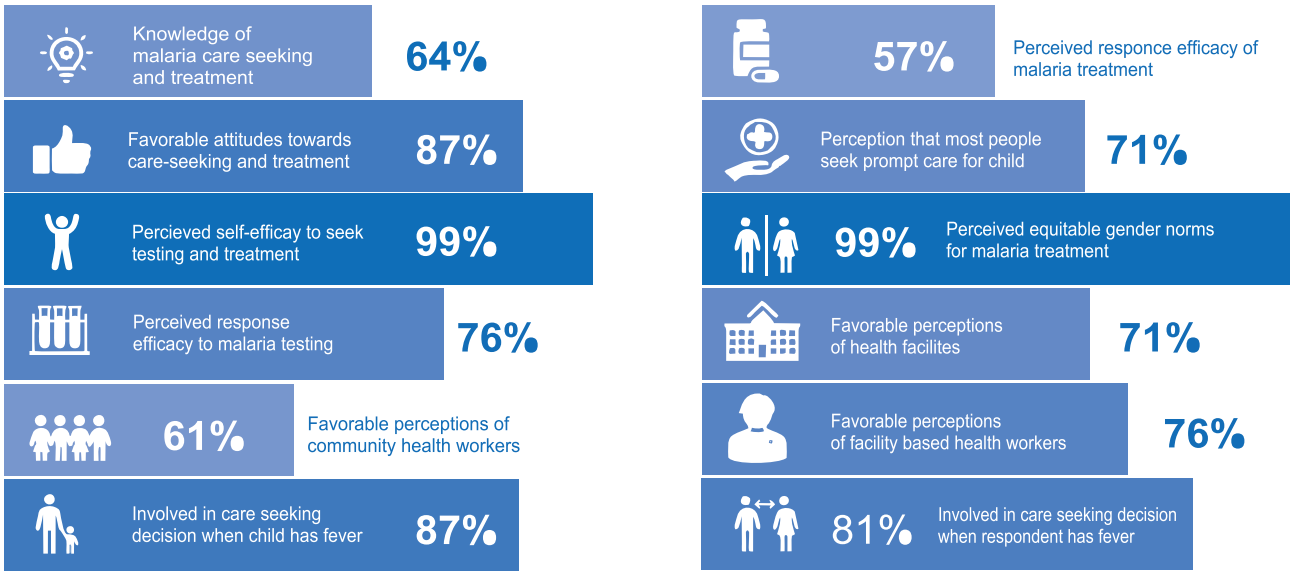
MALARIA CASE MANAGEMENT FOR CHILDREN UNDER FIVE YEARS OLD

This section presents results related to participants' case management of malaria in children under five years of age. First, it highlights key ideational factors linked with malaria care-seeking and treatment. Then, care-seeking behaviors for children under five years of age in the two weeks prior to the survey are described, including self-reported prompt and appropriate care-seeking and treatment. Finally, results from a multivariable logistic regression model are presented to examine associated factors.

Ideational Variables Linked with Care-Seeking

This section presents ideational factors linked with malaria care-seeking and treatment, including knowledge, attitudes, response efficacy, self-efficacy, community norms, attitudes towards providers, decision-making, and gender norms. Figure 6 presents a snapshot of these ideational factors at a glance, and Table 3 presents the key socio-demographic characteristics.

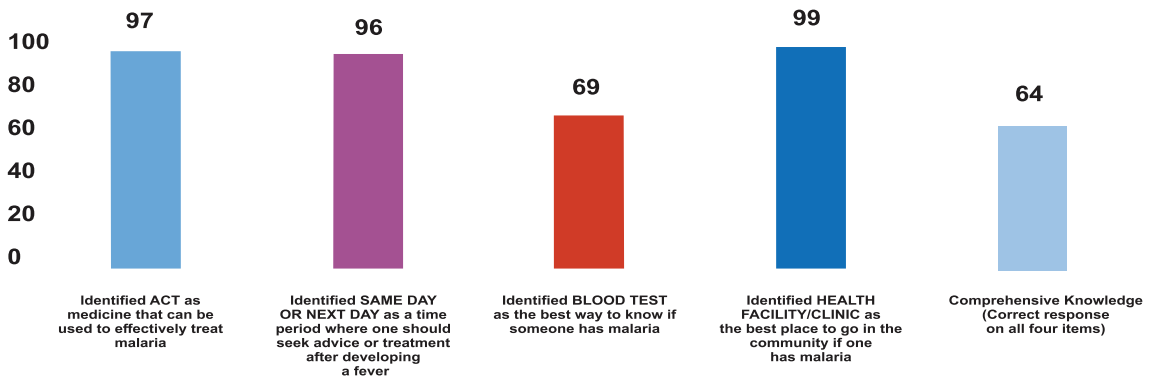
Figure 6.
Ideational Factors at a Glance



Knowledge of Malaria Care-seeking and Treatment

Sixty-four percent of respondents had knowledge of malaria care-seeking and treatment, with male respondents having significantly higher knowledge (69%) than female (61%) respondents ($p<.01$). Knowledge of malaria care-seeking and treatment also increased with increasing age of the respondent, from 46% among 15–19-year-olds to 70% among those aged 45 years and older ($p<.001$). Level of education was also associated with knowledge of care-seeking and treatment: those with no formal education had less knowledge (64%) than those with a college/university (72%) education ($p<.05$). Figure 7 shows differences in specific components of comprehensive knowledge of malaria care-seeking and treatment. Table 3 summarizes the results.

Figure 7.
Knowledge of Malaria Care-seeking and Treatment



Favorable Attitudes Towards Care-seeking and Treatment

Eighty-seven percent of respondents had favorable attitudes towards malaria care-seeking and treatment. Respondents in urban areas (93%) were more likely to have favorable attitudes than those in rural areas (86%; p<.01). Significant differences also were observed in attitudes towards care-seeking and treatment based on education and wealth quintile, with favorable attitudes ranging from 77% among those with no formal education to 97% among those with a college/university education (p<.001) and from 80% among those in the lowest wealth quintile to 91% in the highest quintile (p<.01). Table 3 summarizes the results.

Specific attitudes towards malaria care-seeking and treatment varied, with 97% of respondents agreeing that health providers are the best people to talk to if they think their child has malaria or needs medication and 95% agreeing that the child should take the medication as prescribed. Other attitudes towards malaria care-seeking and treatment were less prevalent among respondents (see Annex Table A.3.2).

Perceived Response Efficacy of Malaria Testing

Seventy-six percent of respondents reported that malaria testing was effective. Such response efficacy varied significantly by education, from 71% among those with no formal education to 81% among those with secondary education and 79% among those with college/university education (p<.05; Table 3). Most (91%) reported that a blood test is the only way to diagnose malaria, but 55% agreed that malaria can be diagnosed by a caregiver based on symptoms. Overall, 27% agreed that it is possible to take malaria medicine despite a negative blood test (see Annex Table A.3.3).

Perceived Response Efficacy of Malaria Treatment

More than half (57%) had a high perceived response efficacy of malaria treatment, and this rate varied significantly by education level. It was lowest (50%) among those with no formal education and highest (62% and 60%) among those with secondary and college/university education, respectively (p<.05; Table 3). In particular, 95% of respondents agreed that malaria drugs obtained from health facilities are effective, but only 59% disagreed that malaria drugs obtained from the market are just as effective as those from the health facility (see Annex Table A.3.4).

Perceived Self-efficacy of Malaria Testing and Treatment

Perceived self-efficacy of malaria testing and treatment was high (99%) and did not vary significantly by socio-demographic characteristics (Table 1). Most respondents reported they could take their child to the health facility at the first sign of malaria (92%) or on the same or next day after they develop a fever (97%). Most (96%) could request a blood test for malaria at the health facility (96%), make sure their child takes the full dose of medicine (99%), and pay for the medication the health provider recommends (95%). However, 88% of respondents reported they needed permission from another family member to take their child with fever to the health facility (see Annex Table 3.6).

Perceived Community Norms Regarding Malaria Testing and Treatment

Perceived supportive descriptive community norms regarding malaria testing and treatment was high, with 71% reporting that most people in their community take their children to a health provider on the same day or day after they develop a fever. There were no statistically significant differences based on socio-demographic characteristics (Table 1). Overall, most (79%) reported that children with fever are taken to a health facility to get tested for malaria, and 70% believed that people in their community approve of prompt care-seeking for children with fever (Annex Table 3.7). A larger percentage of male respondents (83%) than females (77%) reported perceiving that most children in their community are taken to health facilities to receive malaria tests ($p<.05$). In contrast, a larger percentage of females (75%) than males (61%) perceived most people in their community approve of prompt care-seeking for children with fever ($p<.001$; Annex Table 3.8).

Gender Norms Related to Malaria Treatment

Equitable perceptions of gender norms related to malaria treatment were common (99%) and did not vary by socio-demographic characteristics (Table 1).

Perception of Health Facilities and Health Workers

Seventy-one percent of respondents had favorable perceptions of health facilities providing malaria care and treatment. Results varied by residence, with 79% of urban and 69% of rural residents reporting favorable perceptions ($p<.01$; Table 3). Favorable perceptions towards health facilities were significantly negatively associated with age, ranging from 79% among those aged 15–19 years to 66% for those 45 years and older ($p<.05$; Table 3). In particular, 93% of respondents agreed that facilities always have rapid diagnostic test kits, and 73% agreed health facilities always have medication to treat malaria. This perception varied by residence, with 81% of urban respondents agreeing and only 71% of rural respondents doing so ($p<.01$; Annex Table A.3.8).

Sixty-one percent of respondents had favorable perceptions of community-based health workers regarding malaria care-seeking and treatment. These perceptions varied by respondent sex, with a larger percentage of females (64%) than males (57%) having favorable perceptions ($p<.01$; Table 3). Overall, 43% and 50% of respondents agreed that community health workers always have malaria medication and rapid diagnostic test kits, respectively (Annex Table A.3.9).

Seventy-six percent of respondents had favorable perceptions towards facility-based health workers providing malaria care and treatment. These perceptions varied by education, with a smaller percentage (69%) of those with no formal education reporting favorable perceptions towards facility-based health workers, compared to 81% of college-educated respondents ($p<.01$; Table 3).

Respondents in both urban and rural areas agreed that providers know how to treat malaria in children (95%) and treat patients with respect (90%). However, a significant proportion of respondents agreed that health facility providers in their community make parents pay for medication (28%) and rapid diagnostic tests (30%).

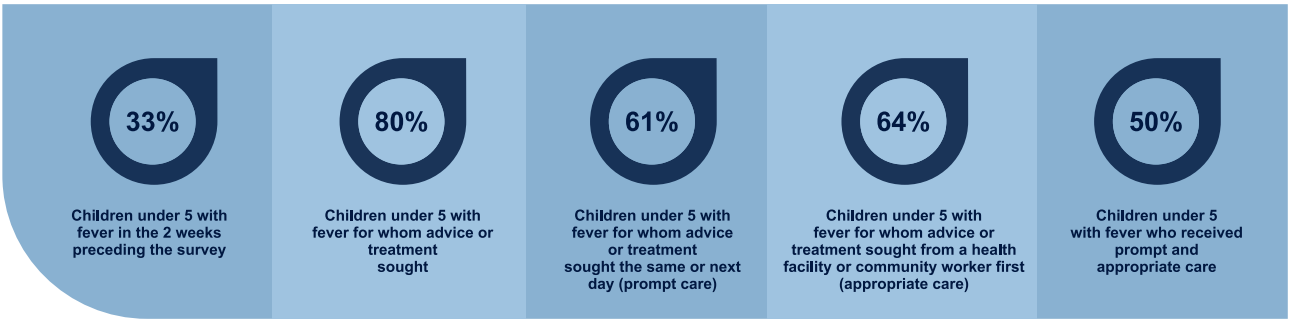
Decision-making for Malaria Care-seeking and Treatment

Regarding decision-making for malaria care and treatment among respondents who were married or cohabitating, involvement in decisions to go to the health facility when a child has malaria was high (87%) and increased with age in both urban and rural settings. Involvement in decision-making ranged from 75% (urban) and 74% (rural) among those 15–19 years of age to 94% (urban) and 86% (rural) among those 45 years and older, but these differences were significant only in urban areas ($p<.05$). Involvement in decision-making was similar by sex of respondent. A similar trend was observed in respondents' involvement in the decision to purchase medicine for a child with fever (81%) and about what to do when the respondent is sick (75%). Overall, male respondents reported a higher percentage of involvement than females in these decisions (Annex Table A.3.11).

Care-seeking Behaviors

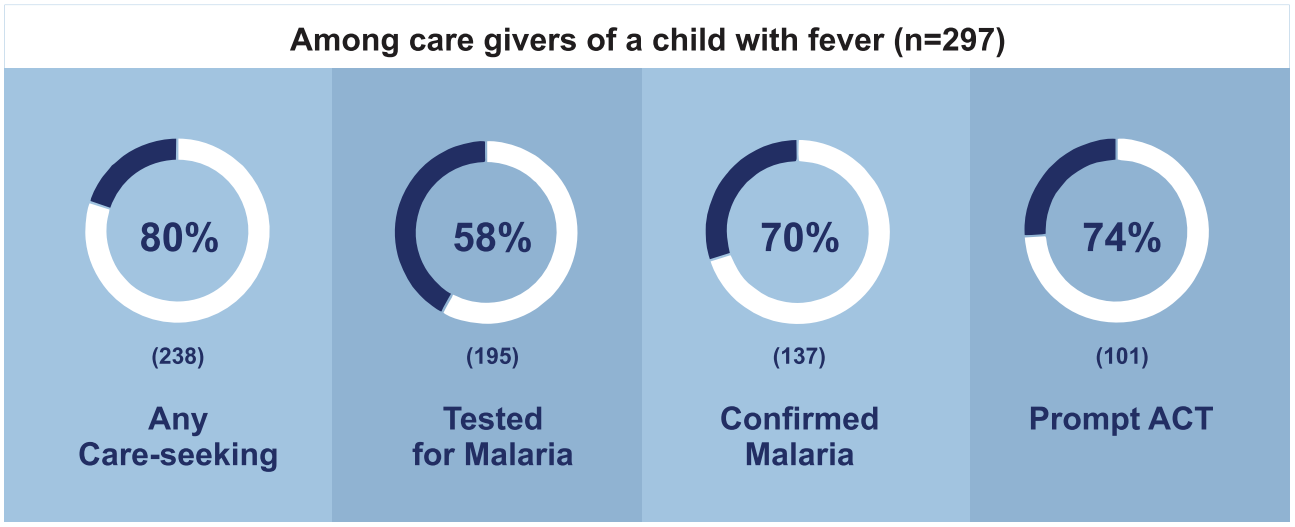
Caregivers of children under five were asked about care-seeking for children in their household who had a fever in the two weeks before the survey. Overall, 33% of children under five (35% in rural and 26% in urban ares) had a fever in the two weeks preceding the survey ($p<.05$). Advice or treatment was sought for 80% of children with a fever in the two weeks preceding the survey. Advice was sought the same or next day for 61% of children with a fever in the two weeks preceding the survey. More than half (64%) had caregivers who sought appropriate advice or treatment from a health facility or community worker first, including a government dispensary (37%), government hospital (17%), and pharmacist or chemist (16%; Table 4). Overall, 50% of children under age five with fever reportedly received both prompt and appropriate care-seeking (Figure 8).

Figure 8.
Care-seeking Behaviors for Children under Five with Fever in Two Weeks Preceding the Survey



Among caregivers of children under age five with a fever, 58% reported their child received a malaria test, which varied by age (48% of children younger than 12 months; 67% of those aged 12–13 months; and 66% of those aged 24 months or older ($p<.05$; Table A.3.12). Of those, 70% tested positive, and 86% with malaria-induced fever received ACT, most (74%) on the same or next day (Annex Table A.3.13 and Figure 9). The most common sources of ACT were government dispensaries (40%), pharmacists or chemists (19%), and private hospitals or clinics (14%; Table 5).

Figure 9.
Care-seeking and Treatment for Child with Fever in Two Weeks Preceding the Survey



Factors Associated with Prompt and Appropriate Care-seeking

To explore socio-demographic, ideational, structural, and access factors related to prompt and appropriate care-seeking for children under five with fever, unadjusted and adjusted logistic regression models were used. Several of the strongest associations with prompt and appropriate care-seeking were ideational. Figure 10 highlights the results from the final model fit, which spotlights socio-demographic and ideational factors of interest. Table 6 at the end of this section details all factors in the regression model.

After adjusting for socio-demographic characteristics, respondents who discussed malaria with their spouse/partner were twice as likely (AOR: 2.0; 95% CI: 1.15–3.64) to seek prompt and appropriate care for a child under five with fever ($p<.05$), compared to those who had no such discussion. Attitudes towards community health workers also appeared to be significantly associated with prompt and appropriate care-seeking for children. Those who perceived that community health workers always had rapid diagnostic test kits (called “blood test kits” in the survey instrument), one component of attitudes towards community health workers, were 1.9 times more likely to seek prompt and appropriate care, compared to those who did not have such attitudes (95% CI: 1.1–3.4; $p<.05$; Table 6).

Figure 10.
Logistic Regression of Socio-Demographic, Ideational, Structural, and Access Factors Associated with Seeking Prompt and Appropriate Care for Children with Fever in Two Weeks Prior to the Survey

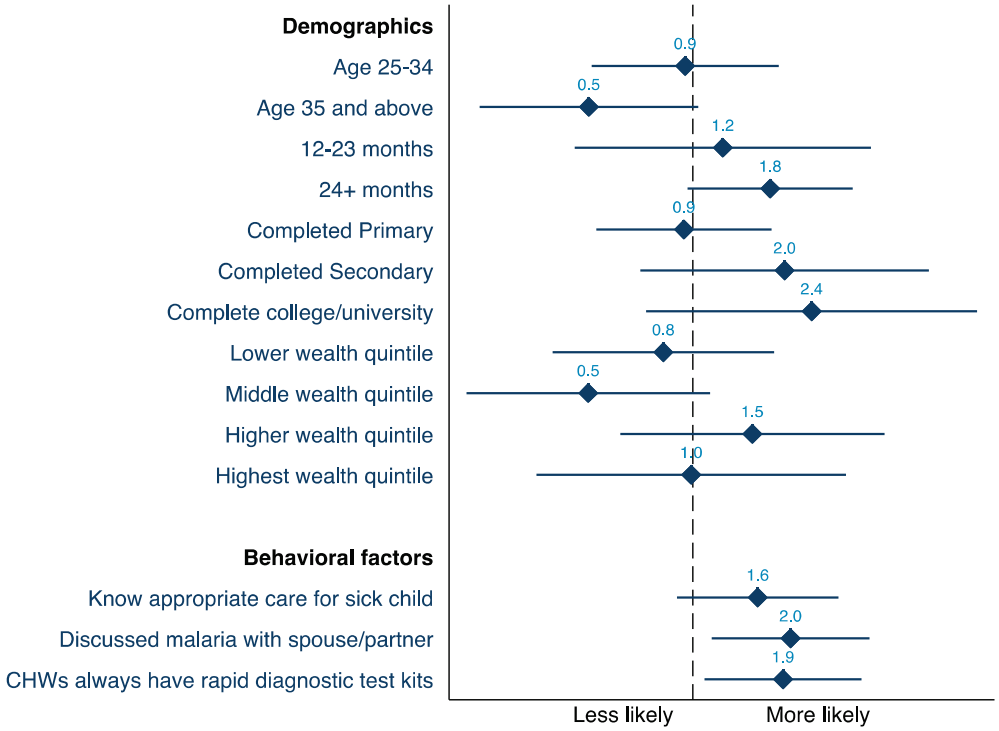


Table 3.
Summary of Ideational Variables Related to Case Management for Children Under Age Five (N=2253)

Panel A.

	Knowledge of malaria care-seeking and treatment (%)	Favorable attitudes towards care-seeking and treatment (%)	Perceived response-efficacy of malaria testing (%)	Perceived response-efficacy of malaria treatment (%)	Perceived self-efficacy to for malaria testing and treatment (%)	Perceived supportive descriptive community norms for malaria testing and treatment (%)	Perceive equitable gender norms related to malaria treatment (%)
Residence		**					
Urban	63	93	80	58	99	73	99
Rural	65	86	75	56	99	71	98
Sex	**						
Female	61	88	76	56	98	70	99
Male	69	86	75	57	99	74	98
Age	***						
15–19	46	89	69	60	97	67	98
20–24	59	87	77	60	98	70	97
25–34	67	87	77	54	99	72	98
35–44	68	87	77	53	99	70	99
≥45	70	86	75	61	99	75	100
Education	*	***	*	*			
None	64	77	71	50	99	75	98
Primary	60	88	76	57	98	69	98
Secondary	69	92	81	62	99	71	99
College/university	72	97	79	60	99	72	99
Wealth quintile		**					
Lowest	60	80	69	56	98	66	99
Second	67	87	75	59	98	69	98
Middle	66	90	78	54	99	74	98
Fourth	62	89	78	56	99	75	98
Highest	66	91	81	57	99	73	99
Total	64	87	76	57	99	71	99

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Panel B.

	Favorable perceptions of health facilities regarding care-seeking and treatment (%) (N=2253)	Favorable perceptions of community-based health providers regarding care-seeking and treatment (%) (N=2253)	Favorable perceptions of facility-based health providers regarding care-seeking and treatment (%) (N=2253)	Involved in decision to go to the health facility and purchase malaria medicine when their child has a fever among married or cohabitating participants (%) (n=1599)	Involved in decision about what to do when the respondent themself is sick among married or cohabitating participants (%) (n=1599)
Residence	**				
Urban	79	52	78	84	76
Rural	69	63	76	87	82
Sex		**			*
Female	72	64	78	89	78
Male	69	57	74	85	84
Age	*				**
15–19	79	63	78	75	63
20–24	75	61	73	81	75
25–34	70	59	75	86	79
35–44	69	65	78	90	85
≥45	66	57	77	87	85
Education			**		
None	71	63	69	85	80
Primary	71	61	78	87	81
Secondary	69	60	79	86	80
College/university	73	61	81	91	86
Wealth quintile					
Lowest	71	61	75	85	85
Second	68	61	77	83	76
Middle	69	60	75	90	83
Fourth	71	62	77	90	84
Highest	77	62	79	88	79
Total	71	61	76	87	81

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Table 4.
Location Where Care Was First Sought for a Child Under Five with Fever in the Two Weeks Preceding the Survey (n=238)

Location	Percentage
Government dispensary	37.0
Government hospital	17.0
Pharmacy/chemist	16.0
Government health center	12.0
Private hospital/clinic	12.0
Community health volunteer	2.0
Faith-based, church, mission hospital/clinic	2.0
Nursing/maternity home	0.4
Other public facility	0.4

Table 5.
*Source of Artemisinin-based Combination Therapies (With or Without a Malaria Test) for Children Under 5 with Malaria-induced Fever in Two Weeks Preceding the Survey (n=133)**

Source	Percentage
Government dispensary	40
Pharmacy/chemist	19
Private hospital/clinic	14
Government hospital	11
Govt. Health center	11
Other source	11
Faith-based, church, mission hospital/clinic	2
Community health volunteer	2
Worksite clinic	2

*Includes all children under 5 with fever in 2 weeks preceding the survey, not just those with a positive malaria diagnosis

Table 6.
Logistic Regression Results for Factors Associated with Malaria Care-seeking for and Testing of Children with Fever in Two Weeks Preceding Survey

	Sought prompt and appropriate care in prior 2 weeks (%)	Adjusted odds ratio	95% confidence interval
Age			
15–24 (reference)	55	1	--
25–34	54	0.94	0.48–1.88
≥35	39	0.47‡	0.21–1.04
Age of child*			
<12 months (reference)	39	1	--
12–23 months	57	1.24	0.42–3.68
≥24 months	60	1.76‡	0.96–3.23
Education*			
None (reference)	42	1	--
Primary	48	0.94	0.49–1.78
Secondary	62	1.96	0.68–5.63
College/university	73	2.38	0.71–8.02
Household wealth quintile			
Lowest (reference)	46	1	--
Second	42	0.81	0.36–1.81
Middle	47	0.46‡	0.19–1.13
Fourth	66	1.54	0.59–4.06
Highest	58	0.99	0.32–3.07
Residence			
Urban (reference)	56	1	--
Rural	49	1.21	0.47–3.09
Near a public or private facility (subjective)			
No (reference)	47	1	--
Yes	52	0.96	0.52–1.76
Knowledge of malaria care-seeking and treatment**			
No (reference)	40	1	--
Yes	61	1.61	0.89–2.90
Knowledge of at least 1 incorrect way to transmit malaria			
No (reference) =	55	--	--
Yes	46	--	--
Perceived risk of malaria			
No (reference)	62	--	--
Yes	48	--	--
Talked about malaria with spouse* (n=236)			
No (reference)	40	1	--
Yes	57	2.04*	1.15–3.64
Perceived CHWs always have rapid diagnostic test			
No (reference)	46	1	--
Yes	54	1.93*	1.09–3.44
Positive attitude towards community health workers			
No	19	--	--
Yes (reference)	51	--	--
Heard a message about malaria on the media			
No (reference)	45	--	--
Yes	55	--	--
Total	50	--	--
Pseudo-R_2	0.1198		
Number of observations	236		

Note: ‡p<.1 *p<.05; **p<.01; ***p<.001

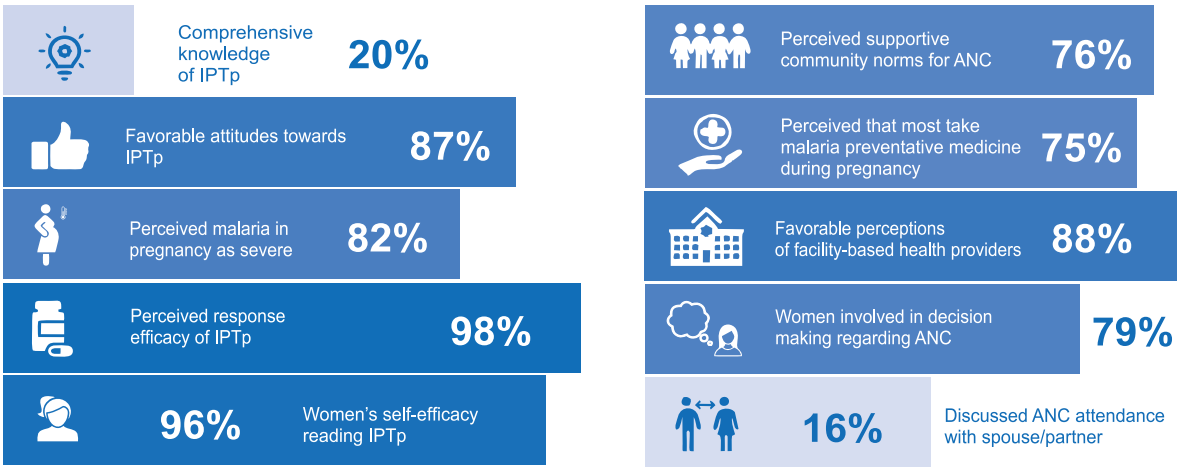
MALARIA IN PREGNANCY

This section focuses on ideational factors and health behaviors related to malaria in pregnancy, particularly related to ANC and IPTp. This section describes the related ideational variables and then presents respondents' ANC intentions and use, including results from multivariable logistic regression models examining associations between ideational variables and ANC intentions for future pregnancy among women. Finally, this section describes respondents' IPTp intentions and use. As IPTp intentions were common among respondents, there was not sufficient variation in responses to conduct multivariable logistic regression analyses to examine adjusted associations between ideational variables and IPTp intentions.

