Survey on the Determinants of Behaviors Related to Malaria

Cameroon (June 2020)

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Table of Contents

Acronyms

ACT	Artemisinin-based combination therapies
AL	Artemether-lumefantrine
ANC	Antenatal care
ASAQ	Artesunate-amodiaquine
CCP	Johns Hopkins Center for Communication Programs
CHW	Community health worker
CNERSH	Comité National d'Ethique de Recherche et de la Santé Humaine
EA	Enumeration area
IPTp	Intermittent preventive treatment of malaria for pregnant women
IRS	Indoor residual spraying
ITN	Insecticide-treated net
IRESCO	Institut pour la Recherche, le Développement Socio-économique et la Communication
MICS	Multiple Indicator Cluster Survey
NIC	National Institute of Cartography
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
RC	Reference category
RDT	Rapid diagnostic test
SBC	Social and behavior change
SMC	Seasonal malaria chemoprophylaxis
SP	Sulphadoxine-pyrimethamine
USAID	United States Agency for International Development
WHO	World Health Organization

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Yannick Nkoumou National Coordinator, Breakthrough ACTION/CCP, Yaoundé, Cameroon

Preface

Malaria is a major public health problem throughout Cameroon, one of the 11 high-burden countries that account for more than 70% of the global malaria cases and deaths. The 2018 World Malaria Report estimated that Cameroon accounted for 16% of malaria cases in the Central Africa region and 3% share of global malaria cases in 2017 (WHO, 2018). Since 2016, there has been a steady rise in malaria cases and deaths due to malaria in Cameroon with the disease accounting for 28.0% of out-patient consultations and 18.3% of reported deaths in 2019. Children under five years and pregnant women are the most affected, contributing respectively, 60% and 12% of deaths attributed to malaria in 2019.

The Government of Cameroon has made the fight against malaria a priority. The latest National Malaria Control Strategic Plan (2019-2023) is aligned with the Abuja Declaration, the Sustainable Development Goals (SDGs), the Global Technical Strategy for Malaria 2016-2030 (Global Malaria Programme, 2015), and the World Health Organization High Burden to High Impact strategy and aims to reduce the mortality and morbidity due to malaria by 60% compared to the situation in Cameroon in 2015 (PNLP, 2019). The National Malaria Control Program (NMCP) is responsible for implementing the strategic plan. The plan covers four pillars: strengthening policy dialogue, using strategic information for action, key policies and strategies for malaria control, and coordination.

It is against this background that I laud the collaboration between the Ministry of Public Health through the National Malaria Control Program (NMCP) and the United States President's Malaria Initiative (PMI) through the implementing partner Breakthrough Action. This collaboration has made the implementation of the Malaria Behavioral Survey (MBS) designed to assess the behavioral determinants related to malaria prevention and treatment possible. Findings from the survey will provide a better understanding of the socio-demographic and psychosocial factors associated with malaria-related behaviors in the North and Far-North regions. This will allow us to develop adequate guidelines and strategies for malaria control.

The Malaria Behavior Survey provides an opportunity to obtain reliable data on malaria-related behaviors in the North and Far-North regions. 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 effective exploitation of the results by all actors and partners involved in the fight against malaria in order to translate the national strategy and the relevant recommendations into action. To fully take advantage of the possibilities offered by the MBS, the NMCP will make all the needed efforts to extend its implementation in the 08 other regions of the Country.

I take this opportunity to reiterate the Government's appreciation to the United States Government through PMI for the decisive contribution to the realization of this important survey. Our thanks and congratulations also go to Breakthrough ACTION, the NMCP team, IRESCO and all the resource persons at various level of the health pyramid, whose dedication and expertise have made this survey possible. I would like to thank the administrative, traditional and religious authorities as well as the residents of the study communities for their contribution and support.

Finally, based on the results of this study, I would like to call for a reorientation of our communication strategies and increased mobilization of all relevant actors to address the insufficiencies observed so that together we will meet the challenges for achieving the malaria control goal.

