

# Survey on the Determinants of Malaria- Related Behaviors in Côte d'Ivoire

## Malaria Behavior Survey Report

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## Acronyms

ANC	Antenatal Care
CCP	Center for Communication Programs
CNER	Comité National d'Éthique et de Recherche
IPTp	Intermittent Preventive Treatment of Malaria in pregnancy
LLIN	Long Lasting Insecticidal Net
MICS	Multiple Indicator Cluster Survey
NIS	National Institute of Statistics
NMCP	National Malaria Control Program
NSP	National Strategic Plan
PMI	President's Malaria Initiative
SBC	Social and Behavior Change
SDG	Sustainable Development Goal
USAID	United States Agency for International Development

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# Preface

Every year in Côte d'Ivoire, a significant proportion of children and women are infected with the malaria parasite. Since 1996, the fight against malaria has been one of the priorities defined in the various National Health Development Plans in the country. And after more than twenty years of efforts to combat malaria, we are beginning to see significant improvements. It is against this background that I laud the collaboration between the Ministry of Health and Public Hygiene through the National Malaria Control Program and its partners that has made the design and implementation of the Malaria Behavioral Determinants Survey possible.

The data will allow us to better understand the scale of the epidemic, and to develop adequate guidelines and strategies for malaria control. Findings from this survey will provide a better understanding of the socio-demographic and psychosocial characteristics associated with malaria-related behaviors in Côte d'Ivoire.

The implementation of this survey was a collaborative effort of Breakthrough ACTION, the NMCP, United States Agency for International Development through the United States President's Initiative for the fight against malaria, national experts from various ministries and stakeholders involved in the fight against malaria.

The Malaria Behaviors Determinants Survey provides an opportunity to obtain reliable national and regional data on the status of malaria in Côte d'Ivoire. As such, the findings will allow us to determine the appropriate focus of programmatic activities designed to influence relevant psychosocial factors associated with malaria and to improve behaviors. I would like to advocate an effective exploitation of the data to all actors and partners involved in the fight against malaria for in order to translate the national strategy and the relevant recommendations into action.

I take this opportunity to reiterate the government's thanks to the development partners who have made a decisive contribution to the realization of this important survey. In particular, I express my gratitude to United States Government through USAID and PMI.

I congratulate Breakthrough ACTION, PMI, my NMCP team, national experts, including the NMCP Scientific Support Group, and all the researchers whose dedication and expertise have made this survey possible. I would like to thank the administrative, political, traditional and religious authorities, the civil society organizations and the residents of the study communities for their contribution and support.

Finally, I would like to call for a general mobilization of all relevant actors so that together we meet the challenges for achieving the Sustainable Development Goals (SDGs).

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## Summary

Breakthrough ACTION collected relevant information from 5,969 households, 6,749 women and 1,930 men. The data collected are representative at national, regional as well as urban and rural levels. By highlighting the ideational variables that influence the adoption of malaria-related behaviors and services, the survey provides results that inform the design, implementation and evaluation of communication for social change and behavior (CCSC) for decision makers and implementing partners. The recommendations that flow from these data are presented in this section.

### **Differences between zonal areas with regards to the characteristics of households and respondents**

The data collected show significant differences across zonal areas in housing characteristics and the physical assets owned by households. In particular, Abidjan differs from others in terms of proximity to public health facilities, proximity to private health facilities, and possession of assets such as radio, televisions and mobile phones. In general, household wealth and education levels are higher in Abidjan than in other areas. The level of education is lowest in the North.

### **Media exposure**

The radio is not popular as a source of information among respondents: less than one third of households have a radio. Less than half of the respondents whose household owns a radio station listen to it at least once a week. Men are more likely to listen to the radio regularly than women. Television has much wider reach except among the poorest households and in rural areas.

More than half of the men or women who listen to the radio regularly do so either at the beginning or end of the morning. Men are more likely than women to listen to the radio early in the morning. Older respondents are more likely than their younger counterparts to listen to the radio early in the morning. For television, women are more likely to listen early in the evening and men are more likely to do so late in the evening. The proportion of people watching late-night television shows increases significantly with age.

Just over one-third (37.6%) of respondents heard a message about malaria in the media and other sources over the past 12 months. Exposure was higher among men than women, and in urban areas. Moreover, exposure increases with age, education, and household wealth quintile.

### **Cross-sectional ideational determinants**

More than three-quarters of respondents know that fever is a symptom of malaria, while the vast majority know that the disease is transmitted through mosquito bites. Knowledge is lower among the poorest and uneducated.

Many men and women believe that people in their communities only get malaria during the rainy season. Malaria is not generally perceived as a severe disease, particularly in the North and Central regions.

Interpersonal communication about malaria is not widespread; less than a quarter of women talked about malaria with their husbands or with others in the last six months. Interpersonal communication about malaria was less common among women than among men. A survey in Liberia found a similar result (HC3, 2014).

While health service providers are generally perceived to treat their patients with respect, many men and women believe that people seeking treatment for fever in their community health center are not well managed. This perception may be due to several factors and shows a need for greater attention in the healthcare services offered patients.

### **Ownership and Use of LLIN - Behavioral determinants**

Generally speaking, knowledge on use of mosquito nets as a means of preventing malaria is very high. On the other hand, many men and women are not convinced of the effectiveness of mosquito nets to prevent malaria; perceived effectiveness of mosquito nets is less common in Abidjan than in other zonal areas.

Attitudes towards the use of mosquito nets are generally positive. Relatively few men and women associate a white mosquito net with a shroud or would prefer not to sleep under a mosquito net if the only available color was white. Preference is largely for blue or green mosquito nets though color doesn't matter for about one third of the respondents.

About two-thirds of respondents perceive that the use of mosquito nets is the norm in their communities though this is lower in Abidjan. Most know that there are steps to be taken to maintain their nets, however, a large proportion believe that it is not possible to fix the holes in mosquito nets and don't think they can fix their nets on time. In addition, only about a quarter of respondents perceive that net repair is the norm in their community.

### **Ownership and Use of ITN - Practices and Behaviors**

Less than three-quarters of households have at least one net. Household mosquito nets are mostly ITNs obtained, in most cases, from a mass distribution campaign or antenatal care visit. There is still a significant level of inadequate coverage of ITNs. Half of the population in households with a net has at least one net for two members. This shortfall is more evident in Abidjan than in other zonal areas.

A little over a quarter of the mosquito nets available in households have been washed at least once and were usually washed with mild soap and water as recommended. However, in more than half of the cases, mosquito nets have been dried in the sun, although it is recommended that they be dried in the shade.

Overall, three-quarters of the nets available in households were used to sleep under on the night before the survey, though, in Abidjan, only half of the available nets were used. Only 57.8% of persons living in households with at least one net slept under it the night before the survey. Among households with at least one net for two, just over two thirds slept under a net the night before the survey. Of the men and women surveyed and whose household owns at least one net, only two thirds sleep under one net every night. Even among those surveyed with a sufficient number of nets, 71.8% use a net every night. These results imply that the problem of the non-use of nets in Côte d'Ivoire is not solely due to the lack of nets in households.

The following ideational variables are positively associated with the use of nets every night: perceived self-efficacy, positive attitudes towards the use of nets, interpersonal communication, and the perception of the use of ITNs as the norm in the community. Lack of knowledge of the cause of malaria is negatively associated with the probability of using a net every night. Exposure to messages on malaria, the number of nets in the household and the presence of a child under the age of five in the household were positively associated with net use. Perceived vulnerability, educational attainment, household size, economic well-being and residence in a dwelling structure with a complete and watertight ceiling reduced the probability of net use.

### **Treatment of fever in children - ideational determinants**

Attitudes were generally supportive of prompt and appropriate treatment of fever and the perceived level of self-efficacy for actions related to the treatment of fever generally high. However, there are still doubts on the relevance of malaria diagnostic tests, especially outside Abidjan. Moreover, nearly one-third of respondents do not consider the timely and appropriate treatment of fever to be the norm in their community.

The majority of respondents appreciate the competence of health workers in relation to the treatment of children suffering from malaria though think that health workers charge parents for antimalarial drugs in health centers.

Just over one-fifth of women with at least one child under the age of five in their household reported that a young child in their household had a fever within two weeks prior to the survey. The prevalence of fever does not vary according to socio-demographic characteristics. About three quarters of the children with fever were brought for treatment within 24 hours. However, treatment was not always sought from a primary health care facility. Indeed, less than two thirds of the children who had fever were brought to a health care facility within 24 hours.

Several ideational variables were positively associated with seeking treatment for fever within 24 hours and in a primary health care facility including the perception that immediate care-seeking for the treatment of fever in children is the norm, the perception that antimalarial drugs are still available in health centers in their community, favorable attitudes toward immediate care seeking, and the perception that health workers have the skills to properly treat malaria in children. Moreover, this behavior is more prevalent in wealthy households.

Less than two-thirds of the children with fever who were brought to a health facility were tested for malaria. The prevalence of diagnostic testing is lower in Abidjan than in the North or Central regions. Overall, the majority (83.8%) of the cases of fever detected were reportedly positive for malaria. However, the area of Abidjan differs from other areas with a low level (63.1%) of cases of confirmed malaria fever. Less than half of all confirmed malaria cases received ACT treatment.

### **ANC/IPTp**

There is a good level of knowledge on the number of ANC visits a pregnant woman should make from the first consultation. However, the number of doses of SP that a pregnant woman must



receive is not well known. Indeed, less than a quarter (22.6%) of respondents know that a pregnant woman should receive three doses of SP during pregnancy.

The severity of malaria during pregnancy is well understood by respondents though attitudes are not always supportive of ANC. The majority of respondents do not believe that a woman can take a dose of SP on an empty stomach and a significant proportion believe that a woman who suspects she is pregnant must wait a few months before going for ANC. Perceived effectiveness of SP is almost universal and the majority of respondents demonstrate a high level of perceived self-efficacy. Receiving at least four ANC visits is generally seen as the norm, but the perception that receiving at least three doses of SP as the norm is not widespread.

About three quarters of women who had a child in the last two years received at least four ANC visits with the prevalence higher in Abidjan than in other zonal areas. Urban and more educated women are better placed to receive at least four ANC visits. The decision to visit the health center for ANC is not always made in conjunction with the spouse. Only one third of women who had at least one child said that the decision was jointly made with their spouse and a third of women reported that their husbands accompanied them to the health center for ANC.

Many (47.0%) women do not receive the three doses of SP during pregnancy. The prevalence of SP is higher in Abidjan than in other areas. This indicator is highly dependent on the number of ANC visits and economic well-being. While the health facility remains the most important source of supply for SP, it should be noted that one quarter of women received their doses in a pharmacy with women in Abidjan more likely to obtain their doses in a pharmacy.

## **IRS**

The level of awareness of IRS is quite low. Only one tenth of the respondents heard about this program prior to the survey, however, the majority of respondents supported the idea of having the program in their homes. Concerns reported related to the belief that IRS can cause skin problems for people living in a sprayed house, or that the insecticide used to spray houses can bring out bugs. There was also the concern of leaving one's possessions outside while the house is sprayed. Despite these concerns, the majority of people believe in the effectiveness of the program. However, the need to take out one's belongings to allow agents to spray your house can be a significant deterrent to many people.

# 1 Introduction

Malaria remains a major cause of mortality and morbidity in Côte d'Ivoire. Malaria is the main cause of consultations in the country's health facilities: about 43% of consultations in health facilities are attributable to malaria (Ministry of Health and Public Hygiene, 2016). The disease causes a high proportion of absenteeism at work and in school (Houngbedji, Prisca et al. 2015; Ministry of Health and Public Hygiene, 2016). The percentage of absenteeism due to malaria has been estimated at 40% in schools and 42% in professional settings (Ministry of Health and Public Hygiene, 2016). Malaria is endemic throughout Côte d'Ivoire with transmission throughout the year, culminating in the long rainy season. The beginning and end of the rainy season vary by region; however, rains occur mainly between March and August, with a second rainy season between September and November (Kouassi et al, 2018). The total population, estimated at 23,844,228 in 2016 (WHO, 2017) is at risk of malaria, while children under five and pregnant women are the most vulnerable. Indeed, the incidence of malaria in 2015 was estimated at 155.4 per 1,000 at the national level, but at 291.7 per 1,000 among children under five (Ministry of Health and Public Hygiene, 2016). The risk is also higher in less wealthy households and in rural areas (Houngbedji, Prisca et al. 2015). While incidence steadily declined between 2010 and 2016, this trend reversed between 2016 and 2017 (WHO, 2018). With an estimated number of malaria-related deaths of 9,579 in 2017, Cote d'Ivoire contributes about 2.2% of the global number of malaria-related deaths.

The government of Côte d'Ivoire is committed to reducing the malaria burden, as stated in the 2016-2020 National Malaria Control Strategic Plan (NSP) (Ministry of Health and Public Hygiene, 2016). According to the plan, the objectives of the country's efforts are to reduce the incidence of malaria by at least 40% as compared to 2015 and to reduce malaria mortality by 40% in 2020. The strategic plan elaborates on several measures to achieve these objectives, including:

- i. Universal access to long-lasting insecticide-treated nets (LLINs) in terms of coverage and use;
- ii. Universal access to intermittent preventive treatment (IPT) for pregnant women and improved utilization;
- iii. Introduction of indoor residual spraying (IRS) and larval control programs (LCP) as additional preventive measures;
- iv. Achievement of universal coverage for the correct management of cases (systematic confirmation and treatment by Artemisinin-based Combination Therapies - ACT) in all public and private health facilities;
- v. Strengthening of community-based integrated management of childhood illnesses (malaria, diarrhea, ARI);
- vi. Strengthening of the monitoring and evaluation system including monitoring of therapeutic effectiveness and monitoring resistance to ACTs;
- vii. Strengthening of pharmacovigilance;
- viii. Capacity-building for the management and coordination of the program and malaria control actors at the operational level;
- ix. Enhancing supply chain efficiency; and

- x. Strengthening the Community system. (Ministry of Public Health and Hygiene, 2016, p. 30)

It is increasingly clear that social and behavioral change (SBC) can be an effective approach to increasing the prevalence of many positive health behaviors, including those related to malaria prevention and treatment. To be effective, messages must target specific perceptions and beliefs that influence the decisions of individuals related to these behaviors. With regards to malaria, there is a lack of quantitative research to help programs prioritize their messages. Data from quantitative research allow interviewers to isolate the independent effect of specific ideational or psychosocial variables (such as knowledge, perceived effectiveness, self-efficacy, attitudes, perceived risk) on behaviors or to show how different ideational determinants influence behaviors. These data also provide information on the relative prevalence of these determinants in the total population or among specific subgroups.

With funding from the United States Agency for International Development (USAID) and the President's Malaria Initiative (PMI), the Breakthrough ACTION project, managed by the Johns Hopkins Center for Communication Programs (CCP), collaborated with the National Malaria Control Program (NMCP) and other Ivorian governmental and non-governmental organizations to design and implement a survey on the determinants of malaria-related behaviors from a representative sample of households in Côte d'Ivoire. The survey provides a better understanding of the determinants of malaria-related behaviors and provides data used to conceive the activities of malaria control programs. This report describes the relevant results of the survey.

## 2 Methodology

### Purpose and Objectives of the Study

The purpose of this study is twofold: (1) To have a better understanding of the socio-demographic and ideational characteristics associated with malaria-related behaviors in Côte d'Ivoire and (2) To determine the appropriate orientation of programmatic activities to improve behaviors and influence the behavioral factors related to malaria. The study's specific objectives were to:

- Identify relevant factors related to the use, maintenance and repair of LLINs;
- Identify relevant factors related to the adoption of IPT during pregnancy;
- Highlight relevant factors associated with the rapid and appropriate treatment of malaria in children;
- Evaluate factors related to the acceptance of indoor residual spraying;
- Understand the reasons why people do not adopt appropriate malaria prevention and treatment behaviors; and,
- Identify key SBC strategies to promote appropriate malaria prevention and treatment behaviors in Côte d'Ivoire.

## Survey Design

This study used a cross-sectional survey with a random sample of women and men using structured questionnaires. Respondents were selected through a multi-step random process that produced a representative sample at the zonal level (district group). The main geopolitical subdivision in Côte d'Ivoire is the administrative district. The country is divided into 14 administrative districts. The 14 administrative districts are divided into 31 administrative regions and two autonomous districts surrounding the cities of Abidjan and Yamoussoukro (Figure 2.1).

Figure 2.1: Cote d'Ivoire and its administrative regions



It should be noted that for the purposes of management by the Ministry of Health, the country is divided into 20 regions and 86 health districts.

For the purposes of determining the appropriate sample size for this study, the research team initially grouped the regions into three geographic zonal areas as shown in Table 2.1: North, Central, and South. However, as indicated by the data in Table 2.1, the population of the South zone represents more than half of the population of Côte d'Ivoire. In addition, the population of the Autonomous District of Abidjan is estimated at 5,196,093 inhabitants, or 37.2% of the total population of the South Zone. The research team therefore decided to separate the district of Abidjan from the South zone for the purpose of calculating the required sample size. Thus, the country was divided into four areas for purposes of this study (Figure 2.2). The four zones are different in terms of women's literacy, net use and prevalence of fever in children (Table 2.1).

Figure 2.2: Survey zones



TABLE 2.1: CHARACTERISTICS OF GEOGRAPHICAL AREAS

Area	Region	Population in 2018 <sup>1</sup>	% of women with formal education <sup>2</sup>	% of household members who slept under LLIN <sup>3</sup>	% of children below 5 having a fever <sup>3</sup>
North	Folon, Kabadougou, Bafing, Worodougou, Poro, Bere, Tchologo, Hambol, Bounkani, Bagoué, Gontougo	5,648,865	30.0	66.4	23.7
Central	Tonkpi, Haut Sassandra, Marahoué, Yamousoukro District, Gbéké, N'Zi, Iffou, Bélier, Guémon, Moronou District	5,408,733	43.3	73.3	25.5
South/ Forest	Cavally, San Pedro, Nawa, Gbôklé, Gôh, Lôh-Djiboua, Grand Ponts, Abidjan District, Agnéby-Tiassa, Mé, Sud Comoé, Indémie-Djuablin	13,967,309	53.8	57.2	28.5
		25,024,907	46.8	62.7	26.7

<sup>1</sup>Projection based on 2014 population census figures; available on: <http://www.ins.ci/n/RESULTATS%20GLOBAUX.pdf>; <sup>2</sup> Source: DHS 2011/2012; <sup>3</sup> Source: MICS 2016 – Secondary analysis by Stella Babalola

## Sampling

### Sample size and justification

The research team estimated the sample size needed to measure each of the relevant malaria outcomes, including the use of nets, the incidence of fever in children under 5 years of age and the prevalence of positive attitudes towards nets. Since there is no recent publicly available estimate for these indicators (the most recent DHS was in 2011 and the raw data from MICS 2016 are not publicly available to allow the calculation of indicators for each of our four areas), the study assumes that the prevalence of each of these indicators is 50%; this level of prevalence will provide maximum variability and more than a sufficient sample size. The following formula shall be used to estimate the sample size required:

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

Where:

“n” is the required sample of individuals (e.g. women);

“Z” is the Z value for the desired confidence level. In analyzes, Z = 1.96 corresponding to a 95% confidence level;

“d” represents the cluster effect due to the deviation from the simple random sampling (assuming that this result is 3.0 based on the secondary analysis of the DHS 2011/2012);

“p” is the estimated (expected) performance indicator. For example, the proportion of women of childbearing age who slept under ITN the night before the survey, or the proportion of children under five who had a fever within the last two weeks. For each result, the required sample size assumes that p = 0.5 (for maximum variability);

δ represents the desired margin of error; the study sample assumes that δ = 5%;

R<sub>h</sub> is the response rate for households. The study sample assumes 90% for this parameter;

R<sub>i</sub> is the response rate for women in selected households. We assume 96% for this parameter.

The results are presented in Table 2.2. Given the sample size required for each outcome, the study targeted 6,000 households. This sample size takes into account the potential non-response at household and individual levels and will allow for the effective measurement of key malaria-related behavioral and perception indicators.

**TABLE 2.2: TOTAL SAMPLE SIZE REQUIRED, BY OUTCOME AND ZONE**

Indicator	Area
-----------	------

	North	Central	South	Abidjan	All
% of women of childbearing age sleeping under ITN	1465	1509	1908	1051	5933
% of children (<5 years) who have had fever within the last two weeks	883	1166	1290	1021	4360
Percentage of women of childbearing age with a positive attitude towards the systematic use of ITN	1209	1282	1311	604	4406

## Population

The survey targeted men and women of reproductive age (15-49 years for women and 18-59 years for men). The study participants were selected from a sample of urban and rural households for each area.

### *Inclusion and exclusion criteria*

The inclusion criteria for the selection of the sample include:

- Those 15 to 49 years of age for women and 18 to 59 years of age for men;
- Be a usual resident of the selected household; and,
- Have the ability to communicate in French or in the predominant language of the study region.

Eligible men and women with the following characteristics were excluded from the study:

- Inability to consent to participate in the study; and,
- Inability to understand questions and/or answer intelligently.