Ideational Variables Linked with Malaria in Pregnancy, ANC, and IPTp

Figure 11 illustrates a summary of ideational variables related to malaria in pregnancy. These ideational factors are presented by key socio-demographic characteristics in Table 7 at the end of this section.

Figure 11.
Ideational Factors at a Glance



Comprehensive Knowledge of IPTp

Comprehensive knowledge of IPTp was low among respondents (20%) and varied significantly by age and education level. Comprehensive knowledge of IPTp demonstrated a negative association with age, with a smaller percentage of those ages 15–19 having comprehensive knowledge of IPTp (13%) than those aged 20–24 (23%), 25–34 (22%), and 35 and older (20%; p<.01). In contrast, respondents with no formal education were more knowledgeable on IPTp (29%) than those with primary, secondary, or college/university education (17%, 18%, and 14%, respectively; p<.001). There was no significant difference between males (18%) and females (21%) in comprehensive knowledge of IPTp. See Table 7 for results.

Among individual components used to assess respondents' comprehensive knowledge of IPTp, 41% knew the appropriate timing for a first ANC visit and 48% knew how many times during pregnancy a woman should receive medicine to prevent malaria. In contrast, 81% of respondents knew how many ANC check-ups a woman should receive during pregnancy (Annex Table A.4.1).

Favorable Attitudes Towards IPTp

Most (87%) respondents had favorable attitudes towards IPTp, with 84% of those with no formal education reporting favorable attitudes, compared to 93% of those with college/university education (p<.05; Table 7). Regarding specific attitudes towards IPTp, 95% of the respondents agreed that IPTp is safe for both mother and baby, but only 75% agreed that a pregnant mother should take several doses of IPTp to prevent malaria during pregnancy (Annex Table A.4.2). Whereas 71% in urban areas agreed that a woman should not wait a few months to see a health provider if she thinks she may be pregnant, only 64% of respondents in rural areas agreed that women should not delay care-seeking (p<.01; Annex Table A.4.2).

Perceived Severity of Malaria in Pregnancy

Eighty-two percent of respondents reported perceived severity of malaria during pregnancy, which varied significantly by age and education level, with a larger percentage of respondents 35 years and older reporting higher perceived severity (90%), compared with those aged 15–19 (59%), 20–24 (75%), and 25–34 (83%; p<.001; Table 7).

In particular, 95% of respondents agreed that malaria has serious effects on a pregnant woman and her unborn child, and 84% agreed that pregnant women are more likely than non-pregnant ones to die from malaria (Annex Table A.4.3).

Perceived Response Efficacy of IPTp

The perceived response efficacy of IPTp was high (98%) among respondents, demonstrating that most believed IPTp is effective in ensuring the health of mothers during pregnancy.

Perceived Self-efficacy for IPTp

Female respondents had high perceived self-efficacy for IPTp (96%), demonstrating that most felt confident practicing specific behaviors related to IPTp and ANC, such as going to appointments and taking medicine to prevent malaria at least three times during pregnancy (Annex Table A.4.5). The percentage of participants with high perceived self-efficacy differed significantly by household wealth, both overall and in rural settings specifically. Overall, 99% of women in the highest wealth quintile reported high perceived self-efficacy for IPTp, compared to 93% in the lowest wealth quintile (p<.01; Table 7)

In comparison, male respondents also had high perceived self-efficacy for IPTp based on their belief that they could engage in behaviors such as supporting and accompanying their spouse/partner in going to ANC appointments (Annex Table A.4.6). Overall, 97% of men had high perceived self-efficacy for IPTp, which was significantly higher in urban areas (100%) than in rural areas (96%; p<.05; Table 7).

Perceived Community Norms Regarding IPTp

More than three-quarters of respondents reported that most women in their community go to ANC at least four times when pregnant (76%), that most women in their community take medicine to prevent malaria when pregnant (75%), and that most people in their community approve of pregnant women taking medicine to prevent malaria (76%; Table 7).

A larger percentage of male respondents (80%) than female respondents (74%) perceived that most pregnant women in the community go to ANC at least four times ($p<.05$; Table 7).

Relating to the perception that most pregnant women in their community take malaria preventive medicine during pregnancy, perceived community norms related to IPTp differed significantly by respondent age. A smaller percentage of respondents aged 15–19 reported that most take malaria preventative medicine during pregnancy (69%), compared with those aged 20–24 (72%), 25–34 (79%), and older than 35 (75%; $p<.05$; Table 7).

Relating to the perception that most people in their community will approve of pregnant women taking medicine to prevent malaria, perceived community approval of IPTp differed significantly by respondent age and household wealth. Seventy percent of adolescents aged 15–19 perceived that most people in the community will approve of pregnant women taking medicine to prevent malaria, compared to 81% of adults aged 35 and older ($p<.05$; Table 7). A positive association was observed between perceived community norms related to approval of IPTp and household wealth, ranging from 70% among those in the lowest wealth quintile to 81% among those in the highest wealth quintile ($p<.05$; Table 7).

Perceived Equitable Gender Norms Regarding Malaria in Pregnancy

Eighty-eight percent of respondents reported perceived equitable gender norms regarding ANC. A larger percentage of male respondents perceived that pregnant woman should feel comfortable asking a husband/spouse to attend a prenatal consultation (92%), compared with female respondents (86%; $p<.01$; Table 7). Perceived equitable gender norms also varied by age, with a smaller percentage of younger respondents reporting more equitable gender norms (83%), compared with older respondents (89%, 88%, and 91%, respectively, for those aged 20–24, 35–34, and 35 and older; $p<.01$; Table 7). Significant differences by household wealth were also observed among those living in urban areas (See Annex Table A.4.8 for further details).

Perceptions of Health Workers Regarding Malaria in Pregnancy

Ninety-six percent of respondents reported favorable perceptions of community-based health workers providing ANC. A smaller percentage of younger respondents reported favorable attitudes (15–19: 91%), compared with older age groups (35 and over: 97%; $p<.01$). In comparison, 88% reported favorable perceptions of facility-based health workers regarding malaria in pregnancy. A similar but statistically insignificant trend was observed by age. Overall, perceptions of facility-based health workers differed by level of education, with a smaller percentage of respondents with no formal education reporting favorable attitudes (85%), compared to those with primary (86%), secondary (91%), and college/university education (93%; $p<.01$; Table 7).

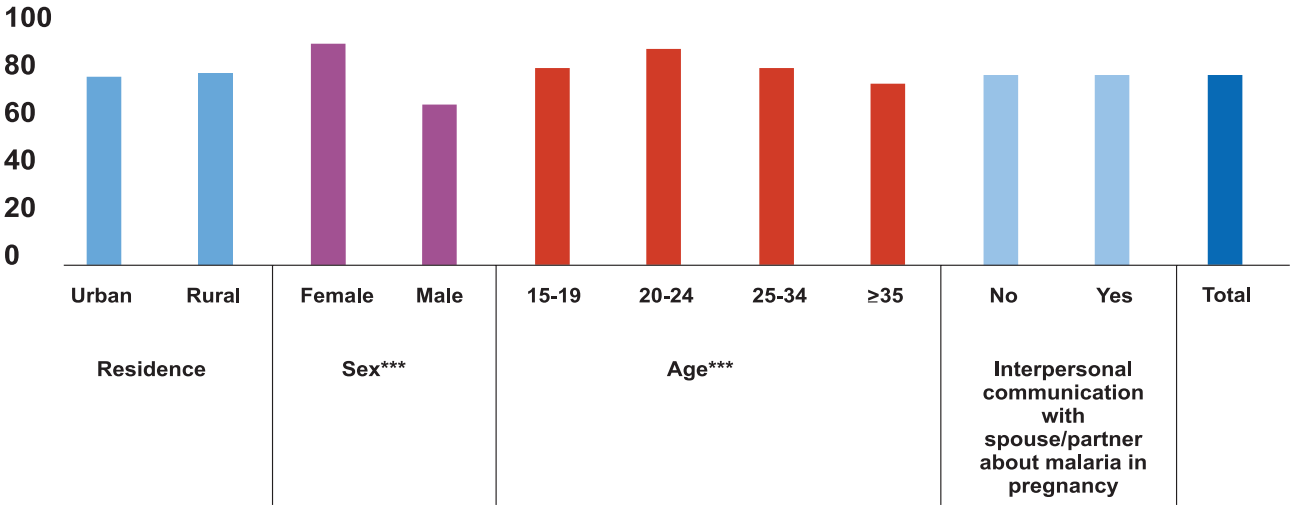
Interpersonal Communication and Decision-making Regarding ANC

Sixteen percent of respondents who were married or cohabitating with a partner reported discussing ANC attendance with their spouse/partner. Such interpersonal communication was significantly different across age groups, with a notable decrease from 36% among those aged 15–19 and 40% among those aged 20–24 to 21% among those aged 25–34 and 8% among those aged 35 years and older ($p<.001$; Table 7).

As shown in Figure 12, 79% of married or cohabitating respondents reported involvement in decision-making regarding ANC, with significantly more female respondents (92%) than male respondents

(67%; p<.001) and significantly more in the 15–19 age group (82%) than the 35 and older group (75%) doing so (p<.01; Table 7). No difference in respondent involvement in decision-making was observed based on interpersonal communication about malaria in pregnancy (Figure 12).

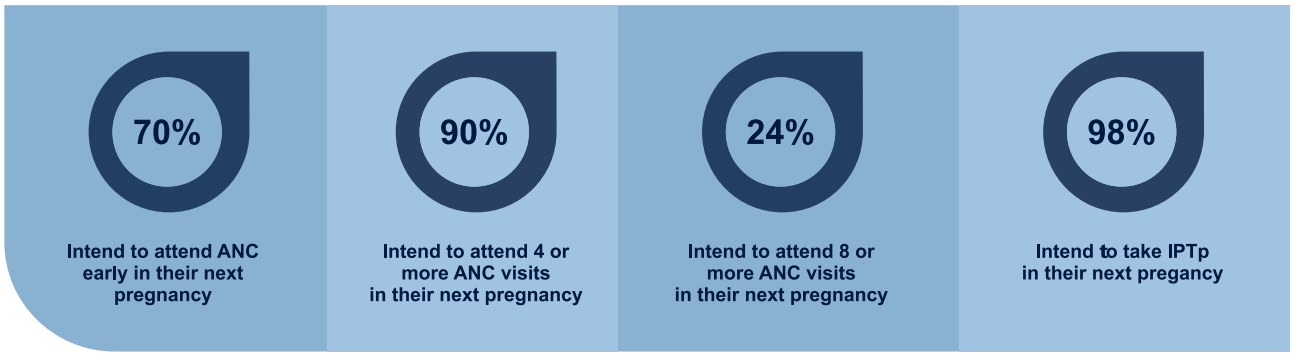
Figure 12.
Antenatal Care Decision-making



Factors Associated with ANC Intentions and Use

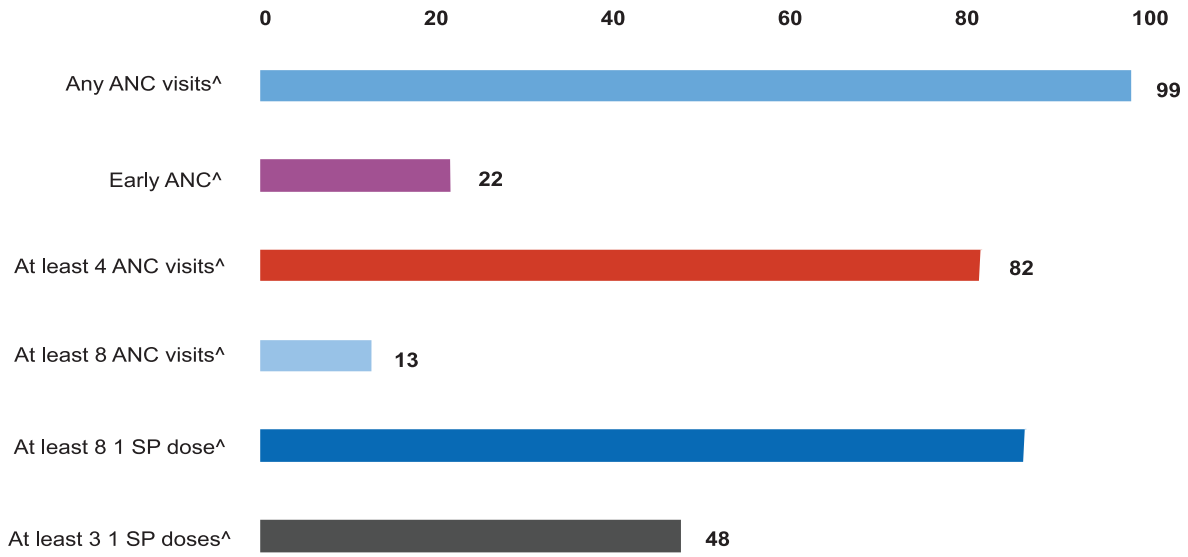
Of the women who intended to have more children who also had a child in the last two years, 70% planned to attend ANC early in their next pregnancy, 90% to attend 4 or more ANC visits, and 24% to attend 8 or more ANC visits (Figure 13).

Figure 13.
Intentions Related to Future Antenatal Care (ANC) and Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Among Women Who Had a Live Birth in the Last Two Years



Among women with a live birth in the past two years, 99% reported attending at least one ANC visit, 82% at least four ANC visits, and 13% at least eight ANC visits (Figure 14; Annex Table A.4.14).

Figure 14.
Antenatal Care (ANC) Attendance and Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) With Sulfadoxine Pyrimethamine Among Women With a Live Birth in the Last Two Years (N=514).



Among individuals who did not attend ANC during the first trimester, Table 8 shows common reasons cited by respondents, such as not knowing they were pregnant (20%), not feeling sick (19%), or lack of time (17%).

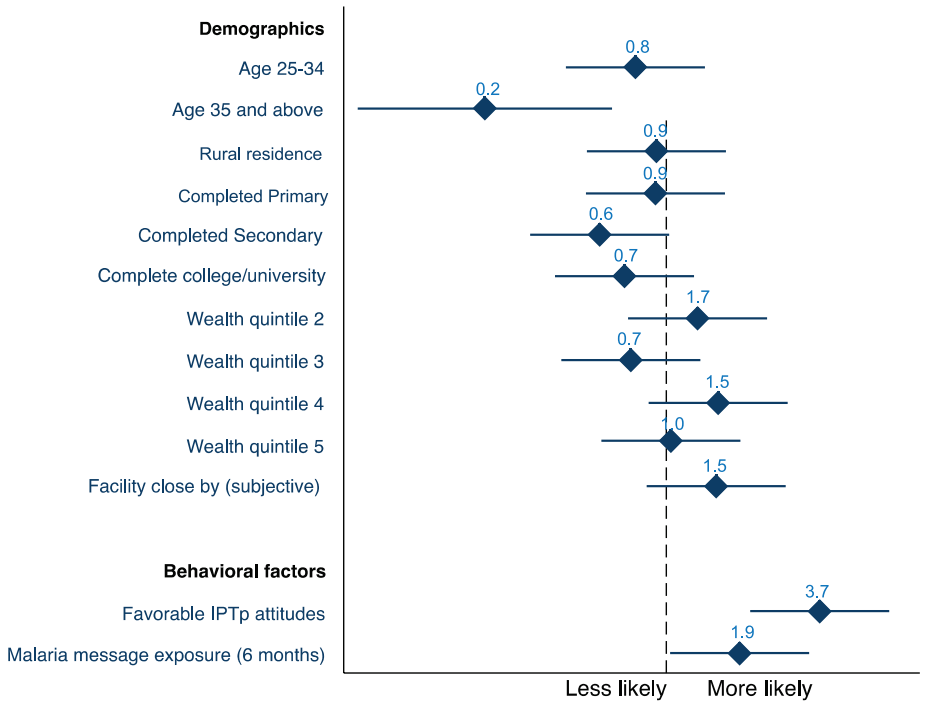
Advanced Analysis

To explore socio-demographic, ideational, structural, and access factors related to ANC intentions for women who intend to have another child and who had a live birth in the last two years, unadjusted and adjusted logistic regression models were used. Several of the strongest associations with ANC intentions were ideational. Figure 15 highlights the results from the final model fit looking at factors associated with intention to attend the first ANC visit in the first trimester (early ANC), which spotlights socio-demographic and ideational factors of interest and their associations with early ANC intentions. Table 9 at the end of this section provides detail about all factors included in the regression model. Similar models were also fit to examine factors associated with intentions to attend four or more and eight or more ANC visits, which are also summarized below.

A smaller percentage of those aged 35 or older planned early ANC (42%), compared to other age groups (72% and 70%, respectively; $p<.1$). A larger percentage of respondents with favorable attitudes towards ANC/IPTp had intentions for early ANC (72%), compared to those who did not have favorable attitudes (53%; $p<.05$). Adjusting for education, household wealth, residence, proximity to a public or private health facility, and attitudes related to ANC/IPTp, respondents aged 35 or older had 79% reduced odds of seeking early ANC during the next pregnancy ($p<.01$). Respondents exposed to malaria messages in the last 6 months (AOR: 1.9; $p<.05$) and those with favorable ANC/IPTp attitudes (AOR: 3.7; $p<.001$) had significantly increased odds of seeking early ANC during the next pregnancy, compared with those not exposed to malaria messages and those who did not have favorable ANC/IPTp attitudes.

Figure 15.

Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Seek Early Antenatal Care (ANC) in Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years

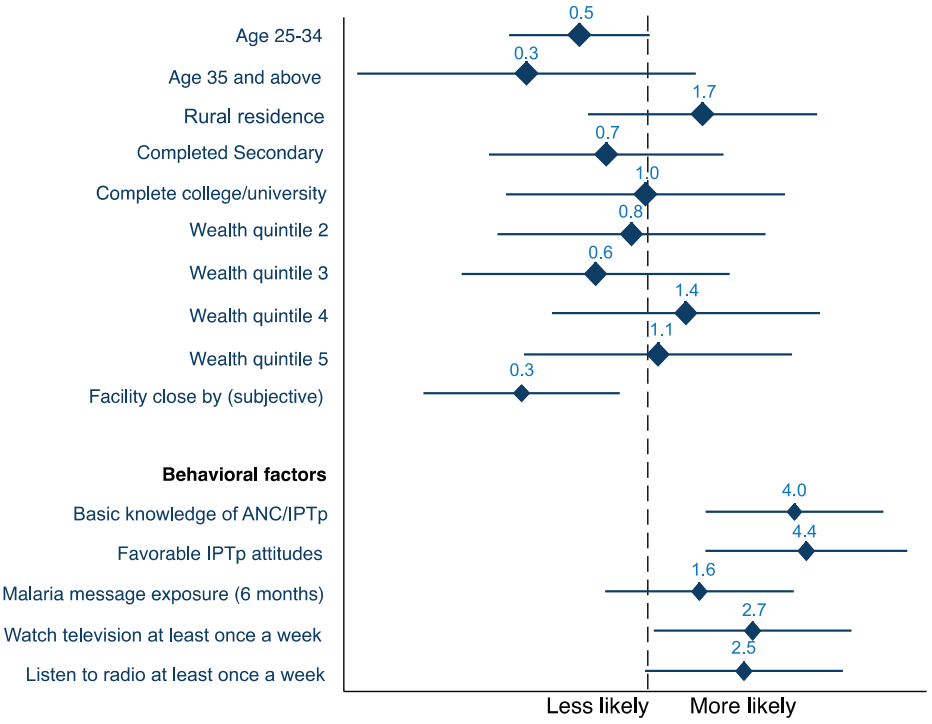


Overall, 90% of respondents planned to attend four or more ANC visits during the next pregnancy. Figure 16 highlights the results from the final model fit. In adjusted models, after adjusting for age, education, household wealth, residence, and proximity to a public or private health facility, respondents with favorable ANC/IPTp attitudes had significantly increased odds of seeking four or more ANC appointments during the next pregnancy, compared to their counterparts (AOR: 4.4; p<.01). Basic knowledge of ANC/IPTp[25] was also associated with quadrupled odds of seeking four or more ANC visits (AOR: 4.0; p<.01). Respondents who watched television at least once a week or listened to radio at least once a week had 2.7 and 2.5 times, respectively, higher odds of seeking four or more ANC visits (p<.05)

[25] Basic knowledge was defined as knowing at least one of the following: pregnant women should receive ANC in the first trimester, they should attend at least four ANC appointments in the whole pregnancy, and they should receive at least three IPTp doses during pregnancy.

Figure 16.

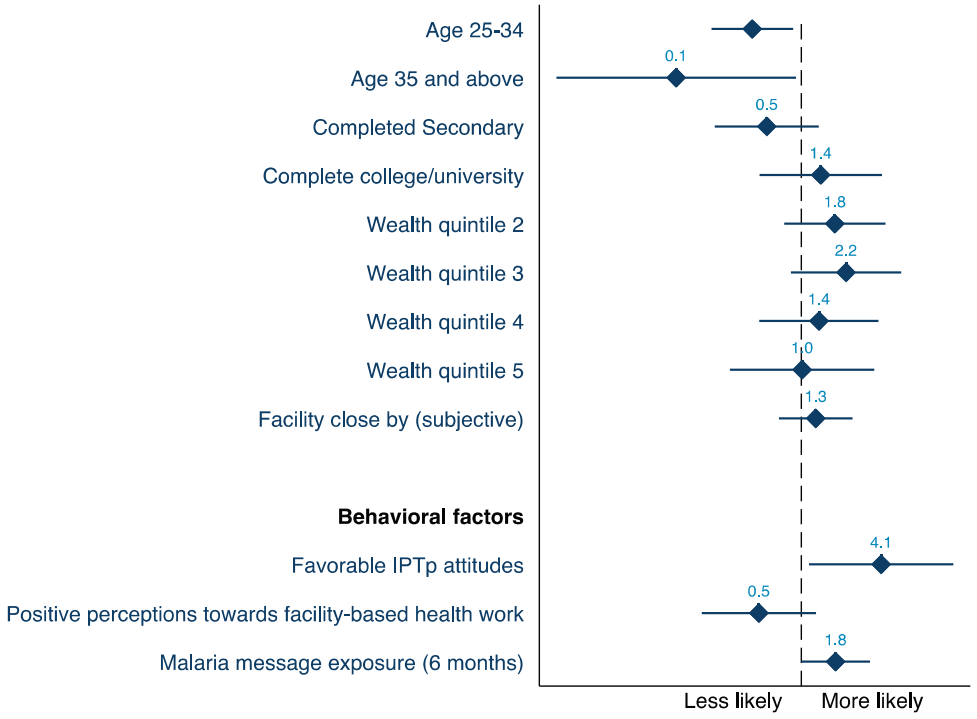
Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Attend Four or More Antenatal Care (ANC) Visits in the Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years



Respondents aged 35 or older had lower intentions to seek eight or more ANC visits (7% vs. 29% for the 15–24 age group and 18% for the 25–34 age group; p<.1). Figure 17 highlights the results from the final model fit. In adjusted models, older respondents had significantly reduced odds of seeking eight or more ANC visits, compared to those aged 15–24 (25–34 AOR: 0.42, p<.05; 35 and older AOR: 0.11, p<.05). Respondents exposed to malaria messages in the last six months or who had favorable ANC/IPTp attitudes had 1.8 and 4.1 times increased odds of seeking eight or more ANC appointments, compared to their counterparts (p<.05 and p=0.051, respectively).

Figure 17.

Logistic Regression of Socio-demographic, Ideational, Structural, and Access Factors Associated with Intention to Attend Eight or More Antenatal Care (ANC) Visits in the Next Pregnancy Among Women Who Intend to Have Another Child and Who Have Had a Live Birth in the Last Two Years



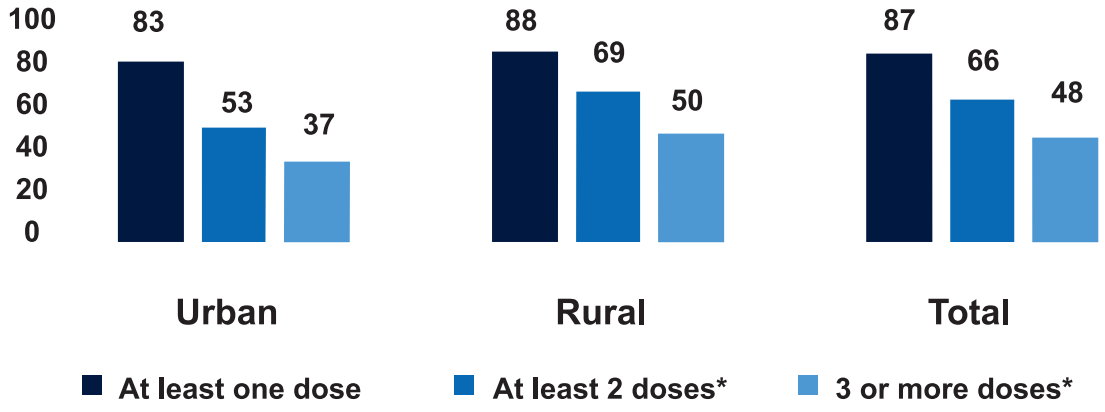
IPTp Intentions and Use

Among women who intend to have children in the future, most (98%) intended to take IPTp during their next pregnancy. In urban areas, the percentage of women aged 35 and older with IPTp intentions was significantly lower (49%) than other age categories (92% and above; p<.05; Annex Table A.4.13).

Among women with a live birth in the two years preceding the survey, use of IPTP ranged from 87% for the first treatment to 48% for the third (Figure 17). Residence was statistically significantly associated with receipt of two or more and three or more sulfadoxine pyrimethamine (e.g., brand names Fansidar and Maloxine) doses. A smaller percentage of women in urban areas received two doses (69%) and three doses (50%), compared with urban residents (53% and 37%, respectively; p<.05; Figure 18).

Attendance at ANC visits was significantly and positively associated with ITPp uptake (p<.01). A smaller percentage of female respondents who reported having no ANC visits received one, two, or three or more doses of sulfadoxine pyrimethamine, compared with those who attended 1–3, 4–7, and 8 or more ANC visits (Annex Table A.4.15

Figure 18.
Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Doses Received by Women During Their Last Pregnancy Among Women Who Gave Birth in the Two Years Preceding the Survey, by Urban/Rural Residence (n=514)



Among those who received one or more doses of sulfadoxine pyrimethamine, 97% accessed IPTp during ANC visits, 14% at a non-ANC visit to a health facility, and 4% from a pharmacy (Figure 19; Annex Table A.4.16).