Dr. Dorothy Fosah Achu
Permanent Secretary
National Malaria Control Program
Ministry of Public Health - Cameroon

Summary

The Malaria Behavior Survey (MBS) is a theory-based household survey that draws on the ideation model. The survey was conducted in North Region and Far North Region in Cameroon between September 5 and October 1, 2019, a period that coincides with the end of the rainy season. The survey collected relevant information on malaria-related behaviors and their determinants from a representative sample of households in each region, stratified by urban-rural residence. Data were collected with SurveyToGo electronic questionnaires loaded on Android tablets. Overall, data came from 2,756 households, which included 3,565 women of reproductive age and 949 of their male spouses/partners. During field work, trained data collectors took appropriate steps to minimize risks to participants. These steps included obtaining informed consent prior to commencing interviews, emphasizing voluntary participation and the right of participants to decide not to participate in the survey or terminate the interview at any time, and stressing the right to refuse to answer any questions they did not feel comfortable with. No personal identifiers were retained in the electronic dataset. Approval for the survey was obtained from the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health in Baltimore, USA (IRB # 9646), and the Comité National d'Ethique pour la Recherche en Santé Humaine (CNERSH) in Cameroon. The data, representative of the urban and rural populations in both regions, provide a basis on which to better identify, prioritize, and reach target audiences with tailored and effective social and behavior change (SBC) approaches. This section summarizes the key findings from the survey.

Media Habits

The potential individual reach of radio and television is limited in both urban and rural areas of both study regions. The low reach of the radio is partly due to low household possession of the device; however, even in households with a radio, listenership remains low (37.1% in the North and 49.6% in the Far North). The only exceptions to this trend are men and women from more affluent urban households, and men from the Far North Region, especially older men. As for the television, although only about one fifth of households possess a television, among those from households with the device, 70.9% in the North and 77.3% in the Far North watch televised programs regularly. In sum, both radio and television have limited relevance for providing the population with access to malaria prevention and case management SBC materials. Personal ownership of mobile phones is lower in rural areas (42.1% in the North, 46.9% in the Far North) than in urban areas (74.1% in the North, 75.5% in the Far North). Most (87.9% in the North and 84.6% in the Far North) people with a mobile phone reported capability to receive text messages while a noticeable proportion reported that their phone is capable of receiving photographs, video, and audio files.

Insecticide-treated Net Ownership and Use

Household mosquito net ownership was not universal; almost one third of households in both regions had no mosquito nets. On average, wealthier households owned significantly fewer bed nets than poorer households. The indicators for household net coverage (34.2%) and population access (54.3%) were rather low. In households with at least one net, about two-thirds (68.1%) slept under a net on the night before the survey; in households with a sufficient number of nets, 80.9% slept under a net. **All the same, the use:access ratio (0.83 in the North and 1.00 in the Far North) indicates that most people who have access to a net sleep under it.** The data suggest that in the Far North Region, there is a tendency for more than two people to share a net. In households with at least one net, use the previous night was lower among older children and teenagers (aged 5-17 years old) compared to younger children and adults.

Results of multivariable logistic regression reveals that, among the male and female caregivers interviewed, the **ideational variables positively associated with consistent ITN use in both regions include perceived susceptibility to malaria, perceived self-efficacy to use nets, and the perception of net use as a community norm**. Also in both regions, household net coverage was positively associated with consistent use. There was also a significant association with education level in both regions, although the direction of this association was not the same in both regions (positive in the North, negative in the Far North). In addition, in the **North Region consistent use was positively linked with attitudes toward the use of bed nets and negatively associated with perceived response efficacy of nets, discussion of malaria with others, and exposure to malaria messages**; these relationships were not observed in the Far North Region.

Insecticide-treated Net Care Attitudes and Behaviors

The majority of the survey respondents believed there were steps a person could take to ensure net durability and that a person could protect the health of family members by taking care of their nets. Nonetheless, observed net care behaviors were not likely to foster net durability. Only about a third of the nets enumerated in the households and used for sleeping on the night preceding the survey were found to be suspended, folded, and tied over the sleeping space, a key action to protect nets from wear and tear. Furthermore, whereas the WHO guidelines for washing nets with a mild soap was generally followed by the population, the majority (71.0% in the North, 80.9% in the Far North) of washed nets were left to dry in the sun instead of outside in the shade.