## Recruitment process

Participants in the study were selected through a multi-step process involving the successive and random selection of clusters, households and individuals. The study team obtained a complete list of clusters (Enumeration Areas, EAs) in Côte d'Ivoire from the National Institute of Statistics (NIS). This list served as a sampling frame for the selection of the sample. Each area was divided into two strata: urban and rural. In each stratum, a number of EAs were selected with a probability proportional to their sizes. A total of 300 clusters were selected for inclusion in the study: 74 in the North, 76 in the Central zone, 97 in the South and 53 in the Abidjan zone (Table 2.3). The study team also obtained sketch maps of selected clusters from the National Institute of Statistics (NIS). Upon entry into a given EA and obtaining the necessary permissions from community leaders, the study team updated the EA map, adding new structures while removing those that no longer existed. The study team then conducted an enumeration of all households in the EA using a household listing form that includes the cluster number, the building number, the household head's nickname, the address of the household or the location

description, the number of women aged 15 to 49 and the number of men aged 18 to 59 in the household.

TABLE 2.3: DISTRIBUTION OF THE TARGET SAMPLE BY AREA				
Area	Clusters	Households	Women	Men
North	74	1,482	1,778	494
Central	76	1,526	1,831	509
Forest/Coastal (excluding Abidjan)	97	1,929	2,315	643
Abidjan	53	1,063	1,276	354
<b>Total</b>	<b>300</b>	<b>6,000</b>	<b>7,200</b>	<b>2,000</b>

Once household listing was completed, the study team selected 20 households from the list using a systematic sampling approach with a sampling interval proportional to the total number of households in the cluster. For this survey, a household is defined as a group of people living under the same roof and sharing the same meal. When a selected EA did not have the required number of households, the study team made a household count of an adjacent EA to complete the number. The list of households was destroyed after the data collection in each cluster was completed.

Interviewers visited each of the 20 households selected by cluster and obtained the consent of the head of the household and administered the household questionnaire. The household questionnaire included a sheet listing all household members, questions about household characteristics and properties, and a list of treated mosquito nets. After the completion of the household questionnaire, the interviewer used the list of members to select all women aged 15 to 49 for individual interviews. The interviewer used a recruitment form to determine the eligibility of each woman considered eligible. The selection form included questions about age, residence status in the selected household, and languages spoken. If the woman met the eligibility criteria, the interviewer obtained her consent and administered the individual questionnaire. The refusal rate was negligible at this stage.

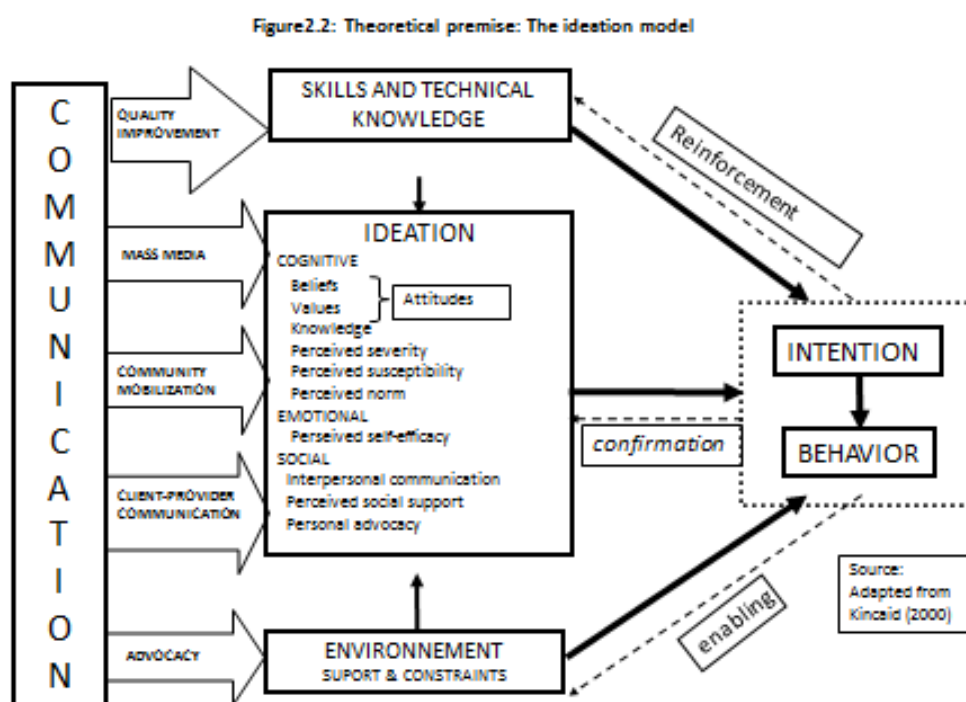
In one third of the households that agreed to participate in the survey, the field team also identified the spouse/partner of one of the eligible women to seek and interview.

In total, we collected information on a total of 5,969 households and 8,679 individual respondents (6,749 women and 1,930 men).



## Data collection tools

The survey questionnaires were developed based on CCP's prior research on ideational determinants related to malaria prevention and treatment in Liberia, Madagascar, Mali and other African countries. The design of the collection tools is based on the ideation model (Figure 2.2). In addition to the usual questions on socio-demographic characteristics, questions on access to and use of mosquito nets, the presence of mosquito nets in homes, indoor residual spraying, intermittent preventive treatment of malaria (IPT) for pregnant women, prevalence of



fever in children under 5 years of age and measures taken to treat fever were also included in the survey questionnaires. In addition, given the focus of the study on ideation, the collection tools included questions about knowledge, perceived severity, perceived vulnerability, perceived effectiveness, attitudes, perceived self-efficacy, norms and social interactions related to each of the behaviors of interest to the study. Furthermore, questions on exposure to relevant communication interventions that focused on malaria prevention and treatment were introduced.

The survey particularly collected relevant information on the following behaviors:

- Use of a mosquito net the previous night by all household members, including children, youth and adults;
- Administration of IPT to pregnant women during their most recent pregnancy;

- Receipt of appropriate treatment for fever in children who have had fever in the last two weeks and within the last six months;
- Perceptions of the threat of malaria, perceived effectiveness of mosquito nets and treatments, attitudes towards relevant behaviors, perceived self-efficacy to practice these behaviors, and perceptions of social norms associated with these behaviors; and,
- Exposure to messages promoting malaria prevention and treatment behaviors.

## Data collection, treatment and analysis

The Breakthrough ACTION team selected a local research firm, Omédia, through a competitive bidding process. Data collection took place between September 2 and November 11, 2018. A team of 50 data collection agents, eight supervisors and eight quality control agents hired by Omédia was directly involved in the collection process. Data collectors had a minimum level of Baccalaureate plus two years of higher education (diploma) while supervisors and controllers had at least a university degree. The data was collected using portable electronic devices owned by Omédia. In addition, during the collection, there were six field visits by teams composed of representatives of Breakthrough ACTION and the NMCP. Each field visit team included two representatives from Breakthrough ACTION and two NMCP staff. Their aim was to check the collection process and provide advice to the collection teams.

Once data collection was complete, the Omédia team cleaned the data before sharing it with Breakthrough ACTION, which performed data analysis using Stata 14.0.

In this report, descriptive results and those from logistic regression analyses are presented. Descriptive results show the prevalence of ideational variables and key behaviors. For its part, logistic regression analysis examines the relationship between ideational variables and targeted behaviors. These regression models also examined whether socio-demographic characteristics and exposure were associated with desired behaviors.

## Ethical considerations

Ethics Committee approval was obtained from the National Ethics and Research Committee (CNER) in Côte d'Ivoire and the Ethics Committee of the Johns Hopkins University School of Public Health in Baltimore, USA. This process lasted about three months. In addition, interactions with respondents followed standard ethical procedures. An informed and signed consent was obtained from all participants in the study prior to the interview. The interviewers explained to the study participants that participation was voluntary, that they could refuse to participate or answer any questions, and that they could terminate the interview at any time. All participants in the study gave their consent before being interviewed. In addition, the confidentiality of participants was protected through face-to-face interviews in the absence of third parties, by not retaining personal identifiers in electronic databases, by limiting access to the paper-based household list to research staff and by destroying the form containing the household listing immediately after the data collection is complete in the cluster.

## 3 Results

### 3.1 Description of the sample

The purpose of this section is to present the characteristics and living conditions of households through the characteristics of the dwelling, the property possessed, the socio-economic level, the composition of the household and the socio-demographic characteristics of the persons surveyed.

#### Population and household characteristics

Relevant information was collected from 5,969 households including 6,749 women and 1,930 men.

#### Housing Characteristics

Table 3.1.1 presents the characteristics of the dwelling unit such as the number of rooms used for sleeping, access to electricity, distance from a health facility, and flooring and roofing materials. Overall, the results show a significant difference between geographic areas in terms of housing characteristics. Households use an average of 2.3 rooms for sleeping, however, the average number of rooms used to sleep is lower in the North (2.2). Abidjan has the largest average number of rooms (2.4). On average, 2.5 people slept in a room. The northern zonal area had the highest ratio of 2.7 people sleeping in a room compared to 2.5 in the central and southern areas.

There was a high degree of household access to electricity, with significant differences between zones. Abidjan had the highest coverage with 97.8% while households in the South had the lowest electricity coverage, with 80.7%. In terms of floor covering material, the main material used was cement, regardless of the area.

TABLE 3.1.1: HOUSING CHARACTERISTICS, CÔTE D'IVOIRE 2018					
	North	Central	South/ Forest	Abidjan	All
Average number of rooms used to sleep in the accommodation	2.1	2.3	2.2	2.4	2.3
Number of people per room used to sleep	2.6	2.5	2.5	2.6	2.6
Percentage of households with electricity***	90.0	89.8	80.7	97.8	89.4

Flooring material ***					
Soil/sand/mud	8.6	10.0	9.6	1.9	7.5
Tiling	11.4	11.5	11.7	43.1	20.2
Cement	78.7	77.2	74.7	49.8	69.2
Carpet	0.9	0.9	2.3	3.8	2.1
Other	0.4	0.3	1.7	1.5	1.0
Note: *** $p < 0.001$					

### Household-owned durable goods

The survey assessed the standard of living of households through the possession of certain durable consumer goods (radio, television, mobile phone, etc.), means of transportation (bicycles, motorcycles, vehicles, etc.) and other goods, Table 3.1.2 shows the ownership of these goods by zonal area.

There was a significant difference between zonal areas in terms of possession of durable goods. Generally speaking, households were more likely to have television (74.4%), radio (58.3%) and mobile phones (55.4%) than other goods.

Information on 13 variables related to housing characteristics and household assets (number of bedrooms, wall materials, electricity, radio, television, television, computer, smartphone, bicycle, car, fan, air conditioner, animals, and farmland) allows for the calculation of an economic well-being index using the principal component analysis method (Rutsein & Shea, 2004). The index was then divided into quintiles (very poor, poor, average, wealthy and very wealthy). The distribution of households by the level of well-being varied significantly by zonal area. For example, in Abidjan, more than 80.0% of households surveyed were in the two highest wealth quintiles whereas less than one third of households in the North and Central region were in these wealth quintiles.

TABLE 3.1.2: INDICATORS OF LIVING CONDITIONS BY GEOGRAPHICAL AREA, CÔTE D'IVOIRE 2017					
Indicator	North	Central	South/ Forest	Abidjan	All
Percentage of households with a radio***	59.7	56.6	53.4	64.5	58.3
Percentage of households with a television***	67.8	67.4	65.8	94.4	74.4
Percentage of households with Smartphones ***	44.6	44.5	49.9	78.7	55.4

Percentage of households with any type of mobile phone ***	95.1	92.5	94,6	97.0	94.7
Percentage of households with a refrigerator***	18.2	19.8	17.0	59.2	29.5
Percentage of households with a clock***	49.7	47.8	55.2	77.9	58.4
Percentage of households with a bicycle***	23.0	22.4	23.5	6.9	18.6
Percentage of households with a motorcycle***	61.8	26.4	25.8	4.8	25.6
Percentage of households with a car***	3.4	3.4	4.6	14.5	6.8
Percentage of households with a computer***	6.6	8.1	6.0	29.0	13.0
Household wealth quintile ***					
Lowest	23.0	22.9	25.6	1.0,	20.0
Second	26.3	24.5	20,78	4.0	20.1
Middle	15.7	23.5	22.5	13.1	20.7
Fourth	22.3	16.8	18.1	31.9	19.4
Highest	12.7	13.7	13.0	51.0	19.7
Number of observations	1,080	1,943	1,915	1,031	5,969
Significance of area differences: *** p<0.001					

### Composition of household members

The survey collected socio-demographic information from household members, particularly information on age and gender; the summary of this information is contained in Table 3.1.3.

Generally speaking, there was a significant difference between survey areas in terms of the age and gender composition. There was a predominance of women (55.0%) in households and a very young population illustrated by the average age of 22.4 years. Moreover, 45.4% of household members were under 18 years of age. Abidjan had a low proportion (11.7%) of children under five and the highest proportion of adults aged 18 and over (60.7%).

**TABLE 3.1.3: CHARACTERISTICS OF MEMBERS OF SURVEYED HOUSEHOLD**

Socio-demographic characteristics	North	Central	South/ Forest	Abidjan	All
Percentage of males***	43.2	45.3	46.2	44.4	45.0
Percentage residing in urban areas***	45.6	46.4	42.4	98.4	54.6
Age Distribution ***					
% aged 0-4 years	15.9	14.5	15.0	11.7	14.0
% aged 5-17 years	33.7	32.5	32.9	27.6	31.4
% aged 18 years and above	50.4	53.0	52.1	60.7	54.6
Average age***	21.1	22.2	21.6	23.9	22.4
Un-weighted staff	5,421	10,122	9,566	5,627	30,736
Significance of area differences: *** p<0.001					

### Sociodemographic characteristics of respondents

In the course of the survey, all women aged 15-49 in the selected households were interviewed and men aged 18-59 were interviewed in one third of these households. Table 3.1.4 summarizes the characteristics of the respondents.

The majority of the population surveyed was young (59.6% under 35 years of age) and 38.4% had no education and a high proportion of Christians (52.1%) was noted.

**TABLE 3.1.4: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF MEN AND WOMEN SURVEYED**

	North	Central	South/ Forest	Abidjan	All
Sex					
Women	79.5	78.1	78.3	77.7	78.3
Men	20.5	21.9	21.7	22.3	21.7
Age group					
15-24 years	25.8	25.6	23.7	23.0	24.4
25-34 years	37.4	33.8	35.5	35.1	35.2
35-44 years	24.5	24.6	27.7	28.2	26.4
45 years and above	12.2	16.0	13.1	13.7	14.0
Religion					

Christian	24.9	55.8	60.7	54.8	52.1
Muslim	64.4	30.2	35.5	43.0	40.4
Other	10.7	14.0	3.8	2.2	7.5
Level of education					
None	54.5	36.9	41.8	26.6	38.4
Primary	18.9	28.7	24.6	20.7	23.9
Secondary or higher	26.6	34.4	33.6	52.8	37.7
All	1,653	2,801	2,714	1,398	8,566

There were significant differences by zonal area. Abidjan had a higher proportion (52.8%) of people with a secondary or higher education level than other areas. The proportion of uneducated people in the North was higher (54.5%) than elsewhere. Similarly, there were fewer Christians in the North than in other areas.

## 3.2 Media consumption and exposure to messages

Data on media consumption and exposure of households to messages are presented in Tables 3.2.1 and 3.2.2, based on gender, residence, religion, educational level and household wealth quintile.

### Media consumption habits

Just over one third (36.6%) of respondents listen to the radio at least once a week with significant differences by zonal area: the proportion that regularly listens to the radio is higher in Abidjan than elsewhere. The results (Table 3.2.1) show that, overall, women are less likely to listen to the radio regularly than men. Indeed, twice as many men as women are exposed to the radio. The level of exposure to the radio increases as the level of education, age and household wealth increases. There were significant differences by zone of residence but not by type of place of residence.

**TABLE 3.2.1: % LISTENING TO THE RADIO AT LEAST ONCE A WEEK, BY SOCIO-DEMOGRAPHIC CHARACTERISTICS - ALL HOUSEHOLDS**

Variable	Group	% listening at least once per week	
		All respondents	Household residents having a radio
Sex	Men	64.9***	78.4***

	Women	28.8	40.1
Type of place of residence	Rural	35.3	49.6
	Urban	37.5	49.0
Age group	15-24 years	27.9***	37.5***
	25-34 years	35.7	48.8
	35-44 years	38.5	50.2
	45 years and above	50.6	64.9
Level of formal education	None	27.1***	40.1***
	Primary	37.6	50.5
	Secondary or higher	45.5	55.9
Household wealth quintile	Very poor	28.6***	50.3
	Poor	34.1	49.5
	Average	35.2	48.0
	Wealthy	37.8	51.1
	Very wealthy	44.4	48.2
Area of residence	North	37.9**	53.3**
	Central	37.6	50.1
	South/ Forest	32.1	44.7
	Abidjan	39.9	50.3
All		36.6	49.2
Significance of differences between groups: ** p<0.01; *** p<0.001			

Data on radio ownership (Table 3.1.2) show that 58.3% of households own a radio. When the analysis of radio exposure was limited to households with a radio, differences by household wealth quintile disappear. However, differences by sex, education, area of residence and age remain significant. In general, access to radio is not the only reason why people do not listen to the radio regularly: data suggest that there is little preference for radio as a source of information. Indeed, only 49.2% of respondents whose household owns a radio station said they listen to the radio at least once a week.

As for television, exposure is higher than for the radio, and more than three-quarters of respondents (76.5%) follow television programs at least once a week. It was noted above that about three quarters of households have a television. The majority (92.4%) of respondents in these households watch the television regularly. More than a quarter (29.0%) of respondents whose household does not own a television reported that they watch television programs at least once during the week. Among respondents with television sets in their households, there were significant differences in television viewing among socio-demographic groups (Table 3.2.2). The indicator increases with educational level and household wealth. There is also a



higher proportion of people who watch television programs in urban areas compared to rural areas. Finally, exposure to television is more common in Abidjan (96.1%) than in other areas.

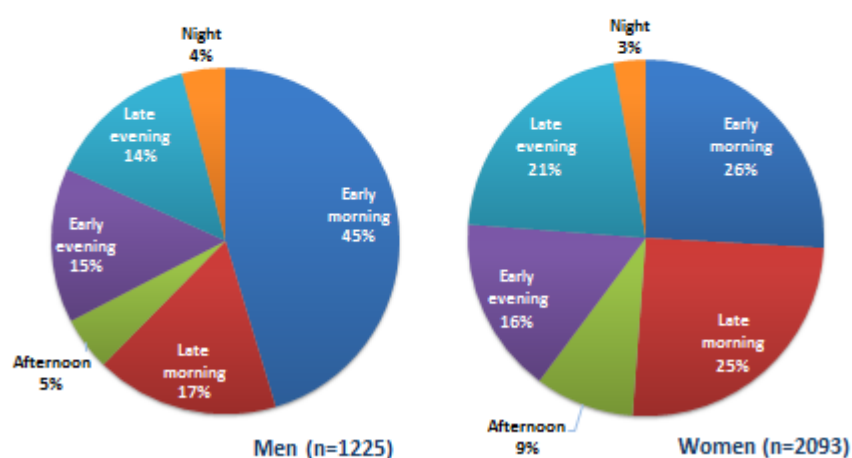
TABLE 3.2.2: % OF RESPONDENTS WHO WATCH TELEVISION PROGRAMS AT LEAST ONCE A WEEK, BY SOCIO-DEMOGRAPHIC CHARACTERISTICS			
Variable	Group	% watching television at least once per week	
		All respondents	Household residents having a television
Sex	Men	78.8**	93.6*
	Women	75.9	92.1
Living environment	Rural	58.1***	87.3***
	Urban	87.7	94.3
Age group	15-24 years	79.3***	93.8**
	25-34 years	76.7	92.8
	35-44 years	75.9	91.7
	45 years and above	72.2	90.6
Level of education	None	65.6***	87.8***
	Primary	75.0	92.9
	Secondary or higher	88.3	95.8
Household wealth quintile	Very poor	24.0***	71.4***
	Poor	65.3	83.8
	Average	84.9	90.7
	Rich	95.1	95.3
	Very rich	96.0	96.1
Zone of residence	North	70.8***	89.6***
	Central	72.5	90.3
	South/ Forest	68.9	91.6
	Abidjan	93.0	96.1
All		76.5	92.4
Significance of differences between groups: ** p<0.01; *** p<0.001			

The survey collected information on respondents' preferred time to listen to the radio or watch television programs.

Figure 3.2.1 shows that the favorite time respondents listen to the radio is in the morning regardless of their sex. However, nearly half of men compared to about a quarter of women

said they preferred to listen to the radio in the early morning. Comparatively, few men and women prefer to listen to the radio in the afternoon or at night.