Figure 19.
Source of Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Among Women with a Live Birth in the Two Years Preceding the Survey Who Received at Least One Dose of Sulfadoxine Pyrimethamine (n=459)

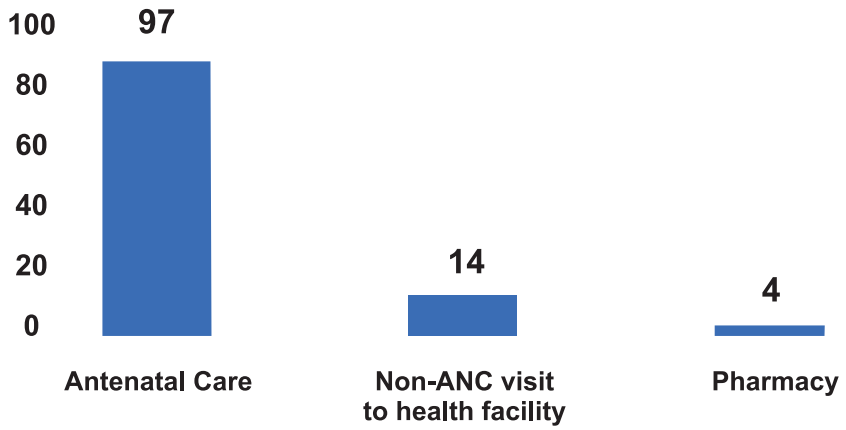


Table 7.

Summary of Ideational Variables Related to Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp)

Panel A

	Knowledge of IPTp recommendations (N=2253)	Favorable attitudes towards IPTp (N=2253)	Perceived malaria in pregnancy as severe (N=2253)	Perceived response-efficacy of IPTp (N=2253)	Perceived self-efficacy regarding IPTp among women (n=1787)	Perceived most in community go to ANC care at least 4 times during pregnancy (N=2253)	Perceived most take malaria preventative medicine during pregnancy (N=2253)
Residence							
Urban	18	89	81	99	97	78	75
Rural	20	86	83	98	96	76	75
Sex						*	
Female	21	86	81	98	96	74	74
Male	18	88	85	97	97	80	76
Age	*		***				*
15–19	13	85	59	96	96	72	69
20–24	23	88	75	97	95	73	72
25–34	22	89	83	98	96	77	79
≥35	20	86	90	98	97	78	75
Education	***	*	*				
None	29	84	87	98	95	77	76
Primary	17	86	79	97	97	74	73
Secondary	18	86	82	99	97	80	76
College/university	14	93	85	98	97	77	77
Wealth quintile					**		
Lowest	24	86	83	97	93	72	74
Second	21	86	81	98	97	80	78
Middle	17	84	82	97	96	75	71
Fourth	19	89	81	98	99	79	78
Highest	19	88	84	98	97	77	71
Total	20	87	82	98	96	76	75

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Panel B.

	Perceived most people in community will approve of pregnant women taking medicine to prevent malaria (N=2253)	Perceived equitable gender norms regarding ANC (N=2253)	Favorable perceptions of community health workers (N=2253)	Favorable perceptions of facility-based health workers (N=2253)	Involved in decision-making regarding ANC among married or cohabitating participants (n=1599)	Discussed ANC attendance with spouse/partner among married or cohabitating participants (N=1599)
Residence						
Urban	78	90	95	90	78	19
Rural	76	88	96	87	80	16
Sex		**			***	
Female	77	86	96	88	92	14
Male	75	92	95	87	67	18
Age	*	**	**		***	***
15–19	70	83	91	86	82	36
20–24	73	89	95	84	90	40
25–34	76	88	95	88	82	21
≥35	79	91	97	89	75	8
Education				**		
None	75	89	96	85	79	15
Primary	77	87	95	86	80	17
Secondary	76	88	95	91	78	19
College/university	76	93	97	93	77	13
Wealth quintile	*					
Lowest	70	88	97	85	78	16
Second	72	86	94	89	77	21
Middle	80	87	96	89	78	14
Fourth	80	93	96	87	81	15
Highest	81	89	96	88	85	14
Total (%)	76	88	96	88	79	16

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Table 8.
Reasons for Not Attending Early Antenatal Care (ANC) Among Women with a Live Birth in the Last Two Years (n=274)

	Percentage
Did not know she was pregnant	20%
Did not feel sick	19%
Did not have time	17%
Health facility too far	8%
Did not want others to know she was pregnant	8%
No money for transport to facility	8%
Was not her first pregnancy	6%
Did not want to make too many visits	6%
Did not know early ANC/ had preference for later ANC	6%
Feared treatment at clinic or pregnancy viability	3%
No money for ANC	2%
School commitments	2%
Covid-19 pandemic	1%
Spouse went in her place	1%
Other family member did not give permission	0.3%
Spouse did not give permission	0.2%
No one to accompany her	0.1%

Table 9.
Factors Associated with Seeking Early Antenatal Care (ANC), Four or More ANC Visits, and Eight or More ANC Visits During the Next Pregnancy

	Intends to obtain early ANC care			Intends to attend 4 or more ANC visits			Intends to attend 8 or more ANC visits		
	%	Adjusted odds ratio	95% confidence interval	%	Adjusted odds ratio	95% confidence interval	%	Adjusted odds ratio	95% confidence interval
Age	ǂ						ǂ		
15–24 (reference)	72	1	--	92	1	--	29	1	--
25–34	70	0.77	0.43–1.40	86	0.52	0.22–1.27	18	0.42*	0.20–0.87
≥35	42	0.21**	0.07–0.63	89	0.32	0.06–1.64	7	0.11*	0.01–0.91
Education									
None (reference)	69	1	--	88	1	--	22	1	--
Primary	74	0.90	0.45–1.81	92	1.73	0.62–4.85	26	0.87	0.42–1.83
Secondary	64	0.56	0.26–1.23	88	0.68	0.22–2.06	21	0.54	0.22–1.36
College/university	70	0.71	0.27–1.87	90	0.97	0.25–3.74	30	1.41	0.48–4.14
Wealth quintile									
Lowest (reference)	66	1	--	88	1	--	21	1	--
Second	76	1.30	0.60–2.83	90	0.84	0.25–2.78	27	1.80	0.74–4.42
Middle	70	0.74	0.31–1.76	88	0.63	0.15–2.68	34	2.20	0.83–5.81
Fourth	71	1.54	0.62–3.87	93	1.45	0.34–6.16	21	1.36	0.48–3.90
Highest	62	1.05	0.36–3.04	89	1.12	0.17–7.45	16	1.01	0.28–3.62
Residence				*					
Urban (reference)	73	1	--	80	1	--	21	1	--
Rural	69	0.90	0.42–1.90	91	1.68	0.55–5.18	25	2.14ǂ	0.91–5.04
Near public or private facility (subjective)				ǂ					
No (reference)	64	1	--	94	1	--	22	1	--
Yes	73	1.52	0.87–2.66	87	0.30*	0.11–0.80	25	1.29	0.67–2.46
Comprehensive knowledge of malaria							ǂ		
No (reference)	68	--	--	89	--	--	20	--	--
Yes	72	--	--	91	--	--	30	--	--
Perceived severity									
No (reference)	64	--	--	91	--	--	29	--	--
Yes	73			89	--	--	22	--	--
Basic knowledge of ANC/IPTp				ǂ					
No (reference)	69	--	--	84	1	--	27	--	--
Yes	70	--	--	92	4.00**	1.75–9.15	23	--	--
Perceived IPTp response efficacy				**					
No (reference)	74	--	--	64	--	--	0	--	--
Yes	70	--	--	90	--	--	25	--	--
Perceived self-efficacy related to malaria in pregnancy				**			ǂ		
No (reference)	54	--	--	68	--	--	0	--	--
Yes	71	--	--	91	--	--	26	--	--

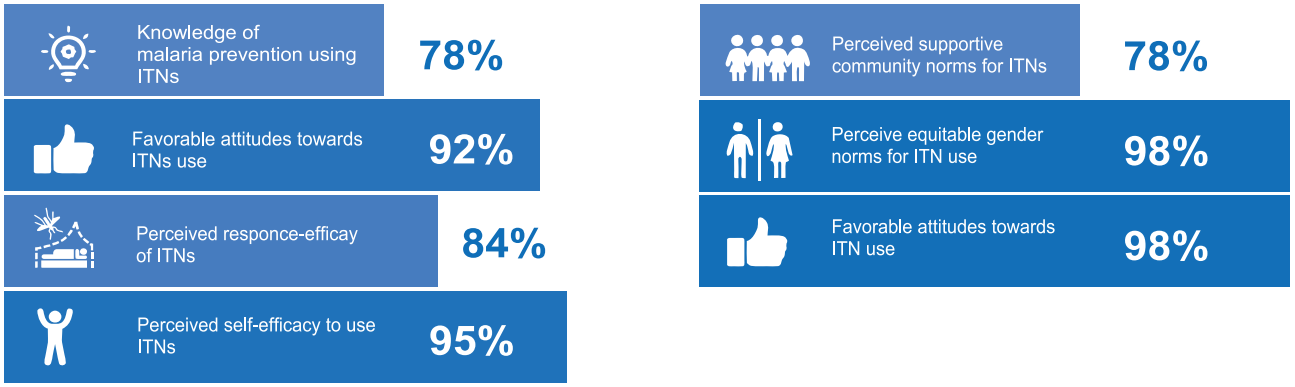
	Intends to obtain early ANC care			Intends to attend 4 or more ANC visits			Intends to attend 8 or more ANC visits		
	%	Adjusted odds ratio	95% confidence interval	%	Adjusted odds ratio	95% confidence interval	%	Adjusted odds ratio	95% confidence interval
Favorable attitudes Toward ANC/IPTp	*			ǂ					
No (reference)	53	1	--	82	1	--	15	1	--
Yes	72	3.71***	1.73–7.99	91	4.42**	1.57–12.40	25	4.09*	1.14–14.59
Participant involved in decision about ANC				*					
No (reference)	62	--	--	76	--	--	27	--	--
Yes	72	--	--	91	--	--	23	--	--
Favorable perceptions of facility health workers providing malaria care in pregnancy							*		
No (reference)	72	--	--	89	--	--	46	1	--
Yes	70	--	--	90	--	--	23	0.47	0.17–1.29
Favorable perceptions of community health workers									
No (reference)	74	--	--	80	--	--	32	--	--
Yes	70	--	--	90	--	--	24	--	--
Heard message about malaria on the media									
No (reference)	67	1	--	88	1	--	19	1	--
Yes	73	1.87*	1.08–3.24	92	1.63	0.71–3.74	29	1.83ǂ	1.00–3.35
Watches television at least once a week									
No (reference)	67	--	--	87	1	--	24	--	--
Yes	72	--	--	92	2.72*	1.04–7.12	25	--	--
Listens to radio at least once a week				**					
No (reference)	65	--	--	80	1	--	23	--	--
Yes	71	--	--	93	2.50*	1.03–6.07	24	--	--
Total	***70***	**--**	**--**	***90***	--	--	***24***	--	--
Pseudo-R^2	0.0834			0.1778			0.1107		
Number of observations	292			292			292		

Note: ǂ p<.1 *p<.05; **p<.01; ***p<.001.

INSECTICIDE-TREATED NET USE

This section describes the ideational factors related to ITN use, including data related to knowledge; attitudes toward net use and care; and perceived response-efficacy, self-efficacy, supportive community norms, and equitable gender norms. Other variables reported in this section include the prevalence of relevant ITN use outcomes and the associations between the ideational factors and relevant outcomes using logistic regression. Relevant outcomes include household-level net and ITN ownership, population-level net access and use, ITN use-to-access ratio, characteristics, use of existing nets in the household, net care practices, and consistent net use by respondents.

Figure 20.
Ideational Factors at a Glance



Ideational Variables Correlated with ITN Use

Table 10 at the end of this section highlights the ideational factors related to ITN use and care. Nearly all ideational factors had high prevalence (above 80%). Ideational factors with the lowest prevalence among respondents included those with high perceived response efficacy of ITNs (84%) and perceived community norms favorable to ITN use (78%). All differences summarized in this section are statistically significant ($p<.05$) unless otherwise noted.

Knowledge of Malaria Prevention Using Mosquito Nets

Nearly all participants reported knowledge of malaria prevention using ITNs (94%). Knowledge increased with wealth but decreased with age, with lowest knowledge among those aged 45 and older (90%).

Favorable Attitudes Towards ITN Use, Care, and Repair

Most respondents had positive attitudes towards ITN use (92%) and care and repair (98%). There were significant differences across socio-demographic determinants on attitudes toward ITN use and care, with favorable attitudes increasing with increased education (Annex Table A.5.2 and A.5.3).

One in six respondents (17%) believed that sleeping under a net is an inconvenience for couples trying to get pregnant (Annex Table A.5.2). Nearly one-third (36%) stated it is not easy to sleep under an ITN because they have to unfold it and cover the sleeping space. These results differed

significantly by residence (p<.05), with those in rural areas (38%) reporting these attitudes more frequently than those in urban areas (30%).

Perceived Response-efficacy of ITNs

Most (84%) perceived that ITNs are effective for prevention of malaria. Of note, only half (51%) of the respondents in the second wealth quintile in rural areas perceived ITNS to be effective, compared to those in the other wealth quintiles. Among all respondents, increased education was associated with increased reporting of perceived effectiveness of ITNs (p<.001). The percentage of respondents with high perceived response-efficacy of ITNs increased from 78% among those with no formal education to 90% among those with college/university education (Annex Table A.5.4).

Perceived Self-efficacy to Use ITNs

Ninety-five percent of respondents reported confidence in using ITNs (Table 1), and levels of high perceived self-efficacy varied significantly by education, with a smaller percentage of those with no formal education reporting self-efficacy to use ITNs (93%), compared to those with college/university education (98%; p<.05).

Perceived Community Norms Regarding ITNs

Seventy-eight percent of respondents reported that most individuals in their community use nets daily. Perceived norms favorable of ITN use in the community were lowest among the youngest age groups in the study, with only 72% of those aged 15–19 and 71% aged 20–24 reporting that they perceived most individuals within their community use nets daily (p<.05). These perceptions also varied by residence, with a smaller percentage of those in rural areas reporting that most individuals in their community use nets daily (77%), compared to those in urban areas (82%; p<.05).

A larger percentage of respondents with no formal education or primary education (87% and 88%, respectively) perceived that at least half of the community members who have ITNs use them nightly or more often, compared with those with secondary or college/university education (74% and 79%, respectively; p<.01; Annex Table A.5.6).

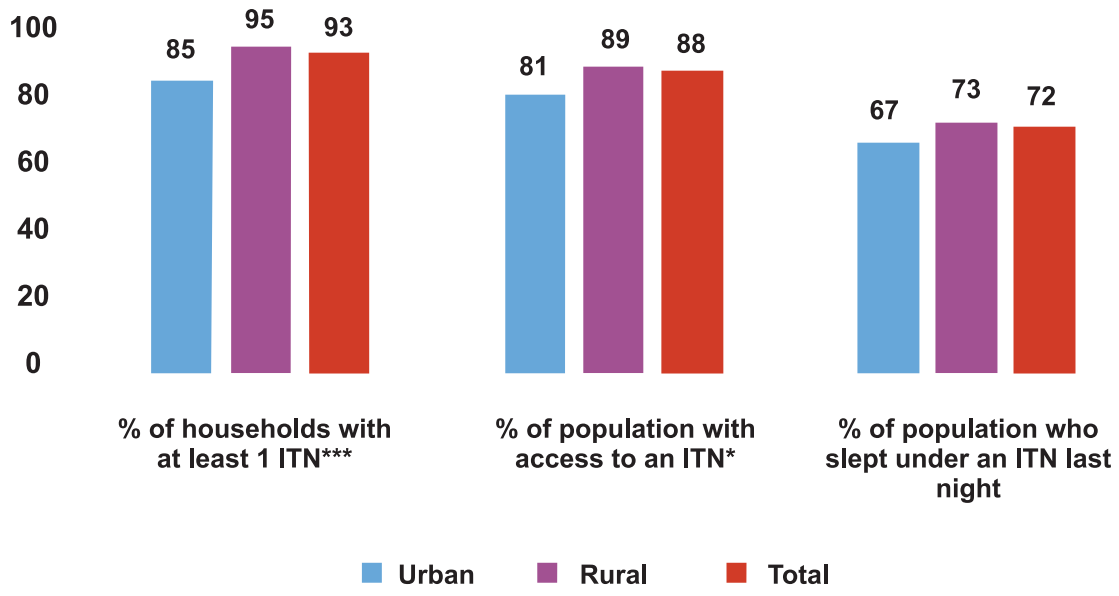
Perceived Equitable Gender Norms Regarding ITNs

Nearly all respondents had an equitable perception of gender norms related to ITN use (98%). Perceived gender norms regarding ITN use varied across wealth quintile in the urban sub-sample, with particularly low rates among respondents in the second wealth quintile (67%), who disagreed that when there are not enough nets, it is more important that female rather than male children sleep under the available nets (daughter preference; Table A.5.7). Perceived gender norms related to daughter preference varied across the sample by respondent age and education level, with those aged 25–44 reporting more equitable perceptions of gender norms than those in the youngest (age 15–24) and oldest (age 45 and older) age groups (p<.05). Level of education was also positively associated with perceptions of gender norms related to daughter preference, with the percentage of respondents reporting more equitable perceptions of gender norms increasing from 92% overall among those with no formal education to 98% among those with college/university education (p<.01; Annex Table A.5.7).

Household ITN Access and Individual Use

Most households had at least one mosquito net (97%) or ITN (93%; Figure 21). ITNs differed significantly by residence, with 95% of rural households and 85% of urban ones owning an ITN (p<.001). Households in the highest wealth quintile had lower ITN ownership (86%) than those in less wealthy households (96%, 94%, 97%, and 90%, respectively), which aligns with the differences noted between urban and rural household ownership (Annex Table A.5.8).

Figure 21.
Insecticide-treated Net (ITN) Ownership, Access, and Use



Most of the de facto population (88%) had access to an ITN (defined as one ITN per two household members), but responses varied significantly between rural (89%) and urban (81%) areas (p<.05; Annex Table A.5.9). The highest access was in the lowest wealth quintile in the urban sub-sample (95%) and the middle quintile in the rural sub-sample (95%).

Seventy-two percent of the de facto population slept under an ITN the night preceding the study, with 73% of those in rural areas and 67% of those in urban areas reporting they slept under a ITN the night preceding the survey (Annex Table A.5.10). ITN use did not differ significantly by residence, but it did vary significantly by age, with those in the youngest (aged 0–4) and oldest (aged 25 and older) age groups having the highest rates of ITN use the night before the study. This result was observed for the aggregate, urban, and rural sub-samples. A significant association was noted between the number of ITNs in the household and the percentage of de facto household members who slept under an ITN the night before the survey. In households with one or more nets per every two people, 80% of the de facto population slept under an ITN the night before the survey, compared to only 17% of the de facto population doing so if there was less than one net per two people (Table A.5.10).

Measuring population-level ownership, access, and use is important to understand progress of ITN coverage. Measuring behavior can be best assessed by looking at individual use of ITNs among those with access to one. Table 11 highlights the ITN use-to-access ratio (quotient of ITN use the previous night and ITN access). Household members aged 0–4 years (85%) and 25 and older (86%) used ITNs more often than those aged 5–24 years, given adequate ITN access. This trend persisted

across all sub-samples except for urban female respondents, for which there was no significant difference by individual household member age. Individual ITN use given adequate access to ITNs did not vary significantly by household wealth (Table 2).

Characteristics and Use of Available Bed Nets

Ninety-three percent of nets were ITNs, obtained for free (92%) and through distribution campaigns (72%). Over 95% of ITNs were less than three years old. Most were white (44%) or blue (51%) in color (Annex Table A.5.14). See Figure 22 and Figure 23.

Overall, consistent net use was high (87%), with highest use among those aged 20 years and older (85% or higher) and lowest among those aged 15–19 (70%; p<.001). Consistent net use was higher among males (90%) than females (85%; p<.05). Consistent net use varied significantly across wealth quintiles (p<.05), ranging from 83% in the second quintile to 92% in the fourth quintile. Generally, consistent net use seemed to increase with higher levels of wealth (Annex Table A.5.13).

Figure 22.
Net Characteristics and Use

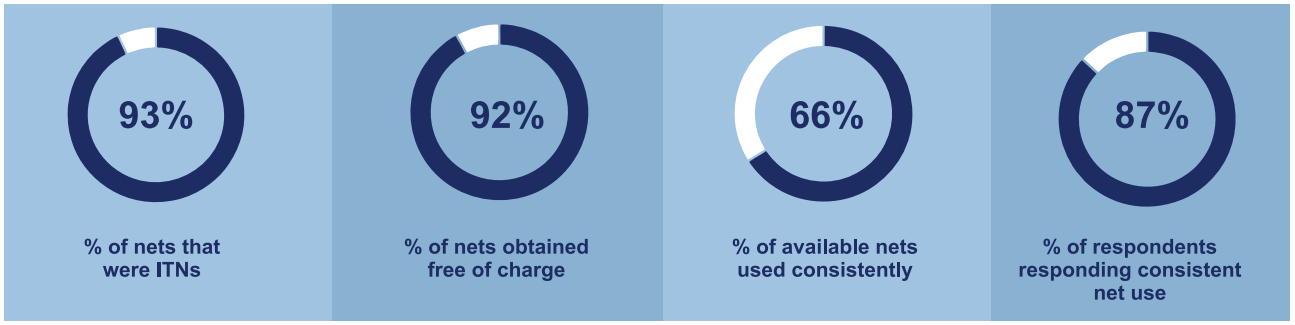
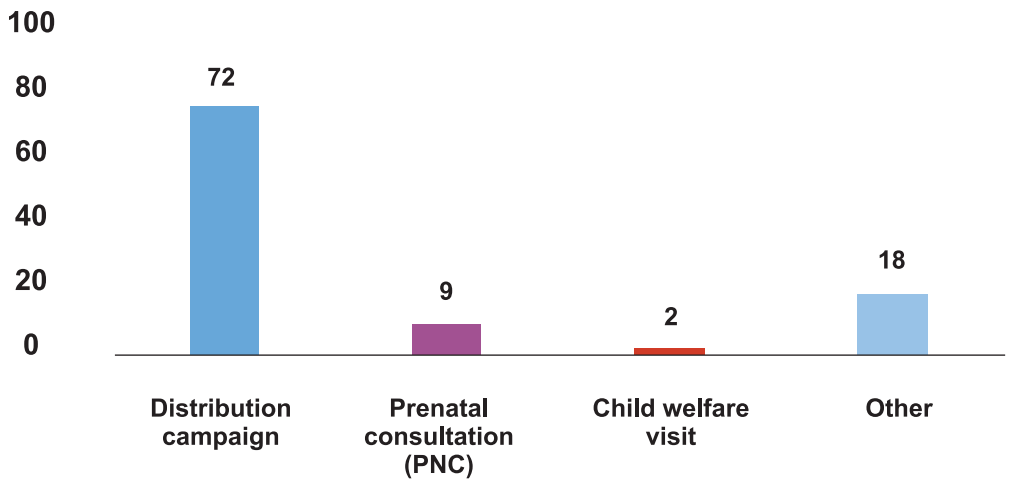


Figure 23.

Percentage of Net Procurement Sources



Net Care and Repurposing

Table 12 at the end of this section outlines key indicators of ITN care and repurposing. Slightly over half (54%) of ITNs captured in the sample had been washed at least once, with 51% of those washed with bar soap. However, 48% of washed ITNs were reported as being washed with detergent (32%) and mix (16%), respectively, which can be harmful to the ITN's protective insecticide. Approximately one third (36%) of the washed ITNs in the sample were dried in the sun. A third (33%) of ITNs were suspended above the sleeping place, 28% of which were folded and tied above the sleeping space. In contrast, 31% were stowed away, either unpacked (8%) or in their original packaging (23%). More than half (58%) reported they did not practice recommended net care behavior, including hanging or tying up nets when not in use. One third (33%) had repurposed their nets, which was more common in rural (35%) than in urban areas (23%; $p<.01$).

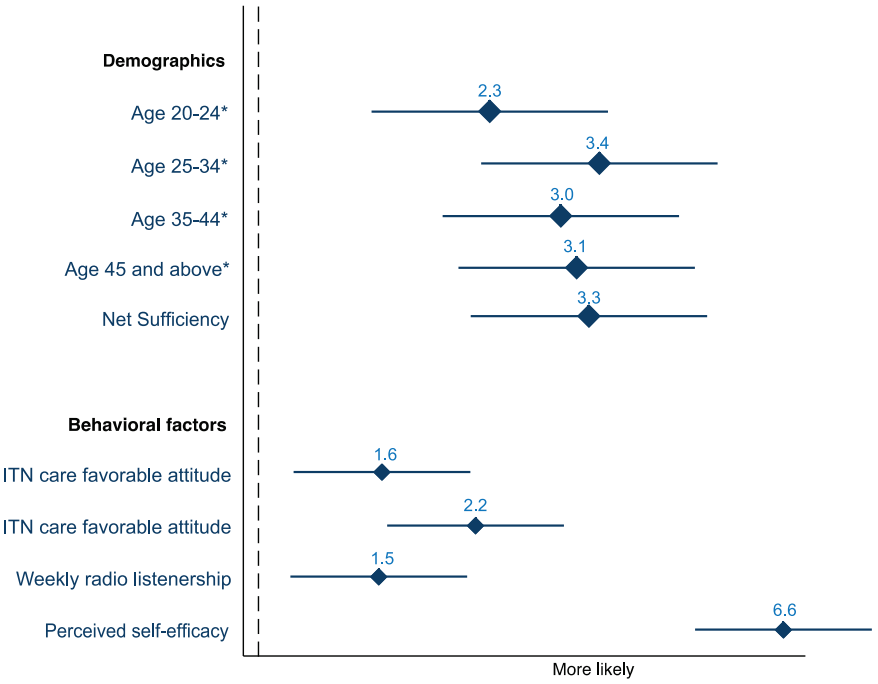
Advanced Analysis

To explore ideational, structural, and access factors related to consistent net use, adjusted logistic regressions were run using data from households with at least with net. Several of the strongest associations with consistent net use were ideational. Figure 23 highlights the statistically significant ($p<.05$) results from the logistic regression of socio-demographic and ideational factors of interest. Table 13 at the end of this section summarizes all the factors included in the regression model.

Respondents with high perceived self-efficacy had 6.6 times increased odds of consistently using nets, compared to those with low perceived self-efficacy (OR: 6.6, 95% CI: 4.8–9.2; $p<.001$). Those with a favorable attitude towards ITN care or who listened to the radio at least once per week had about 1.5 times increased odds of consistently using nets, compared to those who did not. Individuals in households with at least one net per two members (net sufficiency) had 3.3 times increased odds of using nets consistently (OR: 3.3, 95% CI: 2.1–5.1), compared to households with less than one net per two members. Those with favorable attitudes toward net use had 2.2 times the odds of using nets consistently when compared with those without such favorable attitudes (OR: 2.2, 95% CI: 1.6–3.0). Additionally, age had a positive association with consistent net use, with those in the older age groups having 2–3 times increased odds of consistent net use than those aged 15–19 (Figure 24; Table 13).