Seasonal Malaria Chemoprophylaxis

Awareness of seasonal malaria chemoprophylaxis (SMC) is widespread in the study regions: 81.9% in the North and 88.9% in the Far North had heard of SMC prior to the interview. The findings indicate that providers reportedly did not always follow established protocol while distributing the medication. Although the first dose of SMC is supposed to be taken by children under direct observation of the provider, results indicate that this was not the case for many children. In 39.2% of the cases in the North

Region and 16.3% in the Far North, the SMC distributors gave the medication to a caregiver, but did not observe it being taken. The data showed that either through provider direct observation or caregiver administration, 91.5% of eligible children in the North and 97.6% in the Far North reportedly took the first dose of the SMC regimen.

Findings related to some of the ideational variables provide a premise for understanding the readiness of the population to adhere to the SMC regimen. For example, only 8.7% of caregivers in the North and 22.5% in the Far North knew both the number of days per month and the number of months that a child must take SMC during the rainy season. A noticeable proportion of caregivers (62.3% in the North and 61.3% in the Far North) reported that the SMC door-to-door distributors did not discuss side effects of the medication with them. **While overall attitudes related to SMC were generally positive, certain negative perceptions toward its distribution and its benefit in protecting healthy children were common in the study regions.** For example, 46.6% of caregivers in the North and 46.7% in the Far North believed that taking SMC makes no difference to a child's chances of contracting malaria. **Many respondents believed that healthy children did not need to take SMC (50.6% in the North and 27.5% in the Far North) and that SMC could harm children (45.1% in the North and 43.7% in the Far North**). Furthermore, **62.4% of caregivers in the North and 34.0% in the Far North believed that SMC distributors forced the medication on parents while about 30.0% of caregivers in the North and 19.7% in the Far North expressed lack of trust in SMC providers**.

Malaria Case Management

Prompt care-seeking for children with fever (that is, seeking care for a child with fever within 24 hours of the onset of fever) was common in the Far North Region (81.8%) but significantly less so in the North Region (51.8%). Taking a child sick with fever directly to a health facility or CHW as a first recourse on the same day, or the next, as the onset of fever was considerably less common, particularly in the North Region where only about one third of women with a sick child reported this behavior compared to 57.4% in the Far North). **The ideational variables associated with prompt care-seeking in a health facility or from a CHW as a first recourse include knowledge of ACT as an effective antimalarial drug, knowledge about how soon after fever starts someone should seek care, perception that prompt care-seeking is a community norm, and preference for antimalarials administered as injections**. Other significant correlates of prompt care-seeking in a health facility or from a CHW as a first recourse include agreeing that antimalarials are always available in the health facility in the community, disagreeing that facility-based health workers make their clients pay for antimalarial drugs for children, and disagreeing that when their child has fever, they would start by giving the child medication they have at home.

Knowledge of blood test as an accurate method of diagnosing malaria, artemisinin-based combination therapies (ACT) as an effective malaria treatment, and how soon to seek care for fever was relatively common. Overall, malaria knowledge was higher in the North Region compared to the Far North. Positive attitudes related to malaria care-seeking and treatment were widespread, but some negative attitudes persisted**. Attitudes favoring self-medication remained widespread with 81.7% in the North**