**Figure 3.2.1: Percent distribution of respondents by preferred time for listening to the radio, men and women**



There are also differences between age groups in the preferred time of listening to the radio

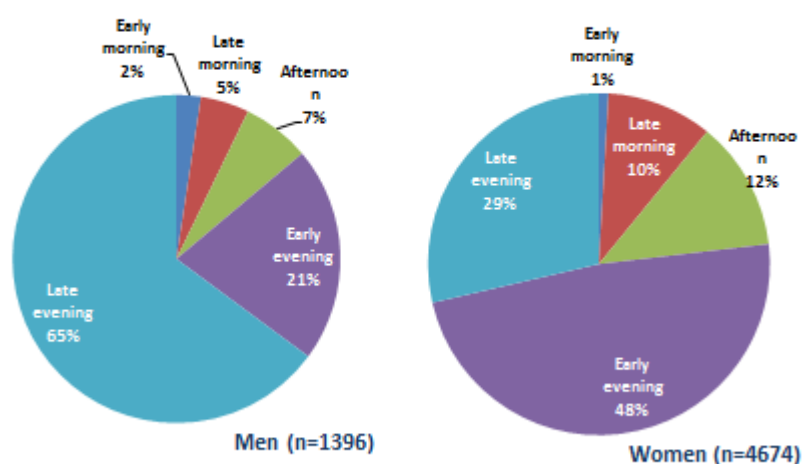
**TABLE 3.2.3: PERCENT DISTRIBUTION OF RESPONDENTS BY PREFERRED TIME TO LISTEN TO THE RADIO, BY AGE GROUP**

		Early in the morning	End of morning	Afternoon	Early in the evening	End of evening	Night
Age Group	15-24 years	28.0	23.0	8.6	19.3	22.0	3.0
	25-34 years	27,8	23.4	8.6	15.0	21.5	3.7
	35-44 years	39.7	21.2	5.9	14.9	16.0	2.3
	45 years or older	41.5	21.7	6.5	13.2	13.1	4.4

Television shows are generally watched in the evenings, especially in the early evening for women and in the late evening for men (Figure 3.2.2). Very few men and women watch television in the early morning.

Younger people tend to prefer early evenings (47.4% for 15-24 years and 43.8% for 25-34 years) compared to older people (29.7% for 45 years or older). However, the preference for late-night is more common for those aged 45 years or older (52.3%; compared to 27.5% among those aged 15-24).

**Figure 3.2.2: Percent distribution of respondents by preferred time for watching television, men and women**



### Exposure to messages on Malaria

Table 3.2.4 presents population exposure to malaria awareness messages over the past six months. Sources of exposure to messages on malaria include mass media, interpersonal channels and community events. Overall, 41.2% of respondents have heard a message about malaria in the past six months with differences by socio-demographic characteristics (Table 3.2.4).

**TABLE 3.2.4: % EXPOSED TO MESSAGES ON MALARIA FROM ANY SOURCE IN THE LAST SIX MONTHS BY SOCIO-DEMOGRAPHIC CHARACTERISTICS (N=8321)**

Variable	Group	%
Sex***	Men	49.4
	Women	38.9
Type of place of residence**	Rural	37.7
	Urban	43.3
Age group***	15-24 years	35.5

	25-34 years	41.8
	35-44 years	43.5
	45 years and above	45.0
Educational level	None	29.1
	Primary	41.5
	Secondary or higher	53.1
Household wealth quintile ***	Very poor	25.2
	Poor	36.0
	Average	42.8
	Rich	46.6
	Very rich	49.6
Area of residence*	North	45.5
	Central	43.3
	South	37.4
	Abidjan	40.4
All		41.2
Significance of differences between groups: *p<0.05; **p<0.01; *** p<0.001		

The results show a higher level of exposure for men (49.4%) than for women (38.9%). Similarly, urban respondents were more likely than rural respondents to be exposed to messages. The level of exposure increases proportionately with an increase in the level of education and household wealth. The proportion exposed to messages was higher in the North (45.5%) than in the South (37.4%).

The media, particularly the television and the radio, are the most frequently cited sources of exposure to messages. In fact, 65.8% of those exposed to messages on malaria cited the television as their source, while 21.7% cited the radio. Few respondents (5.9%) mentioned billboards or posters. Only 4.6% reported hearing messages from a health worker, while 6.3% reported hearing messages from a friend or relative.

During the course of the survey, respondents were also asked to complete the slogan - “United, we will win” that the NMCP has used for its campaigns since 2013. About 11.7% of respondents were able to complete the slogan with a higher proportion in Abidjan (15.4%) than in other areas (North - 9.3%, Central - 11.5%, South - 10.2%). In addition, during the survey, the interviewers showed the respondents three logos, including the NMCP logo. The interviewers then asked the respondents which logos they had seen before. Nearly half (45.6%) of respondents recognized the NMCP logo with recognition of the logo slightly higher in Abidjan (49.7%) than in other areas (North - 49.7%, Central – 43.8.%, South – 43.8%).

### 3.3 Cross-sectional ideational determinants

In this section, data on ideational variables that may influence all malaria-related behaviors are presented. The section particularly focuses on knowledge about malaria, perceived severity of malaria, perceived vulnerability, perceived self-efficacy for malaria prevention, and interpersonal communication about malaria. This section also covers gender norms and perceptions about providers.

#### Knowledge of Malaria

To assess knowledge about malaria, respondents were asked questions about the symptoms and causes of malaria. Knowledge of fever as a symptom of malaria was widespread but not universal as 79.7% of respondents cited fever as a symptom of malaria. This proportion varied significantly by sex, place of residence, household wealth and zonal area. This indicator was higher among men (83.1%) than among women (78.7%) and in urban areas (82.8%) as compared to rural areas (74.4%). Knowledge increased with the level of education and household wealth.

TABLE 3.3.1: INDICATORS OF KNOWLEDGE ON MALARIA			
Percentage which:		Knows that fever is a symptom of malaria (n=8494)	Know that malaria is caused by mosquito bite (n=8491)
Gender	Men	83.1***	94.2***
	Women	78.7	90.6
Type of place of residence	Rural	74.4***	88.4***
	Urban	82.9	93.3
Level of formal education	None	74.0***	85.7***
	Primary	77.9	91.8
	Secondary or higher	86.5	96.9
Zone	North	76.2***	88.5***
	Central	77.4	90.1
	South	77.1	91.4
	Abidjan	87.1	94.7
Household wealth quintile	Very poor	67.9***	84.7***
	Poor	76.3	90.6
	Average	80.2	91.2
	Rich	82.2	92.9
	Very rich	87.3	95.4
All		79.7	91.4
Significance of differences between groups: *** p<0.001			

Knowledge of mosquito bites as a cause of malaria is higher than that of fever as a symptom. The majority (91.4%) of respondents know that mosquito bites are the cause of malaria. This knowledge is lowest among the uneducated (85.7%) and the poorest (84.7%). A significant number of men and women are unaware of the cause of malaria. For example, 42.7% of respondents believed that malaria is caused by an unhealthy environment, and 23.6% believed that staying in the sun for too long can cause malaria. In all, 63.9% of respondents reported an incorrect cause of malaria. This lack of knowledge was more prevalent among men (66.9%) than among women (63.1%).

### Perceived vulnerability

Perceived vulnerability is the belief that one is likely to be affected by a health problem. This ideational determinant was assessed by asking whether respondents agree with four statements related to vulnerability or not. Responses to these questions were recoded between -1 and +1, with the highest values reflecting a higher level of perceived vulnerability. The total score was then split at zero to indicate perceived rather than unperceived vulnerability.

TABLE 3.3.2 : PERCENT AGREEING WITH SOME MEASURES OF PERCEIVED VULNERABILITY BY ZONE - CÔTE D'IVOIRE 2018					
The percentage agrees with the following statements:	North	Central	South/ Forest	Abidjan	All
People in this community only catch malaria during the rainy season.*	54.6	46.4	48.3	44.0	47.6
Almost every year, a person in this community catches severe malaria.***	78.7	77.1	75.7	67.9	74.5
When your child has a fever, you're almost always afraid it's malaria.*	82.6	83.5	81.3	78.5	81.4
During the rainy season, you are afraid almost every day that a member of your family will suffer from malaria.	74.7	74.0	72.3	74.3	73.7
% who perceive vulnerability to malaria					
Men	78.0	77.3	78.7	75.1	77.2
Women**	80.6	78.2	76.4	73.1	76.7
All*	80.0	78.0	76.9	73.6	76.8
Significance of differences between groups: *p<0.05 ;**p<0.01 ;*** p<0001					

Generally speaking, most respondents agreed that when their child has a fever, they are almost always afraid it is malaria. About three-quarters think that almost every year, a person in their community catches severe malaria. However, almost half believed that malaria is only

contracted in the rainy season. The proportion aware of their vulnerability to malaria was high (76.8%) and more pronounced in the North compared to the South and Abidjan.

### Perceived severity

Perceived severity is the perception that the consequences of a condition are severe. This behavioral determinant was assessed using four statements (Table 3.3.3) to which respondents were required to say if they agree or disagree. Responses were treated in the same way as for the perceived vulnerability indicator in order to distinguish respondents who perceive the severity of malaria from their counterparts who do not.

TABLE 3.3.3 : PERCENT AGREEING WITH SOME MEASURES OF PERCEIVED SEVERITY BY ZONE - CÔTE D'IVOIRE 2018					
The percentage agrees with the following statements:	North	Central	South	Abidjan	All
You are not afraid of malaria, because it can be treated easily	35.9	39.8	35.0	35.4	36.7
Only weak children can die of malaria	39.6	36.6	32.6	25.8	33.1
Each case of malaria can potentially lead to death	92.9	89.6	91.2	91.2	91.0
When someone you know has malaria, you usually expect them to recover completely within a few days	84.3	83.9	82.3	84.9	83.8
% who perceive the severity of malaria					
Men*	51.7	48.0	56.0	51.7	51.8
Women**	47.7	45.2	52.2	54.5	50.0
All***	48.5	45.8	53.0	53.9	50.4
Significance of differences between groups: * $p < 0.05$ ; ** $p < 0.01$ ; *** $p < 0.001$					

Data from Table 3.3.3 indicate that perceptions of malaria severity are rather mixed. While there was a clear awareness that malaria can lead to death, the majority (83.8%) expect a person with a malaria illness to recover completely within a few days. What is even more troubling is the fact that more than a third of the respondents believe that only sickly children can die from malaria. Moreover, 36.7% of the population was not afraid of malaria. In all, half (50.4%) perceived the severity of malaria, which varied by zonal area and higher in Abidjan and the South than in other areas.

## Interpersonal communication

The data (Table 3.3.4) show that malaria is not a regular subject in interpersonal communications. In the six months prior to the survey, malaria was not sufficiently discussed between couples (30.4%), in families or among friends (25.4%). Low levels of interpersonal communication about malaria were observed regardless of gender, educational level, place of residence and zone of residence. However, the level of interpersonal communication about malaria varied significantly by sex, education, place of residence and zonal area.

TABLE 3.3.4: INTERPERSONAL COMMUNICATION ON MALARIA, CÔTE D'IVOIRE 2018			
		% who talked about malaria with their spouse/partner in the previous six months (n=6380)	% who spoke of malaria with a friend or family member in the previous six months (n=8566)
Sex	Men	33.7***	27.6*
	Women	29.2	24.8
Type of place of residence	Rural	30.8	23.4
	Urban	30.2	26.6
Level of education	None	26.6***	22.4***
	Primary	30.5	25.7
	Secondary or higher	35.4	28.2
Area	North	25.5*	18.8***
	Central	30.9	25.0
	South	31.3	24.1
	Abidjan	32.1	31.3
Household wealth quintile	Very poor	26.3*	20.8***
	Poor	26.9	23.0
	Average	33.6	28.5
	Rich	31.5	26.6



	Very rich	33.0	26.6
All		30.4	25.4
Significance of differences between groups: * p<0.05; *** p<0.001			

Men (33.7%) were more likely than women (29.2%) to report having spoken about malaria with their wives or other persons. In general, interpersonal communication (with spouses or others) was less common in the North than in other zonal areas. In addition, interpersonal communication about malaria within the family increased as the level of education increased.

### Perception of health workers

The data presented in Table 3.3.5 show that most respondents perceive that health workers in the health center and CHWs treat their patients with respect. These results show that the interpersonal communication skills of health workers and CHWs are generally well appreciated. On the other hand, only two-thirds of respondents believe that people who seek treatment for fever in a health center are well looked after, thereby questioning the quality of services they receive. In addition, more than other groups, urban respondents, Abidjan residents and those with a high level of education, were more critical of the interpersonal skills of health workers and the quality of services received in a health center.

TABLE 3.3.5: GENERAL PERCEPTION OF HEALTH WORKERS, CÔTE D'IVOIRE 2018 – (N=8566)				
Percentage that agrees with the following statements:		The health workers in your community's health center are treating their patients with respect. (n=8336)	Community health workers (CHW) in your community treat their patients with respect. (n=8336)	In your community, people seeking treatment for fever in a health center are well looked after. (n=8336)
Sex	Men	79.2**	74.6**	64.6
	Women	82.9	77.6	65.6
Type of place of residence	Rural	88.8***	87.7***	71.5***
	Urban	78.0	70.4	61.7
Area	North	84.4*	78.8*	64.1***
	Central	83.9	76.9	69.2
	South	82.8	79.5	69.4
	Abidjan	77.8	73.1	57.5
Level of education	None	84.6***	80.5***	67.8***
	Primary	83.5	78.3	67.1

	Secondary or higher	78.6	72.6	61.9
All		82.1	77.0	65.4
Significance of differences between groups: *** p<0.001				

## Gender norms

The results presented in Table 3.3.6 are intended to show whether there was a preference for male or female sex in the context of malaria prevention and management. Very few of those surveyed favor one sex over the other in the prevention and treatment of malaria.

TABLE 3.3.6: SOME MEASURES OF GENDER-RELATED NORMS BY AREA - CÔTE D'IVOIRE 2018 - N=8323					
% agree with the following statements:	North	Central	South	Abidjan	All
If there are not enough mosquito nets, it is more important that female children sleep under the available mosquito nets than male children.	7.1	8.3	8.0	6.7	7.6
If there is not enough money, it is more important that male children with fever be able to have drugs rather than female children.	4.5	7.7	3.0	3.7	4.8
If there is not enough money, it is more important that female children with fever be able to have drugs rather than male children.	5.9	8.6	4.1	3.4	5.5
Percentage with equitable gender attitudes***	91.2	90.3	94.4	95.5	92.9
Significance of differences between areas: *** p<0.001					

## 3.4 Long lasting insecticide-treated nets (LLIN)

There is no doubt about the effectiveness of mosquito nets, especially LLINs, in preventing malaria. WHO recommends this practice in malaria-prone areas. In this section, ideational variables and mosquito net-related behaviors are presented.

### Behavioral determinants

#### Knowledge

Of those surveyed, 84.0% were aware that mosquito net is a malaria prevention method (Table 3.4.1). Regardless of socio-demographic characteristics, the proportion of respondents who claim that using mosquito net is a malaria prevention method is over 80%. However, there

were significant differences in socio-demographic groups. For example, knowledge was slightly higher among men than women and was lowest in Abidjan (80.7%).

TABLE 3.4.1: % WHO KNOW THAT MOSQUITO NETS ARE A METHOD OF PREVENTING MALARIA, CÔTE D'IVOIRE, 2018 (N=8479)		
Socio-demographic characteristics		%
Sex*	Men	85.8
	Women	82.4
Type of place of residence	Rural	84.1
	Urban	83.8
Zone***	North	83.2
	Central	83.6
	South	86.3
	Abidjan	80.7
Level of formal education***	None	79.9
	Primary	86.2
	Secondary or higher	86.9
All		83.9
Significance of differences between groups: * p<0.05; *** p<0.001		

## Attitudes

Attitudes regarding the use of mosquito nets were assessed through nine attitudinal statements. Respondents were asked to indicate whether they agreed with each statement or not. Responses to these statements are presented in the tables in Appendix 3.4.A for women and men.

For women, attitudes generally favor the use of mosquito nets. The majority of women believe that sleeping under a mosquito net allows a good night's sleep (82.6%), that mosquito nets are easy to use (85.7%), and that sleeping under an insecticide-treated net does not pose a health hazard (85.5%). Relatively few women (13.6%) agree that white mosquito nets remind them of a shroud, or if the only mosquito nets they had were white, they would prefer not to sleep under a mosquito net (12.6%). Reluctance to use a white mosquito net is more widespread among women who associate a white mosquito net with a shroud (52.5%) compared to other women (6.4%):  $p<0.001$ . In addition, more than half (53.2%) of the women surveyed report that they do not like to sleep under a mosquito net when the weather is hot, while 37.7% agree that the smell of insecticide in a mosquito net makes them uncomfortable. One-fifth of women believe that more expensive mosquito nets are more effective than cheaper or free nets. Overall, for women, positive attitudes towards the use of mosquito nets are less widespread in Abidjan than in other areas.

For men, attitudes towards the use of mosquito nets are generally positive and similar to what was observed for women. Most men agree that mosquito nets are very useful (97.0%), are generally

easy to use (89.5%), allow for a good night's sleep (85.1%), and sleeping under a mosquito net is not a health risk (87.8%). However, as observed in women, many men (53.5%) said they do not like to sleep under a mosquito net when it is hot, and one-third said that they are uncomfortable with the smell of insecticide on the mosquito net. As with women, almost 20% of men believed that more expensive mosquito nets are more effective than less expensive or free nets.

Some attitudes are not widespread among men. For example, only 10.6% associated white mosquito nets with a shroud, while 11.1% would prefer not to sleep under a mosquito net if the only available mosquito nets are white. More men who associate the white mosquito net with a shroud (50.1%) are unwilling to sleep under a mosquito net if the only available color is white compared to those who do not (6.5%):  $p < 0.001$ . Some positive attitudes towards use of mosquito nets are less common in Abidjan than elsewhere. Fewer men in Abidjan accept that it is easier to spend a good night sleeping under a mosquito net and that mosquito nets are generally easy to use. On the other hand, men in Abidjan were more likely to report that they do not like to sleep under a mosquito net when it is hot, or that they are uncomfortable with the insecticide on the mosquito net.

In order to obtain an index of attitudes towards net use, responses to the nine claims were recoded between -1 and +1, so that the highest values reflect a more favorable attitude towards the use of mosquito nets. The total of these values was then divided into two at zero to indicate a positive rather than negative attitude. Overall, 90.5% of respondents had positive attitudes towards the use of mosquito nets. Positive attitudes varied significantly by educational level, household wealth quintile, place of residence and zonal area. Positive attitudes were less prevalent among respondents from wealthy households compared to those from poor households and among urban residents compared to their rural counterparts (Table 3.4.2). Positive attitudes were also less prevalent in Abidjan than in other areas and among respondents with a high level of education.

**TABLE 3.4.2: % WITH FAVORABLE ATTITUDES TOWARDS THE USE OF MOSQUITO NETS, CÔTE D'IVOIRE, 2018 (N=8446)**

Socio-demographic characteristics		%
Sex	Men	91.6
	Women	90.1
Type of place of residence***	Rural	93.2
	Urban	88.8
Area**	North	91.8
	Central	90.6
	South	92.0
	Abidjan	87.8
Level of education ***	None	91.8
	Primary	92.4
	Secondary or higher	87.9

Household wealth quintile ***	Lowest	94.4
	Second	92.8
	Middle	90.2
	Fourth	90.5
	Highest	86.1
All		90.5
Significance of differences between groups: ** p<0.01; *** p<0.001		

### Perceptions about handling of mosquito nets

Table 3.4.3 presents the knowledge indicators on steps to be taken to make their nets last longer. Overall, most respondents (89.4% of men and 88.7% of women) believed that there are steps that can be taken to maintain the net. On the other hand, more than half of men and women do not know that it is possible to fix holes in a mosquito net, which was more widespread in Abidjan (almost 70%) than in other zonal areas.

TABLE 3.4.3: INDICATORS OF KNOWLEDGE ON THE HANDLING OF NETS						
Percentage that agrees with the recommendation:	Group	North	Central	South	Abidjan	All
There are some steps I can take to make my mosquito net last long	Women	90.0	90.0	88.7	86.2	88.6
	Men	91.2	92.0	86.5	89.4	89.6
	All	90.3	90.4	88.3	86.9	88.9
It is not possible to fix holes in nets	Women	58.9	59.2	59.3	67.7	61.4
	Men	60.7	54.2	57.9	71.0	60.7
	All	59.3	58.1	59.0	68.4	61.2

### Preferred mosquito net color

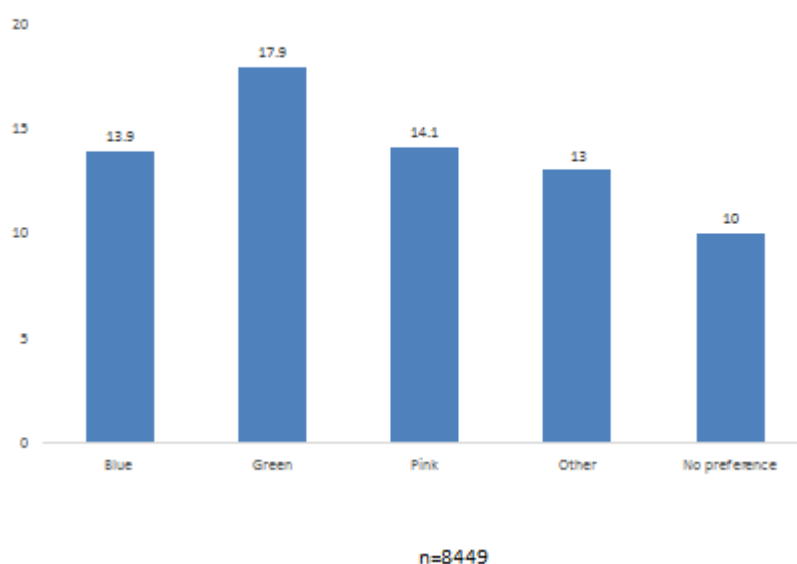
Table 3.4.4 presents preferences for mosquito net color. Generally speaking, blue (37.2%) or green (20.0%) mosquito nets were the most popular in all geographical areas. However, color is of little importance for 33.1% of the respondents, while a minority had a preference for white mosquito nets (6.8%). The data show significant differences by area.