Figure 24.

Significant (p<.05) Results of Logistic Regression of Consistent Net Use on Demographic and Ideational Factors



**Note*: Reference group for respondent age was ages 15–19

Table 10.
Summary of Ideational Variables Related to Insecticide-Treated Net (ITN) Use

	Knew of malaria prevention using mosquito nets	Favorable attitude towards ITNs	Favorable attitude towards ITN care and repair	Perceived response-efficacy of ITNs	Perceived self-efficacy to use ITNs	Perceived community norms regarding ITNs	Perceived equitable gender norms related to ITN use
Residence						*	
Urban	94	94	99	87	96	82	99
Rural	95	92	97	84	95	77	98
Sex						*	
Female	95	93	98	83	95	76	98
Male	93	91	97	86	96	81	98
Age	*					*	
15–19	94	93	97	80	93	72	98
20–24	95	88	96	81	94	71	97
25–34	94	93	98	84	95	78	98
35–44	96	93	98	86	96	81	99
≥45	90	93	98	87	97	81	98
Education		**	*	***	*		
None	93	88	97	78	93	76	97
Primary	95	93	97	84	95	80	98
Secondary	94	94	99	88	96	78	99
College/university	96	95	99	90	98	75	99
Wealth quintile		**					
Lowest	92	88	96	83	94	76	98
Second	94	93	98	81	94	76	98
Middle	94	93	97	84	95	77	97
Fourth	96	94	99	86	97	82	98
Highest	97	94	98	88	97	80	99
Total (%)	94	92	98	84	95	78	98

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Table 11.
Household Members Who Slept Under an Insecticide-treated Net (ITN) the Night Preceding the Survey Among Household With Enough ITNs

	Female			Male			Total		
	Urban (%) (n=865)	Rural (%) (n=2,538)	Total (%) (n=3,403)	Urban (%) (n=652)	Rural (%) (n=2,161)	Total (%) (n=2,813)	Urban (%) (n=1,517)	Rural (%) (n=4,699)	Total (%) (N=6,216)
Age		***	***	**	***	***	***	***	***
0–4	81.9	87.2	86.4	86.0	83.5	84.0	84.0	85.3	85.0
5–14	79.3	76.7	77.1	80.0	74.5	75.2	79.6	75.6	76.2
15–24	72.2	73.9	73.6	66.5	66.6	66.6	70.4	71.0	70.9
≥25	80.0	86.9	85.8	81.7	85.8	85.1	80.7	86.4	85.5
Wealth									
Lowest	90.9	77.4	77.8	79.4	73.9	74.0	85.7	75.7	76.0
Second	97.5	81.7	82.0	88.9	80.6	80.7	93.6	81.2	81.4
Middle	74.3	82.2	81.1	88.8	77.8	79.0	80.0	80.2	80.2
Fourth	80.7	81.3	81.2	80.2	81.5	81.2	80.5	81.4	81.2
Highest	77.1	87.0	81.7	76.1	81.0	78.8	76.7	83.9	80.3
Total	78.4	81.1	80.6	79.9	78.3	78.5	79.1	79.8	79.7

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

Table 12.
Care and Repurposing of Insecticide-treated Net (ITNs)

	Urban (%) (n=974)	Rural (%) (n=2937)	Total (%) (N=3911)
ITN washed at least once	59	53	54
Product used to wash ITN			
Bar soap	42	52	51
Detergent	40	31	32
Bleach	0	0	0
Mix	18	16	16
Nothing (water only)	0	1	1
Where ITN was dried*			
In the shade	50	66	64
In the sun	50	33	36
Location of ITN			
Suspended at sleeping place	31	33	33
Suspended, folded, and tied	29	28	28
Not suspended but not stowed	3	6	5
Unpacked but stowed	9	8	8
Still stowed under packaging	24	23	23
Other	4	2	2
Practice net care behavior	39	43	42
Repurpose nets**	23	35	33

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table 13.
Results of Multivariable Logistic Regression Examining Factors Associated with Nightly Insecticide-treated Net (ITN) Use Among Households with at Least One ITN

	Uses ITN every night (%)	Adjusted odds ratio (95% confidence interval)
Sex		
Female (reference)	84.9	1.00
Male	89.9	0.77 (0.51 - 1.16)
Age		
15–19 years (reference)	70.0	1.00
20–24 years	85.3	2.30*** (1.47 - 3.59)
25–34 years	90.2	3.37*** (2.17 - 5.25)
35–44 years	88.8	2.97*** (1.87 - 4.72)
≥45	90.4	3.13*** (1.78 - 5.51)
Education		
None (reference)	84.1	1.00
Primary completed	87.5	1.34 (0.94 - 1.92)
Secondary	87.4	1.11 (0.71 - 1.75)
College/university	90.1	1.29 (0.72 - 2.32)
Household wealth quintile		
Lowest (reference)	84.2	1.00
Second	83.5	0.92 (0.61 - 1.41)
Middle	87.6	0.95 (0.62 - 1.47)
Fourth	92.4	1.42 (0.86 - 2.35)
Highest	88.4	1.17 (0.68 - 2.04)
Residence		
Urban (reference)	90.8	1.00
Rural	86.1	0.67+ (0.44 - 1.02)
Attitudes favorable to the care of mosquito nets§		
No (reference)	79.4	1.00
Yes	89.1	1.57** (1.15 - 2.14)
Attitudes favorable to the use of mosquito nets§		
No (reference)	80.3	1.00
Yes	93.1	2.18*** (1.59 - 2.98)
ITN Use perceived as norm in community		
No (reference)	81.6	1.00
Yes	88.4	1.35+ (0.99 - 1.86)
Spoke with others about malaria		
No (reference)	83.2	1.00
Yes	90.6	1.29 (0.94 - 1.76)
Perceived self-efficacy for mosquito net use§		
No (reference)	51.2	1.00
Yes	91.3	6.62*** (4.75 - 9.23)
Weekly radio listenership		
No (reference)	78	1.00
Yes	88.6	1.54* (1.09 - 2.17)
Household size	n/a	0.97 (0.92 - 1.03)
Net sufficiency	n/a	3.27*** (2.12 - 5.05)
Pseudo-R2	n/a	0.22
Number of observations	2173	2173

Notes: ǂ p<.1 *p<.05; **p<.01; ***p<.001. n/a: not applicable. §These constructs were split at the median value of their respective sub-item scales to increase performance for regression analysis.

INDOOR RESIDUAL SPRAYING

Indoor residual spraying (IRS) involves coating the walls, eaves, and ceiling (if not iron sheet) of a house with a residual insecticide. For up to nine months, the insecticide will kill mosquitoes and other insects that come in contact with these surfaces. IRS does not directly prevent people from being bitten by mosquitoes. Rather, it usually kills mosquitoes after they have fed if they come to rest on the sprayed surface. IRS thus prevents transmission of infection to other persons. To be effective, IRS must be applied to a very high proportion of households in an area (usually >85%).

Ideational Variables Linked with Acceptance of IRS

Ideational factors related to IRS are summarized in Figure 25 for the full sample and Figure 26 for the subset of Homa Bay and Migori counties where the IRS program is being implemented. Ideational factors for the full sample are presented by key socio-demographic characteristics in Table 14 at the end of this section. All differences are statistically significant (p<.05) unless otherwise noted.

Figure 25.
Ideational Factors at a Glance Among Full Sample

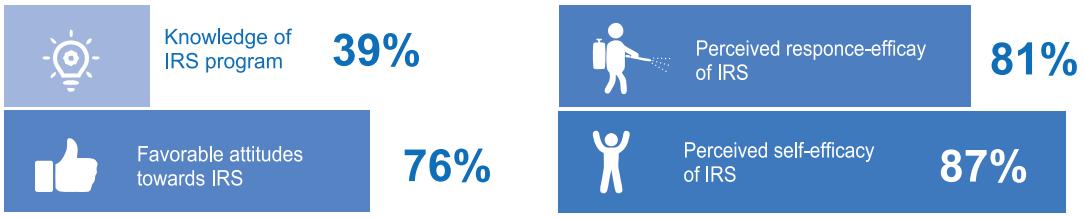
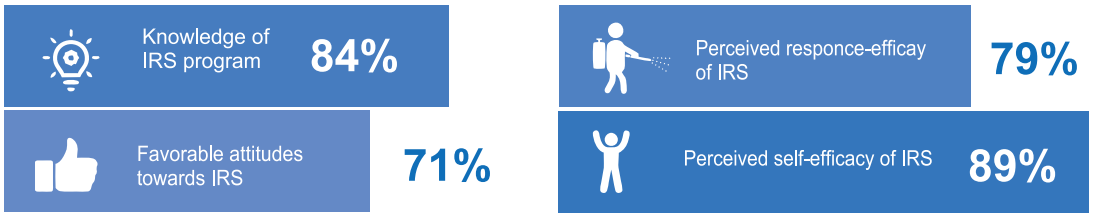


Figure 26.
Ideational Factors at a Glance in Homa Bay and Migori Counties Where Indoor Residual Spraying (IRS) Program Is Implemented



Knowledge of IRS Program

Knowledge of the IRS program was comparative across all eight lake endemic counties (39%), compared to 84% in Homa Bay and Migori counties where the program is implemented. A statistically significant difference in knowledge of the program was observed across sex and level of education subsets. More men (42%) than women (37%) were aware of the IRS program (p<.05; Table 14). A limiting factor in this knowledge was residence in a non-IRS intervention area. Most (84%) in Homa Bay and Migori had knowledge of the IRS program, compared to 27% in non-IRS implementation areas (p<.001; Table 14).

Favorable Attitudes Towards IRS

Favorable attitudes towards IRS were common among respondents who had knowledge about the IRS program across the eight lake endemic counties (76%) and the two counties implementing IRS (71%). In urban areas, positive attitudes towards IRS were higher among male (85%) versus female (68%) respondents ($p<.05$; Annex Table A.6.2). Residence in an IRS-intervention area was negatively associated with attitudes towards IRS, with 71% reporting favorable attitudes towards IRS, compared to 79% among respondents residing in non-IRS intervention areas ($p<.05$; Table 14). There were no statistically significant differences in attitudes towards IRS based on age, education, or household wealth.

Perceived Response Efficacy of IRS

The percentage of respondents with high perceived response efficacy of IRS was 81% among respondents with knowledge about the IRS program (Table 8). Age, education, and household wealth demonstrated positive but insignificant associations with perceived response efficacy of IRS ($p>0.05$). There was no statistically significant difference in the percentage of respondents reporting that IRS is effective in IRS-intervention areas (79%), compared to non-IRS intervention areas (83%; Annex Table A.6.3). Most (93%) viewed IRS as an effective way to prevent malaria. In comparison, 84% of respondents agreed that people who live in houses that have been sprayed are less likely to get malaria.

Perceived Self-efficacy for IRS

Perceived self-efficacy for IRS was high (87%) overall (Table 8) and higher among male (91%) versus female (84%) respondents ($p<.05$; Table 14). This difference was most pronounced in rural areas ($p<.05$). Among respondents in urban areas, 60% with no formal education reported high self-efficacy for IRS, compared to 78% with a college/university education ($p<.05$; Table 8). Though perceived self-efficacy regarding IRS showed an overall downward trend as household wealth increased (90% in the lowest quintile vs. 82% in the highest quintile), this association was not statistically significant. Importantly, those living in IRS-intervention areas had higher self-efficacy for IRS (89%) than those in non-IRS intervention areas (85%; $p<.05$).

Willingness to Accept IRS

Willingness to accept IRS was high (94%) and increased with age, but this trend was not statistically significant. Those aged 15–29 had the lowest acceptance rates (93%) for IRS intervention in their homes, compared to 97% of respondents aged 45 years and older (Table 8). A smaller percentage of those living in IRS-intervention areas reported willingness to accept IRS (87%), compared to those living in non-IRS intervention areas (96%; $p<.001$).

IRS Coverage

Figure 27 highlights levels of IRS coverage across the entire sample, as well as within subsamples of households in Migori and Homa Bay where primary intervention for IRS is currently implemented. Across the entire sample, only 15% of households were approached by somebody asking if they would like their home sprayed. This results indicates only 1 in 10 (11%) households in the sample were sprayed. However, among households asked, 77% received IRS services.

Approximately 7 in 10 households (72%) were approached regarding IRS services in Migori and Homa Bay, where 56% of households were sprayed. Among households approached in Migori and Homa Bay, the rate of service receipt was similar to the overall sample rate, with 78% receiving IRS services. IRS coverage among those who were approached differed significantly by residence in both the overall sample and within Migori and Homa Bay, with those in rural areas having higher rates of coverage. Household IRS coverage among households approached for IRS services differed between households in IRS intervention areas (78%) and households in non-IRS intervention areas (55%; Annex Table A.6.6).

Figure 27.

Indoor Residual Spraying (IRS) Coverage Among Full Sample and Intervention Counties

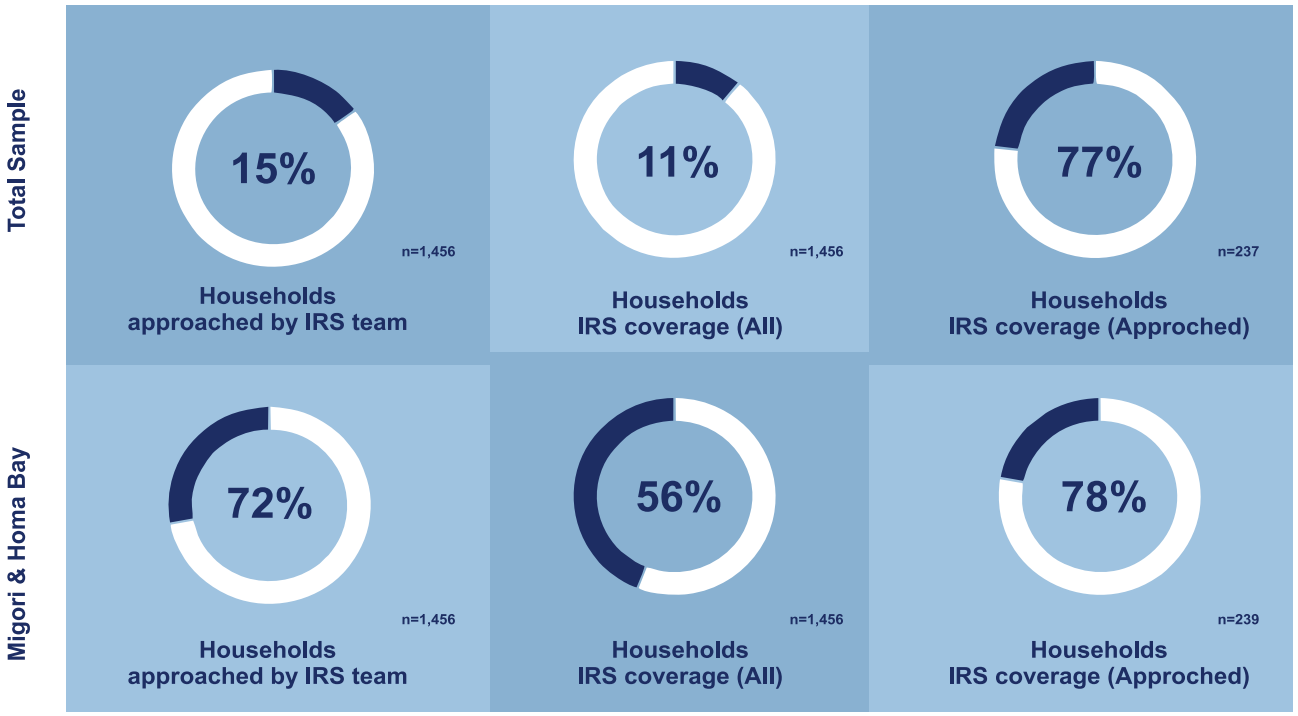


Table 14.
Summary of Ideational Variables Related to Indoor Residual Spraying (IRS)

	Knowledge of IRS program (%) (N=2253)	Favorable attitude towards IRS (%) (n=928)	Perceived IRS as effective (%) (n=928)	Perceived self-efficacy of IRS (%) (n=928)
Residence				*
Urban	37	76	77	80
Rural	39	76	82	88
Sex	*			*
Female	37	74	79	84
Male	42	77	84	91
Age				
15–24	36	70	73	84
25–34	37	72	82	84
35–44	41	81	85	91
≥45	43	78	84	89
Education				
None	40	75	76	87
Primary	38	76	82	89
Secondary	37	73	81	84
College/university	42	80	88	84
Wealth quintile				
Lowest	35	76	75	90
Second	39	75	80	90
Middle	38	76	85	88
Fourth	41	75	83	84
Highest	43	76	84	82
IRS Intervention area	***	*		*
No	27	79	83	85
Yes (Homa Bay and Migori)	84	71	79	89
Total	39	76	81	87

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

MEDIA CONSUMPTION AND MESSAGE EXPOSURE

This section presents results for media consumption, including radio listenership, TV viewership, and mobile phone ownership, by socio-demographic characteristics, along with preferred listening and watching times and exposure to malaria-related messages and logos.

Media Consumption

Trends in media consumption were observed across rural and urban settings. Rates of radio listenership in the week prior to the survey and mobile phone ownership were high (84% and 81%, respectively), and 62% of participants reported television viewership in the prior week (Figure 28). Table 15 at the end of this section presents media consumption by key socio-demographic characteristics.

Figure 28.
Media Access and Consumption

More respondents indicated radio listenership than TV viewership in the prior week (overall 84% vs. 62%; Figure 28 and Table 15). Radio listenership was higher in rural areas than urban areas (85% vs. 77%; p<.05). In contrast, TV viewership was higher in urban areas than rural areas (80% vs. 58%; p<.001).

Radio Listenership and TV Viewership

Men had higher rates of radio (92%) and television viewership (66%), compared to women (78% and 59% respectively; p<.001 and p<.01). Whereas the percentage of respondents who reported listening to the radio increased with age, TV viewership was similar across all age groups (Table 15). The higher the level of education and wealth quintile, the smaller the proportion of respondents who listened to radio in the prior week. For example, those with no formal education listened to the radio more often than college-educated respondents (81% vs. 74%; p<.01), whereas college-educated respondents watched TV more than those without a formal education (79% vs. 52%; p<.001). The higher the level of education and wealth, the higher the percentage of respondents who reported watching TV (college/university vs. no formal education: 79% vs. 52%, p<.001; highest vs. lowest wealth quintile: 95% vs. 28%, p<.001).

Annex Table A.7.3 shows variation in reported preferred times to listen to the radio or watch television. Late evening (8 pm to 12 am) was the most popular time to listen to the radio (30%), with no difference in listenership between early morning (4 am to 8 am) and early evening (4 pm to 8 pm; 20% each; Annex Table A.7.3). Males reported listening in early morning (22%) and late evening (8 pm-12 am; 35%), and women reported listening throughout the day (11%–27%). Only sex and age resulted in statistically significant differences in preferred times for radio listenership (see Table A.7.3 for more information). Overall, the range in television viewing time ranged from 0% at night (12 am to 4 am) to 55% in the evening (8 pm to 12 am). TV viewership in general was higher from

8 pm to 12 am for males and females. Early morning (4 am to 8 am) viewership was low across all demographic groups.

Mobile Phone or Tablet Ownership

Overall, 81% of respondents owned a mobile phone or tablet, and ownership was more likely among urban than rural dwellers (91% vs. 79%; p<.001). Men were more likely to own a mobile phone or tablet (90%) than women (75%; p<.001). Mobile phone ownership was highest among those aged 45 and older (90%), compared to those aged 15–19 (38%; p<.001). The higher the level of education (range: 73% to 96%; p<.001) and wealth quintile (range: 73% to 93%; p<.001), the larger the percentage of respondents who reported owning a mobile phone or tablet (Table 15). Mobile phone ownership was highest among college-educated participants (96%) and lowest among those with no formal education (73%; p<.001).

Upon further analysis of the phone types owned (Table 16), nearly all (99%) were able to chat, text, or receive and send email messages. A little over half reported could receive photos (54%), videos (52%), and audio files (55%). Most (84%) could receive web-based media, which could be "kabambe" (i.e., button) phones or smartphones.

Message Exposure

Fifty-three percent of respondents reported having heard or seen a malaria message in the past six months (Figure 29), more so among males (63%) than females (47%; p<.001) and among older age groups (61% among those 45 and older) than younger ones (39% among those aged 15–19; p<.001). Exposure to malaria messages was significantly associated with education level, with 47% of those with no formal education and 67% of those with college/university education reporting exposure (p<.001).

Identification of the national malaria logo and slogan was low (10%), with higher rates among females (13%) than males (7%; p<.01). Recall of the campaign slogan was very low (6%), with highest rates among those with a college/university education (11%; p<.01) and in higher wealth quintiles (9%; p<.05).

Figure 29.
Malaria Message Exposure and Recall

Table 17 summarizes sources of exposure to malaria messages in the last six months, mostly radio (59%) and television (37%), followed by health centers/hospitals (13%), community health volunteers (8%), SMS/chat/email (8%), family or friends (6%), and social media (5%). See Table 18 at the end of this section for message sources disaggregated by socio-demographic characteristics.

Table 15.
Variables Related to Media Consumption and Malaria Message Exposure (N=2253)

	Listens to radio at least once a week (%)	Watches TV at least once a week (%)	Owns mobile phone (%)	Completed campaign slogan (%)	Recalled malaria message in past 6 months (%)	Identified campaign logo (%)
Residence	*	***	***			
Urban	77	80	91	9	56	9
Rural	85	58	79	6	53	11
Sex	***	**	***		***	**
Female	78	59	75	6	47	13
Male	92	66	90	7	63	7
Age	**		***		***	
15–19	77	66	38	5	39	14
20–24	79	65	80	6	45	12
25–34	83	62	88	6	52	9
35–44	88	60	86	7	60	11
≥45	85	59	90	6	61	8
Education	**	***	***	**	***	
None	81	52	73	3	47	13
Primary	87	59	78	6	52	11
Secondary	85	72	90	8	56	7
College/university	74	79	96	11	67	8
Wealth quintile		***	***	*	*	
Lowest	83	28	70	4	49	8
Second	87	58	77	5	53	12
Middle	85	71	84	7	49	11
Fourth	84	70	85	9	58	11
Highest	78	95	93	9	61	9
Total	84	62	81	6	53	10

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table 16.
Characteristics of Mobile Phones (N=1783)

	Percentage
Chat, text or email messages	98.9
Pictures	53.8
Videos	52.0
Audio files	54.9
Web based media	84.4

Table 17.
Source of Malaria Message (N=1154)

	Percentage
Radio	58.5
Television	36.7
Health center/hospital	12.5
Community health volunteer	7.7
SMS/chat/email	7.7
Friends/family	5.6
Social media	5.1
Baraza	2.3
Community leaders	2.0
Peer educators	1.9
Posters/billboards	1.8
Mosque/church	0.5
Workplace	0.6
Newspaper	0.7
Political leaders	0.1

Table 18.
Sources of Exposure to Malaria-related Messages (N=1154)

	Radio (%)	Television (%)	Health center or hospital (%)	Community health worker (%)	SMS/ chat/ email (%)	Friends/ family (%)	Social media (%)
Sex	*						
Male	62.4	36.9	10.2	6.8	9.4	5.6	5.7
Female	55.2	36.5	14.5	8.4	6.2	5.6	4.5
Age			*	*			
15–19	48.8	46.3	8.9	2.7	5.4	6.7	6.3
20–24	53.8	31.5	22.5	10.3	9.8	6.1	5.3
25–34	58.8	35.7	13.2	6.1	9.5	6.3	6.3
35–44	61.0	35.2	11.9	11.3	6.4	4.0	4.8
≥45	61.0	39.3	8.3	4.9	6.7	6.4	3.0
Residence	*	***					
Rural	60.9	32.4	12.5	8.1	7.1	6.0	4.4
Urban	48.0	56.0	12.6	5.9	10.2	3.9	8.1
Education	***	***					***
None	63.5	24.0	10.3	8.8	8.1	5.4	2.1
Primary	65.1	36.3	12.8	6.8	5.4	5.7	1.5
Secondary	51.5	39.9	10.7	7.5	7.6	5.7	9.1
College/ university	42.7	52.5	17.4	8.6	13.0	5.6	13.6
Wealth quintile	***	***					
Lowest	69.9	13.5	11.5	10.2	6.9	4.3	1.1
Second	60.0	27.8	13.3	7.8	8.2	8.9	7.0
Middle	58.6	37.5	13.8	8.6	6.0	6.2	4.3
Fourth	63.9	51.6	10.0	5.0	5.6	3.8	5.5
Highest	37.6	57.8	13.9	6.4	11.9	4.4	7.8
Total	58.5	36.7	12.5	7.7	7.7	5.6	5.1

Note: Asterisks denote statistical significance of the characteristic with the ideational determinant based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

CONCLUSIONS AND RECOMMENDATIONS

In addition to the implementation of supportive policies and other structural interventions, human behavior critical to effective malaria control and elimination. Understanding populations' malaria-related knowledge, attitudes, and practices is key to developing and implementing effective SBC programs. The findings from the 2022 Kenya MBS are an essential resource to inform programmatic and policy decisions. This section highlights relevant conclusions and recommendations for the lake endemic region where the Kenya MBS is implemented.

The Kenya Malaria Strategy 2019–2023 aims to reduce malaria incidence and deaths by 75% of 2016 levels by 2023. The strategy outlines targets and key objectives to accomplish by 2023, including six central objectives with associated priority implementation strategies.

Objective 1 aims to protect 100% of people living in malaria risk areas through access to appropriate malaria preventive interventions. Strategies are as follows:

- Distribute long-lasting ITNs through appropriate channels to achieve and sustain universal coverage in malaria risk areas.
- Use IRS in the targeted areas.
- Use larval source management in the targeted areas.
- Develop, review, and update documents for malaria vector control.
- Provide IPTp at ANC visits in targeted areas.
- Engage community health workers to identify IPTp missed opportunities for referral to ANC in targeted areas.

Objective 2 aims to manage 100% of suspected malaria cases according to the Kenya malaria treatment guidelines. Strategies are as follows:

- Strengthen capacity for integrated malaria case management.
- Strengthen capacity for case management of severe malaria.
- Provide malaria case management at the community level in targeted areas.
- Ensure quality of malaria parasitological diagnosis.
- Procure diagnostic and treatment commodities.

Objective 3 aims to establish systems for malaria elimination in targeted counties. Strategies are as follows:

- Establish structures and capacity at the national and county levels to coordinate and drive implementation of the elimination agenda.
- Develop capacity for malaria elimination.
- Establish active case detection, notification, investigation, and response systems for elimination in targeted counties.
- Strengthen quality assurance for diagnosis, treatment, and entomology to enhance surveillance.
- Strengthen SBC for malaria elimination.

Objective 4 aims to increase utilization of appropriate malaria interventions in Kenya to at least 80%. Strategies are as follows:

- Scale up malaria advocacy at national and county levels for increased utilization of malaria interventions.

- Strengthen community-based SBC activities for all malaria interventions.
- Strengthen structures for the delivery of malaria SBC interventions at all levels.
- Strengthen program communication for increased utilization of all malaria interventions.