and 75.7% in the Far North reporting that they start by giving their feverish child any malaria medicine they have at home. There was also a strong preference for injectable antimalarials over tablets: 79.4% of caregivers in the North and 63.1% in the Far North preferred their feverish child to be treated with an injection rather than tablets. The indicator of perceived response-efficacy of malaria diagnostic test revealed a moderate level of conviction about the efficacy of the test. Many (68.4% in the North and 71.8% in the Far North) believed that parents were able to diagnose malaria as well as a test could, and that people should still take antimalarials even if the test was negative. The perception of prompt care-seeking as a community norm was only moderately common: reported by 59.5% in the North and 60.6% in the Far North. **Less than two-thirds of women (59.7% in the Far North, 60.1% in the Far North) reported being involved in household decisions related to care-seeking for a child with fever**. A large proportion of respondents perceived malaria tests (88.1% in the North, 77.6% in the Far North) and treatment drugs (90.0% in the North, 77.4% in the Far North) to be always available at health facilities. Relatively fewer men and women believed that these services were always available with CHWs: 61.4% in the North and 44.7% in the Far North concerning diagnostic tests; 73.2% in the North and 59.7% in the Far North concerning treatment drugs. Whereas belief in the technical and interpersonal competence of facility-based providers and CHWs who provide malaria services was widespread, a noticeable proportion of the respondents were of the opinion that these service providers make parents pay for malaria testing and treatment. For example, 57.0% of respondents in the North and 43.8% in the Far North believed that facility-based providers in their community make parents pay for antimalarials.

Malaria in Pregnancy

Whereas most women made at least one ANC visit, obtaining the recommended number of ANC visits was far from being a universal practice in either region. Spousal presence during ANC visits was not common. Fewer than half of the women with a live birth in the last two years obtained at least three doses of IPTp. **Even among women who attended ANC four or more times, less than two thirds obtained the recommended number of IPTp doses.** The data showed that after controlling for sociodemographic and other background behaviors, obtaining the recommended number of ANC visits and early commencement of pregnancy care were critical gateway behaviors for IPTp uptake. Looking at intention to obtain IPTp should the woman become pregnant in the near future, about four fifths of women reported such an intention. **The ideational variables strongly and positively associated with intention in both regions were awareness of the recommended number of IPTp doses and the perception that IPTp was a community norm**. There were other ideational variables that showed significant association with intention, although only in one region or the other. **Perceived self-efficacy for obtaining IPTp and positive attitudes toward IPTp were significant in Far North, but not in North Region. In contrast, perceived response efficacy of IPTp, positive perceptions about ANC/IPTp services, and discussion of malaria with others were strong correlates only in North Region**.

Knowledge related to the timing of the first antenatal care (ANC) visit, the number of ANC visits a woman should make during a pregnancy, and the recommended number of IPTp (intermittent preventive treatment [for malaria] in pregnancy) doses was generally low. At the same time, most

respondents were cognizant of the severity of malaria during pregnancy. Attitudes were generally not very positive toward ANC and IPTp. In particular, attitudes favoring delay in seeking pregnancy care—especially if the woman is not in her first pregnancy—were relatively common. Also common was the belief that a woman should not take IPTp medication on an empty stomach. Perceived response efficacy of IPTp, and perceived self-efficacy to take actions related to ANC and IPTp, were widespread in both regions. Participation in decision-making about seeking pregnancy care was moderate in Far North but especially low in North Region. In Far North, there appears to be an inverse relationship of participation in ANC decision-making and both education level and wealth quintile. ANC and IPTp were perceived to be community norms by about two thirds of the respondents. Perceptions of health workers were somewhat mixed. The majority of the respondents from both regions believed that health workers treat their clients with respect. In North Region, most respondents believed that health workers usually offered IPTp to their clients; this belief was less common in Far North. At the same time, the belief that health workers would not give their clients IPTp unless they had eaten was common in both regions. **There was also a noticeable prevalence of specific negative perceptions, including that health workers would send a woman home if she sought ANC early in pregnancy, that health workers would make a woman pay for IPTp, and that health care providers would deny a woman ANC if she were unaccompanied by her husband**. These negative attitudes were more prevalent in North Region compared to Far North.

Indoor Residual Spraying

The survey collected ideational information regarding indoor residual spraying (IRS) in preparation for the launch of IRS implementation in the two regions. At the time of the survey, IRS had not yet been implemented in North and Far North Regions. Very few of the respondents had heard of indoor residual spraying (IRS) prior to the survey. **Potential acceptance of the program was very high in both regions.** Some people who heard about the IRS program prior to the survey voiced concerns about the program. Many people, particularly in North Region, felt it was unsafe to touch house walls after the sprayed insecticide dried up, associated IRS with increased appearance of bed bugs and fleas, and were concerned about having to take their property outside in order to accommodate the IRS agents. Perceived response efficacy and perceived self-efficacy to prepare their dwelling unit for spraying were high.