TABLE 3.4.4: DISTRIBUTION OF RESPONDENTS BY PREFERRED MOSQUITO NET COLOR AND BY AREA N=8449					
	North	Central	South/ Forest	Abidjan	All
White	5.8	5.6	5.5	10.4	6.8
Blue	33.2	40.5	37.1	35.9	37.2

Green	22.6	22.8	20.4	14.8	20.0
Pink	3.2	3.2	2.7	2.5	2.9
Any color	35.1	27.9	34.3	36.4	33.1
Total	100.0	100.0	100.0	100.0	100.0

Figure 3.4.1 shows that, regardless of the preferred color, respondents are generally not opposed to sleeping under a white mosquito net in case there are no other colors available. Those most likely to indicate that they would not sleep under a white mosquito net are those

Figure 3.4.1: Percent that reported preferring not to sleep under a mosquito net if white nets were the only ones available, by preferred net color



who prefer the green color (17.9%). Only 10.0% of those who can use any color are opposed to sleeping under a white mosquito net.

### Perceived response-efficacy

Five questions measured perceived effectiveness of mosquito nets. The responses for men and women are presented in Appendix 3.4.B. A high proportion considers sleeping under a mosquito net every night the best way to avoid malaria (79.2% among women and 79.3% among men). However, more than half of the respondents (69.2% among women and 67.2% among men) believe that many people who sleep under a mosquito net still get malaria. More than one-third of respondents (36.7% of women and 36.3% of men) estimate that the likelihood of having malaria is the same whether they sleep under a mosquito net or not. In summary, only 53.3% of women and 56.4% of men perceive the effectiveness of mosquito nets

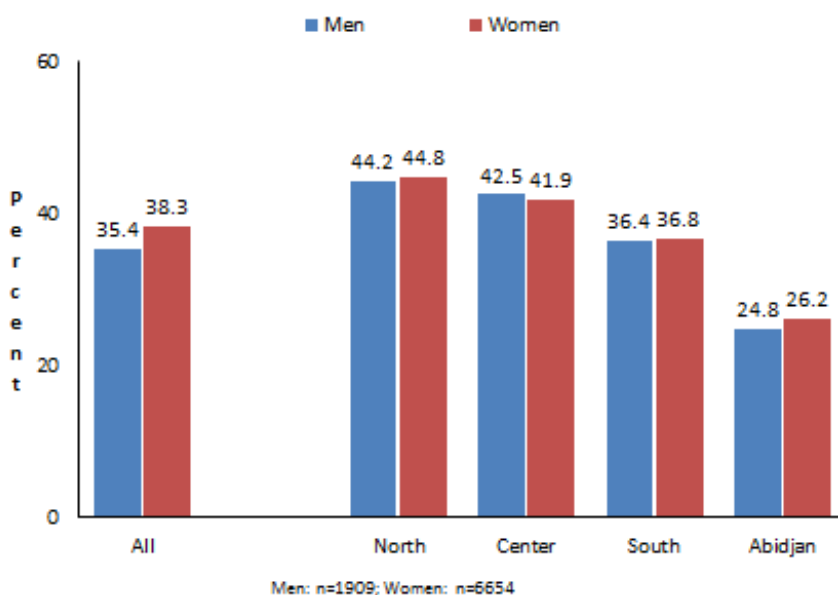
as an effective means of protection against malaria and was lowest in Abidjan than in other areas. For example, 47.4% of Abidjan women compared to 57.1% in the North, 56.0% in the Central zone and 54.0% in the South perceive the effectiveness of mosquito nets.

### Perceived self-efficacy

Four questions were used to determine the level of perceived self-efficacy in the use of mosquito nets. Moreover, a question allowed us to assess the self-efficacy of repairing mosquito nets. The results are presented in Appendix 3.4.C for men and women. In terms of perceived self-efficacy, 91.3% of women and 90.9% of men feel they can sleep under a mosquito net all night long when there are many mosquitoes. Furthermore, 81.6% of these women and 79.6% of men believe they can sleep under a mosquito net even when there are few mosquitoes. In the same vein, 88.9% of women and men feel they can ensure all their children sleep under a mosquito net every night of the year. Nationally, 82.2% of women and 80.0% of men perceived the self-efficacy for using mosquito nets though was lower in Abidjan (68.5% for women and 61.6% for men) than in other zonal areas.

As for maintenance of mosquito nets, only 38.3% of women and 35.4% of men said they can immediately fix defective mosquito nets (Figure 3.4.2). Residents of Abidjan were less likely than their counterparts in other areas to express self-efficacy in the immediate repair of mosquito nets. There was no significant difference between men and women in this indicator.

Figure 3.4.2: Percent of respondents that perceive the self-efficacy to promptly repair holes in mosquito nets, Côte d'Ivoire 2018



## Descriptive Norm

Table 3.4.5 refers to the perceived norm for the use of mosquito nets by geographic area. In all, 63.9% of women compared to 67.3% of men believe that the use of mosquito nets is a norm in their communities. Among both women and men, there were differences by area: generally speaking, the perception that the use of mosquito nets is a community norm was more widespread in the North than in other areas.

TABLE 3.4.5: SOME MEASURES OF ATTITUDES TOWARDS MOSQUITO NETS BY AREA, CÔTE D'IVOIRE, 2018 - MEN (N=1823); WOMEN (N=6582).					
Percentage who believe that:	North	Central	South/ Forest	Abidjan	All
The use of mosquito nets is a norm in their community.					
Women ***	76.0	63.4	70.2	50.0	63.9
Men ***	79.6	70.0	70.7	54.9	67.3
Fixing mosquito nets is a norm in their community.					
Women***	25.9	25.9	23.3	27.4	25.6
Men*	25.8	25.8	23.0	26.6	25.2
Significance of differences between Areas: *** p<0.001					

Contrary to what we have observed on the use of mosquito nets as the norm, only one quarter of men and women believe that the repair of mosquito nets is the norm in their communities. This indicator varies significantly by area: residents of the South are less likely than their counterparts in other areas to believe that repairing mosquito nets is the norm in their communities.

## Practices and behaviors

This section presents results on indicators including the ownership of mosquito nets, management of nets, use by household members, use-access ratio and individual use, and the determinants of use.

### Access and possession of LLINs within households

Within the framework of the reduction of malaria-related mortality and morbidity, WHO recommends the promotion, distribution and use of mosquito nets. This promotional strategy translates into the distribution of LLINs to households during mass distribution campaigns.



Data presented in Table 4.6.6 indicate that 67.4% of households surveyed have at least one mosquito net, mainly LLIN. The net ownership rate was higher in the North (73.0%), the Central zone (75.1%) and the South (76.1%), compared to Abidjan (54.4%).

Access to LLINs within households is closely related to the proportion of household members sleeping under LLIN. For every member to have access to mosquito nets, the household must have at least one net for two members of the household. This indicator measures the universal coverage of LLINs within households. The data show that less than one third of households have universal coverage. The population with access to LLINs in households indicates the proportion that could potentially sleep under a LLIN provided that one LLIN is shared by two household members. This indicator is preferred to better assess the provision of LLINs within households (Koenker et al., 2018). According to this indicator (Table 4.6.6), half of the population in households have access to a LLIN, indicating a serious shortfall in the provision of nets within households. This shortfall is more pronounced in Abidjan.

TABLE 3.4.6: ACCESS TO LLINS IN HOUSEHOLDS, CÔTE D'IVOIRE 2018					
	North	Central	South	Abidjan	All
Percentage of households with at least one mosquito net***	73.0	75.1	76.1	54.4	67.4
Percentage of households with at least one LLIN for two persons***	30.4	30.7	31.6	22.2	28.6
Population with access to LLIN in households 1***	53.0	55.3	56.1	38.6	50.4
<sup>1</sup> Assuming that two members share a LLIN; Significance of differences between Areas: *** p<0.001					

### Characteristics of mosquito nets available in households

Table 3.4.7 shows some attributes of mosquito nets available in households. A total of 8,108 mosquito nets were identified in the households surveyed. The vast majority (97.8%) of these nets were LLINs. Approximately three quarters (72.1%) of the available LLINs were used to sleep overnight prior to the survey. It appears that the proportion of available LLINs used to sleep varies by zonal area. Abidjan stands out with a relatively low LLIN use (50.6%). Use of available LLINs decreases as the level of household wealth increases and is higher in rural areas compared to urban areas (Figure 3.4.3).

TABLE 3.4.7: CHARACTERISTICS OF LLINS IN HOUSEHOLDS, CÔTE D'IVOIRE 2018					
Indicator	North	Central	South	Abidjan	All
Percentage of LLINs that are LLINs	98.4	97.0	98.4	97.9	97.8

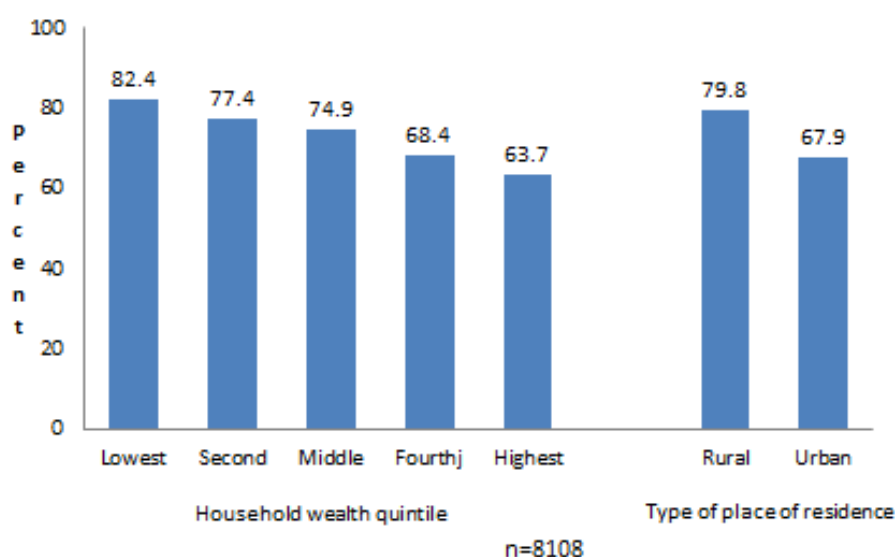
Percentage of LLINs used the previous night***	77.9	76.1	79.0	50.6	72.1
Percentage of LLINs used every night of the previous week***	69.8	69.2	66.7	40.1	62.6
Percentage of LLINs obtained free of charge	95.3	95.2	91.3	94.4	93.8
Source of LLIN***					
Distribution campaign	71.8	80.1	71.8	75.3	75.2
Antenatal care visit (ANC)	17.8	12.5	17.4	17.6	15.9
Immunization	6.8	4.5	3.9	2.8	4.3
Other	3.5	2.9	6.9	4.2	4.6
Average age of LLIN (months)	12.9	12.6	10.3	9.7	11.3
LLIN Color					
White	1.0	0.8	0.4	1.5	0.8
Blue	26.1	34.3	31.3	34.0	32.1
Green	71.3	63.2	67.2	62.9	65.6
Other color	1.6	1.7	1.1	1.5	1.5
Location of LLIN***					
Suspended at sleeping place	35.9	31.8	34.3	20.6	30.9
Suspended, folded, and tied	45.1	48.3	47.8	35.4	45.0
Not suspended but not stowed	0.8	2.4	1.5	2.9	2.0
Unpacked but stowed	5.8	5.9	5.0	7.9	6.0
Still stowed under packaging	12.4	11.6	11.4	33.0	16.1
Total number of LLIN	1,425	2,859	2,789	1,035	8,108
Significance of differences between Areas: *** p<0.001					

As for regular use, less than two thirds (62.6%) of the available LLINs were used every night of the week preceding the survey. This proportion is lower in Abidjan (40.1%) compared to other areas (North - 69.8%); Central - 69.2%; South - 66.7%).

The vast majority (93.8%) of LLINs were obtained free of charge. In addition, Table 3.4.7 shows that 75.2% of LLINs were obtained through mass distribution campaigns, while less than one-fifth were obtained through antenatal consultation.

The average age of LLINs was 11.3 months with significant variations by zonal area. LLINs available in the North and Central were older than those in the South and Abidjan. As for color, two thirds (65.6%) were green, while nearly one third (32.1%) were blue. Very few (0.8%) of LLINs were white. During the visit of the collection team (made during the day), less than half (45.0%) of the LLINs were found hanging, folded and tied to the sleeping area while just under one third were suspended from the sleeping area but not folded or tied. One-fifth of the LLINs were stowed, including 6.0% that were unpacked and 16.1% that were still wrapped. One third (33.0%) of LLINs in Abidjan were still found in their packaging.

**Figure 3.4.3: Percent of available LLINs used on the night before the survey, by wealth and type of place residence, Côte d'Ivoire 2018**



#### LLIN Management, Maintenance and Repair Habits

It is recommended to wash the LLIN when it is dirty but not more than four times a year gently with mild soap and water. Table 3.4.8 shows that 28.5% of LLINs had already been washed at least once. In 60.2% of cases, the LLINs were washed with powder or liquid soap. About a quarter of LLINs were washed with bar soap, while 10.3% were washed with simple water.

After washing, it is recommended to dry LLINs outside in the shade. More than half (55.3%) of LLINs were dried in the sun, while 43.8% were dried in the shade.

**TABLE 3.4.8: MANAGEMENT OF LLINS, CÔTE D'IVOIRE 2018**

Indicator	North	Central	South	Abidjan	All
% of LLINs already washed (n= 8108)	29.2	29.4	31.7	16.3	28.5
Product used to wash LLIN (n=2311)					
Bar soap	18.4	27.0	29.2	32.7	27.2
Powder soap/liquid soap	72.8	61.4	58.0	47.6	60.2
Nothing	7.2	10.0	10.4	18.3	10.7
Other	1.5	1.6	2.4	1.3	1.9
Where was LLIN dried? (n=2311)					
Out in the Shade	45.6	46.6	37.9	51.7	43.8
Out in the sun	54.3	52.8	60.7	47.7	55.3

Other	0.2	0.6	1.4	0.6	0.8
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### Use of LLINs by household members

Of those in households with at least one LLIN and who spent the night in the house, more than half (57.8%) slept under one LLIN the day before the survey. Table 3.4.9 shows household members' use of LLINs the night before the survey by socio-demographic characteristics. These results are limited to households with at least one LLIN. The data show variations by zonal area, household size, place of residence, wealth quintile, age group and sex.

Overall, the percentage of the household population with at least one LLIN who slept under one LLIN the night before the survey was higher among women (59.8%) than among men (55.4%). Children aged 5 or older and adolescents had the lowest utilization rate (50.1%) while use was highest (65.4%) among children under five. In addition, the utilization rate is inversely proportional to the level of household wealth.

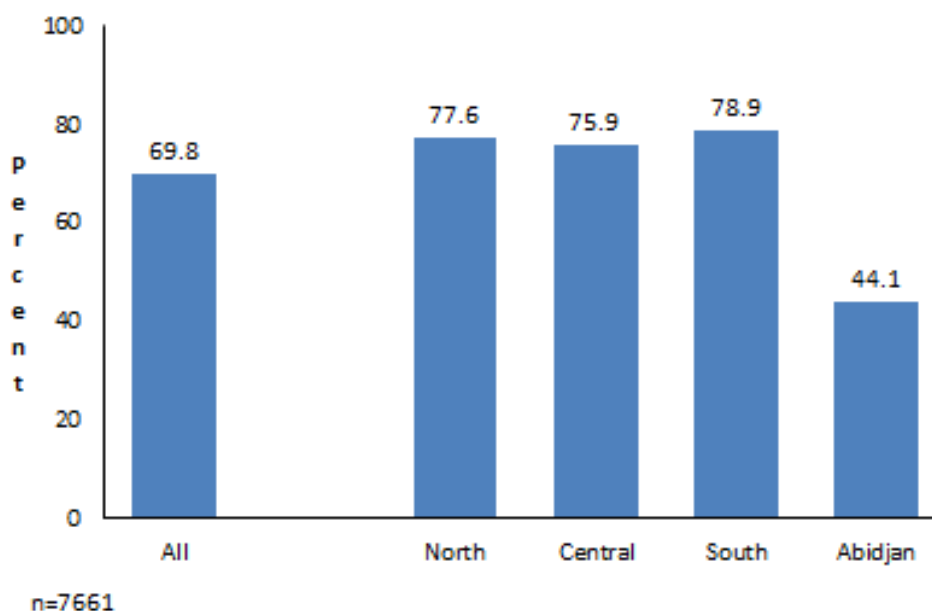
TABLE 3.4.9: USE OF LLINs ON THE NIGHT BEFORE THE SURVEY, BY ZONAL AREA, CÔTE D'IVOIRE 2018 - HOUSEHOLD MEMBERS WITH AT LEAST ONE LLIN (N=22166)		
Socio-demographic characteristics		%
Sex***	Men	55.4
	Women	59.8
Age group***	< 5 years	65.4
	5 – 17	50.2
	18 or above	60.4
Number of LLINs in household***	One	45.5
	Two	63.4
	Three or more	61.5
Household wealth quintile ***	Lowest	73.0
	Second	62.7
	Middle	58.2
	Fourth	53.2
	Highest	44.9
Type of place of residence***	Rural	67.3
	Urban	51.0
Area***	North	62.2

	Central	64.6
	South	65.8
	Abidjan	34.4
All (n=21947)		57.8
Significance of differences between groups: *** p<0.001		

The relationship with the number of LLIN is positive: the proportion of people who have slept under a LLIN increased as the number of LLINs in the household increased. It is observed that, overall, having at least two LLINs in the household significantly increases the utilization rate compared to having only one. The results also show a negative correlation with urban residence.

Among households with access to LLINs (i.e. at least one LLIN for two members), slightly more than two thirds (69.8%) of members slept under a mosquito net the night before the survey, indicating that the non-use of mosquito nets was not only due to the non-availability of mosquito nets. The data shows significant variations by area (Figure 3.4.4) for this indicator with use highest in the South (78.9%) and lowest in Abidjan (44.1%).

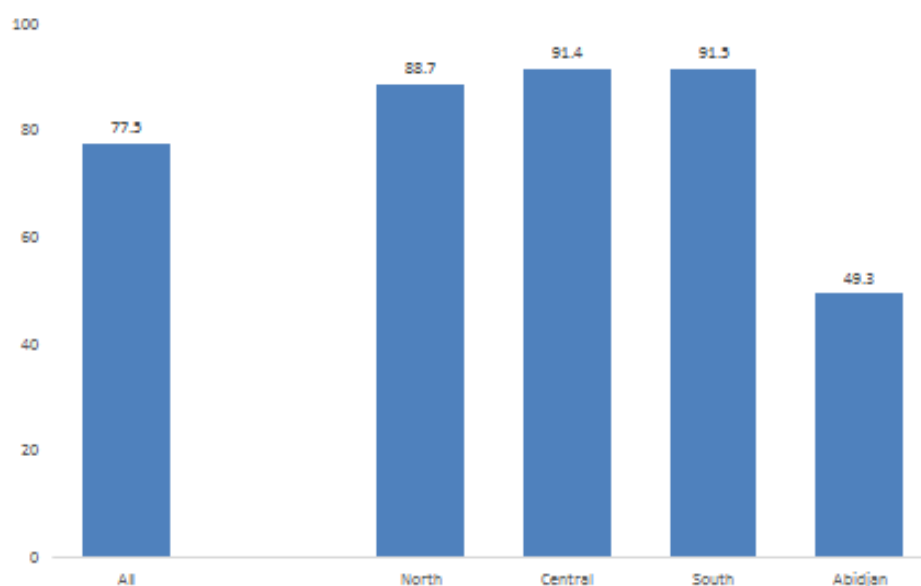
**Figure 3.4.4: Percent of household members that slept under an LLIN, households with access to LLIN, by zonal area, Côte d'Ivoire 2018**



### Use-access ratio

The use-access ratio is the ratio of mosquito net utilization to mosquito net access in the community. If every person who has access to net (i.e. at least one LLIN for two household members) in a population uses it, the utilization-access ratio will be at least 100%. It is possible for the indicator to be more than 100% if there is a tendency for more than two people to sleep under a net. This indicator allows us to identify the problems related to net use behavior rather than the unavailability of mosquito nets. Calculations were performed using the methodology proposed by Koenker & Killian, 2014. The data suggests that even when households have a sufficient number of LLINs, members do not always use them to sleep (Figure 3.4.5). Generally speaking, the use-access ratio is 77.5%, indicating that among the Ivorian population, behavioral factors combine with unavailability of nets to explain non-use. The use-access ratio is lower in Abidjan (49.3%) than in other zonal areas.