Objective 5 aims to strengthen malaria surveillance and use of information to improve decision-making for program performance. Strategies are as follows:

- Strengthen malaria surveillance.
- Strengthen malaria epidemic preparedness and response.
- Increase use of malaria data for decision-making.
- Conduct and facilitate health facility surveys.
- Conduct and support community surveys.
- Facilitate operational research for policymaking.
- Conduct entomological surveillance.
- Monitor efficacy and effectiveness of vector control tools and technologies.

Objective 6 aims to provide leadership and management for optimal implementation of malaria interventions at all levels, for the achievement of all strategic objectives by 2023. Strategies are as follows:

- Align malaria governance and legislation to constitutional mandates and core functions.
- Strengthen partnerships and coordination for malaria program management.
- Strengthen capacity for malaria programming at national and county levels.
- Strengthen resource mobilization initiatives for malaria.
- Enhance malaria commodity security at all levels.
- Strengthen the use of supply chain data for decision-making.

The following key findings, conclusions, and recommendations from the Kenya MBS have been aligned to inform the first two central objectives of the Kenya Malaria Strategy and offer evidence to strengthen SBC for malaria elimination (Objective 3) and structures for the delivery of malaria SBC interventions at all levels (Objective 4).

Please note that the key findings summarized here have also been reported in the executive summary and previous chapters. Recommendations appear at the end of each sub-section.

OBJECTIVE 1: ACCESS TO APPROPRIATE MALARIA PREVENTIVE INTERVENTIONS

The first objective of the Kenya Malaria Strategy is to protect 100% of people living in malaria-risk areas by 2023 through access to appropriate malaria preventive interventions. Core implementation strategies for this objective include the following:

- Distribute long-lasting ITNs through appropriate channels to achieve and sustain universal coverage in malaria risk areas.
- Use IRS in the targeted areas.
- Use larval source management in the targeted areas.
- Develop, review, and update documents for malaria vector control.
- Provide IPTp via ANC in targeted areas.
- Engage community health workers to identify referrals for IPTp in targeted areas.

Below, cross-cutting findings related to key ideational factors are summarized. Then, key findings and recommendations for malaria in pregnancy, ITN use, and IRS are outlined.

General Cross-cutting Ideational Factors

Variation in cross-cutting malaria-related ideational factors was observed among respondents. Ideational factors with the highest prevalence were perceived equitable gender norms (98%), favorable perceptions of facility-based health providers (95%), and community-based health providers (82%). Overall, 81% of respondents reported that they or their children were at risk of contracting malaria (perceived susceptibility to malaria).

In contrast, malaria-related ideational factors with lower prevalence included comprehensive knowledge of malaria (44%), perceived severity of malaria, interpersonal communication about malaria with spouse/partner (46%), and interpersonal communication about malaria with friends/family (40%).

Malaria in Pregnancy

Ideational Factors Related to Malaria in Pregnancy

Overall, most ideational factors related to malaria in pregnancy were high. Those with the lowest prevalence among respondents were comprehensive knowledge of IPTp (20%)[26] and recent discussion of ANC attendance with spouse/partner (16%).

Knowledge related to IPTp and favorable attitudes towards IPTp were significantly and positively associated with level of education, with a larger percentage of those with higher education attainment reporting comprehensive knowledge and favorable attitudes towards IPTp. A smaller percentage of younger respondents had comprehensive knowledge of IPTp (13% among those aged 15–19 vs. >20% among older age groups).

Respondent age was significantly associated with multiple ideational factors related to malaria in pregnancy. In particular, compared to older respondents, fewer younger respondents had comprehensive knowledge, perceived severity of malaria in pregnancy, perceived community norms

[26] Comprehensive knowledge of IPTp/ANC was defined as knowing to attend the first ANC appointment in the first trimester, to attend four or more ANC appointments during pregnancy, and to receive at least three IPTp doses.

that most pregnant women in their community take malaria preventive medicine during pregnancy, perceived community approval of IPTp, favorable perceptions of community-based health workers about ANC. In comparison, interpersonal communication and involvement in decision-making regarding ANC significantly decreased with age.

ANC and IPTp Intentions and Use

Among women with a live birth in the past two years, 99% reported attending at least one ANC visit, 82% reported attending at least four ANC visits, and 13% reported attending at least eight ANC visits. Among women with a live birth in the two years preceding the survey, use of IPTp during pregnancy ranged from 87% for IPTp1 to 48% for IPTp3. A smaller percentage of women in urban areas received IPTp2 (69%) and IPTp3 (50%) as compared with urban residents (53% and 37% respectively). Attendance at ANC visits was significantly and positively associated with IPTp uptake.

Of the women who intend to have more children who had a child in the last two years, 70% intended to attend ANC early in their next pregnancy, 90% intended to attend 4 or more ANC visits in their next pregnancy, and 24% intended to attend 8 or more ANC visits in their next pregnancy. Among women who intend to have children in the future, most women (98%) intended to take IPTp during their next pregnancy. In urban areas, the percentage of women aged 35 and older with IPTp intentions was significantly lower (49%) than other age categories (92% and above).

Adjusted logistic regression models showed that favorable IPTp attitudes were consistently and positively associated with ANC intentions (early, 4 or more, and 8 or more). Other factors found to be statistically significantly associated with future ANC intentions included exposure to malaria messages in the past 6 months (early ANC and 8 or more ANC), television or radio listenership (4 or more ANC intention), and basic knowledge of ANC/IPTp (4 or more ANC intention).

Recommendations

Programs should build on the high levels of ANC attendance reported in this study by addressing ideational factors shown to be significantly associated with future ANC intentions. SBC programs can do the following:

- **Continue to foster favorable IPTp attitudes.** Most respondents had favorable IPTp attitudes, and this ideational factor was significantly associated with future ANC intentions. Given the strong link between ANC attendance and receipt of IPTp, continued maintenance of such favorable attitudes will be critical to improve ANC and IPTp uptake.
- **Improve knowledge of IPTp and ANC among pregnant women.** Knowledge of IPTp and ANC includes knowing that pregnant women should attend their first ANC appointment during the first trimester and they should attend four or more ANC appointments and receive at least three or more IPTp doses during pregnancy. Attention to ANC and IPTp knowledge is particularly important for younger age groups and those with lower levels of education. Only 41% of respondents knew the appropriate timing for the first ANC visit and 48% knew how many times during pregnancy a woman should receive IPTp. Malaria messages should focus on these topics. Additionally, community leaders can be engaged to address misconceptions related to malaria in pregnancy, particularly among younger age groups.
- **Engage community and other health workers as important sources of malaria messages.** A large percentage of respondents reported favorable attitudes towards community-based health workers, and the survey results showed associations between malaria message exposure and ANC intentions. These findings highlight an opportunity to engage community and

other health workers as sources of malaria messages. Such efforts could include conducting household visits and dialogue and action days to foster favorable IPTp attitudes and improve knowledge of ANC and IPTp.

- **Develop a youth-focused campaign strategy and messages related to ANC and IPTp**. The observed age-related differences in ideational factors related to malaria in pregnancy indicate a need to focus on appropriate media channels for reaching youth and supporting youth-friendly service points. Evidence that television or radio listenership were significantly associated with ANC intentions suggests these media channels could be particularly useful for disseminating malaria messages. This campaign strategy could include engagement with audiences such as parents or spouses/partners of pregnant women to encourage discussions related to sexuality, as well as youth groups and youth champions.

Insecticide-treated Nets (ITNs)

Ideational Factors Related to ITNs

Generally, ideational factors related to ITN use and care were high across respondents. The ideational factors with the lowest prevalence among respondents were perceived community norms favorable towards ITN use (78%) and high perceived response efficacy of ITNs (84%). Individuals with higher levels of education more often reported favorable attitudes towards nets, higher use and better care of ITNs, perceiving ITN use as a community norm, and perceiving equitable gender norms related to ITN use.

Knowledge that ITNs can prevent malaria increased with household wealth but decreased with older age of respondents. Perceived efficacy of ITNs to prevent malaria also varied significantly by household wealth within the rural subsample, with only half (compared to 84% of respondents overall) of those living in the second wealth quintile of the rural subsample reporting they perceive ITNs to be effective. A similar outcome was observed in the urban subsample regarding perceived equitable gender norms related to ITN use, with 67% (compared to 94% of respondents overall) of those in the second wealth quintile reporting it is more important for female rather than male children to sleep under nets.

Only one factor, perceived community norms favorable towards ITN use, varied depending on residence (82% in urban areas vs. 77% in rural areas) and by sex (81% of men vs. 76% of women), and it was significantly correlated with age, with participants in the youngest age groups (age 15–24) perceiving less net use than those in the older age groups.

Despite positive attitudes towards net use among 92% of respondents, misconceptions about expensive nets being more effective than cheaper or free nets were unexpectedly high (31%). Other common negative perceptions about ITNs included their inconvenience for couples trying to get pregnant (17%), the smell of insecticide making it difficult to sleep (41%), and the tediousness of folding and unfolding it to cover the sleeping space (36%).

Household ITN Access and Individual Use

Ownership of ITNs at the household level was high, but universal coverage (one ITN per two people) was low. Households in the lowest wealth quintiles were more likely than those in the top quintiles to own at least one ITN. A similar trend was noticed when exploring individual household member access to ITNs, with the lowest wealth quintile in urban areas and middle wealth quintile in rural

areas having the highest rates of ITN access in the sample. On average, 31% of available ITNs in the household were not used the night preceding the survey. Use of ITNs the night preceding the survey by individuals in households with at least one ITN per two household members did not differ by residence or household wealth, but rates did differ by age, with only 71% of those aged 15–24 years sleeping under an ITN the night preceding the survey, compared to the survey average of 80%.

On average, 87% of respondents in households with at least one net reported that they use a net every night of the week (consistent net use). Adjusted logistic regression models highlighted that respondents with high perceived self-efficacy to use nets, favorable attitudes towards net use and care, as well as those who reported that they listen to the radio at least once weekly had significantly greater odds than their counterparts of consistently using nets. Unsurprisingly, individuals living in households with at least one net per two household members also had significantly greater odds of consistent use than those in households without sufficient nets. Surprisingly, age also was highly correlated with consistent net use, with those in older age groups having two to three times greater odds of using nets than those aged 15–19 years.

Recommendations Related to Consistent Net Use

Programs should prioritize ideational factors shown to be significantly associated with consistent net use in the design of future messages. SBC programs can do the following:

- **Frame net use as an easy behavior to practice.** Aim to maintain self-efficacy of net users.
- **Maintain positive attitudes about net use**, particularly addressing negative attitudes and inaccurate perceptions, such as the belief that more expensive nets are more effective than free nets or that nets are not easy to sleep under.
- **Heighten focus of health education messages encouraging the use of nets by all household members in all sleeping spaces within the household**. Net hanging demonstrations by community health volunteers and health care workers, as well as education via radio messaging, may be useful in achieving increased net use.
- **Conduct further research exploring the high rates of nets being stored and not used** and why those with adequate nets are not using them. This research may help distribution and SBC programs understand how they may collaborate to improve access to ITNs and ensure distributed ITNs are used.
- **Continue to explore what motivates youth, particularly those aged 15–19, to use nets consistently**. Survey respondents in older age groups were more likely to use nets consistently. A study powered and designed to examine this particular age group may help illuminate how to best promote net use among younger populations in the lake endemic region.

Characteristics and Use of Available Bed Nets

Most nets observed were ITNs (93%) and obtained through distribution campaigns (72%). The remaining nets were obtained through appointments for prenatal care (9%), child welfare visits (2%), and other sources (17%) such as shops and markets (6%), other health facility or community health worker visits (4%), friends or family (3%), and schools (2%). A large proportion of ITNs were white and blue in color, an indication that color was not a factor affecting use of ITNs. Few nets (5%) were three or more years old, and most (92%) were obtained free of charge.

Net Care and Repurposing

Repurposing of nets was higher in rural than urban areas; however, net care practices were similar in both urban and rural areas. Some improper net care practices were observed, such as washing ITNs with detergent or a mix of products, drying the net in the sun, failure to suspend and tie ITNs, and stowing ITNs either packed or unpacked. These practices affected the ratio of use, given households' access to ITNs.

Recommendations Related to Mosquito Net Care

Programs should prioritize ideational factors shown to be significantly associated with consistent net use in the design of future messages. SBC programs can do the following:

- **Maintain positive attitudes about net care**, particularly addressing negative attitudes, such as perceptions that net care is tedious.
- **Focus on specific issues related to net care to complement existing efforts**. This messaging could include instructions to not wash ITNs with harmful products such as bleach and detergent, given the sizable percentage of respondents who reported such behaviors.

Indoor Residual Spraying (IRS)

IRS-related Ideational Factors

Knowledge of IRS was low across the sample (39%) but relatively high within focal IRS intervention counties (84%). Generally, respondents reported positive attitudes towards IRS (76%), although some sub-groups of the population had less favorable attitudes. Compared to male respondents in urban areas (85%), female respondents in urban areas (68%) had less favorable attitudes ($p<.05$). Common misconceptions cited in the survey included beliefs that IRS causes skin rashes (38%) and that walls sprayed with IRS are not safe to touch even after drying (32%). Respondents also were bothered by leaving possessions outside of their homes (40%).

Most respondents perceived IRS as being effective (81%) based on agreement with statements that spraying interior walls can effectively prevent malaria (93%) and that people in households with IRS are less likely to get malaria (84%). Perceived response efficacy did not vary by socio-demographic characteristics.

Perceived self-efficacy was high across the sample (87%), though this varied by residence, with household heads in urban areas (80%) reporting lower self-efficacy than those in rural areas (88%) ($p<.05$). Those living in IRS intervention areas (89%) reported higher self-efficacy than those in non-intervention areas (85%) ($p<.05$). Perceived self-efficacy related to IRS also varied by sex, with a larger percentage of men (91%) than women (84%) reporting high perceived self-efficacy ($p<.05$).

IRS Coverage and Acceptance

IRS coverage across the sample was low (11%) and moderate (56%) in IRS intervention counties (i.e., Migori and Homa Bay). It is important to note that these values include households not approached by an IRS representative. Among households approached, IRS coverage rates were similar between intervention areas (78%) and the aggregate sample (77%). Within intervention areas, those in rural areas (80%) reported receipt of services more often than those in urban areas (42%). An opposite

trend was observed in non-intervention counties among households approached by an IRS team, where those in urban areas (76%) reported higher service receipt than those in rural areas (46%). This difference may be due to differences in available service providers, though more research is needed to understand the market landscape for IRS in non-intervention areas. Willingness to accept IRS was high, with most (87%) in intervention counties reporting willingness to accept to IRS.

Recommendations

SBC programs can do the following:

- **Address persistent misconceptions about IRS to improve acceptability and uptake**, including the beliefs that IRS causes skin rashes and that sprayed walls are not safe to touch even after drying. Concerns about leaving possessions outside of the home also should be addressed when discussing IRS implementation. Community-based resources, religious leaders, and government administrative officers can serve as IRS knowledge sources.
- **Undertake further research to understand why those approached about IRS service do not receive it**. This research should focus on urban and rural differences in IRS uptake and could include market analyses aimed at understanding supply-side factors affecting differences in IRS service use.

OBJECTIVE 2: CASE MANAGEMENT

The second objective of the Kenya Malaria Strategy is to manage 100% of suspected malaria cases according to the Kenya malaria treatment guidelines by 2023. To accomplish this objective, a set of core implementation strategies is needed:

- Strengthen capacity for integrated malaria case management.
- Strengthen capacity for case management of severe malaria.
- Provide malaria case management at the community level in targeted areas.
- Ensure quality of malaria parasitological diagnosis.
- Procure diagnostic and treatment commodities.

Below, key findings and recommendations for case management for children under five with fever are outlined.

Case Management

Ideational Factors Related to Malaria Case Management

Ideational factors related to malaria case management for children under five years old were relatively high across respondents. The ideational factors related to case management with the lowest prevalence were knowledge of malaria care-seeking and treatment (64%), high perceived response efficacy of malaria treatment (57%), favorable perceived community norms that most people seek prompt care for children (71%), favorable perceptions of health facilities (71%), and favorable perceptions of community health workers (61%).

Sixty-four percent of respondents had knowledge of malaria care-seeking and treatment, which was higher among males, older respondents, and those with higher educational attainment. Level of education was significantly and positively associated with multiple case management-related ideational factors, including knowledge of malaria care-seeking and treatment, favorable attitudes towards care-seeking and treatment, high perceived response efficacy of malaria testing as well as treatment, and favorable perceptions of facility-based health workers.

Fifty-seven percent of respondents reported high perceived response efficacy of malaria treatment. In particular, most respondents agreed that malaria drugs obtained from health facilities are effective (95%), but only 59% of respondents disagreed that malaria drugs obtained from the market are just as effective as those from the health facility.

Perceived community norms favorable towards malaria testing and treatment were relatively high, with 71% reporting that most people in their community take their children to a health provider on the same day or day after they develop a fever. Most 79%) reported that most children with fever who are taken to a health facility get tested for malaria. Seventy percent of respondents reported that most people in their community approve of prompt care-seeking for children with fever.

Sixty-one percent of respondents had favorable perceptions of community-based health workers regarding malaria care-seeking and treatment. These perceptions varied by respondent sex, with a larger percentage of females (64%) than males (57%) having favorable perceptions of community-based health workers.

Care-seeking Behaviors

Caregivers reported that 33% of the children under age five had fever in the two weeks preceding the survey. Advice or treatment was sought for 80% of those children. Advice was sought promptly (the same or next day) for 61%, of which 64% sought appropriate advice or treatment from a health facility or community worker. Overall, 50% of children under age five with fever reportedly received both prompt and appropriate care-seeking. In adjusted logistic regression models, interpersonal communication about malaria with a spouse/partner and favorable perceptions of community-health workers were significantly and positively associated with prompt and appropriate care-seeking.

For children under five with a fever in the prior two weeks, 58% of caregivers reported that a malaria test was administered (48% of children under 12 months, 67% of children aged 12–13 months, and 66% of children aged 24 months or older). Among those, 70% had confirmed malaria, and 86% of those with fever received ACT (74% on the same or next day).

Recommendations

With only 50% of children under age five with fever reportedly receiving both prompt and appropriate care, SBC programs should focus on ideational factors significantly associated with care-seeking:

- **Focus on interpersonal communication about malaria with a spouse or partner to improve prompt and appropriate care-seeking.** In adjusted logistic regression models, this ideational factor was significantly associated with prompt and appropriate care-seeking of children with fever. Interpersonal communication can increase knowledge of malaria and foster other relevant ideational factors, such as positive attitudes and perceptions, response efficacy, and self-efficacy. SBC programs could support such communication by developing focused messages on interpersonal communication to be delivered via media campaigns aimed at both women and men, as well as community dialogues, modeling, and other male engagement approaches. Special emphasis should focus on women and youth, as fewer women (33%) than men (59%) and younger respondents aged 15–19 (33%) and 20–24 (41%) as compared to older respondents reported that they had interpersonal communication with their spouse or partner about malaria. Improving communication in these groups can include community initiatives involving stakeholder engagements or opinion leaders prompting interpersonal communication on malaria. Interpersonal communication also can be strengthened through programs specifically designed to incorporate interpersonal communication on malaria, such as call-in shows and mass media campaigns.
- **Foster favorable perceptions related to community health volunteers, specifically the belief that they always have rapid diagnostic test kits.** Perceptions that community health volunteers do not have the necessary supplies could be affected by real-world supply issues, previous interactions with community health volunteers, or other factors. These perceptions could be addressed through SBC approaches that work in parallel with supply-side interventions to improve interpersonal communication, quality of care, and trust in health workers.
- **Focus on barriers to seeking care promptly and to accessing appropriate sources of care.** A useful approach to this effort could be using the Three Delays Model[27] to identify factors affecting delays in decision-making around care-seeking, in getting to a health facility, and in provision of adequate care. Identified barriers can then be used to guide interventions.
- **Collaborate with service delivery partners to improve provision of ACT.** More than one quarter of children under five with malaria-related fever did not receive ACT promptly, indicating

[27] Thaddeus S, Maine D. To far to walk: maternal mortality in context. Soc Sci Med. 1994;38:1091–1110.

a need to ensure all suspected cases of malaria are appropriately tested and promptly treated following Kenya's national guidelines for malaria diagnosis, treatment, and prevention. In particular, access-related barriers to ACT must be addressed to promote use of this recommended first-line treatment.

CROSS-CUTTING STRATEGY: SOCIAL AND BEHAVIOR CHANGE

To improve access to malaria prevention interventions (Objective 1) and case management (Objective 2) and to strengthen SBC for malaria elimination (Objective 3) and structures for delivery of malaria SBC interventions at all levels (Objective 4), this section summarizes key findings and recommendations related to media consumption and message exposure.

Key Findings

Clear trends emerged in media consumption across rural and urban settings. Radio listenership in the week prior to the survey and mobile phone ownership were high (84% and 81%, respectively), and 62% of participants reported watching television. Radio listenership was higher in rural areas than urban areas (85% vs. 77%). In contrast, TV viewership was higher in urban areas compared to rural areas (80% vs. 58%). Radio listenership and TV viewership varied by sex, with men reporting higher rates than women. Listenership and viewership also varied by education level and household wealth, with a larger percentage of those with higher educational attainment and those from households with greater wealth reporting listenership and viewership in the last week.

Urban dwellers were more likely than rural dwellers to own a mobile phone or tablet (91% vs. 79%). Men, older respondents, those with higher levels of education, and those from households with higher wealth also had greater ownership of mobile phones, compared to women, younger respondents, and those with lower levels of education and wealth. Those aged 15–19 had lower phone ownership but were more likely to watch television and to access malaria messages through friends, family, and peers.

Fifty-three percent of respondents reported having heard or seen a malaria message in the past six months, which was higher for males (63%) than females (47%), older respondents, and those with higher levels of education. Radio and TV were the two most common sources of malaria messages. Identification of the national malaria logo and slogan was low (10%), with very low recall of the campaign slogan (6%), for which college-educated (11%) and wealthier respondents (9%) had the highest rates of recognition.

Recommendations

Media consumption recommendations include the following:

- **A comprehensive mass media plan is needed to target messages to specific audiences and age groups, including vulnerable populations**. Based on survey response differences by sex, age, education, and wealth, a comprehensive media plan can adapt messages and media channels for specific audiences and ensure complementary messaging. Timing is important to ensure focal audiences are reached when they are most likely to be listening to the radio or watching television.
- **Radio, television, mobile phones, and social media are recommended channels.** Weekly radio listenership was higher than weekly television viewership in rural areas, suggesting that radio may be a better communication channel in rural areas. In urban areas, weekly listenership and viewership rates were similar, suggesting that both radio and television would be useful channels. The high access to radio provides a good opportunity to maximize reach across participants with different socio-demographic characteristics. Similarly, high phone ownership, albeit higher in urban than rural areas, provides an opportunity to scale up the use of social

media to disseminate key messages. Radio listenership was higher among those with lower levels of educational attainment, whereas television viewership and mobile phone ownership were higher among those with higher educational attainment and wealth. Older age groups reported higher weekly radio listenership and mobile phone ownership than did younger age groups. Based on the preferred times for TV watching reported in this study, TV spots in rural areas should air in the evenings for the best reach. Radio spots should air in the late evening (8 pm to 12 am) for best reach in both rural and urban areas.

- **Men have higher radio listenership, TV viewership, and mobile phone ownership, indicating an opportunity to spread malaria messages to men at the household and community levels via these channels. Radio and mobile phones are the best channels for reaching women.** Messages on spousal/couple communication, the importance of ANC, consistent and correct ITN use, and men's role in supporting malaria prevention and treatment can be shared via these channels.
- **SBC programs should adapt their campaign strategies to recognize that youth access media and information differently**. Younger respondents had less access to phones, suggesting that other channels, such as friends, family, peer groups, and youth champions, may be most successful in reaching young people and making malaria relatable to them.
- **Efforts should be made to identify strategies to reach those with no formal or primary only education levels**. A gap in malaria message exposure was observed for females in rural areas, especially younger respondents aged 15–24 years and those aged 35–44 years. Further analysis and research are needed to better understand how to engage with these groups. Communication and education channels on the importance of appropriate net use at the community level should be designed to reach low-literacy audiences and boost community perceptions around net use and other key malaria-related behaviors.
- **Malaria campaigns can be strengthened by leveraging existing opportunities and building partnerships to sustain and achieve maximum impact**. Campaigns should be restructured to increase their intensity, frequency, and duration to target various household members. For example, media partnerships can help ensure that messaging is broadcast for longer periods, and the Zero Malaria Campaign Coalition can support the development of community-specific messages. Corporate social responsibility in the private sector also could include goals aimed at creating innovative approaches to encourage malaria social behavior change efforts.
- **Continued efforts should be made to build on the Kenya MBS findings related to exposure to malaria-related messages and campaigns**. Omnibus surveys can be conducted to assess the reach and impact of SBC messages and guide future message development and dissemination. Given the observed gaps in malaria message exposure among women in rural areas and especially among younger respondents, further analysis and research are needed to better understand how to engage with these populations.

IMPLICATIONS FOR FUTURE RESEARCH

Several important implications for future research emerged from the 2022 MBS results, including differences in ideational factors and key malaria-related health behaviors by sex, age, level of education, and household wealth. Beyond these socio-demographic characteristics, other structural inequalities likely play important roles in individuals' access to health services and their specific health behaviors. To identify these factors, future research should look at intersections of important aspects of people's social locations. For example, during the Kenya Malaria Behavioral Survey 2022 data interpretation workshop, frequent requests were made to analyze data based on intersections between all factors (in addition to sex, age, and education) to understand how best to identify gaps, develop SBC messages, and implement tailored SBC programs.

Deeper exploration of ideational factors and malaria-related behaviors among youth is needed across topic areas. In this MBS, age categories were further disaggregated to enable comparisons between those aged 15–19, 20–24, and older, with differences by age emerging related to case management, IPTp use, ITN use, and IRS. Greater attention to youth-specific factors thus is needed to inform SBS programs. This effort could involve adding questions related to peers, social media, and other relevant factors.

As recommended in other MBS reports, facility assessments could expand on the identified trends related to respondents' perceptions of health facilities, facility-based health workers, and community health workers. These assessments can examine the context of health provision and explore client and provider perspectives and interactions during health-related interactions. Such data could provide further evidence to help identify barriers relevant to the Three Delays Model and would be applicable to efforts aimed at improving case management.

Across focal areas covered in this survey, perceptions of equitable gender norms and community norms related to key malaria-related behaviors were positive. Further exploration should pursue mixed- method approaches to understand the nuances of these norms and their relationships with malaria-related behaviors. An in-depth, focused analysis to understand norms, relevant audiences, and opportunities for social norms interventions is recommended.

Future MBS studies should build on these findings to identify opportunities for streamlining and parsimony. At the same time, several additional research areas emerged during analysis and should be considered for inclusion in future MBS surveys:

- Reasons for non-use of health services or non-engagement in particular malaria-related behaviors;
- Youth's sexual and reproductive health as it relates to malaria in pregnancy;
- ITN-specific questions, such as net color preferences, reasons for storing and not using bed nets, and reasons for repurposing bed nets; and
- Preferred television or radio programming and listening/viewing habits.