1. Introduction

Malaria is a major public health problem in all regions of Cameroon, including the North Region and Far North Region. The climate in the North Region is tropical with a malaria transmission season of four to six months with the volume of rain peaking between June and September. In the Far North Region, both tropical and Sahelian climates are found with a shorter malaria seasonal transmission period of three to five months (June to October) (NMCP, 2019). Malaria cases in these regions account for about one in five health facility consultations (Cameroon NMCP & RBM, 2017). Children under the age of 5 years are among those most vulnerable to malaria. This is evidenced by the fact that 67% of health facility deaths in the North and 32% in the Far North were due to malaria in children (NMCP & RBM, 2017). That notwithstanding, progress has been made recently. Malaria mortality in health facilities has declined slightly in both regions (NMCP & RBM 2016; NMCP & RBM, 2017). Between 2011 and 2018, malaria parasitemia among children under 5 years old, as assessed using rapid diagnostic testing (RDT), decreased dramatically from 57.2% to 21.8% in the Far North Region and from 36.2% to 26.0% in the North (Institut National de la Statistique [INS] and ICF, 2019; INS and ICF, 2012). Despite these noticeable declines, attributable primarily to interventions such as mass ITN distribution and SMC, the malaria-related morbidity in the North and Far North remains relatively high when compared to the national statistics (NMCP & RBM, 2017).

The Cameroonian government, through the National Malaria Control Program (NMCP) in collaboration with non-governmental and funding agencies, has promoted the prevention and effective treatment of malaria in these two regions using interventions including insecticide-treated net (ITN) distribution, seasonal malaria chemoprophylaxis (SMC), intermittent preventive treatment of malaria in pregnancy (IPTp), and the use of rapid diagnostic tests (RDTs) and artemisinin-based combination therapies (ACTs) for malaria case management.

The most recent NMCP strategic plan aims to meet the following behavioral targets by 2023 (Ministère de la Santé Publique, 2019):

- 80% of the population sleeps under an ITN,
- 80% of pregnant women are protected through IPTp,
- 80% of suspected malaria cases in health facilities are tested by RDT or microscopy,
- 100% of confirmed malaria cases in health facilities and the community are treated.

Research increasingly demonstrates the effective role social and behavioral change (SBC) programs play in increasing the prevalence of many positive health behaviors, including those related to malaria prevention and treatment. SBC program messages need to target the specific psychosocial variables that influence decisions for malaria-related behaviors such as ITN use or prompt care-seeking for fever. The main sources of representative data on the prevalence of relevant behavioral indicator data are the latest 2018 Demographic and Health Survey (DHS), the Multiple Indicator Cluster Survey (MICS)

conducted in 2014, and the combined DHS and MICS fielded in 2011. However, these data sources are limited in their investigation of factors that might explain malaria-related behaviors. A single knowledge, attitudes and practices survey was identified but dates from 2012 (Malaria No More, 2012). In order to design SBC interventions that work, one needs current knowledge of how common the determinants of such behaviors are and how they vary across a population's subgroups. Such data allow researchers to examine the specific effects of psychosocial variables (such as knowledge, attitudes, perceived susceptibility to malaria infection, and social norms related to behaviors), thereby arming SBC programs with the insights to prioritize target behaviors and their determinants.

Breakthrough ACTION is led by the Johns Hopkins Center for Communication Programs (CCP). In close partnership with the Cameroon NMCP and with the financial and technical support of USAID/PMI, Breakthrough ACTION conducted a large household survey of the North and Far North Regions to better understand behaviors related to malaria prevention, care-seeking, diagnosis, and treatment. The survey provides current and comprehensive data on malaria behaviors in these two regions. This report presents the methods, key results, findings, and recommendations based on these data. These findings will help the NMCP, malaria projects, and policy makers create and prioritize audience segments and SBC messaging.