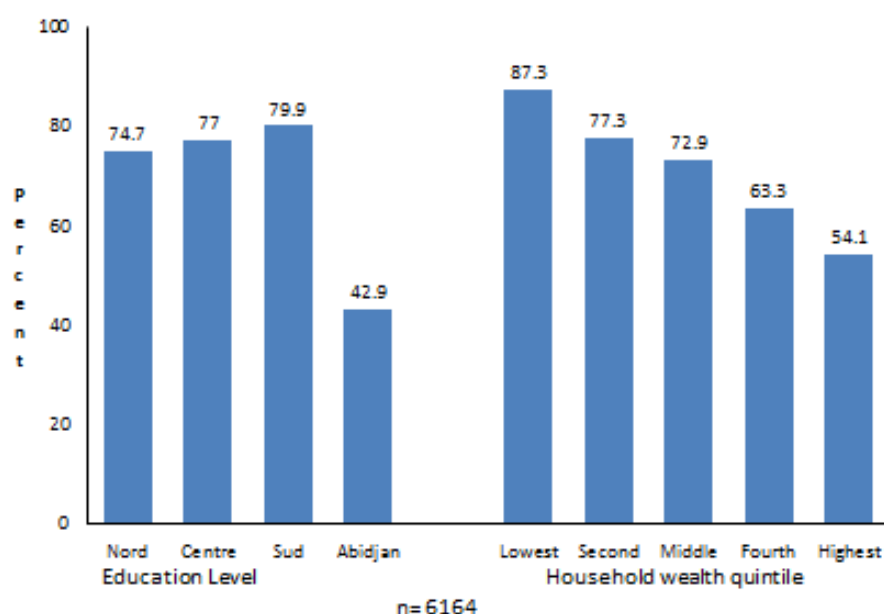
**Figure 3.4.5: Use-access ratio, Côte d'Ivoire 2018**



### Use of LLINs among men and women surveyed

Three-quarters (70.7%) of respondents residing in households with at least one LLIN slept under a LLIN the night before the survey. While LLIN use was not different between men (70.0%) and women (70.9%), there were variations according to educational level and household wealth (Figure 3.4.6). There were also significant differences by residence. Use in Abidjan was lower (42.9%) compared to other areas (North - 74.7%, Central - 77.0%, South - 79.9%). For those who reside in households with at least one LLIN for two members, use was 81.1%. That notwithstanding, this indicator was particularly low in Abidjan (53.3%) compared to other areas (North - 86.9%, Central - 85.3%, South - 88.4%)

**Figure 3.4.6: Percent of respondents that slept under a LLIN, households with at least one LLIN, Côte d'Ivoire 2018**



To be more effective in preventing malaria, the use of LLINs must become a habit: it is important to sleep under LLIN every night of the year. Overall, about two-thirds (65.6%) of the respondents living in households with at least one LLIN and 71.8% of those living in households with at least one LLIN for two persons sleep under LLIN every night. Table 3.4.10 presents the results of the logistic estimation of factors associated with the use of LLINs every night by the men and women surveyed. The results show that the variables associated with the use of LLINs includes socio-demographic and ideational determinants, household and housing characteristics, and the community context. The likelihood of sleeping under LLIN every night increases with age. The association of this variable with the level of education is negative, so the chances of using LLINs were 24% lower among people with primary education and 27% lower among people with secondary education or higher than among their uneducated counterparts. Exposure to messages on malaria through the media was associated with a higher odds ratio to sleep under a LLIN every night.

**TABLE 3.4.10: RESULTS OF THE LOGISTIC ESTIMATE OF THE FACTORS ASSOCIATED WITH THE USE OF LLIN EVERY NIGHT. CÔTE D'IVOIRE, 2018**

Determinants	Odds Ratio (ET)
Sex	
Male	1.000
Female	1.163‡ (0.103)
Age in completed years	1.010** (0.004)

Level of education	
None	1.000
Primary	0.764*** (0.064)
Secondary or higher	0.730*** (0.061)
Attitudes favorable to the use of mosquito nets	2.772*** (0.335)
Perceived severity	0.930 (0.061)
Perceived vulnerability	0.758*** (0.061)
Talked about malaria with spouse	1.287** (0.115)
Talked about malaria with friends/family members	1.262** (0.114)
Perceived mosquito net effectiveness	1.114 (0.074)
Perceived self-efficacy for mosquito net use	6.581*** (0.480)
Use of mosquito nets perceived as the norm in the community	1.166* (0.084)
Mentioned at least one incorrect method of transmitting malaria	0.861* (0.059)
Heard a message about malaria on the media	1.285** (0.093)
Household has at least one child below the age of 5	1.242*** (0.086)
Household size	0.948*** (0.013)
Number of LLIN	1.307*** (0.043)
Household wealth quintile	
Lowest	1.000
Second	0.789* (0.083)
Middle	0.736** (0.080)
Fourth	0.671*** (0.077)
Highest	0.668** (0.086)
The ceiling of the house is complete and watertight	
No	1.000
Yes	0.769*** (0.061)
Windows of the house are equipped with mosquito nets to prevent mosquitoes from entering.	
No	1.000
Yes	0.866 (0.094)
Zonal Area	



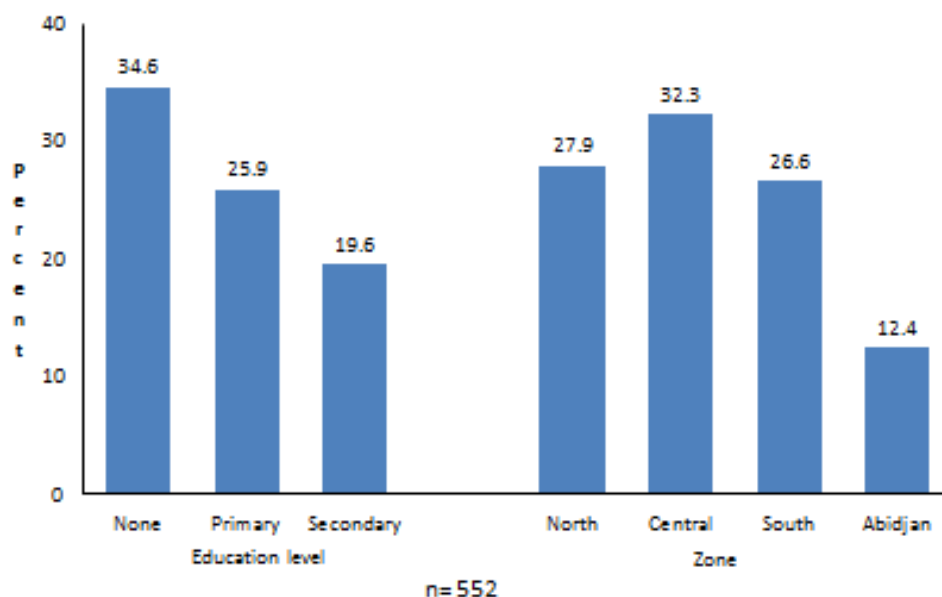
North	1.000
Central	1.213* (0.114)
South	0.998 (0.093)
Abidjan	0.355***(0.043)
Pseudo-R <sup>2</sup>	21.4%
Number of observations	6,060
Notes: ‡ p<0.1 * p<0.05; ** p<0.01; *** p<0.001	

The results also highlight the important role of ideational determinants. Ideational determinants that are positively correlated with the use of LLINs include perceived self-efficacy to use of nets, favorable attitudes towards the use of mosquito nets, interpersonal communication with spouse or others about malaria, and the perception that the use of mosquito nets is the norm in the community. Specifically, perceiving the self-efficacy to sleep under a mosquito net was associated with a six-fold increase in the odds of sleeping under a LLIN every night while positive attitudes towards mosquito nets increase the odds by 177%. People who have already spoken about malaria with their spouses have 29% higher odds of sleeping under a LLIN while communicating with others increases the odds by 26%. Similarly, perceiving the use of mosquito nets as a community norm increases the odds by 17%. Meanwhile, misunderstanding the causes of malaria reduces the likelihood of sleeping under LLIN. Rather unexpectedly, the perceived vulnerability was negatively correlated with the use of LLINs. This unexpected result may be explained by the fact that people who use LLINs every night are not likely to think they are susceptible to malaria.

Only one housing characteristic was significantly correlated with the use of LLINs - the presence of a complete, waterproof ceiling; the relationship to this variable is negative. People living in a household with a child under the age of five were 24% more likely to sleep under a LLIN every night. Moreover, the odds of sleeping under LLIN were negatively correlated with household size and the level of household wealth. However, the more mosquito nets in the household, the higher the chances of sleeping under one.

There were significant variations by zone of residence. The odds of sleeping under a LLIN every night were 65% lower in Abidjan than in the North. However, the odds were lower in the Central zone compared to the North.

**Figure 3.4.7: Percent of respondents that slept under a net every night while traveling, Côte d'Ivoire 2018**



It is not just important to sleep under a LLIN every night when at home, it is also important to use the LLIN every night one spends outside your usual home. Of the 552 people who reported spending at least one night outside their homes in the past two weeks, barely a quarter (24.5%) slept under a mosquito net each night while traveling, while two-thirds did not sleep under a mosquito net at all during their trip. Use of LLIN each night of the trip is more common among women (26.6%) than among men (20.2%). Net use was also a function of the level of education and the area of residence (Figure 3.4.7). In addition, it appears that the practice was more widespread among people who sleep under a LLIN while at home (33.4%) than among others (15.5%).

In general, sleeping outdoors is not a common practice in Côte d'Ivoire. Indeed, only 451 (5.3%) of the respondents reported that they sleep outside (for example, on the terrace, veranda, roof or courtyard) in any month of the year. Sleeping outdoors was more common among men (7.7%) than among women (4.6%). In general, when people slept outside, they did not use mosquito nets. Only 25.3% of people who slept outside used a mosquito net each time, while 61.9% did not use one at all.

### 3.5 Treatment of malaria cases in children under the age of five;

WHO recommends that all children with fever be brought to a health center without delay for diagnosis and effective treatment. In this section, ideational and behavioral variables (related to the care of children suffering from malaria) were analyzed.

#### Ideational factors

Previous studies have identified some ideational variables as key determinants of rapid care seeking for fever. These variables include knowledge related to malaria, attitudes toward the point-of-treatment, perceived effectiveness of testing, self-efficacy of taking relevant actions for appropriate management, and perceived standards.

#### Knowledge

Generally speaking, more than one-third (39.5%) reported ACTs as effective malaria drugs. ACT knowledge was higher among men (42.3%) than among women (38.8%). There was also a significant difference between rural respondents (35.8%) and urban respondents (41.8%). This indicator is slightly higher in Abidjan (41.9%) than in other areas (North - 39.4%); Central - 39.6%; South - 37.3%).

#### Attitudes towards prompt and appropriate treatment of malaria

In general, attitudes were positive towards prompt and appropriate treatment of malaria (Table 3.5.1). The majority of respondents believed that the health worker is always the best person to talk to when a child has malaria (96.3%) and that the child should be taken to a health worker on the same day that fever begins (92.0%).

Similarly, the majority agree that a blood test is necessary to confirm that the disease is caused by malaria (87.6%) and that all antimalarial tablets prescribed by the health worker should be taken (92.6%). However, attitudes toward self-medication were quite widespread, with 58.9% of respondents saying that when a child has a fever, it is best to start by giving them the malaria drugs available at home. It is worth noting that this attitude is less widespread in Abidjan (48.3%) than in the other zonal areas.

**TABLE 3.5.1: SOME MEASURES OF ATTITUDES TOWARDS MALARIA TREATMENT, BY AREA - CÔTE D'IVOIRE 2018 - (N=8363)**

Percentage that agree with the following proposals:	North	Central	South	Abidjan	All
The health worker is always the best person to talk to when you think your child has malaria.*	94.2	96.8	96.2	97.3	96.3
A person should only take malaria drugs if a health worker says that their fever is really caused by malaria.**	93.3	92.6	90.5	94.7	92.6
A person should take a child to a health worker the same day the child has a fever.*	91.1	92.8	90.3	93.4	92.0

When my child has a fever, it's better to start treatment by giving him the antimalarial medications I have at home.***	62.4	61.9	63.3	48.3	58.9
A person with a fever needs to do a blood test to confirm that the disease is really malaria before taking medication against malaria.***	87.4	90.1	82.4	90.7	87.6
It is important to take all prescribed antimalarial medication to ensure that the patient is fully treated*	95.1	96.1	97.3	96.9	96.5
Percentage with positive attitudes towards malaria treatment					
Women**	92.2	93.4	92.6	95.5	93.5
Men*	94.3	94.2	90.8	94.8	93.4
Significance of differences between Areas: *p<0.05; ** p<0.01; *** p<0.001					

### Perceived efficacy of malaria diagnostic tests

Perceptions of the efficacy of the malaria diagnostic test were mixed (Table 3.5.2). The majority of women and men, 84.8% and 84.6%, respectively, reported that a blood test to confirm malaria is the only way to know if someone really has malaria. However, a significant number of women (32.4%) and men (31.7%) believed that malaria drugs should still be taken even if the results of the diagnostic test indicate that the fever is not caused by malaria. Barely half of the women and men believed antimalarial drugs are not needed if the test is negative. The perceived efficacy of malaria diagnostic test varied significantly by zonal area with Abidjan highest.

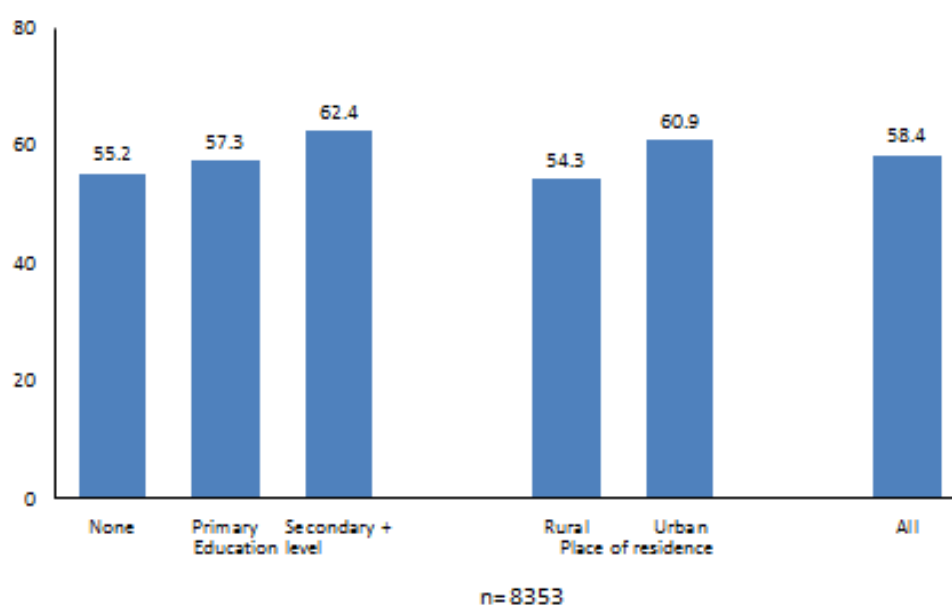
**TABLE 3.5.2: SOME PERCEIVED EFFECTIVENESS MEASURES OF THE DIAGNOSTIC TEST BY AREA - CÔTE D'IVOIRE 2018**

Percentage that agree with the following proposals:	North	Central	South/ Forest	Abidjan	All
A blood test to confirm malaria is the only way to know if someone really has malaria or not.					
Women***	84.6	86.1	81.1	87.5	84.8
Men***	85.7	86.9	78.1	88.4	84.6
A person should take antimalarial drugs even though the results of the malaria test indicate that the fever is not caused by malaria.					
Women**	38.2	36.1	29.7	27.7	32.4
Men*	36.9	33.7	33.7	24.3	31.7

% who believe in the efficacy of diagnostic test					
Women **	54.3	55.2	58.1	65.3	58.5
Men **	55.2	58.4	52.7	65.5	58.2
Significance of differences between Areas:** p<0.01 *** p<0.001					

With respect to the perceived efficacy of the screening test, there were significant variations in terms of type of place of residence and level of education (Figure 3.5.1). Urban respondents were more likely to believe that the test is efficacious compared to rural respondents. Similarly, the higher the level of education, the greater the likelihood of believing in the efficacy of the test.

**Figure 3.5.1: Percent of respondents that perceived the efficacy of malaria diagnostic test, Côte d'Ivoire 2018**



#### Perceived self-efficacy

The majority of respondents (95.5%) believed they are able to find money to take a sick child to the health center, while 94.7% said they are able to take the child to the health center on the same day or the day after the onset of the fever (Table 3.5.3). In addition, 98.1% said they are able to ensure that the child takes the full dose of the medications prescribed for malaria. Overall, 84.0% of respondents reported being able to take the six actions described in Table 3.5.3, thus indicating a high level of self-efficacy. This indicator varied significantly by zonal area and is higher in Abidjan (92.4%) than in the other areas. Results by sex showed 88.7% among men and 82.7% among women, and by residence, 79.3% in rural areas as compared to 86.8% in urban areas.

**TABLE 3.5.3: SOME PERCEIVED SELF-EFFICACY MEASURES RELATED TO TREATMENT BY AREA - CÔTE D'IVOIRE 2018 - (N=8566)**

Percentage which believe they can:	North	Central	South/ Forest	Abidjan	All
Find money to take your child to the health center when the child has a fever.***	92.9	94.5	95.5	98.1	95.5
Obtain permission from your husband or other family member (give permission to your wife or other family member) to take your child to the health center/health care provider when the child has a fever***	88.9	89.0	92.7	97.0	92.1
Take your child to the health center the same day or the day after he/she has a fever.****	91.4	94.0	94.0	98.1	94.7
Ask the health center for a blood test if you think your child has malaria***	89.9	93.4	92.1	97.5	93.5
Make sure your child takes the full dose of medications prescribed for malaria.**	95.6	98.3	98.1	99.3	98.1
Find the money to pay for the medications that the health care provider recommends to treat malaria.**	91.9	95.4	95.9	98.0	95.7
Percentage that can take all six actions ***	80.1	80.6	82.1	92.4	84.0
Significance of the differences between Areas: ** p<0.01;*** p<0.001					

### Descriptive norms

Early diagnosis of malaria is a sure way to prevent the complications associated with the illness. In the course of the survey, the respondents' perception of the norms in their community regarding the one-time treatment of fever was explored.

More than two-thirds believed that the norm in their community is to take a sick child to the health center on the same day or the day after fever begins (Table 3.5.4) with no difference between men and women. There were significant differences by zonal area with the highest (84.3%) in Abidjan.

**TABLE 3.5.4: PERCENT WHO PERCEIVE THAT THE NORM IN THEIR COMMUNITY IS TO TAKE A SICK CHILD TO THE HEALTH CENTER ON THE SAME DAY OR THE DAY AFTER THE ONSET OF FEVER, BY AREA - CÔTE D'IVOIRE 2018**

Area	Women*** (n=6537)	Men*** (n=1800)	All*** (n=8337)
North	73.8	75.9	74.3
Central	65.3	69.1	66.2
South	69.8	69.8	69.8
Abidjan	84.9	82.3	84.3
All	73.0	73.8	73.2
Significance of differences between Areas: *** p<0.001			

In addition, there were significant differences in educational level and place of residence. The result was higher in urban areas (75.4%) than in rural areas (69.5%). Similarly, people with secondary or higher levels of education (76.0%) were more likely than illiterate people (69.7%) to perceive immediate treatment as the norm.

#### Perceptions of health workers regarding the treatment of children with fever

In general, perceptions about the ability of health workers to treat malaria were very positive (81.7%). On the other hand, (73.6%) respondents believed that health workers charge parents for anti-malaria medications for children. These perceptions varied by region.

**TABLE 3.5.5: PERCEPTIONS OF THE BEHAVIOR OF HEALTH CARE PROVIDERS IN THE TREATMENT OF MALARIA BY ZONAL AREA - CÔTE D'IVOIRE 2018 (N=8335)**

Percentage which agrees with the following statements:	North	Central	South	Abidjan	All
Community health workers (CHW) in your community know how to treat malaria in children.	78.7	80.9	82.6	83.5	81.7
Your community's health workers charge parents for malaria treatment medications meant for children	75.0	67.0	78.9	74.3	73.6
Significance of differences between Areas: *** p<0.001					

## Behaviors

The data presented in this section address behaviors related to the treatment of children below the age of five with a fever. To provide a better understanding of the context of these behaviors, the analysis first examined the prevalence of fever in children under the age of five.

### Prevalence of fever

It was observed that 23.1% of children under 5 years of age had fever within the two weeks prior to the survey with no significant gender difference: 52.7% were male. There were no significant differences by wealth quintile, place of residence or zonal area (Table 3.5.6).