CONCLUSION

In the context of ongoing efforts for effective malaria control and elimination, the 2022 Kenya MBS serves as an invaluable resource to identify crucial malaria-related knowledge, attitudes, and practices for understanding human behavior and designing impactful programmatic and policy decisions. The results reveal opportunities to improve knowledge of malaria, ANC, IPTp, and IRS. Favorable attitudes towards health facilities and workers were generally high, highlighting opportunities for continued investment in these areas to improve these factors, particularly in situations with direct influence on health behaviors. Interpersonal communication about malaria in general or malaria in pregnancy remains an important cross-cutting factor to address. Work is needed at the individual, household, community, and health facility levels to improve case management, IPTp, ITN use, and IRS coverage. Importantly, the observed gaps in knowledge of, attitudes toward, and engagement in malaria-related health behaviors are based on important socio-demographic characteristics that can be addressed by robust, multi-level SBC programs. Together, these findings provide important evidence that can inform efforts to achieve the objectives outlined in the Kenya Malaria Strategy and improve the health of those in the lake endemic region as well as throughout Kenya.

ANNEX A: DATA TABLES FOR THE 2022 KENYA MBS

This annex provides all data tables for the 2022 Kenya MBS that were not included in the main body of the report. A brief description of the purpose of each table is provided. Data presented in these tables are often disaggregated by study location and/or respondent or household socio-demographic characteristics. Data tables pertaining to the specific subsections can be found by utilizing the table of contents at the beginning of this report.

A.1 Sample Characteristics

A.2 Cross-Cutting Ideational Determinants

A.3 Malaria Case Management for Children Under Five Years Old

A.4 Malaria in Pregnancy

A.5 Insecticide-Treated Net Use

A.6 Indoor Residual Spraying (IRS)

A.7 Media Consumption and Message Exposure

A.1 SAMPLE CHARACTERISTICS

This subsection of the Annex provides all data tables related to sample characteristics. The following tables also may appear in the main body of the report.

Table A.1.1
Housing Characteristics

This table describes the distribution of selected household characteristics in the study, disaggregated by residence.

	Urban (%) (n=418)	Rural (%) (n=1038)	Total (%) (N=1456)
Average number of sleeping rooms	1.92	2.22	2.16
Number of people per sleeping room	2.55	2.63	2.62
Households with electricity	79.9	29.7	38.8
Households near* a public health facility	74.6	52.8	56.8
Households near* a private health facility	78.1	40.3	47.2
Households near* a pharmacy/chemist	95.1	69.6	74.3
Households with finished floors	85.2	38.4	46.9
Households with finished roofs	100	98	98.4
Households with finished walls	76.4	31.0	39.3

Note: *Located 5 kilometers or less, less than 30 minutes on foot, or less than 10 minutes by car

Table A.1.2
Ownership of Assets, by Wealth Quintile

This table describes the distribution of household ownership of assets and wealth quintiles, disaggregated by residence.

	Urban (%) (n=418)	Rural (%) (n=1038)	Total (%) (N=1456)
Asset			
Radio	74.0	70.9	71.4
Television***	70.6	43.5	48.5
Mobile phone*	78.6	84.8	83.7
Refrigerator***	18.5	3.0	5.8
Clock***	21.3	10.8	12.7
Bicycle	21.7	23.9	23.5
Motorcycle	18.2	17.0	17.2
Car***	11.5	1.7	3.5
Computer***	4.4	16.7	6.7
Wealth Quintile* **			
Lowest	3.8	26.0	22.0
Second	2.5	26.5	22.1
Third	18.1	20.9	20.4
Fourth	27.0	16.8	18.7
Highest	48.7	9.7	16.8

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.1.3
Characteristics of Household Members

This table describes the sex and age of household members, disaggregated by residence, and the distribution of these characteristics for all household members listed in the household questionnaire. It does not necessarily reflect only the characteristics of individuals interviewed.

	Urban (%) (n=1935)	Rural (%) (n=5638)	Total (%) (N=7573)
Sex			
Female	53	56	54
Male	47	44	46
Age (in years)			
0–4	15	16	15
5–17	38	31	37
≥18	47	53	48
Average	21	21	21

Table A.1.4
Socio-demographic characteristics of respondents

This table describes the distribution of respondents by socio-demographic characteristics, including participant sex, age, and level of education, disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
Sex			
Female	61	61	61
Male	39	39	39
Age* **			
15–19	10	12	12
20–24	17	13	13
25–34	37	29	30
35–44	27	28	28
≥45	10	19	17
Education* **			
None	14	29	26
Primary	36	43	42
Secondary	29	18	20
College/university	21	10	12

=*Note*: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

A.2 CROSS-CUTTING IDEATIONAL DETERMINANTS

This subsection of the Annex provides all data tables related to cross-cutting ideational determinants, including malaria knowledge, perceived susceptibility and severity, gender norms, perceptions regarding health workers, and interpersonal communication. The tables summarize the prevalence of ideational determinants, and some may be duplicated in the main body of the report.

Table A.2.1
Correct Knowledge of Malaria

This table summarizes respondents' knowledge of malaria including proportions who knew fever is the main symptom of malaria, that malaria is caused by a mosquito bite, and at least one major malaria prevention measure (e.g., sleeping under a treated bed net every night). Data are presented according to respondent background characteristics and disaggregated by residence.

	Urban (n=631)			Rural (n=1622)			Total (N=2253)		
	Knows fever is symptom of malaria (%)	Knows malaria is caused by mosquito bite (%)	Knows at least one major prevention measure (%)	Knows fever is a symptom of malaria (%)	Knows malaria is caused by mosquito bite (%)	Knows at least one major prevention measure (%)	Knows fever is symptom of malaria (%)	Knows malaria is caused by mosquito bite (%)	Knows at least one major prevention measure (%)
Sex									
Female	85	67	96	82	56	95	82	58	96
Male	81	63	94	82	53	93	82	54	93
Age									
15–19	76	73	96	83	61	95	82	63	95
20–24	88	75	98	73	56	95	76	60	96
25–34	84	65	96	84	50	94	84	53	94
35–44	82	59	96	84	54	96	84	55	96
≥45	87	57	87	81	58	91	82	58	91
Education	*	***			***		*	***	
None	78	45	94	79	45	93	79	45	93
Primary	83	53	96	83	54	95	83	54	95
Secondary	81	75	93	80	62	94	80	66	94
College/university	93	85	97	88	71	96	89	75	96
Wealth quintile		***	*		**		*	***	
Lowest	72	29	93	78	47	92	78	47	92
Second	64	76	97	84	51	94	84	52	94
Middle	80	55	90	79	55	95	79	55	94
Fourth	86	57	96	88	61	97	87	60	97
Highest	85	75	97	83	73	97	84	74	97
Total	84	65	95	82	55	94	82	56	95

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.2
Perceived Susceptibility to Malaria

This table summarizes the distribution of perceived susceptibility to malaria, based on responses to specific statements. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
DISAGREE: *People in this community only catch malaria during the rainy season.*	49	46	46
AGREE: *Almost every year, a person in this community catches severe malaria.*	87	85	85
AGREE: *When your child has a fever, you're almost always afraid it's malaria.*	89	91	91
AGREE: *During the rainy season, you are afraid almost every day that a member of your family will suffer from malaria.*	83	82	82
Perceive susceptibility to malaria (overall)	83	81	81
Sex		*	**
Female	80	78	79
Male	87	85	86
Age	**	***	***
15–19	61	61	61
20–24	81	76	77
25–34	84	81	82
35–44	85	88	88
≥45	93	88	88
Education	*		
None	90	81	82
Primary	77	79	79
Secondary	83	84	84
College/university	87	84	85
Wealth quintile			
Lowest	69	77	77
Second	84	82	82
Middle	80	80	80
Fourth	85	87	86
Highest	83	83	83

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.3
Perceived Severity of Malaria

This table presents distribution of participants' perceived severity of malaria, based on agreement with several statements. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

-	**Urban (%) (n=631)**	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
DISAGREE: *I am not afraid of malaria because it can be treated easily.*	31	32	32
DISAGREE: *Only weak children can die of malaria.*	78	75	75
AGREE: *Each case of malaria can potentially lead to death.*	83	81	81
DISAGREE: *When someone you know has malaria, they usually recover completely within a few days.*	87	84	85
Perceive malaria severity (overall)	68	62	63
Sex			
Female	66	61	62
Male	72	64	65
Age			
15–19	59	57	57
20–24	71	57	60
25–34	66	61	62
35–44	71	64	66
≥45	74	67	68
Education		*	**
None	63	56	56
Primary	66	62	63
Secondary	70	70	70
College/university	74	65	68
Wealth quintile		*	**
Lowest	66	54	54
Second	59	62	62
Middle	62	68	67
Fourth	70	66	67
Highest	71	67	69

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.4
Interpersonal Communication Regarding Malaria

This table presents data regarding participants' reporting of interpersonal communication regarding malaria in the six months prior to data collection. This includes reports of talking about malaria with one's spouse or friends and family members. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

	Urban		Rural		Total	
	Discussed malaria with spouse or partner in previous 6 months (%) (n=439)	Discussed malaria with friend or family member in previous 6 months (%) (n=631)	Discussed malaria with their spouse or partner in previous 6 months (%) (n=1160)	Discussed malaria with a friend or family member in previous 6 months (%) (n=1622)	Discussed malaria with their spouse or partner in previous 6 months (%) (n=1599)	Discussed malaria with a friend or family member in previous 6 months (%) (N=2253)
Sex	**		***	***	***	***
Female	38	35	32	34	33	35
Male	57	47	59	49	59	48
Age	**	***	**	***	**	***
15–19	31	11	24	18	26	17
20–24	27	28	37	27	35	27
25–34	43	40	41	40	41	40
35–44	59	53	49	49	50	49
≥45	63	53	54	50	55	50
Education	*	**	*	**	**	***
None	34	26	42	38	41	37
Primary	42	38	44	39	44	39
Secondary	49	37	47	37	48	37
College/university	33	55	59	55	61	55
Wealth quintile						
Lowest	32	35	43	36	43	36
Second	9	11	42	39	42	38
Middle	46	43	47	40	47	41
Fourth	44	41	54	44	51	43
Highest	54	39	47	49	51	44
Total	48	40	46	40	46	40

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.5
Perceptions Regarding Facility-based Health Workers

This table presents distribution of participants' perceptions of facility-based health workers providing general care, case management, seasonal malaria chemoprevention, and care for malaria in pregnancy. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
Has positive general perceptions towards health workers	89	90	90
*Has positive perceptions towards health workers providing case management**	94	91	91
Has positive perceptions towards health workers providing care for malaria in pregnancy	93	93	93
Favorable perception of facility-based health workers (overall)	97	95	95
Sex		**	*
Female	96	96	96
Male	98	93	94
Age			
15–19	99	96	97
20–24	96	93	94
25–34	97	95	95
35–44	98	95	96
≥45	94	95	95
Education			
None	97	94	94
Primary	98	95	95
Secondary	99	96	97
College/university	93	98	96
Wealth quintile			
Lowest	97	94	94
Second	100	95	95
Middle	98	97	97
Fourth	97	94	95
Highest	96	96	96

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.6
Perceptions Regarding Community Health Workers

This table presents distribution of participants' perceptions of community-based health workers providing general care, case management, seasonal malaria chemoprevention, and care for malaria in pregnancy. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Positive general perceptions towards health workers	78	83	82
Positive perceptions towards health workers providing case management	43	53	53
Positive perceptions towards health workers providing care for malaria in pregnancy	81	85	84
Favorable perception of community health workers			
Sex		***	***
Female	78	85	84
Male	81	77	78
Age			
15–19	83	81	82
20–24	74	82	81
25–34	79	81	81
35–44	81	84	83
≥45	80	82	82
Education			
None	79	81	81
Primary	84	81	82
Secondary	79	82	81
College/university	73	87	83
Wealth quintile			
Lowest	70	80	80
Second	83	81	81
Middle	74	80	79
Fourth	83	85	85
Highest	79	91	85
Total	79	82	82

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.2.7
Gender Norms Related to Malaria

This table presents distribution of participants' perceived gender norms related to malaria based on agreement or disagreement with several statements. Results are presented by participant socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
DISAGREE: *When there are not have enough nets, it is more important that female children sleep under the available nets rather than male children.*	96	94	94
DISAGREE: *When there are not have enough nets, it is more important that male children sleep under the available nets rather than female children.**	99	97	97
AGREE: *A pregnant woman should feel comfortable asking her husband/spouse to go to the health facility for a prenatal consultation.*	90	88	88
DISAGREE: *When there is not enough money, it is more important that male children with fever get medicine rather than female children.**	99	97	97
DISAGREE: *When there is not enough money, it is more important that female children with fever get medicine rather than male children.*	97	96	96
Positive gender norms related to malaria*			
Sex			
Female	99	98	99
Male	100	97	97
Age			
15–19	100	97	98
20–24	98	98	98
25–34	100	97	98
35–44	99	99	99
≥45	100	98	98
Education			
None	99	97	97
Primary	99	97	97
Secondary	100	99	99
College/university	100	99	99
Wealth quintile			
Lowest	100	98	98
Second	100	98	98
Middle	100	98	98
Fourth	100	98	98
Highest	99	98	99
Total	99	98	98

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

A.3 MALARIA CASE MANAGEMENT FOR CHILDREN UNDER FIVE YEARS OLD

This subsection of the Annex provides all data tables related to malaria care-seeking and treatment, particularly for children under five years old. The following tables include data related to care-seeking and treatment behavior, as well as several ideational factors including knowledge, attitudes, perceived response efficacy, perceived self-efficacy, gender norms, and perceived community norms. Some tables also appear in the main body of the report.

Table A.3.1
Knowledge of Malaria Care-seeking and Treatment

This table presents respondent knowledge of malaria care-seeking and treatment according to respondent socio-demographic characteristics, disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
Identified ACT as medicine that can be used to effectively treat malaria	96	97	97
Identified SAME DAY OR NEXT DAY as time period to seek advice or treatment for a child under 5 with a fever	97	96	96
Identified BLOOD TEST as best way to know if someone has malaria.	67	70	69
Identified HEALTH FACILITY as best place to go in the community if one has malaria.*	98	99	99
Comprehensive knowledge of malaria care-seeking and treatment	63	65	64
Sex		*	**
Female	59	62	61
Male	69	69	69
Age	**	**	***
15–19	41	47	46
20–24	53	61	59
25–34	69	66	67
35–44	65	69	68
≥45	69	70	70
Education		*	*
None	56	65	64
Primary	58	60	60
Secondary	63	71	69
College/university	74	71	72
Wealth quintile			
Lowest	47	61	60
Second	52	67	67
Middle	60	67	66
Fourth	66	61	62
Highest	63	69	66

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.2
Attitudes towards Malaria Care-seeking and Treatment

This table presents the distribution of favorable attitudes toward malaria care-seeking and treatment, based on participants' agreement or disagreement with related statements. Data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: *The health provider is always the best person to talk to when you think your child may have malaria.*	98	97	97
DISAGREE: *One does not need to continue taking all the medicine doses against malaria if the patient is already cured.**	79	73	74
DISAGREE: *A parent should ask for an injection from a health provider or community health worker if they think child has malaria.*	69	61	62
DISAGREE: *I prefer that my child receive the medicine to treat malaria by injection rather than swallow it.*	44	47	47
AGREE: *A person should only take malaria medicine if a health provider says that his/her fever really is caused by malaria.*	92	90	90
DISAGREE: *If a health provider says a person does not have malaria, the patient should still ask for a malaria medication just in case.**	81	73	75
DISAGREE: *When my child has a fever, it is better to start by giving him any malaria medicine I have at home.***	80	68	70
AGREE: *It is important to take all the antimalaria pills prescribed to ensure a complete recovery.*	96	95	95
DISAGREE: *When my child has a fever, I do not go directly to the health facility, I first go elsewhere to buy him/her medicine.**	79	70	71
Favorable attitude towards malaria care-seeking and treatment**	93	86	87
Sex			
Female	93	87	88
Male	94	84	86
Age			
15–19	94	88	89
20–24	90	86	87
25–34	92	86	87
35–44	95	85	87
≥45	96	85	86
Education		***	***
None	84	77	77
Primary	93	87	88
Secondary	94	91	92
College/university	96	97	97
Wealth quintile	***		**
Lowest	81	80	80
Second	63	87	87
Middle	96	89	90
Fourth	93	87	89
Highest	94	87	91

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.3
Perceived Response Efficacy of Malaria Testing

This table presents the distribution of perceived response efficacy regarding malaria testing, calculated based on a participant's agreement or disagreement with several statements. Data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: *A blood test for malaria is the only way to know if someone really has malaria or not.*	92	91	91
DISAGREE: *A person should still take malaria medicine even if the malaria test result says that the fever is not due to malaria.*	77	72	73
DISAGREE: *Parents can diagnose malaria by a person's symptoms just as well as a blood test for malaria.*	54	44	45
High perceived response-efficacy of malaria testing	80	75	76
Sex			
Female	78	76	76
Male	82	73	75
Age			
15–19	79	68	69
20–24	83	76	77
25–34	80	76	77
35–44	81	76	77
≥45	69	76	75
Education	*		*
None	65	71	71
Primary	81	74	76
Secondary	83	80	81
College/university	82	78	79
Wealth quintile			
Lowest	75	69	69
Second	56	75	75
Middle	74	79	78
Fourth	83	76	78
Highest	81	81	81

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.4
Perceived Response Efficacy of Malaria Treatment

This table presents the distribution of perceived response efficacy regarding malaria treatment, calculated based on agreement or disagreement with several statements. Data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: *The malaria drugs obtained from the health facility are effective in treating malaria.*	96	94	95
DISAGREE: *The malaria medicines that you buy in the market are as good as the ones distributed at the health facility.*	59	59	59
High perceived response-efficacy of malaria treatment	58	56	57
Sex			
Female	57	56	56
Male	59	57	57
Age			
15–19	97	97	97
20–24	99	98	98
25–34	99	98	99
35–44	98	100	99
≥45	99	99	99
Education		*	*
None	49	50	50
Primary	61	57	57
Secondary	64	61	62
College/university	49	65	60
Wealth quintile			
Lowest	59	56	56
Second	42	59	59
Middle	57	53	54
Fourth	61	55	56
Highest	57	57	57

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.5
Perceived Self-efficacy for Malaria Testing and Treatment

This table presents the distribution of perceived self-efficacy regarding malaria testing, calculated based on agreement with several statements. Data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: I can find the money to take my child to the health facility at the first sign of malaria.	94	91	92
AGREE: I get permission from husband or other family member to take my child with fever to the health facility/health provider.	88	88	88
AGREE: I take my child with fever to the health facility on the same day or next day.	98	97	97
AGREE: I request a blood test at the health facility when I think my child might have malaria.	97	96	96
AGREE: I make sure my child takes the full dose of medicine prescribed for malaria.	99	99	99
AGREE: I can find money to pay for medication the health provider recommends to treat malaria.	96	94	95
Perceived self-efficacy for malaria testing and treatment	99	99	99
Sex			
Female	98	98	98
Male	99	99	99
Age			
15–19	96	98	98
20–24	98	97	97
25–34	100	98	98
35–44	100	99	99
≥45	98	100	100
Education			
None	98	99	99
Primary	98	98	98
Secondary	99	99	99
College/university	98	99	99
Wealth quintile			
Lowest	98	98	98
Second	97	98	98
Middle	100	99	99
Fourth	99	99	99
Highest	98	100	99

Table A.3.6
Gender Norms Related to Malaria Treatment

This table presents the distribution of respondents who perceive equitable gender norms related to malaria treatment, calculated based on agreement or disagreement with several statements. Data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
DISAGREE: *When there is not enough money, it is more important that male children with fever get medicine rather than female children.**	99	97	97
DISAGREE: *When there is not enough money, it is more important that female children with fever get medicine rather than male children.*	97	96	96
Perceive equitable gender norms related to malaria treatment	99	98	99
Sex			
Female	98	99	99
Male	100	98	98
Age			
15–19	96	98	98
20–24	98	97	97
25–34	100	98	98
35–44	100	99	99
≥45	98	100	100
Education			
None	99	98	98
Primary	98	98	98
Secondary	99	99	99
College/university	100	99	99
Wealth quintile			
Lowest	100	99	99
Second	100	98	98
Middle	100	98	98
Fourth	100	97	98
Highest	98	100	99

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.7
Perceived Community Norms Regarding Malaria Testing and Treatment

This table presents the perceived community norms regarding malaria testing and treatment, assessed based on perceptions about community members who promptly take their own children to a health provider. Data are presented according to respondent socio-demographic characteristics.

	Most people in community take their child with fever to a health provider on the same day or day after (%) (N=2253)	Most children with fever in the community are taken to a health facility with fever get tested for malaria (%) (N=2253)	Most people in the community approve of prompt care-seeking for children with fever (%) (N=2253)
Residence			
Urban	73	79	70
Rural	71	79	70
Sex		*	***
Female	70	77	75
Male	74	83	61
Age		*	
15–19	67	72	70
20–24	70	74	70
25–34	73	81	69
35–44	70	81	70
≥45	75	81	70
Education			
None	75	81	67
Primary	69	77	70
Secondary	71	78	70
College/university	72	84	73
Wealth quintile			*
Lowest	66	78	63
Second	69	78	67
Middle	74	80	70
Fourth	75	79	77
Highest	73	82	74
Total	71	79	70

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.8
Perceptions of Health Facilities Regarding Malaria Care-seeking and Treatment

This table describes respondents' perceptions of health facilities, particularly considering malaria care-seeking and treatment, based on agreement with a statement. Results are presented by socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE *Health facilities always have the medication to treat malaria.***	81	71	73
AGREE *Health facilities in this community always have the blood test kit to tell if a person has malaria.*	93	93	93
Favorable perception of health facilities providing malaria care and treatment**	79	69	71
Sex			
Female	79	70	72
Male	78	67	69
Age	*	*	*
15–19	88	78	79
20–24	79	74	75
25–34	75	69	70
35–44	79	67	69
≥45	80	64	66
Education			
None	71	71	71
Primary	80	69	71
Secondary	80	65	69
College/university	79	71	73
Wealth quintile			
Lowest	88	71	71
Second	83	67	68
Middle	85	66	69
Fourth	76	69	71
Highest	77	76	77

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.9
Perceptions of Community Health Workers Providing Malaria Care and Treatment

This table describes respondents' perceptions of community health workers' malaria care and treatment, based on agreement with several statements. Results are presented by socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE *Community health workers always have the medication to treat malaria.*	37	44	43
AGREE *Community health workers in this community always have the blood test kit to tell if a person has malaria.*	41	52	50
AGREE *Community health workers in this community know how to treat malaria in children.*	49	56	55
DISAGREE *Community health workers in your community make parents pay for the medication to treat malaria in children less than five years old.*	70	67	68
DISAGREE *Community health workers in your community make parents of children less than five years old pay for the blood test to see if the child has malaria.*	71	71	71
Has favorable perceptions of community health workers	52	63	61
Sex		**	**
Female	52	66	64
Male	51	58	57
Age			
15–19	61	64	63
20–24	50	64	61
25–34	53	61	59
35–44	52	67	65
≥45	42	58	57
Education			
None	56	63	63
Primary	53	62	61
Secondary	50	63	60
College/university	51	65	61
Wealth quintile			
Lowest	51	61	61
Second	62	61	61
Middle	41	63	60
Fourth	55	65	62
Highest	55	70	62

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.10
Perceptions of Facility Health Workers Providing Malaria Care and Treatment

This table describes respondents' perceptions of facility health workers providing malaria care and treatment, based on agreement with several statements. Results are presented by socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE *Health providers in health facilities in this community treat their patients with respect.*	89	90	90
AGREE *Health providers at the health facilities in this community know about how to treat malaria in children.*	95	95	95
DISAGREE *Health providers at the health facility in your community make parents pay for the medication to treat malaria in children less than five years old.*	76	71	72
DISAGREE *Health facility providers in your community make parents of children less than five years old pay for the blood test to see if the child has malaria.*	69	70	70
Has favorable perceptions of health facility workers providing care and treatment	78	76	76
Sex			
Female	75	78	78
Male	84	73	74
Age			
15–19	86	77	78
20–24	75	73	73
25–34	78	74	75
35–44	80	78	78
≥45	75	77	77
Education		**	**
None	74	69	69
Primary	82	78	78
Secondary	82	78	79
College/university	70	86	81
Wealth quintile			
Lowest	55	75	75
Second	87	77	77
Middle	82	74	75
Fourth	81	75	77
Highest	77	81	79

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.11
Decision-making for Malaria Care and Treatment

This table presents the distribution of decision-making regarding malaria care and treatment. Results are presented by socio-demographic characteristics and disaggregated by type of decision and residence.

	Urban (n=439)			Rural (n=1160)			Total (N=1599)		
	Decision to go to the health facility when child has malaria (%)	**Decision to purchase medicine when child is sick with fever (%)**	**Decision about what to do when respondent is sick (%)**	**Decision to go to the health facility when child has malaria (%)**	**Decision to purchase medicine when child is sick with fever (%)**	**Decision about what to do when respondent is sick (%)**	**Decisions to go to the health facility when child has malaria (%)**	Decision to purchase medicine when child is sick with fever (%)	Decision about what to do when respondent is sick (%)
Sex					*	*		*	**
Female	85	72	72	90	80	71	89	78	71
Male	83	80	83	85	85	79	85	84	80
Age	*	*	**		*			**	
15–19	75	68	64	74	62	71	75	63	70
20–24	75	72	65	83	75	71	81	75	70
25–34	79	69	71	88	82	75	87	79	74
35–44	91	84	87	89	85	75	90	85	77
≥45	94	85	91	86	85	77	87	85	78
Education			*			***			***
None	82	82	77	86	80	72	85	80	72
Primary	84	67	75	88	84	75	87	81	75
Secondary	81	81	72	88	80	69	86	80	69
College/university	90	81	89	91	88	92	91	86	91
Wealth quintile				*		***			***
Lowest	88	66	74	85	86	71	85	85	71
Second	74	86	75	83	76	70	83	76	70
Middle	85	73	73	90	85	73	90	83	73
Fourth	86	83	83	92	84	88	90	84	86
Highest	83	73	77	93	85	85	88	79	80
Total	84	76	78	87	82	75	87	81	75

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.12
Care-seeking and Testing of Children with Fever in Past 2 Weeks

This table presents the distribution of care-seeking and testing behavior for children under age five who presented with fever in the two weeks preceding the survey. Sources included advice or treatment from the public medical sector, private medical sector, or community health worker and excludes advice or treatment from a traditional practitioner, shop, market, or itinerant drug seller. This table also presents the percentage of children for whom advice or treatment was promptly sought, and those who had blood taken for testing. Data are presented according to child socio-demographic characteristics and disaggregated by residence.