The report is divided into four chapters. Chapter 1 provides background information on malaria epidemiology in Cameroon and describes the need for data look at the potentially modifiable determinants of malaria-related behaviors. In Chapter 2, data collection and analysis methods are discussed. Chapter 3 presents the results and is divided into eight sections; each section is devoted to a different aspect of the survey findings. Chapter 4 summarizes the findings from the survey and describes their programmatic implications. To make it easier to read the narrative in the report, the more concise Tables and those most pertinent to each section have been retained in the respective sections while longer ones have been moved to the Annex.

2. Methods

Purpose and Study Objectives

The goal of this study is two-fold: to provide a better understanding of the sociodemographic and psychosocial characteristics (also referred to as ideational characteristics) associated with malaria-related behavioral outcomes in the North and Far North Regions of Cameroon and to determine the appropriate focus of programmatic activities designed to improve malaria-related behavioral outcomes. The specific objectives of the study are as follows:

- Determine the factors associated with:
    - ITN use and care;
    - uptake of IPTp;
    - prompt and effective treatment of malaria in children;
    - uptake of SMC.
- Understand reasons for not adopting recommended malaria prevention and treatment behaviors; and,
- Determine what should be the focus of future SBC programs designed to promote appropriate malaria prevention and treatment behaviors in Cameroon.

Survey Design

This research study used a cross-sectional survey of randomly selected household heads, women, and men, who were interviewed using structured questionnaires (one for each group of study participants). Participants in the study were selected through a multi-step and random selection process of clusters, households, and individuals in both urban and rural areas. As seen on **Table 1**, the two regions are different in terms of population size, use of bed nets among children under five years, and the incidence of fever. The sample was designed to provide representative data for each region, stratified into urban and rural areas.

Figure 1. Map of Cameroon showing North and Far North Regions

TABLE 1. SELECTED SUMMARY STATISTICS FOR GEOGRAPHICAL AREAS			
ILLUSTRATIVE INDICATOR	NORTH	FAR NORTH	NATIONAL
Population in 2019[1]	2.9 million	4.6 million	25.5 million
Percentage of pregnant women that slept under a bed net in households with at least one bed net[2]	71.6	79.6	67.0
Percentage of under-5 children that slept under a bed net in households with at least one bed net[2]	58.5	65.7	72.9
Percentage of children (0-4 years old) with fever in the last two weeks[2]	12.0	17.2	15.4
Percentage of children with a fever in the last two weeks who had a finger or heel blood sample tested[2]	23.6	13.3	21.4

[1] 2019 population projections based on 2005 BUCREP census (BUCREP, 2016).
[2] DHS 2018

Sampling

Sample Size and Justification

The research team estimated the sample size needed to measure key malaria-related outcomes including the indicators itemized on **Table 1** and the prevalence of positive attitudes toward the use of insecticide-treated nets among women of reproductive age. The indicators on **Table 1** were derived from the 2018 DHS. In the absence of a recent population-based estimate for ideational indicators, the research team assumed the value of the attitudinal indicator to be 50% for both regions. This prevalence reflects maximum variability in the population in order to ensure an adequate sample size. The research team used the following formula to estimate the sample size required:

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

Where:

- n is the required sample of individuals (e.g., women) with the desired characteristics;

- Z is the value corresponding to the desired level of confidence. A Z=1.96 is assumed, corresponding to 95% of the confidence level;
- d is the design effect due to deviation from simple random sampling; the design effect is assumed to be 2.5;
- p is the estimated (expected) achievement indicator; if the value is not known, it is assumed that p is equal to 50% which gives the maximum sample size for the indicator;
- δ represents the desired margin of error; for the calculation of the study sample size, it is assumed that δ = 6%;
- Rh is the response rate for households; it is assumed that 90% of the households selected and approached for participation will accept to participate in the survey;
- Ri is the response rate for women in selected households; it is assumed that 96% of eligible women in surveyed households will accept to be interviewed.
- CF is the relevant correction factor; for example, the average number of women of reproductive age per household

The results of these calculations are presented in **Table 2**. Given the sample size required for each behavioral outcome indicator, the study aimed to approach 2,820 households. This sample size took into account potential non-response at the household (10%) and individual levels (4%). It provided a representative sample at the regional and residential levels and allowed for the estimation of key indicators.