TABLE 3.5.6: PREVALENCE OF FEVER AMONG CHILDREN BELOW THE AGE OF 5 YEARS ON THE BASIS OF VARIOUS CHARACTERISTICS		
Socio-demographic characteristics		%
Household wealth quintile	Lowest	24.6
	Second	22.5
	Middle	23.9
	Fourth	23.2
	Highest	21.9
Place of residence	Rural	23.2
	Urban	23.1
Area	North	21.1
	Central	22.7
	South	23.7
	Abidjan	24.2
All = (n=3187)		23.2

### Care-seeking for fever

For the majority (89.6%) of cases of fever in children under five years of age, care was sought at some point during the illness. While 73.2% of women surveyed said they sought care for the child with a fever on the same day or the day after the fever began, care seeking in many cases was not primarily in a health facility or from a community health worker. Indeed, less than two-thirds (62.8%) of children with fever were brought to a health facility or community health worker as a first recourse within 24 hours. Some immediately sought care but not in a health facility or from a community health worker first (10.6%) while others (16.1%) did not immediately seek care, but brought the child to a health facility or to a community health worker first.



Prompt care-seeking at a health facility varied by zonal area and was more widespread in Abidjan (71.1%) than in the North (61.5%), the Central zone (64.1%) and the South (54.8%). There were also variations by household wealth quintile: women from higher quintile households were more likely than those from lower quintiles to immediately seek appropriate care (Table 3.5.7). Prompt and appropriate care-seeking was a little more common in urban areas than in rural areas.

**TABLE 3.5.7: PROPORTION OF WOMEN INTERVIEWED WHO IMMEDIATELY SOUGHT APPROPRIATE CARE FOR CHILDREN UNDER FIVE YEARS OF AGE WHO HAD FEVER - N=834**

Socio-demographic characteristics		%
Household wealth quintile **	Lowest	51.5
	Second	52.4
	Middle	69.8
	Fourth	68.2
	Highest	69.7
Type of place of residence	Rural	58.1
	Urban	66.0
All (n=723)		62.8

The ideational determinants most strongly correlated with the immediate and appropriate search for care included favorable attitudes toward immediate treatment, the perception that immediate treatment is the norm, the perception that community health workers are good at treating malaria in children, and the perception of the availability of antimalarial drugs in the health center. Women who had a favorable attitude towards prompt care seeking were 80.0% more likely to bring their sick child to a health-care facility within 24 hours. Similarly, the perception that prompt care seeking is the norm was associated with a 90.2% higher chance of immediately seeking care in a health center. In addition, the perception that antimalarial drugs are always available in health centers was associated with a 44.4% chance of immediately taking the child to a health center for treatment. The relationship with exposure to messages on malaria was positive as was the link with household wealth quintile.

**TABLE 3.5.8: RESULTS OF THE LOGISTIC ESTIMATION OF FACTORS ASSOCIATED WITH THE PROMPT CARE-SEEKING FOR FEVER IN A HEALTH FACILITY. CÔTE D'IVOIRE, 2018 (N=834)**

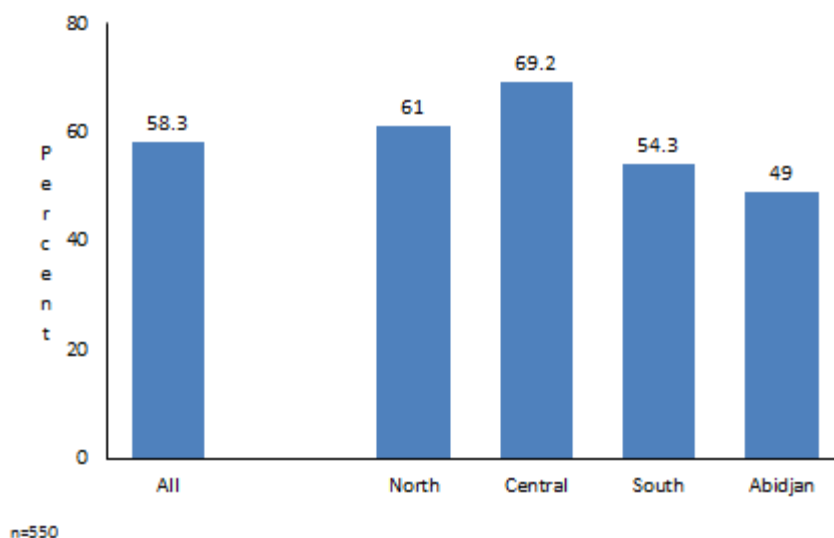
Explanatory variables	Odds ratio	Type variance
Level of education		
None	1.000	
Primary	0.857	0.171
Secondary or higher	0.748	0.165

Exposure to messages on malaria	1.502*	0.259
Perceived that prompt care-seeking is the norm	1.902***	0.365
Perceived that drugs are always available at the health center	1.444*	0.268
Positive attitudes towards prompt care-seeking	1.800***	0.302
Perceived self-efficacy for prompt care-seeking at a health center	1.377	0.300
Perceived that community health workers know how to treat malaria in children	1.852*	0.562
Perceived that community health workers treat their clients with respect	0.760	0.211
Perceived that health workers charge parents for malaria treatment drugs meant for children	0.911	0.183
Talked about malaria with wife	1.544*	0.291
Talked about malaria with friends/parents	0.738	0.140
Household wealth		
Not wealthy	1.000	
Wealthy <sup>a</sup>	1.523*	0.331
More than one child in the household had fever	0.618	0.189
Type of place of residence		
Rural	1.000	
Urban	1.192	0.237
Area		
North	1.000	
Central	1.331	0.333
South	1.021	0.249
Abidjan	1.053	0.328
Pseudo R <sup>2</sup>	8.0%	
Notes: ‡ p<0.1; * p<0.05; ** p<0.01; *** p<0.001; <sup>a</sup> The two highest quintiles		

### Diagnosis and treatment of fever in children

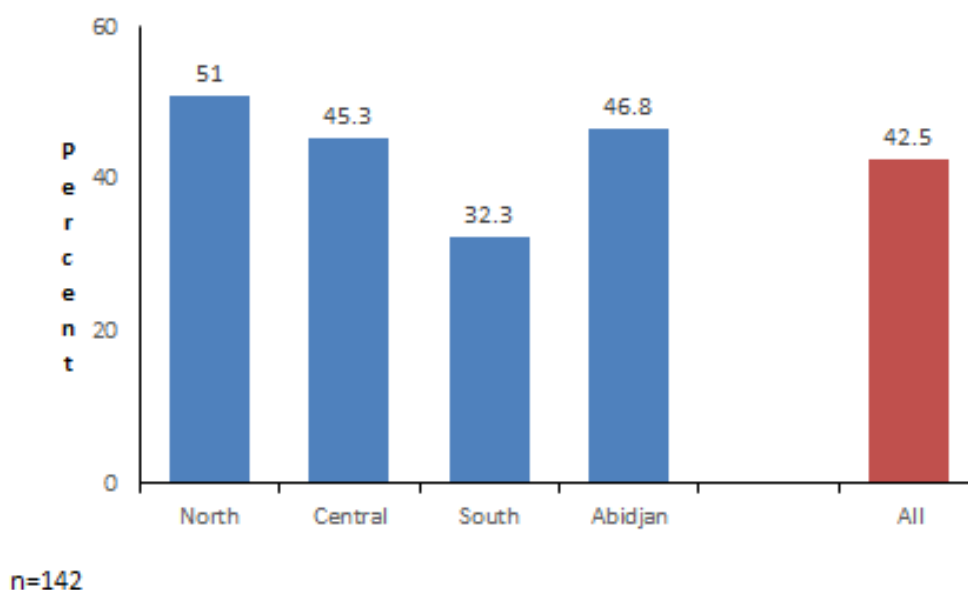
Less than half (45.9%) of children with fever in the two weeks preceding the survey received a malaria test. Even among the children who were taken to the health center at any time during their illness, diagnostic testing was not universal. Indeed, only 58.3% of these children were tested. It is not clear whether this was due to the fact that presumptive treatment is prevalent, or due to the lack of diagnostic testing kits. The prevalence of testing was lower in Abidjan (49.0%) than in the North (61.0%) or the Central zone (69.2%) (Figure 3.5.2).

Figure 3.5.2: Percent of children with fever taken to a health facility who received a malaria diagnostic test, Côte d'Ivoire 2018



According to the women's responses, the majority (82.3%) of the cases of fever that were screened were positive for malaria. However, there was a lower level of positivity in Abidjan (62.7%) compared to other areas (North: 85.1%; Central: 88.8%; South: 89.9%). Almost all (98.8%) the children who tested positive for malaria received some form of treatment. However, it appears that in most cases the child did not receive a dose of an ACT. Indeed, only 42.5% of women reported that the most recent child with fever who was diagnosed with malaria in their household received ACT. During the investigation, a great deal of effort was made to identify the drug the child took, including by asking women to name the drug and showing them the pictures of all ACTs available on the market. However, many women may not know the name of the drug given to the child. Of the children who received an ACT, the majority (88.1%) received it within 24 hours.

Figure 3.5.3: Percent that took an ACT among children whose diagnostic test was positive for malaria, Côte d'Ivoire 2018



## 3.6 Malaria in pregnancy

### Ideational determinants

In this section, data related to ideational variables that may influence the use of intermittent preventive treatment of malaria during pregnancy (IPTp) are presented. The variables evaluated include knowledge, attitudes, perceived severity of malaria during pregnancy, perceived efficacy of IPTp, communication with spouse, and perceived norms.

#### Knowledge

In all survey regions, knowledge about the time of the first antenatal visit (ANC 1) remains very high regardless of sex, place of residence or level of education (Table 3.6.1). Indeed, 80.9% of respondents know the time of the first antenatal consultation. There are significant differences by zone of residence regardless of the socio-demographic group; this knowledge indicator was higher (87.6%) in Abidjan than in other areas. Knowledge was low in the North (75.6%). In addition, men had higher levels of knowledge (84.4%) than women (79.9%). Similarly,

knowledge was higher among urban residents (84.1%) compared to those living in rural areas (75.5%). The level of knowledge was proportional to the level of education of the respondents.

**TABLE 3.6.1: % WHO KNOW THAT THE PREGNANT WOMAN SHOULD GO TO CONSULTATION FOR HER PREGNANCY FOR THE FIRST TIME IN THE FIRST QUARTER OR AS SOON AS SHE KNOWS SHE IS PREGNANT. N= 8365**

		North	Central	South	Abidjan	All
Sex	Men**	81.9	85.8	81.1	87.8	84.4
	Women***	73.9	80.0	76.2	87.6	79.9
Type of place of residence	Rural	72.8	79.3	73.7	60.3	75.5
	Urban***	78.2	83.2	81.3	88.0	84.1
Level of education	None**	70.7	78.2	74.2	84.1	76.3
	Primary**	76.1	83.3	74.0	85.5	80.1
	Secondary or higher***	84.6	82.9	83.5	90.2	85.9
All***		75.6	81.3	77.2	87.6	80.9
Statistical significance of differences between areas: ** p<0.01; *** p<0.001						

Most (77.5%) of the respondents know that a pregnant woman must go for at least four antenatal visits (Table 3.6.2). Generally speaking among women, urban residents, rural residents, and persons with no formal education, knowledge of the required number of antenatal consultations is higher in Abidjan (80.9%) than elsewhere. More women (81.0%) know the number of antenatal visits as compared to men (68.9%).

**TABLE 3.6.2: % WHO ARE AWARE THAT A WOMAN SHOULD HAVE ANTENATAL CONSULTATION DURING PREGNANCY AT LEAST FOUR TIMES DURING PREGNANCY. N=8399**

		North	Central	South/ Forest	Abidjan	All
Sex	Men	73.7	69.7	68.2	66.2	68.9
	Women**	78.5	80.5	79.2	85.2	81.0
	Rural	75.7	78.7	76.0	86.5	77.1

Type of place of residence	Urban	79.2	77.6	77.8	80.9	79.2
Level of education	None***	74.9	77.8	74.1	85.6	77.4
	Primary*	82.1	82.7	79.7	86.7	82.6
	Secondary or higher	79.4	74.7	78.1	76.4	76.7
All*		77.5	78.1	76.9	80.9	78.4
Significance of the differences across zones: * p<0.05; ** p<0.01; *** p<0.001						

As concerns the number of doses of sulfadoxin-pyrimethamine (SP) to be received by a pregnant woman during pregnancy, knowledge is generally low (Table 3.6.3). Indeed, barely a quarter of those surveyed know a woman must receive SP three times during pregnancy. The level of knowledge varied depending on area of residence and low levels of knowledge was more pronounced among men (15.6%) than among women (24.6%).

**TABLE 3.6.3: % WHO KNOW THAT A WOMAN SHOULD RECEIVE PREVENTIVE TREATMENT FOR MALARIA THREE TIMES DURING PREGNANCY, CÔTE D'IVOIRE. N=8365**

		North	Central	South	Abidjan	All
Sex	Men*	15.3	13.5	13.5	20.4	15.6
	Women	22.9	25.1	26.6	22.8	24.6
Type of place of residence	Rural	21.9	22.8	23.9	43.1	23.2
	Urban	20.8	22.3	23.6	22.0	22.3
Level of education	None*	19.7	25.6	23.9	18.3	22.5
	Primary	23.2	21.4	27.3	26.0	24.4
	Secondary or higher	23.3	20.2	21.0	22.7	21.7
	All	21.4	22.5	23.7	22.2	22.6
Significance of the differences between Areas: * p<0.05						

## Perceived severity

Malaria during pregnancy can have serious consequences for pregnant women and the fetus. Data on the perceived severity of malaria in pregnant women (Table 3.6.4) show real awareness of the problem. Indeed, 96.0% of women and 96.4% of men know that pregnant women are more likely to die from malaria than non-pregnant women. Similarly, 93.1% of men and 93.4% of women believe that when a pregnant woman has malaria, the effect on herself and her unborn child can be very severe.

TABLE 3.6.4: SOME PERCEIVED SEVERITY MEASURES OF MALARIA IN PREGNANT WOMEN N=8566						
% agree with the proposition that:		North	Central	South/ Forest	Abidjan	All
Pregnant women are more likely to die from malaria than non-pregnant women	Men	97.1	94.5	97.6	97.0	96.4
	Women	95.7	94.0	97.2	97.1	96.0
When a pregnant woman has malaria, the effect on herself and her unborn child is very serious	Men	93.2	92.5	94.1	92.7	93.1
	Women	93.6	92.4	94.7	92.9	93.4
% with the perceived severity of malaria in pregnant women	Men	93.1	90.5	92.0	89.8	91.1
	Women	91.1	89.2	92.9	89.9	90.8

## Attitudes

Attitudes towards ANC and IPT are mixed. A small proportion of women (8.6%) and men (7.0%) believe that a woman can take SP on an empty stomach without any problems. More than a third of women (40.9%) and men (36.5%) believe that a pregnant woman must wait a few months before consulting a health worker. One-fifth of women and 15.2% of men believe that consultation with a health worker early in pregnancy is not necessary if the woman has had children. However, the majority of respondents (90.6% among women and 91.0% among men) believe that the drug to prevent malaria in pregnant women is safe for her and her baby.

TABLE 3.6.5: SOME ATTITUDE MEASURES TOWARDS ANC/IPT, BY AREA, CÔTE D'IVOIRE 2018 MEN (N=1818); WOMEN (N=6577)						
Percentage that agree with the following statements:	Sex	Area				
		North	Central	South	Abidjan	All

Pregnant women can take the malaria-prevention drug at fasting without any problem.	Men	7.7	7.6	7.4	5.6	7.0
	Women	8.1	9.1	9.2	7.7	8.6
Even if a woman believes she is pregnant, she should wait a few months before consulting a health worker.	Men	35.9	36.1	36.5	31.1	34.9
	Women***	41.3	41.9	40.9	29.6	38.3
A woman who has already given birth does not need to consult a health professional as soon as she thinks she is pregnant.	Men*	20.5	14.9	15.2	12.4	15.1
	Women	21.6	19.2	19.9	17.9	19.4
The medicines given to pregnant women to prevent malaria are safe for themselves and their babies.	Men**	84.0	88.1	91.0	89.4	88.7
	Women	90.9	91.7	90.6	92.0	91.3
Percentage with high level of positive attitudes towards ANC/IPTp	Men	60.3	60.0	60.2	64.8	61.4
	Women**	56.8	53.2	54.6	62.6	56.6
Significance of the differences across zones:*p<0.05 ** p<0.01; *** p<0.001						

It is observed that positive attitudes towards ANC and IPT were not widespread, as only 56.6% of women and 61.4% of men had positive attitudes towards ANC/IPT. Positive attitudes were generally more widespread in Abidjan (63.1%) than in other areas (North - 57.5%); Central - 54.7%; South - 55.8%).

### Perceived efficacy

The majority of respondents believed that drugs given to pregnant women to prevent malaria are effective (Table 3.6.6). About 96% of women and men believe that these drugs are effective in keeping mothers healthy. Similarly, almost all of men (95.4%) and women (95.8%) interviewed were of the opinion that drugs given to pregnant women to prevent malaria are effective to ensure that their baby is healthy.

**TABLE 3.6.6: SOME PERCEIVED EFFECTIVENESS MEASURES OF IPT, CÔTE D'IVOIRE 2018 - MEN (N=1813); WOMEN (N=6566)**

Percentage of respondents who agree with the following propositions:	Women	Men
Drugs given to pregnant women to prevent malaria are effective in keeping mothers healthy.	96.3	95.5



Drugs given to pregnant women to prevent malaria are effective in ensuring their baby is healthy	95.4	95.8
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### Perceived Self-efficacy

Perceived self-efficacy is a belief in an individual's ability to take relevant actions. The objective of this subsection is to present data related to the perceived self-efficacy of respondents as far as IPTp and ANC are concerned. The questions are different for men and women. Therefore, we present the results separately for both sexes (Tables 3.6.7 and 3.6.8).

TABLE 3.6.7: SOME PERCEIVED SELF-EFFICACY MEASURES RELATED TO ANC/IPT BY AREA - CÔTE D'IVOIRE 2018 - WOMEN: N=6566					
Percentage of respondents who believe they can:	North	Central	South	Abidjan	All
Go to antenatal consultation as soon as I think I'm pregnant***	87.5	90.7	88.7	95.5	90.9
Convince my husband/partner to accompany me to the antenatal clinic***	82.0	85.3	85.0	93.5	86.8
Go for at least four antenatal consultations in an antenatal clinic***	91.4	95.8	95.1	98.6	95.6
Go to antenatal consultation even if my religious leader disagrees**	89.8	90.7	91.1	94.8	91.7
Take preventive treatment for malaria at least three times during pregnancy**	96.7	97.4	97.4	98.8	97.7
Ask for medicines that help prevent malaria when I go to antenatal clinics***	87.9	94.2	93.2	97.5	93.8
Percentage that can take all six actions ***	70.2	71.6	70.9	84.7	74.6
Significance of the differences across zones: **p<0.01,*** p<0.001					

Perceived self-efficacy for ANC and IPTp is very high among women (Table 3.6.7). The majority believe that they can take medication to prevent malaria at least three times during pregnancy and go for at least four ANC visits. Similarly, most of these women were confident that they can go to ANC at a health center even if their religious leader disagrees and that they can convince their husbands to accompany them to the health center. Overall, nearly three-quarters (74.6%) of women believe they can take all six relevant actions; this perception is higher in Abidjan (84.7%) than elsewhere.

**TABLE 3.6.8: SOME PERCEIVED SELF-EFFICACY MEASURES RELATED TO ANC/IPTP BY AREA - CÔTE D'IVOIRE 2018 - MEN: N=1813**

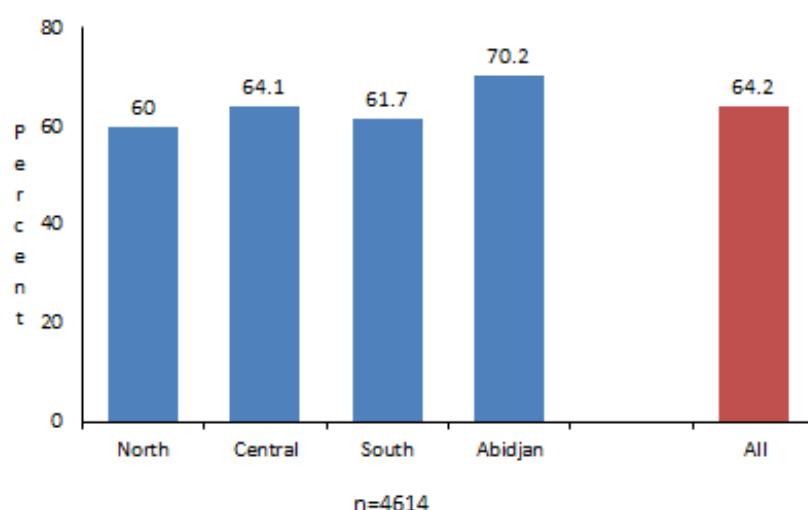
Percentage which believe they can:	North	Central	South	Abidjan	All
Support my wife/partner to go for antenatal consultation as soon as I think she is pregnant**	97.3	96.0	94.8	98.4	96.5
Accompany my wife/partner to the health center for antenatal consultation***	87.3	85.6	86.4	96.7	89.0
Support my wife/partner to attend at least four antenatal clinics at the health center**	96.4	92.4	94.1	98.4	95.1
Support my wife/partner for antenatal counseling even if my religious leader disagrees*	95.7	92.8	93.6	97.2	94.6
Support my wife/partner to take medication to prevent malaria at least three times during pregnancy.*	99.4	98.4	98.6	99.7	99.0
Encourage my wife/partner to ask for drugs that help prevent malaria when she visits antenatal clinics	96.6	96.7	97.5	98.9	97.5
Percentage that can take all six actions ***	79.5	74.9	75.5	91.8	80.2
Significance of the differences between Areas: *** p<0.001					

In men, the perception of self-efficacy for ANC and IPTp is also high (Table 3.6.8). Almost all men surveyed believe they can support their wives to take at least three doses of IPTp, to go for at least four ANC visits, and to go for antenatal consultation even if their religious leader disagrees. Most men also feel able to accompany their wives to the health center for ANC. As observed for women, the overall result of the perception of self-efficacy for ANC and IPTp is higher (91.8%) in Abidjan.