	Caregivers of children under age 5 (n=920)	Caregivers of children under age 5 who reported their child had a fever in the 2 weeks preceding the survey (n=297)			
	Reported their child had a fever in 2 weeks preceding the survey (%)	Sought advice or treatment* (%)	Sought advice or treatment the same or next day* (%)	Sought advice or treatment from a health facility or community worker first* (%)	Reported that their child received a malaria test (%)
Residence	*				
Urban	26	72	61	65	57
Rural	35	82	61	64	58
Age in months					*
<12	na	74	53	56	48
12–23	na	93	69	72	67
≥24	na	84	68	70	66
Wealth quintile					
Lowest	37	81	65	54	50
Second	35	84	52	68	62
Middle	34	82	61	61	57
Fourth	30	80	71	74	58
Highest	29	70	61	67	65
Total	33	80	61	64	58

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.3.13
Treatment of Children with Fever

This table presents the percentage of children under five with a fever who received a positive malaria test in the two weeks preceding the survey. This table also describes the percentage of these children who received artemisinin-based combination therapies (ACT) on the same or next day. Data are presented according to child socio-demographic characteristics and disaggregated by residence.

	Caregivers of children under 5 reporting their child received a malaria test (n=175)	**Caregivers of children under 5 reporting confirmation of malaria as cause of child's fever (n=120)**	
	Child had positive malaria test (%)	**Child received ACT (%)**	**Child received ACT promptly (%)**
Residence			
Urban	*64*	*69*	*58*
Rural	*71*	*89*	*77*
Age in months			
<12	*63*	*86*	*74*
12–23	*65*	*65*	*57*
≥24	*76*	*90*	*77*
Wealth quintile			
Lowest	*70*	*81*	*77*
Second	*83*	*89*	*84*
Middle	*57*	*82*	*74*
Fourth	*62*	*90*	*72*
Highest	*77*	*91*	*57*
Total	*70*	*86*	*74*

A.4 MALARIA IN PREGNANCY

This subsection of the Annex provides all data tables related to media consumption and exposure to malaria messages. Some tables also may appear in the main body of the report.

Table A.4.1
Knowledge of Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table shows the results for awareness and specific knowledge of IPTp. Data are presented by residence and disaggregated by participant sex, age, education, and wealth quintile. Participants reported knowledge related to the appropriate time to first seek prenatal care, the number of recommended check-ups during one pregnancy, and the number of times during pregnancy a woman should receive medicine to prevent malaria.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Correctly answers			
When should a pregnant woman go for pregnancy care for the first time?	37	42	41
*How many times should a woman receive check-up during one pregnancy?**	86	80	81
How many times during her pregnancy should a woman receive medicine to keep her from getting malaria?	48	48	48
Has comprehensive knowledge of IPTp	18	20	20
Sex			
Female	21	21	21
Male	14	19	18
Age		*	*
15–19	16	12	13
20–24	20	24	23
25–34	17	23	22
≥35	19	20	20
Education		***	***
None	29	29	29
Primary	21	16	17
Secondary	13	20	18
College/university	13	14	14
Wealth quintile			
Lowest	25	24	24
Second	42	21	21
Middle	18	16	17
Fourth	19	19	19
Highest	16	21	19

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.2
Attitudes towards Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table presents the distribution of favorable or unfavorable attitudes toward IPTp, calculated based on agreement or disagreement with several statements. Data are presented according to respondent and household socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
AGREE: *It is okay for pregnant women to take the medicine to prevent malaria on empty stomach.*	22	28	27
DISAGREE: *Even if a woman thinks she may be pregnant, she should wait a few months before she sees a health provider.***	71	64	65
DISAGREE: *A woman who has given birth before does not need to see a health provider as soon as she thinks she might be pregnant.*	85	82	83
AGREE: *The medications given to pregnant women to prevent them from getting malaria are safe for them and their babies.*	97	95	95
AGREE: *A pregnant woman must take several doses of the medicine to prevent malaria during pregnancy.*	72	76	75
Has favorable attitude towards IPTp	89	86	87
Sex			
Female	87	86	86
Male	93	86	88
Age			
15–19	85	84	85
20–24	90	87	88
25–34	91	88	89
≥35	88	85	86
Education		*	*
None	86	84	84
Primary	90	86	86
Secondary	87	86	86
College/university	91	94	93
Wealth quintile			
Lowest	93	86	86
Second	92	86	86
Middle	84	84	84
Fourth	93	88	89
Highest	88	88	88

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.3
Perceived Severity of Malaria in Pregnancy

This table describes the percentage of respondents who hold perceptions that malaria during pregnancy is severe. Perceived severity is calculated based on the respondents' agreement or disagreement with certain statements. Data are presented according to participant age, sex, and education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
AGREE: *When a pregnant woman gets malaria, the effect on her and her unborn child is very serious.*	95	95	95
AGREE: *Pregnant women are more likely to die from malaria compared to women who are not pregnant.*	82	84	84
Perceive severity of malaria in pregnancy	81	83	82
Sex			
Female	85	81	81
Male	79	85	85
Age	***	***	***
15–19	49	61	59
20–24	84	73	75
25–34	84	83	83
≥35	87	91	90
Education		*	*
None	79	88	87
Primary	83	78	79
Secondary	79	83	82
College/university	83	85	85
Wealth quintile			
Lowest	78	83	83
Second	62	81	81
Middle	84	82	82
Fourth	79	82	81
Highest	83	85	84

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.4
Perceived Response Efficacy of Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table presents the distribution of perceived response-efficacy regarding IPTp. Perceived response-efficacy is calculated based on a participant's agreement or disagreement to several statements related to IPTp. The data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: Consulting health facility providers during pregnancy is a way to make sure the baby and mother are healthy	99	97	98
AGREE: The medicine given to pregnant women to prevent malaria works well to keep the mother health.	97	96	96
AGREE: Pregnant women should still take the medicine that is meant to keep them from getting malaria even if they sleep under nets every night.	95	93	93
Perceive response-efficacy of IPTp	99	98	98
Sex			
Female	99	98	98
Male	99	97	97
Age			
15–19	99	96	96
20–24	98	98	97
25–34	99	98	98
≥35	99	98	98
Education			
None	98	98	96
Primary	99	97	97
Secondary	100	98	97
College/university	99	97	98
Wealth quintile			
Lowest	100	97	97
Second	100	98	98
Middle	100	97	97
Fourth	99	98	98
Highest	99	97	98

Table A.4.5
Perceived Self-efficacy for Intermittent Presumptive Treatment in Pregnancy (IPTp) Among Women

This table presents the distribution of perceived self-efficacy regarding IPTp, specifically among women. Perceived self-efficacy is calculated based on a participant's agreement or disagreement to several statements related to IPTp care-seeking and treatment. The data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
AGREE: I can go for antenatal care as soon as I think I might be pregnant	94	93	93
*AGREE: I can convince my spouse to accompany me spouse/partner to the health facility for antenatal care**	92	88	89
AGREE: I go to at least eight antenatal care appointments at the health facility	89	87	88
AGREE: I go for antenatal care even if my religious leader does not agree	96	96	96
AGREE: I take the medicine to prevent malaria at least three times during pregnancy	95	96	95
AGREE: I can request the medicine that helps to prevent malaria when I go for antenatal care	93	93	93
Women with perceived self-efficacy for IPTp	96	96	96
Age			
15–19	95	96	96
20–24	96	97	96
25–34	95	96	96
≥35	96	96	96
Education			
None	98	94	95
Primary	95	97	96
Secondary	97	98	98
College/university	93	96	95
Wealth quintile		*	**
Lowest	88	93	93
Second	96	97	97
Middle	98	96	97
Fourth	98	99	99
Highest	94	97	95

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.6
Perceived Self-efficacy for Intermittent Presumptive Treatment in Pregnancy (IPTp) Among Men

This table presents the distribution of perceived self-efficacy regarding IPTp, specifically among men. Perceived self-efficacy is calculated based on a participant's agreement or disagreement to several statements related to IPTp. The data are presented according to respondent socio-demographic characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
*AGREE: I can support my spouse/partner to go for antenatal care as soon as she thinks she might be pregnant.**	100	97	97
AGREE: I accompany my spouse to the health facility for antenatal care.	97	93	94
AGREE: I support my spouse/partner to go for at least four antenatal care appointments at the health facility during pregnancy.	97	93	94
AGREE: I support my spouse/partner to go for antenatal care even if my religious leader does not agree.	99	96	96
AGREE: I support my spouse/partner to take the medicine to prevent malaria at least three times during pregnancy.	98	96	97
AGREE: I support my spouse/partner to request the medicine that helps to prevent malaria when she goes for antenatal care.	98	96	97
Men with perceived self-efficacy for IPTp*	100	96	97
Age			
15–19	95	96	96
20–24	96	97	96
25–34	95	96	96
≥35	96	96	96
Education			
None	100	96	96
Primary	100	97	98
Secondary	98	94	95
College/university	100	98	99
Wealth quintile			
Lowest	100	94	94
Second	100	97	97
Middle	98	95	96
Fourth	100	98	99
Highest	100	100	100

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.7
Perceived Community Norms Regarding Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table presents the perceived community norms regarding IPTp. Perceived community norms were assessed based on participants' responses to a series of questions asking about the proportion of women in their community who 1) go to antenatal care at least four times when pregnant; and 2) take medicine to prevent malaria when they are pregnant. Participants also reported whether they believe others in the community approve of women taking these actions. The data are presented according to respondent socio-demographic characteristics.

	Most women in their community go to antenatal care at least four times when they are pregnant (%) (N=2253)	**Most women in your community take medicine to prevent malaria when they are pregnant (%) (N=2253)**	**Most people in your community approve of pregnant women taking the medicine to prevent malaria (%) N=2253)**
Residence			
Urban	78	75	78
Rural	76	75	76
Sex	*		
Female	74	74	77
Male	80	76	75
Age		*	*
15–19	72	69	70
20–24	73	72	73
25–34	77	79	76
≥35	78	75	79
Education			
None	77	76	75
Primary	74	73	77
Secondary	80	76	76
College/university	77	77	76
Wealth quintile			*
Lowest	72	74	70
Second	80	78	72
Middle	75	71	80
Fourth	79	78	80
Highest	77	71	81
Total	76	75	76

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.8
Perceived Gender Norms Regarding Malaria in Pregnancy

This table presents the distribution of equitable gender norms regarding antenatal care. Equitable gender norms were calculated based on a participant's reported perceptions. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: A pregnant woman should feel comfortable asking her husband/spouse to go to the health facility for a prenatal consultation.	90	88	88
Sex	**	*	**
Female	86	86	86
Male	97	91	92
Age		*	**
15–19	90	82	83
20–24	91	88	89
25–34	95	87	88
≥35	94	90	91
Education			
None	86	89	89
Primary	92	87	87
Secondary	91	87	88
College/university	90	94	93
Wealth quintile	*		
Lowest	82	89	88
Second	77	87	86
Middle	91	86	87
Fourth	95	92	93
Highest	88	90	89
Total	90	88	88

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.9
Perceptions of Community-based Health Workers Providing Malaria Care in Pregnancy

This table summarizes the percept of women who hold favorable perceptions of community health workers regarding malaria in pregnancy, based on respondents' agreement with several statements. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: Community providers at the health facility make pregnant women pay for sulfadoxine pyrimethamine (e.g., Fansidar, Maloxine), the medicine to prevent malaria.	75	74	74
AGREE: Prenatal health providers in this community generally treat pregnant women with respect.	82	83	83
Women with favorable perceptions of community health workers	95	96	96
Sex			
Female	94	96	96
Male	95	95	95
Age	**	**	**
15–19	97	90	91
20–24	88	98	95
25–34	96	96	96
≥35	96	97	97
Education			
None	97	96	96
Primary	95	95	95
Secondary	95	95	95
College/university	92	99	97
Wealth quintile			
Lowest	100	97	97
Second	98	94	94
Middle	96	95	96
Fourth	96	96	96
Highest	93	99	96

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.10
Perceptions of Facility-based Health Workers Regarding Malaria in Pregnancy

This table summarizes the percentage of respondents with favorable perceptions of facility health workers providing malaria care in pregnancy, based on respondents' agreement or disagreement with several statements. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=631)	**Rural (%) (n=1622)**	**Total (%) (N=2253)**
AGREE: *Health providers at the health facility in this community always offer the medicine to prevent malaria to pregnant women.*	86	84	85
DISAGREE: *Health providers at the health facilities in this community always give pregnant women the medicine the medication to prevent malaria only if she's eaten beforehand.*	30	34	33
DISAGREE: *If a woman goes to the health facility during the first two months of her pregnancy, the health providers will send her away.*	93	90	90
DISAGREE: *If a pregnant woman goes to the health facility without her husband/partner, the health providers will send her away.*	95	91	92
Favorable perceptions of facility health workers	90	87	88
Sex			
Female	89	87	88
Male	90	87	87
Age			
15–19	88	86	86
20–24	87	83	84
25–34	91	87	88
≥35	90	89	89
Education		**	**
None	91	84	85
Primary	87	86	86
Secondary	93	90	91
College/university	88	95	93
Wealth quintile			
Lowest	94	85	85
Second	97	89	89
Middle	94	88	89
Fourth	85	88	87
Highest	90	86	88

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.11
Decision-making Regarding Antenatal Care

This table summarizes the distribution of respondents involved in decision-making concerning antenatal care. Results are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=439)	Rural (%) (n=1160)	Total (%) (N=1599)
Sex	***	***	***
Female	91	92	92
Male	66	67	67
Age		**	**
15–19	92	79	82
20–24	86	91	90
25–34	77	84	82
≥35	77	75	75
Education			
None	81	79	79
Primary	75	81	80
Secondary	83	76	78
College/university	76	78	77
Wealth quintile			
Lowest	77	78	78
Second	84	77	77
Middle	70	79	78
Fourth	80	82	81
Highest	80	90	85
Total	78	80	79

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.12
Interpersonal Communication Regarding Antenatal Care

This table describes interpersonal communication regarding antenatal care by residence. Specifically, this table summarizes the distribution of respondents who reported discussing ANC with their spouse/ partner. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=439)	Rural (%) (n=1160)	Total (%) (N=1599)
Sex		*	
Female	20	13	14
Male	18	18	18
Age	*	***	***
15–19	28	38	36
20–24	32	42	40
25–34	24	20	21
≥35	10	8	8
Education			
None	14	16	15
Primary	23	16	17
Secondary	20	19	19
College/university	16	12	13
Wealth quintile			
Lowest	22	16	16
Second	27	21	21
Middle	27	12	14
Fourth	21	13	15
Highest			
Total	19	16	16

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.13
Intention to Use Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table describes women's intention to use IPTp. This data only refers to women and the partners of women who reported that they intend to have children/more children. The table presents the distribution of those who intend to use IPTp in their next pregnancy. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Urban (%) (n=76)	Rural (%) (n=216)	Total (%) (N=292)
Age	*		
15–19	100	100	100
20–24	92	97	97
25–34	99	98	99
≥35	49	100	95
Education			
None	83	100	99
Primary	99	97	97
Secondary	97	100	99
College/university	91	96	94
Wealth quintile			
Lowest	100	95	95
Second	50	100	99
Middle	92	100	98
Fourth	100	97	98
Highest	97	100	98
Total	94	98	98

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.14
Antenatal Care Attendance

This table describes antenatal care attendance among women. All respondents for this table were women with a live birth in the past two years. Data presented includes the percentage of women who reported attending at least one ANC visit, attending at least four ANC visits, attending at least one ANC while accompanied by their spouse, and attending at least one ANC visit and receiving an ITN. Data are presented according to participant sex, age group, education, and wealth quintile and disaggregated by residence.

	Attending at least one antenatal visit (%) (n=514)	Attending at least four antenatal visits (%) (n=514)	Attending at least eight antenatal visits (%) (n=514)	Attending at least one antenatal visit accompanied by their spouse (%) (n=509)	Attending at least one antenatal visit and receiving an ITN (%) (n=509)
Residence				*	
Urban	99	82	12	35	86
Rural	99	82	13	25	89
Age					*
15–19	99	82	14	15	19
20–24	97	82	13	22	34
25–34	100	83	13	24	28
35–44	100	82	12	19	16
Education			*	***	
None	100	79	13	14	88
Primary	97	81	15	28	88
Secondary	99	83	4	34	90
College/university	100	93	20	42	91
Wealth quintile					
Lowest	96	79	10	27	91
Second	100	82	10	25	86
Middle	99	84	15	19	88
Fourth	100	89	18	36	90
Highest	99	78	13	31	90
Total	99	82	13	27	89

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.15
Use of Intermittent Preventive Treatment (IPTp) by Women During Pregnancy

This table summarizes IPTp use during pregnancy among women who have given birth in the two years preceding the survey. Only data of women are presented in this table. Data are presented by residence, participant age group, education, household wealth quintile, and the number of antenatal carevisits they attended during last pregnancy.

	Received 1 or more doses of sulfadoxine pyrimethamine (%) (n=514)	Received 2 or more doses of sulfadoxine pyrimethamine (%) (n=514)	Received 3 or more doses of sulfadoxine pyrimeth-amine (%) (n=514)
Residence		*	*
Urban	83	53	37
Rural	88	69	50
Age			
15–19	87	66	45
20–24	86	67	48
25–34	89	62	45
≥35	86	74	56
Education			
None	88	59	45
Primary	87	67	47
Secondary	84	69	48
College/university	90	74	44
Wealth quintile			
Lowest	89	71	51
Second	89	68	47
Middle	86	60	44
Fourth	89	63	46
Highest	83	66	49
# antenatal care visits	***	***	**
None	23	14	14
1–3	74	47	30
4–7	91	71	52
≥8	90	70	52
Total	87	66	48

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.4.16
Source of Intermittent Presumptive Treatment in Pregnancy (IPTp)

This table describes the common sources of IPTp among women who have given birth in the two years prior to the study. This table also specifies the percentage of women who received one or more doses of IPTp by socio-demographic characteristics. Data are presented by residence, age group, education, and household wealth quintile.

	Received 1 or more doses of sulfadoxine pyrimethamine (%) (n=514)	Sources of sulfadoxine pyrimethamine among those who received at least one dose (n=459)		
		Antenatal care (%)	Non antenatal visit at facility (%)	Pharmacy (%)
Residence				
Urban	83	92	17	3
Rural	88	98	14	4
Age				
15–19	87	100	15	3
20–24	86	96	19	5
25–34	89	97	11	3
≥35	86	97	14	2
Education				
None	88	98	13	5
Primary	87	96	18	3
Secondary	84	98	11	5
College/university	90	94	12	0
Wealth quintile				
Lowest	89	97	17	4
Second	89	98	10	1
Middle	86	98	15	6
Fourth	89	97	16	5
Highest	83	96	15	2
Total	87	97	14	4

A.5 INSECTICIDE-TREATED NET USE

This subsection of the Annex provides all data tables related to ITN use. This includes data related to respondent knowledge of malaria prevention using ITNs; attitudes toward ITNs in general; attitudes toward ITN care and repair; perceived response efficacy and perceived self-efficacy of ITNs; respondents' perceived community norms and gender norms regarding ITNs; household possession, access, and use of ITNs; ITN characteristics; ITN care and repurposing behavior; and sleep patterns, including seasonality of outdoor sleeping. The following tables or and figures also may appear in the main body of the report.

Table A.5.1
Knowledge of Malaria Prevention Using Mosquito Nets

This table presents distribution of participants' knowledge of malaria prevention using ITNs. Results are presented by participant characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Sex			
Female	95	96	95
Male	92	94	93
Age			*
15–19	96	94	94
20–24	98	95	95
25–34	96	94	94
35–44	96	96	96
≥45	87	90	90
Education			
None	93	94	93
Primary	94	97	95
Secondary	94	93	94
College/university	96	97	96
Wealth quintile		*	
Lowest	92	93	92
Second	93	97	94
Middle	94	90	94
Fourth	96	96	96
Highest	97	97	97
Total	94	95	94

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.2
Favorable Attitudes Towards Insecticide-Treated Nets (ITNs)

This table presents distribution of respondents' attitudes toward mosquito net use. This table specifies favorable attitudes toward ITN use based on agreement or disagreement with specific statements. Results are presented by participant characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: *It is easier to get a good night's sleep when I sleep under a mosquito net.*	97	97	97
DISAGREE: *It is not easy to sleep under a net because every night you have to unfold it and cover the sleeping space.**	70	62	64
DISAGREE: *I do not like sleeping under a mosquito net when the weather is too warm.*	71	71	71
DISAGREE: *Sleeping under a net is an inconvenience for a couple that wants to make children.*	82	84	83
DISAGREE: *The smell of the insecticide makes it uncomfortable for me to sleep under a mosquito net.*	61	59	59
AGREE: *Mosquito nets are generally easy to use for sleeping.*	97	95	96
AGREE: *Insecticide-treated nets does not pose a risk to one's health.*	79	80	80
AGREE: *Mosquito nets are very useful.***	99	97	98
DISAGREE: *More expensive mosquito nets are more effective than cheaper or free mosquito nets.*	77	68	69
Favorable attitude towards ITNs			
Sex			
Female	94	93	93
Male	95	91	91
Age			
15–19	90	93	93
20–24	95	86	88
25–34	94	93	93
35–44	96	92	93
≥45	98	93	93
Education		*	**
None	90	88	88
Primary	94	93	93
Secondary	95	94	94
College/university	98	94	95
Wealth quintile		*	*
Lowest	91	88	88
Second	81	93	93
Fourth	96	93	94
Highest	94	95	94
Total	95	92	92

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.3
Favorable Attitudes Towards Insecticide-Treated Net (ITN) Care and Repair

This table presents distribution of participants' attitudes toward ITN care and repair based on agreement or disagreement with specific statements. Results are presented by participant characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: *There are actions I can take to help my mosquito net last longer.**	89	93	92
AGREE: *I can protect my family against malaria by taking care of my mosquito net.*	98	97	97
AGREE: *Other people in this community take care of their mosquito nets.*	86	84	84
AGREE: *It is worth taking time to care for your mosquito net*	95	94	94
AGREE: *I am confident I can prevent children from playing with the net.*	95	94	95
AGREE: *An old net can still protect against malaria if it is well cared for.*	86	83	84
DISAGREE: *I am confident that I can fold or tie up the nets in my home every day after using them.**	96	92	93
Favorable attitude towards ITNs			
Sex		*	
Female	98	98	98
Male	100	96	97
Age			
15–19	99	97	97
20–24	98	95	96
25–34	99	98	98
35–44	99	97	98
≥45	100	98	98
Education			*
None	97	97	97
Primary	100	97	97
Secondary	99	99	99
College/university	100	99	99
Wealth quintile			
Lowest	97	96	96
Second	100	98	98
Middle	100	97	97
Fourth	100	99	99
Highest	98	97	98
Total	99	97	98

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.4
Perceived Response Efficacy of Insecticide-Treated Nets (ITNs)

This table summarizes respondents' perceived response efficacy of ITNs based on their agreement or disagreement with certain statements. Results are presented by participant characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
DISAGREE: *Mosquito nets only prevent mosquito bites when used on a bed.*	72	67	68
DISAGREE: *My chances of getting malaria are the same whether or not I sleep under a mosquito net.*	73	67	68
AGREE: *Sleeping under a mosquito net every night is the best way to avoid getting malaria.*	98	96	96
Perceived response efficacy of ITNs			
Sex			
Female	82	86	83
Male	86	89	86
Age			
15–19	87	79	80
20–24	85	79	81
25–34	86	84	84
35–44	88	85	86
≥45	92	87	87
Education	**	*	***
None	78	77	78
Primary	85	83	85
Secondary	87	90	88
College/university	88	95	90
Wealth quintile		*	
Lowest	83	75	83
Second	82	51	81
Middle	84	88	84
Fourth	85	88	86
Highest	88	88	88
Total	84	87	84

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.5
Perceived Self-efficacy to Use Insecticide-Treated Nets (ITNs)

This table describes respondents' perceived self-efficacy to use ITNs based on their response to a series of questions asking whether they feel they could or could not take certain actions. Results are presented by participant characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
AGREE: I can sleep under a mosquito net for the entire night when there are lots of mosquitoes.	99	99	99
AGREE: I can sleep under a mosquito net for the entire night when there are few mosquitoes.	98	96	96
AGREE: I can Sleep under a mosquito net every night of the year.	92	92	92
AGREE: All of my children can sleep under a mosquito net every night of the year.	97	95	96
Perceived self-efficacy to use ITNs			
Sex			
Female	94	96	95
Male	95	97	96
Age			
15–19	94	93	93
20–24	95	93	94
25–34	97	94	95
35–44	97	96	96
≥45	97	96	97
Education			*
None	93	92	93
Primary	95	96	95
Secondary	96	97	96
College/university	98	97	98
Wealth quintile			
Lowest	94	92	94
Second	94	83	94
Middle	95	97	95
Fourth	96	98	97
Highest	98	96	97
Total	95	96	95

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.6
Perceived Community Norms Regarding Insecticide-Treated Nets (ITNs)

This table describes respondents' perceived community norms regarding ITNs, assessed based on responses to questions about perceptions of community members who use nets every night. Results are presented by participant characteristics and disaggregated by residence.

	Urban (n=631)		Rural (n=1622)		Total (N=2253)	
	At least half of the community members who have nets use them nightly (%)	**At least half of community members approve of using a net every night (%)**	**At least half of community members who have nets use them nightly (%)**	**At least half of community members approve of using a net every night (%)**	**At least half of community members who have nets use them nightly (%)**	At least half of community members approve of using a net every night **(%)**
Sex			*		*	
Female	80	77	75	76	76	76
Male	85	82	80	72	81	74
Age	**				*	
15–19	69	70	73	73	72	73
20–24	70	68	72	72	71	71
25–34	83	81	77	73	78	75
35–44	89	84	79	75	81	77
≥45	91	85	80	77	81	78
Education	**					
None	87	75	75	72	76	72
Primary	88	86	79	75	80	76
Secondary	74	73	79	77	78	76
College/university	79	78	73	75	75	76
Wealth quintile						
Lowest	76	80	76	72	76	72
Second	81	63	76	71	76	71
Middle	85	81	76	77	77	78
Fourth	82	79	82	76	82	77
Highest	82	79	77	83	80	81
Total	82	79	77	74	78	75

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.7
Perceived Gender Norms Regarding Insecticide-Treated Nets (ITNs)

This table presents participants' perceived gender norms related to ITN use. One's reported gender norms are based on their agreement or disagreement several statements. Results are presented by participant characteristics and disaggregated by residence.