### Communication between spouses and decision-making

Sexual and reproductive health indicators are influenced by communication between spouses and the role of each partner in decision-making. This section shows the characteristics of this communication between spouses in relation to ANC and decision-making regarding the use of health services among respondents.

**Figure 3.6.1: Percent of women who already discussed antenatal care with their spouse, Côte d'Ivoire 2018**



Just under two-thirds of women in couples have already discussed ANC with their husband/partner. The data show that communication between spouses is more common (70.2%) in Abidjan than in other areas (Figure 3.6.1).

In addition, communication between spouses regarding ANC varies according to the place of residence and the level of education. Overall, communication between spouses is more common in urban areas than in rural areas. In all areas except Abidjan, the prevalence of communication between spouses increases as the level of education increases (Table 3.6.9).

**TABLE 3.6.9: % OF WOMEN WHO HAVE ALREADY EXCHANGED INFORMATION ON ANTENATAL CONSULTATION WITH THEIR HUSBANDS - N=4614**

		North	Central	South	Abidjan	All
Type of place of residence	Rural	57.2	62.2	56.3	53.2	58.6
	Urban	63.3	65.9	68.7	70.4	68.0

Level of education	None*	55.0	60.8	57.6	68.5	59.8
	Primary	68.0	65.8	65.4	65.9	66.0
	Secondary or higher	71.9	69.0	67.6	74.4	71.1
All*		60.0	64.1	61.7	70.2	64.2
Significance of the differences between Areas: * $p < 0.05$						

With respect to decision-making on ANC visits, about one third of the respondents living as a couple who had at least one child reported that the decision to attend ANC was made jointly with their spouse (Table 3.6.10). Such decisions were more common (38.5%) in Abidjan and Central zone (36.4%) than in other areas. Men were more likely than women to acknowledge that the decision was made jointly. In addition, joint decision-making was more frequent in urban areas and among more educated people.

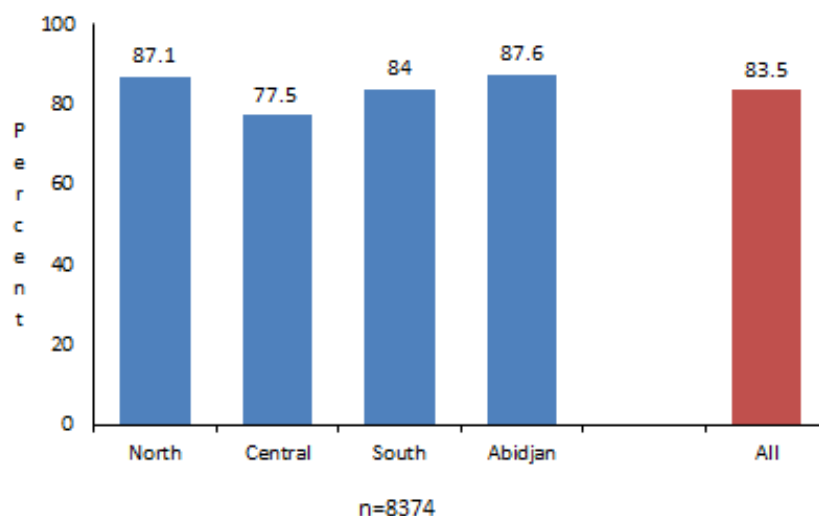
**TABLE 3.6.10: % WHO SAY THAT THE DECISION TO GO TO THE ANTENATAL CLINIC IS MADE JOINTLY WITH THEIR SPOUSE N= 5357**

		North	Central	South	Abidjan	All
Sex	Men*	30.6	41.1	35.9	53.4	41.3
	Women*	26.4	35.6	32.1	35.7	33.1
Type of place of residence	Rural*	21.7	35.2	30.4	58.0	30.6
	Urban	33.1	37.6	35.4	38.2	36.8
Level of education	None	20.8	32.4	26.2	35.3	28.3
	Primary	28.3	34.4	36.6	36.1	34.8
	Secondary or higher	47.1	45.1	41.4	42.0	43.2
All*		27.0	36.4	32.7	38.5	34.3
Significance of the differences between groups: * $p < 0.05$						

## Descriptive norms

Generally speaking, most respondents (83.5%) believe that going for at least four ANC visits is the norm in their community. This perception is slightly more common among women (84.1%) than among men (81.4%). Perception of four ANC visits as the norm also varied by zonal area of residence and was more widespread in Abidjan (87.6%) and in the North (87.1%) than in the Central zone (Figure 3. 6.2). On the other hand, results were similar between urban (81.5%) and rural areas (83.1%).

**Figure 3.6.2: Percent of respondents who perceived that obtaining four ANC visits was a norm in their community, Côte d'Ivoire 2018**



Regarding the use of malaria-prevention drugs by pregnant women, about two-thirds (70.0%) of respondents believe this practice is the norm in their community. Table 3.6.11 shows how the results vary by zonal area and gender. There was a higher proportion of respondents in Abidjan (79.7%) than in other areas who perceived the use of medications to prevent malaria during pregnancy as the norm. In each zone, women were more likely than men to perceive the practice as the norm. The data shows a slight difference between rural areas (66.7%) and urban areas (69.7%).

**TABLE 3.6.11: % WHO BELIEVE TAKING MEDICATION TO PREVENT MALARIA DURING PREGNANCY IS THE NORM IN THEIR COMMUNITY - N=8371**

		North	Central	South	Abidjan	All
Sex	Men***	58.2	60.1	61.3	76.4	64.5
	Women***	71.5	66.2	68.8	80.7	71.5
All***		68.7	64.9	67.2	79.7	70.0

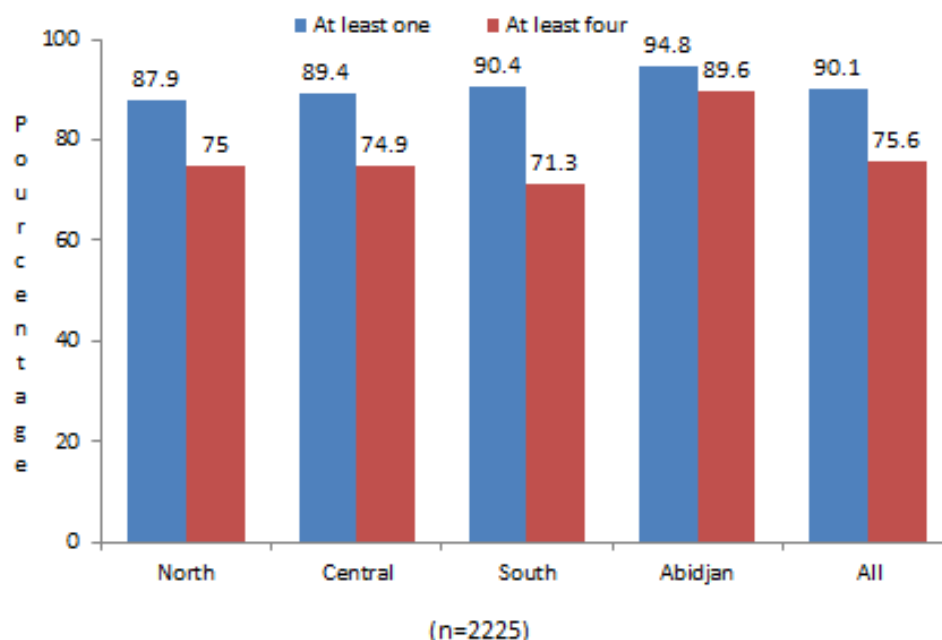
*Significance of the differences between groups \*\*\* p<0.001*

## Practices and behaviors

### Antenatal Care (ANC)

The majority (90.1%) of women who had at least one child in the last two years had at least one ANC visit. Results show that the level of ANC is higher in Abidjan than elsewhere (Figure 3.6.3). Obtaining at least four ANC visits appears high, however some variations are observed. Three-quarters of women had at least four ANC visits during their last pregnancy with women in Abidjan more likely to do so (88.5%) (Figure 3.6.3) compared to women in the other zones. The lowest level is observed in the South area (71.3%). The results (Table 3.6.12) show that there is a significant difference between zonal areas and socio-economic characteristics. The rate is

**Figure 3.6.3: Percent of pregnant women in the last two years that obtained at least one and at least four ANC visits, Côte d'Ivoire 2018**



higher in urban areas (82.2%) than in rural areas (69.5%). The same is true for women with secondary or higher education (81.9%) compared to those without education (71.9%). In addition, women under 25 years of age are less likely to receive the recommended number of ANC visits (69.6%) than older women. The proportion of pregnant women who have had at least four ANC visits increased with education and household wealth quintile.

**TABLE 3.6.12: % OF WOMEN WHO HAVE HAD A CHILD IN THE LAST TWO YEARS AND HAD AT LEAST FOUR ANC VISITS ACCORDING TO SOCIO-ECONOMIC CHARACTERISTICS - N=2225**

Socioeconomic characteristics		% having had at least 4 ANC visits
Type of place of residence***	Rural	69,5
	Urban	82,2
Age group***	15 - 24 years	69,6
	25 - 34 years	78,1
	35 - 44 years	79,6
	45 years or older	76,9 (n=13)
Educational level	None	71,9
	Primary	77,2
	Secondary or higher	81,9
	Lowest	63,9
	Second	71,0
	Middle	77,6
	Fourth	83,5
	Highest	88,2
All		75.6
<i>Significance of the differences between groups: *** <math>p &lt; 0.001</math></i>		

For most (79.9%) of women, the source of ANC was a public hospital or health center (Table 3.6.13). Less than one tenth of the women attended a private institution for their ANC. A high

proportion of women in Abidjan (14.4%) than in the other areas sought their ANC in a private health facility. Generally, only (2.2%) of women visited a Community Health Worker

TABLE 3.6.13: SOURCE OF ANC BY AREA - N=2008					
Source	North	Central	South	Abidjan	All
Hospital/Public Health Center	80.9	82.2	79.5	76.4	79.9
Private Hospital/Health Center	8.2	8.2	8.4	14.4	9.6
Infirmary/maternity	7.6	7.9	8.1	3.4	6.8
Community Health Worker	0.9	1.6	3.0	4.6	2.6
Other	2.5	0.4	1.1	1.152	1.1
Total	100.0	100.0	100.0	100.0	100.0

### Support from spouse

About one third (35.2%) of women were accompanied by their husbands for ANC at least once during their last pregnancy. The proportion of women who were accompanied by their husbands was higher in the North (43.0%) than in the Central zone (33.9%), South (34.2%) or Abidjan (32.3%).

### Obtaining mosquito net during or after pregnancy

More than half (52.7%) of women received a mosquito net at a health facility during their last pregnancy (Table 3.6.14). The proportion of women who received a net during ANC was 46.8% in Abidjan compared to 56.5% in the Central zone, 54.2% in the South and 51.2% in the North. Receiving mosquito nets during ANC was more frequent in rural areas (57.8%) than in urban areas (49.2%).

Overall, a quarter (25.3%) of women who had a child in the last two years received a net at the time of birth. More women in the Central zone (31.3%) than in other zonal areas received a net at the time of delivery. In addition, about one fifth (19.4%) received a mosquito net when their child was vaccinated; this indicator higher in the Central zone (24.0%) than in the other zonal areas.

In all, about two-thirds of the women received a mosquito net either during antenatal consultations, during childbirth or during child immunizations.



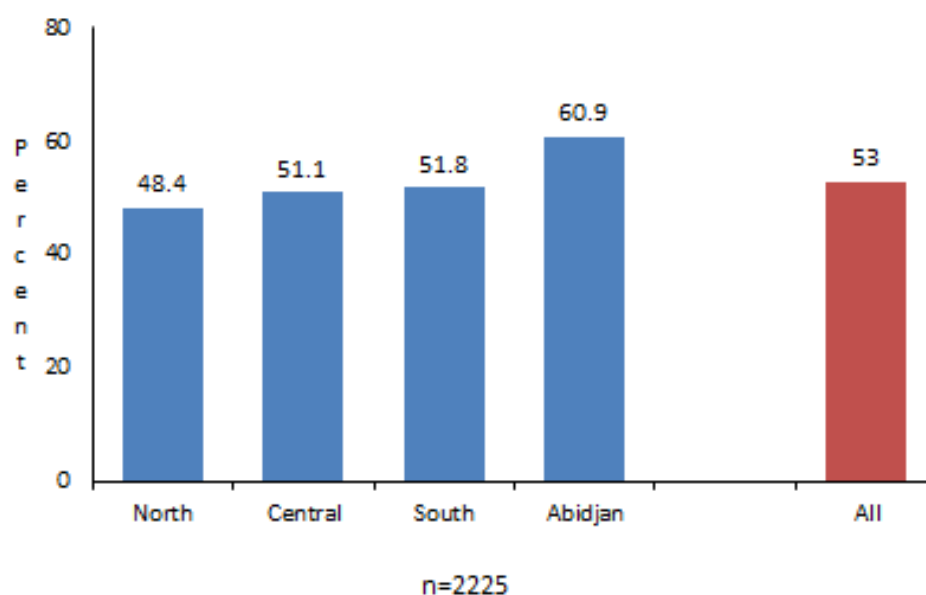
**TABLE 3.6.14: % OF RESPONDENTS WHO RECEIVED A NET DURING OR AFTER PREGNANCY, CÔTE D'IVOIRE, 2018 - N=2225.**

Period	North	Central	South/ Forest	Abidjan	All
During Antenatal Consultation	51.2	56.5	54.2	46.8	52.7
At child birth***	19.2	31.3	24.5	23.0	25.3
During child vaccination***	14.0	24.0	20.3	16.1	19.4
On any of these occasions*	56.8	66.1	64.0	59.0	62.3

### Use of IPTp

The majority (86.5%) of women who had a child in the last two years received at least one dose of SP during their last pregnancy. However, only half (53.0%) of these women received at least three doses. The proportion receiving at least three doses of SP was higher (60.9%) in Abidjan compared to other areas.

**Figure 3.6.4: Percent of women pregnant in the last two years who obtained at least three doses of SP, Côte d'Ivoire 2018**



The level of access of pregnant women to the IPTp varied according to the number of ANC visits, age, level of education, place of residence, and household wealth (Table 3.6.15). Women who have had at least four ANC visits had higher levels of access to IPTp than women who had three or fewer ANC visits. However, it should be noted that among women with at least four ANC visits, only 57.5% received three or more doses of SP.

In addition, there was a higher level of access to IPTp among educated women compared to uneducated women. The proportion of women who received at least three doses of SP was higher in urban areas (57.5%) than in rural areas (47.3%). In addition, younger women (<25 years) were less likely to receive the appropriate number of doses of SP. Moreover, the proportion receiving at least three doses of SP increased as household wealth quintile increased.

**TABLE 3.6.15: % OF WOMEN WHO HAVE HAD A CHILD IN THE LAST TWO YEARS WHO HAVE RECEIVED AT LEAST THREE DOSES OF SP ACCORDING TO SOCIO-ECONOMIC CHARACTERISTICS**

Socioeconomic characteristics		% having received at least 3 doses of SP
Number of ANC***	0 - 3	36.9
	4 or more	57.5
Age group*	15 - 24 years	47.3
	25 - 34 years	54.5
	35 - 44 years	57.5
	45 years or older	58.0 (n=7)
Level of education**	None	50.2
	Primary	51.8
	Secondary or higher	59.5
Household wealth quintile***	Lowest	45.5
	Second	46.1
	Middle	54.9
	Fourth	55.4

	Very rich	62.5
Type of place of residence***	Rural	47.8
	Urban	56.7
All		52.9
Significance of the differences between groups: * $p<0.05$ ; ** $p<0.01$ ; *** $p<0.001$		

The majority (86.2%) of women received their doses of SP during an antenatal consultation, while 11.4% reported receiving the doses during another visit to the health center. It is important to note that about a quarter (26.7%) of women reported receiving their doses of SP in a pharmacy.

There are significant differences in the source of SP doses by zonal area (Table 3.6.16). ANC remains the major source of SP, however, fewer women receive their SP dose during an ANC visit in Abidjan (80.6%) compared to other zonal areas with the highest in the Central zone (92.6%). In addition, a different visit to a health center and the pharmacy represent less frequent sources in the Central zone than in the other zones. A higher proportion of women in Abidjan received their dose of SP during another visit to a health center (17.5%) or a pharmacy (44.5%). Nearly half of the women in Abidjan mentioned the pharmacy as the place where they got SP.

TABLE 3.6.16: SOURCES OF SP DOSES AMONG WOMEN WITH AT LEAST ONE CHILD IN THE LAST TWO YEARS BY AREA. (N=1898)				
Indicator	North	Central	South/ Forest	Abidjan
During antenatal consultation***	84.6	92.6	84.5	80.6
During another visit at the health center*	9.7	9.6	9.9	17.5
Pharmacy***	22.4	9.9	33.9	44.5
Significance of the differences between groups: * $p<0.05$ ; *** $p<0.001$				

Generally speaking, about three-quarters (72.0%) of women who received at least one dose of SP reported having received their doses only from a health center either during an antenatal consultation or during another visit. The health center as the sole source of SP was more common in the Central zone (89.0%) compared to other areas (North - 76.9%, South - 64.1%, Abidjan - 54.1%). Among women who received SP from a source other than a health center,

75.4% reported paying for the drug. It is surprising, however, that 24.3% of women who received their dose only from a health center reported paying for the drug. Women were less likely to pay for a dose of SP obtained from a health center in the Central zone (19.4%; compared to 30.7% in the South, 24.6% in the North and 25.5% in Abidjan).

### 3.7 Indoor Residual Spraying (IRS)

Indoor Residual Spraying (IRS) involves spraying a house with an effective dose of long-lasting insecticide. Spraying is usually done once or twice a year. Insecticide is sprayed on the inner surfaces of walls and ceilings where malaria vectors are likely to land after their blood meal. Such a program is planned to be implemented in Côte d'Ivoire. The survey collected information on the ideational determinants of the respondents vis-à-vis IRS.

#### Ideational determinants

The ideational determinants collected in the survey were knowledge, attitudes, and perceived effectiveness of IRS.

#### Knowledge

Awareness of IRS was low among respondents (Table 3.7.1) with only 10.7% having already heard of IRS. This proportion was higher in Abidjan (18.5%) than in other areas (North - 6.2%, Central - 9.2%, South - 10.2%):  $p < 0,001$ . Men (15.1%) were more likely than women (10.6%) to have heard of the program:  $p < 0,001$ . Awareness of IRS increased as the level of education increased: from 6.7% among uneducated people to 16.7% among those with a secondary or higher level of education.

TABLE 3.7.1: KNOWLEDGE AND INTENT OF IRS					
Indicator	North	Central	South/ Forest	Abidjan	All
% who heard about the IRS program (n=8320)	5.9	10.7	9.2	18.5	11.5
% who will agree to spraying their home among those who had heard of IRS (887)	95.7	92.7	92.4	88.4	92.0
% who will agree to spraying their home (after hearing a description of IRS) among those who had not heard of IRS (n=5895)	90.8	89.4	88.6	86.3	88.6

#### Potential IRS Acceptance

With regard to the acceptance of IRS by the respondents who had already heard of it, it appears from Table 3.7.1 that this program would be accepted by the respondents. Indeed, 92.0% of

those surveyed would agree to have their homes sprayed. For those who have never heard of IRS, there was also a high proportion (88.6%) of IRS acceptance once the program was described to them.

### Attitudes

Attitudes regarding IRS were mixed. More than half of the respondents (61.6%) felt that the benefits of spraying insecticides are worth the effort to have their personal belongings removed to allow spraying. However, almost half (46.8%) would find it annoying to leave their belongings outside their homes while the insecticide is sprayed on the walls. This attitude was somewhat more prevalent in Abidjan (51.2%) than in the South (41.4%). On the other hand, less than one-fifth of the respondents in the Central zone and Abidjan versus one-quarter in the South and North believe that people have problems with bed bugs/fleas once insecticides have been sprayed on walls.