When there are not enough nets…	Urban (n=631)		Rural (n=1622)		Total (N=2253)	
	It is more important that female children sleep under the available nets rather than male children. (%)	**It is more important that male children sleep under the available nets rather than female children. (%)**	**It is more important that female children sleep under the available nets rather than male children. (%)**	**It is more important that male children sleep under the available nets rather than female children. (%)**	**It is more important that female children sleep under the available nets rather than male children. (%)**	It is more important that male children sleep under the available nets rather than female children. **(%)**
Sex		*		*		
Female	94	98	94	98	94	98
Male	98	100	93	96	94	96
Age	*				*	
15–19	96	100	90	95	91	96
20–24	93	97	93	98	93	97
25–34	97	100	94	97	95	98
35–44	98	99	96	97	96	98
≥45	91	100	92	97	92	97
Education			*		**	
None	93	99	91	96	92	96
Primary	96	98	93	97	94	97
Secondary	96	100	96	98	96	98
College/university	97	100	98	99	98	99
Wealth quintile	***					
Lowest	93	100	93	98	93	98
Second	67	100	93	98	93	98
Middle	99	100	94	95	95	96
Fourth	96	99	96	97	96	97
Highest	96	99	96	98	96	98
Total	96	99	94	97	94	97

Note: Asterisks signify significant differences in distributions between urban and rural residence, based upon results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.8
Household Possession of Mosquito Nets

This table summarizes household possession of mosquito nets (treated or untreated). The data table specifies the percentage of households with at least one insecticide-treated net (i.e., a factory-treated net that does not require any further treatment) and at least one insecticide-treated net for every two persons in the household the previous night. Results are presented by residence and household wealth quintile.

	Household has at least one net (%)	**Household has at least one** insecticide-treated net (%)	**Household has at least one net for every two persons who stayed in the household last night** (%)
Residence		***	
Urban	96	85	71
Rural	97	95	68
Wealth quintile		***	***
Lowest	96	96	60
Second	96	94	66
Middle	99	97	71
Fourth	96	90	67
Highest	98	86	80
Total	97	93	68

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.9
Access to an Insecticide-Treated Net (ITN)

This table describes the percentage of de facto population in each zone with access to an ITN in the household if each ITN in the household were used by up to two people. This percentage is interpreted as an indicator of access. Results are presented according to household characteristics and disaggregated by residence.

	Urban (%) (n=1935)	**Rural** (%) (n=5638)	**Total** (%) (N=7573)	**Number**
Wealth quintile				
Lowest	95	89	89	1577
Second	88	87	87	1616
Middle	81	95	93	1606
Fourth	80	86	85	1348
Highest	81	89	84	1426
Total*	81	89	88	7573

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.10
Use of Mosquito Nets by Persons in the Household

This table describes the percentage of de facto population in each zone who slept under an ITN in the household the night before the survey. Results are presented according to participant characteristics and disaggregated by residence.

	Urban (%) (n=1819)	Rural (%) (n=5314)	Total (%) (N=7133)	Number
Sex		*	*	
Female	67	74	73	3911
Male	66	71	71	3222
Age	**	***	***	
0–4	74	79	78	1136
5–14	68	67	68	2093
15–24	57	64	63	1484
≥25	67	81	79	2420
Wealth quintile				
Lowest	83	69	69	1498
Second	83	73	73	1517
Middle	70	77	76	1518
Fourth	69	73	72	1277
Highest	62	75	68	1323
Number of ITNs in household	***	***	***	
<1 net per 2 people	13	18	17	917
≥1 net per 2 people	79	80	80	6216
Total	67	73	72	7133

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.11
Insecticide-Treated Net (ITN) Use-to-access Ratio

This table describes the ITN use:access ratio in each zone, according to household characteristics, disaggregated by residence.

	Female			Male			Total		
	Urban (%) (n=865)	Rural (%) (n=2538)	Total (%) (n=3403)	Urban (%) (n=652)	Rural (%) (n=2161)	Total (%) (n=2813)	Urban (%) (n=1517)	Rural (%) (n=4699)	Total (%) (N=6216)
Age		***	***	**	***	***	***	***	***
0–4	81.9	87.2	86.4	86.0	83.5	84.0	84.0	85.3	85.0
5–14	79.3	76.7	77.1	80.0	74.5	75.2	79.6	75.6	76.2
15–24	72.2	73.9	73.6	66.5	66.6	66.6	70.4	71.0	70.9
≥25	80.0	86.9	85.8	81.7	85.8	85.1	80.7	86.4	85.5
Wealth									
Lowest	90.9	77.4	77.8	79.4	73.9	74.0	85.7	75.7	76.0
Second	97.5	81.7	82.0	88.9	80.6	80.7	93.6	81.2	81.4
Middle	74.3	82.2	81.1	88.8	77.8	79.0	80.0	80.2	80.2
Fourth	80.7	81.3	81.2	80.2	81.5	81.2	80.5	81.4	81.2
Highest	77.1	87.0	81.7	76.1	81.0	78.8	76.7	83.9	80.3
Total	**78.4**	**81.1**	**80.6**	**79.9**	**78.3**	**78.5**	**79.1**	**79.8**	**79.7**

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.12
Use of Existing Insecticide-Treated Nets (ITNs)

This table illustrates the percentage of ITNs that were used the previous night, and those that were used every night in the week prior to the survey, according to household wealth. Results disaggregated by residence.

	Urban (n=974)		Rural (n=2937)		Total (N=3911)	
	ITN used previous night (%)	ITN used every night of previous week (%)	ITN used previous night (%)	ITN used every night of previous week (%)	ITN used previous night (%)	ITN used every night of previous week (%)
Wealth quintile				*		
Lowest	69	69	63	60	63	60
Second	54	46	67	65	67	64
Middle	67	65	70	68	70	68
Fourth	71	71	70	69	70	70
Highest	64	64	74	73	69	69

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.13
Consistent Use of Nets

This table illustrates the percentage of respondents in households with at least one net who reported using a net every night. Results are presented by sex, age, and household wealth quintile and disaggregated by residence.

Factor	Urban (%) (n=609)	Rural (%) (n=1564)	Total (%) (N=2173)
Sex	*	*	*
Female	88	84	85
Male	95	89	90
Age	***	***	***
15–19	74	70	70
20–24	87	85	85
25–34	93	89	90
35–44	94	88	89
≥45	97	90	90
Wealth quintile			*
Lowest	93	84	84
Second	96	83	83
Middle	90	87	88
Fourth	93	92	92
Highest	89	87	88
Total	91	86	87

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.14
Net Characteristics

This table presents the percentage of nets with specific characteristics. Results disaggregated by residence.

	Urban (%) (n=1126)	Rural (%) (n=3070)	Total (%) (N=4196)
Net is insecticide treated	85	95	93
Net obtained for free	82	95	92
Source of net			
Distribution campaign	62	74	72
Prenatal consultation	7	9	9
Child welfare visit	2	2	2
Other	29	15	17
Net age is ≥3 years	6	5	5
Color			
White	43	44	44
Blue	49	51	51
Green	1	1	1
Other	7	3	4

Table A.5.15
Insecticide-Treated Net (ITN) Care and Repurposing

This table describes ITN care and repurposing practices, according to care and repurposing characteristics. Results disaggregated by residence.

	Urban (%) (n=974)	**Rural (%) (n=2937)**	**Total (%) (N=3911)**
ITN washed at least once	59	53	54
Product used to wash ITN			
Bar soap	42	52	51
Detergent	40	31	32
Bleach	0	0	0
Mix	18	16	16
Nothing (water only)	0	1	1
Where ITN was dried*			
In shade	50	66	64
In sun	50	33	36
Location of ITN			
Suspended at sleeping place	31	33	33
Suspended, folded, and tied	29	28	28
Not suspended but not stowed	3	6	5
Unpacked but stowed	9	8	8
Still stowed under packaging	24	23	23
Other	4	2	2
Practiced net care behavior	39	43	42
Repurposed nets**	23	35	33

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.16
Sleep Pattern and Outdoor Sleeping the Previous Night

This table presents the sleep patterns and outdoor sleeping behavior of respondents, according to respondent and household background characteristics.

	Time respondents went to sleep	Time respondents woke up	Proportion of respondents who slept outdoors the previous night
Residence	*	***	
Urban	20:46	6:38	1
Rural	21:13	6:10	1
Sex		*	*
Female	21:04	6:06	1
Male	21:15	6:38	3
Age		***	
15–24	21:04	6:22	1
25–34	21:02	6:56	2
35–44	21:09	5:56	1
≥45	21:22	5:38	2
Wealth quintile	***	***	
Lowest	21:13	6:13	2
Second	21:17	6:8	1
Middle	21:11	6:7	1
Fourth	21:13	6:19	1
Highest	20:41	6:29	1

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.5.17
Seasonality in Outdoor Sleeping

This table presents the proportion of respondents who reported sleeping outdoors. Results are presented by month and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
January	2	1	1
February	2	1	2
March	2	2	2
April	4	3	3
May	3	1	2
June	1	1	1
July	1	1	1
August	1	1	1
September	1	1	1
October	2	1	1
November	2	1	1
December	4	3	3

A.6 INDOOR RESIDUAL SPRAYING (IRS)

This subsection of the Annex provides all data tables related to indoor residual spraying. The section includes data related to respondent knowledge and awareness of IRS; attitudes toward IRS; perceived response efficacy and perceived self-efficacy of IRS; respondents' willingness to accept IRS in their community; and IRS coverage. The following tables and figures also may appear in the main body of the report. These tables include additional information for Home Bay and Migori counties, which are primary investment areas for IRS.

Table A.6.1
Knowledge of Indoor Residual Spraying (IRS)

This table presents the distribution of awareness of IRS programs by study zone. Data are presented by respondent sex, age group, education, and household wealth quintile, and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Sex	*		*
Female	33	38	37
Male	44	42	42
Age			
15–19	33	33	33
20–24	36	39	38
25–34	41	36	37
35–44	34	42	41
≥45	35	44	43
Education	*		
None	22	42	40
Primary	41	37	38
Secondary	42	36	37
College/university	34	45	42
Wealth quintile			
Lowest	32	35	35
Second	32	39	39
Middle	41	37	38
Fourth	38	42	41
Highest	36	52	43
IRS Intervention area	**	***	***
No	29	26	27
Yes (Homa Bay and Migori counties)	72	86	84
Total	37	39	39

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.6.2
Attitudes Towards Indoor Residual Spraying (IRS)

This table presents the distribution of favorable attitudes toward IRS. Attitude favorability is calculated based on a participant's agreement or disagreement to several statements related to IRS. The data are presented according to respondent characteristics and disaggregated by residence.

	Urban (%) (n=251)	Rural (%) (n=677)	Total (%) (N=928)
DISAGREE: *Many people develop skin problems (rashes, itching) after the walls inside their houses are sprayed with insecticide.*	55	63	62
AGREE: *After spraying the interior walls of a household with insecticide, a person can touch the walls safely once the spray has dried.*	71	67	68
DISAGREE: *People have problems with bugs/bed bugs after the walls are sprayed.*	82	75	76
AGREE: *The benefits of having my house sprayed is worth the effort needed to move my belongings out so it can be sprayed.**	93	85	86
DISAGREE: *It bothers me to leave my possessions outside of my house while my walls are being sprayed.*	56	60	60
AGREE: *Spraying the inside walls of a house to kill mosquitoes does not cause any health problems for the people living in the house.*	74	79	78
Positive attitudes towards IRS	76	76	76
Sex	*		
Female	68	75	74
Male	85	76	77
Age			
15–19	73	73	73
20–24	69	68	68
25–34	79	70	72
35–44	82	81	82
≥45	58	80	78
Education			
None	84	75	75
Primary	79	75	76
Secondary	74	72	73
College/university	70	83	80
Wealth quintile			
Lowest	100	75	76
Second	45	76	75
Middle	77	75	76
Fourth	77	75	75
Highest	74	78	76
IRS intervention area	*		*
No	80	79	79
Yes (Homa Bay and Migori counties)	69	72	71

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.6.3
Perceived Response Efficacy of Indoor Residual Spraying (IRS)

This table presents the distribution of perceived response-efficacy of IRS. Perceived response-efficacy is calculated based on a participant's agreement or disagreement to several statements related to IRS. The data are presented according to respondent characteristics and disaggregated by residence.

	Urban (%) (n=251)	**Rural (%) (n=677)**	**Total (%) (N=928)**
AGREE: Spraying the inside walls of a house is an effective way to prevent malaria.	91	93	93
AGREE: People who live in houses that have been sprayed are less likely to get malaria.	81	85	84
Perceive IRS efficacy	77	82	81
Sex			
Female	73	80	79
Male	82	84	84
Age			
15–19	73	74	74
20–24	80	70	72
25–34	76	84	82
35–44	79	86	85
≥45	78	85	84
Education			
None	60	77	76
Primary	78	83	82
Secondary	78	82	81
College/university	83	89	88
Wealth quintile			
Lowest	79	75	75
Second	78	80	80
Middle	72	87	85
Fourth	72	86	83
Highest	83	85	84
IRS Intervention area			
No	77	84	83
Yes (Homa Bay and Migori counties)	79	79	79

Table A.6.4
Perceived Self-efficacy Regarding Indoor Residual Spraying (IRS)

This table presents the distribution of perceived self-efficacy regarding IRS. Perceived self-efficacy is calculated based on a participant's report that they could or could not do several actions related to IRS. The data are presented according to respondent characteristics and disaggregated by residence.

	Urban (%) (n=251)	**Rural (%) (n=677)**	**Total (%) (N=928)**
*AGREE: I can move all my furniture out of my house to prepare the house for spraying.**	83	90	89
AGREE: I can sleep in my house on the night it is sprayed.	92	94	94
Perceived self-efficacy regarding IRS*	80	88	87
Sex		*	*
Female	74	85	84
Male	87	92	91
Age			
15–19	75	86	85
20–24	77	85	83
25–34	82	85	84
35–44	79	93	91
≥45	86	89	89
Education	*		
None	60	88	87
Primary	92	89	89
Secondary	73	88	84
College/university	78	86	84
Wealth quintile			
Lowest	100	90	90
Second	94	89	90
Middle	76	90	88
Fourth	87	82	84
Highest	76	86	82
IRS Intervention area	*		*
No	76	87	85
Yes (Homa Bay and Migori counties)	88	89	89

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.6.5
Willingness to Accept Indoor Residual Spraying (IRS)

This table summarizes individuals' willingness to accept IRS in their home. Results are presented according to respondent characteristics and disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Sex			
Female	93	95	94
Male	95	93	94
Age			
15–19	91	93	93
20–24	93	93	93
25–34	94	93	93
35–44	94	95	95
≥45	98	97	97
Education			
None	93	93	93
Primary	94	95	95
Secondary	93	95	94
College/university	94	94	94
Wealth quintile			
Lowest	100	94	94
Second	98	94	94
Middle	99	96	97
Fourth	93	94	93
Highest	92	92	92
IRS Intervention area	***	*	***
No	96	95	96
Yes (Homa Bay and Migori counties)	87	88	87
Total	94	94	94

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.6.6
Indoor Residual Spraying (IRS) Coverage

This table summarizes household IRS coverage in each study zone among households that were approached for IRS services. Data are presented by household wealth quintile and disaggregated by residence.

	Urban (%) (n=36)	**Rural (%) (n=211)**	**Total (%) (N=247)**
Wealth quintile			
Lowest	N/A	84	84
Second	N/A	76	76
Middle	46	85	81
Fourth	51	76	71
Highest	40	66	62
IRS Intervention area			
No**	76	46	55
Yes (Homa Bay and Migori counties)***	42	80	78
Total**	**47**	**79**	**77**

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

A.7 MEDIA CONSUMPTION AND MESSAGE EXPOSURE

This subsection of the Annex provides all data tables related to media consumption and exposure to malaria messages. The following tables also may appear in the main body of the report. The data are presented according to respondent characteristics including residence, sex, age, education, and household wealth quintile.

Table A.7.1
Variables Related to Media Consumption

This table summarizes key variables related to media consumption: radio listenership, TV viewership, mobile phone ownership, and exposure to malaria messages. The data presented in this table are presented by socio-demographic characteristics.

	Listens to radio at least once a week (%)	Watches TV at least once a week (%)	Mobile phone owner-ship (%)	Completed campaign slogan (%)	Saw or heard malaria message in past 6 months (%)	Identified campaign logo (%)
Residence	*	***	***			
Urban	77	80	91	9	56	9
Rural	85	58	79	6	53	11
Sex	***	**	***		***	**
Female	78	59	75	6	47	13
Male	92	66	90	7	63	7
Age	**		***		***	
15–19	77	66	38	5	39	14
20–24	79	65	80	6	45	12
25–34	83	62	88	6	52	9
35–44	88	60	86	7	60	11
≥45	85	59	90	6	61	8
Education	**	***	***	**	***	
None	81	52	73	3	47	13
Primary	87	59	78	6	52	11
Secondary	85	72	90	8	56	7
College/university	74	79	96	11	67	8
Wealth quintile		***	***	*	*	
Lowest	83	28	70	4	49	8
Second	87	58	77	5	53	12
Middle	85	71	84	7	49	11
Fourth	84	70	85	9	58	11
Highest	78	95	93	9	61	9
Total	84	62	81	6	53	10

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.7.2
Radio Listenership at Least Once a Week

This table describes the distribution of radio listenership. It includes data from all respondents as well as respondents in households that own a radio. The data presented in this table are presented by socio-demographic characteristics and disaggregated by residence.

	All urban respondents (%) (n=631)	Urban respondents in households with a radio (%) (n=473)	All rural respondents (%) (n=1622)	Rural respondents in households with a radio (%) (n=1117)	All respondents (%) (N=2253)	Respondents in households with a radio (%) (n=1650)
Sex	*	*	***	*	***	**
Female	71	78	80	91	78	89
Male	85	91	93	96	92	95
Age			*		**	**
15–19	69	70	79	87	77	84
20–24	70	79	81	92	79	89
25–34	74	83	86	94	83	92
35–44	85	89	88	96	88	95
≥45	84	88	85	92	85	92
Education	*	*	**	**	**	***
None	84	91	81	92	81	92
Primary	81	88	88	96	87	95
Secondary	78	85	88	92	85	90
College/university	62	68	79	86	74	81
Wealth quintile				*		***
Lowest	92	100	82	97	83	97
Second	85	100	87	94	87	94
Middle	74	79	87	93	85	91
Fourth	87	96	84	92	84	93
Highest	71	78	85	87	78	82
Total	77	83	85	93	84	91

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.7.3
Preferred Time to Listen to Radio

This table summarizes respondents' preferred time to listen to the radio, by socio-demographic characteristics.

	Don't know (%)	Early morning (4am-8am) (%)	Late morning (8am-12pm) (%)	After-noon (12pm-4pm) (%)	Early evening (4pm-8pm) (%)	Late evening (8pm-12am) (%)	Night (12am-4am) (%)	All day (%)
Residence								
Urban	0	23	16	8	15	30	1	8
Rural	0	19	14	8	21	31	0	7
Sex* **								
Female	0	18	18	11	19	27	0	7
Male	0	22	9	6	21	35	1	7
Age* **								
15–19	0	14	24	14	23	20	0	5
20–24	0	11	25	13	20	25	1	6
25–34	0	20	14	8	21	32	0	5
35–44	0	25	9	7	16	33	1	8
≥45	0	22	7	5	21	34	1	11
Education*								
None	0	18	13	9	20	29	1	10
Primary	0	20	13	9	18	32	1	7
Secondary	0	20	15	10	22	27	0	6
College/ university	1	26	15	2	21	32	0	3
Wealth quintile								
Lowest	0	13	10	10	23	34	1	9
Second	0	20	13	9	19	31	0	7
Middle	0	21	15	8	20	29	0	7
Fourth	0	22	15	6	20	31	1	6
Highest	1	27	18	8	15	25	1	5
Total	0	20	14	8	20	30	1	7

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.7.4
Television Viewership at Least Once a Week

This table describes the distribution of television listenership. It includes data from all respondents as well as respondents in households that own a television. The data presented in this table are presented by socio-demographic characteristics and disaggregated by residence.

	All urban respondents (%) (n=631)	Urban respondents in households with television (%) (n=456)	All rural respondents (%) (n=1622)	Rural respondents in households with television (%) (n=712)	All respondents (%) (N=2253)	Respondents in households with television (%) (n=1168)
Sex			**	*	**	
Female	79	94	55	91	59	92
Male	82	94	63	97	66	96
Age						
15–19	86	91	63	92	66	92
20–24	78	96	62	91	65	92
25–34	81	97	57	94	62	95
35–44	79	90	57	94	60	93
≥45	81	91	56	93	59	93
Education	*		***		***	
None	68	88	50	93	52	92
Primary	75	94	56	92	59	92
Secondary	86	96	66	95	72	95
College/university	90	94	74	95	79	95
Wealth quintile	***		***	*	***	*
Lowest	55		28	na	28	na
Second	23	100	58	89	58	89
Middle	70	91	71	95	71	94
Fourth	70	91	70	93	70	93
Highest	94	95	97	98	95	96
Total	80	94	58	93	62	93

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.7.5
Preferred Time to Watch Television

This table summarizes respondents' preferred time to watch television. The data presented in this table are presented by socio-demographic characteristics.

	Don't know (%)	Early morning (4am-8am) (%)	Late morning (8am-12pm) (%)	Afternoon (12pm-4pm) (%)	Early evening (4pm-8pm) (%)	Late evening (8pm-12am) (%)	Night (12am-4am) (%)	All day (%)
Residence**								
Urban	0	2	6	6	22	57	1	6
Rural	0	2	6	8	28	55	0	2
Sex***								
Female	0	2	6	10	28	50	0	4
Male	0	2	5	4	24	63	1	1
Age**								
15–19	0	2	11	14	28	41	0	5
20–24	0	3	7	14	29	42	1	5
25–34	0	2	6	7	26	58	0	3
35–44	0	1	4	5	23	65	1	2
≥45	0	2	4	5	30	57	0	2
Education								
None	0	1	7	8	26	56	1	2
Primary	0	3	7	9	29	50	1	2
Secondary	0	2	4	8	26	55	0	5
College/ university	0	1	4	5	21	67	0	2
Wealth quin-tile**								
Lowest	0	1	9	14	41	34	0	2
Second	0	2	4	9	30	54	0	2
Middle	0	3	6	6	32	51	0	3
Fourth	0	2	5	7	19	66	1	1
Highest	0	1	6	7	18	62	1	5
Total	0	2	6	8	26	55	0	3

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

-Table A.7.6
Mobile Phone or Tablet Ownership

This table describes the distribution of ownership of mobile phones or tablets by respondent socio-demographic characteristics, including participant sex, age group, education, and household wealth quintile. The presented data disaggregated by residence.

	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)
Sex		***	***
Female	89	72	75
Male	94	89	90
Age	***	***	***
15–19	54	35	38
20–24	95	76	80
25–34	97	86	88
35–44	92	84	86
≥45	97	90	90
Education	*	***	***
None	81	72	73
Primary	89	76	78
Secondary	95	89	90
College/university	96	97	96
Wealth quintile		***	***
Lowest	87	70	70
Second	62	77	77
Middle	91	83	84
Fourth	92	83	85
Highest	92	94	93
Total	91	79	81

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001

Table A.7.7
Exposure to Malaria Messages

This table describes the percentage of respondents exposed to malaria messages, specifically through an assessment of correct completion of the slogan "Zero malaria starts with me" or "*Ziro malaria inaaza na mimi*" in Kiswahili, reportedly seeing or hearing any messages about malaria in the past six months, or correctly identifying the most recent communication campaign logo. This table presents exposure rates by participant socio-demographic characteristics, including participant sex, age group, education, and household wealth quintile. Data disaggregated by residence.

	Completed campaign slogan			Saw or heard message about malaria in past 6 months			Identified most recent campaign logo		
	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)	Urban (%) (n=631)	Rural (%) (n=1622)	Total (%) (N=2253)	Urban (%) (n=631)	Rural (%) (=1622)	Total (%) (N=2253)
Sex					***			*	
Female	8	5	6	52	46	47	10	13	13
Male	10	6	7	64	63	63	6	7	7
Age				**	***	***		*	
15–19	2	5	5	41	39	39	12	15	14
20–24	7	6	6	44	45	45	6	14	12
25–34	11	5	6	63	49	52	8	10	9
35–44	7	7	7	56	60	60	9	11	11
≥45	12	5	6	68	61	61	10	7	8
Education	*		**		**	***			
None	1	3	3	54	46	47	17	12	13
Primary	6	6	6	54	52	52	7	12	11
Secondary	12	7	8	61	55	56	9	7	7
College/ university	14	10	11	58	72	67	5	9	8
Wealth quintile			*		*	*			
Lowest	7	4	4	34	50	49	4	8	8
Second	0	5	5	41	53	53	14	12	12
Middle	10	6	7	60	47	49	10	12	11
Fourth	9	9	9	56	59	58	7	13	11
Highest	8	10	9	58	65	61	9	9	9
Total	9	6	6	56	53	53	9	11	10

Note: Asterisks signify significant differences in distributions between urban and rural residence, based on results from design-based tests of association using survey-weighted data. *p<.05; **p<.01; ***p<.001.

ANNEX B: REPORT AUTHORS

1. Carol Underwood ..... Johns Hopkins University
2. Zoe Hendrickson ..... Johns Hopkins University
3. Joe Millward ..... Johns Hopkins University
4. Anna McCartney-Melstad ..... Johns Hopkins University
5. Grace Miheso ..... Breakthrough ACTION Kenya
6. Ziporah Mugwang'a ..... Breakthrough ACTION Kenya
7. Jeremia Ochieng ..... Breakthrough ACTION Kenya
8. James Andati ..... Breakthrough ACTION Kenya
9. Mary Goretti Oginga ..... Breakthrough ACTION Kenya
10. Ahmeddin Omar ..... Division of National Malaria Program
11. Elvis Oyugi ..... Division of National Malaria Program
12. Jacinta Opondo ..... Division of National Malaria Program
13. Phirez Ongeri ..... Division of National Malaria Program
14. Christine Mbuli ..... Division of National Malaria Program
15. Charles Chege ..... Division of National Malaria Program
16. Lenson Kariuki ..... Division of National Malaria Program
17. James Sang ..... Division of National Malaria Program
18. Regina Kandie ..... Division of National Malaria Program
19. Edwin Metto ..... Kenya National Bureau of Statistics
20. Elias Nyaga ..... Kenya National Bureau of Statistics
21. Faustina Sakari ..... Kakamega County
22. Lilyana Dayo ..... Kisumu County
23. Edwin Onyango ..... Busia County
24. Moses Wambusi ..... Bungoma County
25. Hellen Agisa ..... Vihiga County
26. Collins Omollo ..... Migori County
27. Philip Mbom ..... Homa Bay County
28. Eunice Oreri ..... Siaya County
29. Daniel Wacira ..... U.S. President's Malaria Initiative
30. Mildred Shieshia ..... U.S. President's Malaria Initiative
31. Jane Githuku ..... U.S. President's Malaria Initiative Measure Malaria Project
32. Francesca Nzuve ..... U.S. President's Malaria Initiative Impact Malaria Project
33. Catherine Onyango ..... U.S. President's Malaria Initiative Kinga Malaria Project
34. Ruth Wanjala ..... PATH
35. Jenny Njuki ..... Malaria No More UK
36. Sammy Makau ..... WACI International
37. James Mwangi ..... Afya Ugavi

PMI | U.S. PRESIDENT'S MALARIA INITIATIVE

LED BY

USAID FROM THE AMERICAN PEOPLE

CDC

KNBS KENYA NATIONAL BUREAU OF STATISTICS *Keeping you informed*

NATIONAL MALARIA CONTROL PROGRAMME MINISTRY OF HEALTH KENYA

Breakthrough ACTION FOR SOCIAL & BEHAVIOR CHANGE