TABLE 3.7.2: SOME ATTITUDINAL MEASURES REGARDING THE IRS BY AREA - CÔTE D'IVOIRE 2018 - INTERVIEWERS WHO HEARD ABOUT THE IRS					
Percentage that agrees with the following propositions:	North (n=99)	Central (n=252)	South (n=272)	Abidjan (n=264)	All (n=887)
Many people have skin problems (skin rashes, itching) after spraying insecticides on the walls inside their houses	12.9	15.4	19.9	18.1	17.3
A person can safely touch the walls after the sprayed insecticide has dried up.	74.0	62.9	62.0	68.9	66.1
People have problems with bed bugs/fleas after spraying insecticide on walls	25.9	16.5	28.0	18.1	20.6
The benefits of spraying insecticide in my home are worth the effort of having to take out my belongings to allow spraying.	68.0	64.2	59.2	59.9	61.6
It would bother me to leave my belongings outside my house while the insecticide is sprayed on the walls	50.0	43.6	41.4	51.2	46.8

Spraying the insecticide on the interior walls of a house to kill mosquitoes does not cause any health problems for people living in the house.	65.9	72.1	64.0	73.2	70.2
Percentage with positive IRS attitudes					
Men (n=260)					
Women (n=620)	82.2	78.4	77.3	70.0	75.9
	68.1	71.0	66.8	68.6	68.8

### Perceived efficacy

Generally speaking, respondents who had heard of IRS perceived the method is an effective means of preventing malaria (85.8%). In addition, about three-quarters (73.7%) of respondents believe that people living in sprayed houses are less likely to have malaria.

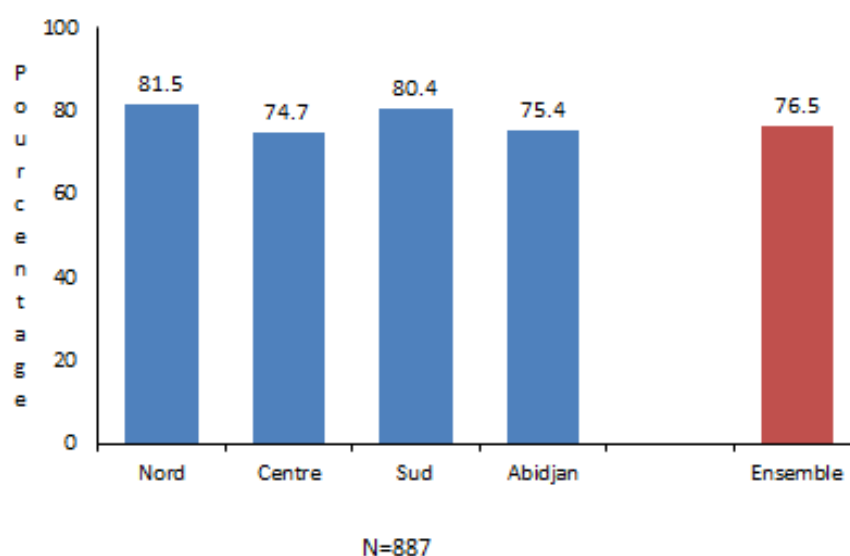
The results of Table 3.7.3 also show that there is a significant difference between men and women in perceived efficacy of IRS. Men were more likely than women to believe that IRS is an effective way to prevent malaria.

TABLE 3.7.3: PERCEPTIONS OF THE EFFECTIVENESS OF IRS AMONG THOSE WHO HAVE ALREADY HEARD OF THE PROGRAM - N=880			
Percentage of agreement that:		People living in houses where insecticide has been sprayed are less likely to have malaria	Spraying insecticide on the interior walls of a house is an effective way to prevent malaria.
Gender	Men	76.9	90.4**
	Women	72.4	83.9
Type of place of residence	Rural	73.3	86.4
	Urban	73.9	85.6
Area	North	78.8	83.8
	Central	71.8	88.5
	South	71.9	82.4
	Abidjan	75.6	87.4
Level of education	None	72.7	86.3
	Primary	72.8	86.9
	Secondary or higher	74.6	85.1
All		73.7	85.8

### Perceived self-efficacy

IRS requires that households move out their belongings so that agents can spray the interior of their homes. It is therefore important for people to feel able to move out their belongings to facilitate spraying. About two-thirds (76.5%) of respondents believe they can move out furniture to prepare their homes for spraying. Measured in this way, IRS self-efficacy is more pronounced in the northern area (81.5%) than in other areas (Figure 3.7.1). The data does not reveal significant variations in this indicator by other characteristics.

Figure 3.7.1: Percent of respondents with perceived self-efficacy to remove all their possessions in preparation for IRS, Côte d'Ivoire 2018



### Behaviors

#### IRS Proposition

In general, it appears that indoor residual spraying was offered to 129 households, or 2.2% of the total. The number of households that reported having been approached for the spraying of the interior walls of their homes varied by zonal area. For example, in the North, only two households were approached for spraying; the number was higher in the South (47) and Abidjan (57).

Among these households, the proportion of those covered by IRS was 57.4%; in other words, more than half of the households to which the IRS was proposed actually benefited from this strategy and was higher in the southern region (72.3%). More than half (52.7%) of households

that had already received IRS have benefited from the IRS conducted by a government agent or program.

## 4 Conclusions and Recommendations

During the survey, relevant information was collected from 5,969 households, 6,749 women and 1,930 men. The data collected are representative at national, regional as well as urban and rural levels. The results have implications for the development and implementation of social and behavioral change programs. Recommendations from these data are presented in this section.

### General Recommendations

#### Media exposure

- It is not apparent that the information available only on radio can reach a significant number of the Ivorian population. More precisely, only one-third of households own a radio station, and only half of households that own a radio station regularly listen to it. The television should be considered as the preferred channel for all target groups.
- However, to maximize the reach of communication programs, it is important to adopt a multi-media approach. Particularly for women, youths and the poorest classes of society, apart from the television and the radio, it is important to consider other media to ensure that the maximum target audience is reached.
- Further research is needed to determine the most relevant additional channels for each target audience group. For example, based on research data, social media and mobile technology can be seen as other components of a comprehensive strategy to reach out to youths. For women and the poor, community mobilization, messaging within tontines, community volunteers and mobile technology are relevant options to be considered.
- To maximize the reach of information disseminated through the radio, programs must be broadcast in the morning. People aged 35 and above are more likely to be reached if radio programs start early in the morning. On the other hand, the radio programs broadcast in the evening are more likely to reach people under the age of 35.
- For television programs, the early evening is the best time for women, while the late evening would be better for men and for people aged 35 and above.
- It is relevant to ensure that women, rural residents, persons below 25 years, poor households and the uneducated receive relevant information on malaria and this should be the priority of every program. These vulnerable groups are also the least likely to listen to the radio regularly. An approach based on a combination of mass media and community channels is therefore appropriate.



### **Cross-sectional ideational determinants**

- People need messages that highlight the severity of malaria and the vulnerability of the population to the disease. People need to understand that it is possible to catch malaria all year round and that the disease can have dangerous consequences regardless of the age of the patient.
- Interpersonal communication plays an important role in behavior change. Messages that encourage people to talk about malaria treatment and prevention with their loved ones are therefore relevant to this population. However, it is important that these messages include factual information about malaria and attempt to correct misinformation.
- In addition, it would be interesting to conduct further research to determine whether there are social and cultural factors limiting this type of discussion, especially among women.
- The results highlight the need to better understand the quality of malaria-related curative care in health centers. Further research focusing on health care providers and their interactions with their patients is indicated. This research can be based on a mixed (quantitative and qualitative) method to better understand the conditions of the treatment of fever in health facilities.

### **Ownership and Use of LLIN - Behavioral determinants**

- The effectiveness of mosquito nets is an ideational variable that clearly needs to be strengthened among the Ivorian population. It is important to make men and women understand that sleeping under a mosquito net every night is an effective way to prevent malaria.
- The population is generally not opposed to the use of white mosquito nets. Although white mosquito nets are not preferred, people would still sleep under a white mosquito net if they have no choice. However, the results point to the fact that the population needs to get used to white mosquito nets, as very few nets currently available in households are white. It is therefore important to highlight the health benefits of LLINs. Furthermore, suppose that from now on only white nets will be distributed by all donors, additional research data can be used to promote the acceptance of white LLINs by combining white with the qualities that the population appreciates; for example, purity, cleanliness or piety.
- Programs should consider using modeling approaches to reinforce the perception that the use of nets is the norm, especially in Abidjan. These approaches must be based on qualitative data to determine the content of relevant messages.

### **Ownership and Use of LLIN - Practices and Behaviors**

- Efforts to strengthen knowledge and capacity in relation to the repair of mosquito nets are relevant to the Ivorian population. However, and especially as the result of a

program for the mass distribution of LLINs, interventions aimed at improving the knowledge and capacity of the population to manage their LLINs well to make them last longer are relevant.

- There is a need to strengthen the public's knowledge of the maintenance of nets. It is also necessary to better understand and target the logistical factors that prevent households from drying their nets in the shade.
- It is clear that there is a problem with the availability of mosquito nets in households in Côte d'Ivoire, especially in Abidjan. It is true that LLINs should continue to be made available free of charge to the population. However, there is a need to review the strategies for mass distribution, especially in urban areas. One can only wonder if the current strategy of dropping mosquito nets into a depot and waiting for people to get them from there is effective in urban areas. Alternative solutions should be identified and tested using a human-centered design approach. Advocacy with donors to mobilize additional resources to address unmet needs in LLIN.
- It is important to continue making efforts to increase awareness in the use of LLINs. Messages should highlight the need for every household member to sleep under a LLIN every night of the year. Relevant interventions can be based on an ideation model. These interventions must seek to reinforce relevant ideational variables, including perceived self-efficacy, supportive attitudes towards the use of LLINs, interpersonal communication, and the perception of the use of LLINs as the norm.

#### **Treatment of fever in children - Behavioral determinants**

- It is necessary to increase the perceived effectiveness of the screening test. People and even providers need to understand that the test result is reliable and that antimalarial drugs should not be given to a person whose malaria test turned out negative.
- Messages that present rapid processing as the norm are also relevant to this population.
- The policy related to the management of malaria cases among children in Côte d'Ivoire specifies free consultation and medications in public health facilities. The perception that these services are paid for among the population needs to be corrected. To prevent the illicit sale of drugs donated by the state and its partners free of charge, the NMCP must educate the public about the national policy on free antimalarial drugs.
- It is also relevant to strengthen the capacity of health workers to better communicate with their patients, especially with regard to the costs of services.

#### **Treatment of fever in children - Practices and behaviors**

- There is the need to continue to promote the immediate and appropriate search for treatment for children having a fever. In this regard, the key message must be for people to bring their children suffering from a fever directly to the health center and within 24 hours.

- To be effective, communication materials must present the immediate search for treatment for children having a fever as the norm, promote the idea that antimalarial drugs are still available in health centers, promote favorable attitudes towards the immediate search for care, strengthen self-efficacy for the immediate and appropriate search for care, and highlight the competence of health workers to treat malaria well.
- Interventions that seek to strengthen providers' knowledge and competence in the treatment of children having a fever are relevant. To be effective, these interventions must be based on the results of a research that identifies structural and logistical barriers to the provision of appropriate care in health facilities.

### **ANC/IPTp**

- The public needs to be better informed about the SP, especially regarding the number and timing of the doses. There is also a need to promote attitudes favorable to ANC and SP. The population particularly needs to better understand that taking SP on an empty stomach does not pose any risk to pregnant women.
- It is also important to emphasize the importance for the pregnant woman to start ANC early in her pregnancy and to comply with national policy
- Interventions that seek to promote an adequate number of ANC visits remain relevant to this population. These interventions should focus on the number of ANC visits to be made and the recommended time for the first visit.
- Programs should also emphasize the importance of male involvement in antenatal care. In this regard, the relevant interventions will be those that promote communication between spouses regarding antenatal care.
- Improving the prevalence of at least three doses of SP should be a priority in any health programs. Relevant strategies will include efforts to identify and target barriers not only to demand but also to supply. Indeed, the discrepancy between the prevalence of the appropriate number of ANC visits and the prevalence of at least three doses of SP suggests that there are barriers to service delivery that need to be addressed.
- It should be noted that the fact that many women receive their doses from a pharmacy calls for concern. Messages that encourage women to go to an institution to receive their doses of SP are relevant. Efforts to minimize SP stock failures in health facilities are also relevant.

### **IRS**

- IRS is an intervention that may be acceptable to the Ivorian population. However, in implementing this program, it is essential to take into account people's concerns about the program and to develop effective strategies to address them. For example, those responsible for implementing the program should find ways to minimize the disadvantages of a household's need to move its property out of the house while the house is sprayed.

- It is also necessary to clarify the link between IRS and skin problems and the presence of insects in the house.

## Recommendations for Specific Zones

This study revealed significant differences in the characteristics, ideational determinants and behaviors of households and individual respondents from different zones. It is important that SBC programs reflect and respond to these differences, In addition to the general recommendations listed above. This section lists some SBC recommendations by region.

### Northern Zone

- This area includes a larger proportion of poor households, compared to other areas. More than half of the men and women surveyed in this area have no level of education. Strategies for this area must consider approaches that benefit the poor and a poorly educated population. For example, programs may want to consider approaches based on community mobilization, community volunteers, community dialogues and materials targeting poorly-educated populations.
- Two thirds of the population are Muslims, and as such, Muslim religious leaders and groups should be engaged.
- The prevalence of spousal communication is lower in this area compared to other areas. It is recommended to use culturally acceptable approaches to promote communication between spouses.
- The proportion of women who received a net at the birth of their child or during an immunization visit is lower in this area than in other areas. It is necessary to identify the causes of this deficiency and to remedy it.
- Almost two thirds of the respondents in this area have positive attitudes toward self-medication. Programs should consider strategies to change attitudes towards self-medication.
- Compared to Abidjan, for example, negative attitudes towards early ANC are more prevalent in the North. Programmatic efforts that seek to change these negative attitudes are relevant. Practitioners should consider interventions that promote benefits, strengthen social support for early ANC, and promote early ANC as the norm
- Position three doses of MS as a community standard.

## Central Zone

- Almost two thirds of the respondents in this area have positive attitudes toward self-medication. Strategies to change attitudes towards self-medication are relevant.

## South Zone

- The proportion that listens to the radio is particularly low in this area. However, half of households own a smartphone and ownership of any type of phone is almost universal. The use of the multimedia platform must be strengthened.
- Almost two thirds of the population of this area are Christians. Consideration should be given to engaging religious leaders and working with religious groups.

## Abidjan Zone

- Level of access to the smartphone is very high and there is almost universal access to basic mobile phones. The use of digital health approaches must be strengthened.
- Consider using model-based approaches to reinforce the perception that net use is the norm.
- Perceptions of health workers are more negative in Abidjan than in other areas. Efforts to better position health workers and enhance their interpersonal and technical skills are relevant.
- Strengthen access to ITNs: Indicators of possession and access are particularly low in Abidjan.
- Relatively fewer children brought to a health facility in Abidjan were tested for malaria. The use of private structures is more widespread in Abidjan. While the reasons for the reduced prevalence of diagnostic testing are not very clear, it may be that the type of health facility used is the cause. Private clinics and nursing homes should be made aware of the use of diagnostic testing
- The data revealed a lower proportion of women who received a net during an antenatal or vaccination visit. Operational research will help to better understand the reasons for this problem and identify appropriate solutions.

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## 6 Appendix

<b>Appendix 3.4.A : Selected measures of attitudes towards use of mosquito nets – Côte d'Ivoire 2018</b>					
<b>Women (n=6617)</b>					
Percentage that agreed with the following statements:	North	Center	South	Abidjan	All
It is easier to get a good night's sleep when I sleep under a mosquito net	87.9	85.7	87.3	70.6	82.6
I do not like sleeping under a mosquito net when the weather is too warm	42.9	52.0	50.5	63.6	53.2
The smell of the insecticide makes it uncomfortable to sleep under a mosquito net	30.3	38.1	36.2	43.5	37.7
White nets remind me of burial	14.1	16.1	12.3	11.7	13.6
Mosquito nets are generally easy to use	90.2	88.1	88.1	77.6	85.7
More expensive mosquito nets are more effective than less expensive or free mosquito nets	18.3	20.6	17.7	15.0	17.9
Insecticide-treated nets are safe to sleep under	87.1	86.8	86.7	81.7	85.5
If the only nets I have are white. I would prefer not to sleep under a net	12.7	14.1	12.8	10.7	12.6
Mosquito nets are valuable	96.6	96.5	96.9	94.0	96.0
Percentage with positive attitudes towards use of mosquito nets**	92.0	90.1	91.6	87.4	90.1
<b>Men (n= 1829)</b>					
Percentage that agreed with the following statements:	North	Center	South	Abidjan	All
It is easier to get a good night's sleep when I sleep under a mosquito net	91.5	89.1	87.5	74.4	85.1
I do not like sleeping under a mosquito net when the weather is too warm	40.9	47.8	52.3	67.2	53.5

The smell of the insecticide makes it uncomfortable to sleep under a mosquito net	29.3	33.3	35.0	41.5	35.4
White nets remind me of burial	10.4	11.4	10.0	10.5	10.6
Mosquito nets are generally easy to use	92.6	92.0	91.5	82.7	89.5
More expensive mosquito nets are more effective than less expensive or free mosquito nets	16.2	20.7	18.6	12.6	17.3
Insecticide-treated nets are safe to sleep under	88.3	88.2	88.9	85.9	87.8
If the only nets I have are white. I would prefer not to sleep under a net	12.8	10.6	11.4	10.4	11.1
Mosquito nets are valuable	97.1	97.3	98.1	95.5	97.0
Percentage with positive attitudes towards use of mosquito nets	91.2	92.3	93.2	89.3	91.6
Significance of differences among zones : ** p<0.01					



<b>Appendix 3.4.B: Selected measures of perceived response efficacy of mosquito nets . by zonal area – Côte d'Ivoire 2018</b>					
<b>Women (n=6595)</b>					
Percentage that agree with the following statements:	North	Center	South	Abidjan	All
Mosquito nets only prevent mosquito bites when used on a bed	43.4	40.5	43.1	44.5	42.8
My chances of getting malaria are the same whether or not I sleep under a mosquito net	32.5	38.0	39.3	34.7	36.7
Sleeping under a mosquito net every night is the best way to avoid getting malaria	82.4	82.3	82.2	70.3	79.2
Many people who sleep under a mosquito net still get malaria	67.4	73.7	69.1	65.5	69.2
A repaired net can still be effective against mosquitoes	37.6	37.6	38.2	27.5	35.2
% with perceived response-efficacy of mosquito nets **	57.1	56.0	54.0	47.4	53.3
<b>Men (n=1846)</b>					
Percentage that agree with the following statements:	North	Center	South	Abidjan	All
Mosquito nets only prevent mosquito bites when used on a bed	42.2	39.2	42.4	34.9	39.4
My chances of getting malaria are the same whether or not I sleep under a mosquito net	33.4	38.3	36.3	35.6	36.3
Sleeping under a mosquito net every night is the best way to avoid getting malaria	84.2	83.2	80.6	70.7	79.3
Many people who sleep under a mosquito net still get malaria	68.2	74.8	66.2	59.2	67.2
A repaired net can still be effective against mosquitoes	40.4	38.0	38.3	26.4	35.3
% with perceived response-efficacy of mosquito nets **	60.0	57.1	56.7	53.2	56.4
Significance of differences among zones: ** p<0.01					

<b>Appendix 3.4.C: Selected measures of perceived self-efficacy to use mosquito nets. by zonal area – Côte d'Ivoire 2018</b>					
<b>Women (n=6585)</b>					
Percentage that agreed with the following statements:	North	Center	South	Abidjan	All
Sleep under a mosquito net for the entire night when there are lots of mosquitoes	92.5	92.3	94.8	85.6	91.3
Sleep under a mosquito net for the entire night when there are few mosquitoes	87.8	84.8	86.8	68.3	81.6
Sleep under a mosquito net every night of the year	76.9	72.3	76.6	55.0	69.8
Get all of your children to sleep under a mosquito net every night of the year	93.4	92.0	91.8	79.3	88.9
Percentage with perceived self-efficacy to use mosquito nets ***	89.4	86.0	86.7	68.5	82.2
<b>Men (n=1824)</b>					
Percentage that agreed with the following statements:	North	Center	South	Abidjan	All
Sleep under a mosquito net for the entire night when there are lots of mosquitoes	93.7	91.3	94.4	85.5	90.9
Sleep under a mosquito net for the entire night when there are few mosquitoes	87.5	86.2	84.3	62.8	79.6
Sleep under a mosquito net every night of the year	77.0	73.6	69.7	52.4	67.3
Get all of your children to sleep under a mosquito net every night of the year	95.8	94.6	88.8	78.7	88.9
Percentage with perceived self-efficacy to use mosquito nets ***	90.8	87.4	84.2	61.6	80.1
Significance of differences among zones : *** p<0.001					