TABLE 2. PROPOSED SAMPLE SIZE BY INDICATOR

INDICATOR	NUMBER OF HOUSEHOLDS				
	NORTH		FAR NORTH		BOTH REGIONS
	Rural	Urban	Rural	Urban	
Women (15-49 years) with a positive attitude toward the use of bed nets	653	592	669	696	2,609
Women (15-49 years) sleeping under a bed net in households with at least one bed net	765	685	673	697	2,820
Children (0-4 years) with fever in the last two weeks	591	614	550	603	2,358

Note: Row totals are based on non-rounded figures.

Participants

The study approached men and women of reproductive age (15–49 years for women and 18–59 years for men) and heads of households or their representatives. Married or partnered men of reproductive age were selected if their female wife/partner participated in the study.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for participant selection are listed below.

Inclusion criteria:

- Is between 15 to 49 years for women and between 18 to 59 years for their husbands/partners;
- Is a regular resident of the selected household;
- Has the ability to communicate in French, English, or Fulfulde.

Exclusion criteria:

- Is not able to provide informed consent;
- Is unable to understand the questions or to respond intelligibly to questions.

Recruitment Process

Participants in the study were selected through a multi-step process and random selection of clusters, households, and individuals. First, the study team selected clusters using a complete list of Enumeration Areas (EAs) as created by the Central Bureau of Census and Population Studies (BUCREP) between September 2016 and October 2017 and their corresponding maps from the National Institute of Cartography (NIC). Each region was divided into two strata: urban and rural. For each region and stratum, a number of EAs were randomly selected from the list of EAs with their chance of selection being proportional to the size of the population in that EA. In this way, more populated EAs were more likely to be selected than less populated EAs within a stratum. To reach the desired sample size, a total of 141 clusters (approximately 20 households per cluster) were selected for inclusion in the study: 72 in the North Region (38 rural, 34 urban), and 69 in the Far North Region (34 rural, 35 urban). This distribution resulted in an oversampling of urban areas, which is adjusted for through sampling weights.

After obtaining the approval of community leaders, the study team updated the provided sketch maps by listing the households in each EA. With the help of local residents, the teams approached each household in each building, structure or complex, and took note of the name of the head of the household, its household address or location description, the number of female residents 15 to 49 years old, and the number of male residents 18 to 59 years old. These household lists were destroyed after completing data collection in each cluster.

Within each selected household, the study team determined eligibility of each individual and obtained consent/assent before interviewing them. First, the head of the household answered the household questionnaire which included providing a list of nicknames of all *de facto* household members, a

description of household characteristics and possessions, and a list of all bed nets and their characteristics. Once the household questionnaire was completed, the study team interviewed all women ages 15 to 49 years about their practice of various behaviors, as well as about their attitudes, perceived norms, and other ideational factors related to those behaviors. In one out of three households that agreed to participate in the survey, the study team also identified the spouse or partner of one of the interviewed women and interviewed him using the individual questionnaire for men. Men were also asked about their attitudes and perceived norms but were asked fewer questions regarding their practice of malaria care-seeking, prevention, and treatment behaviors.

The study team interviewed 2,756 households, 3,565 women, and 949 male partners of these women. Actual response rates were high at 98.2% at the household level, 99.7% among women, and 98.4% among men. Note that, depending on the composition of a household, women of reproductive age or their male partners may also have been interviewed as head of household or his/her representative.

Data Collection Tools

This study was based on similar surveys carried out by CCP, which investigated the prevalence of malaria-related prevention, care-seeking, and treatment behaviors and concomitantly their ideational determinants. The recommended behaviors of interest in this study are:

- ITN use and care
- Prompt care-seeking for fever in children, malaria diagnosis using rapid diagnostic test, and prompt and effective malaria treatment with ACTs;
- Use of antenatal care and receipt of IPTp during a woman's most recent pregnancy;
- Receipt of SMC among children under five years old; and,
- Acceptance of IRS.

Three questionnaires were therefore based on the corresponding tools used in Liberia, Madagascar, Mali, and Côte d'Ivoire after adapting them to the Cameroonian context. The questionnaire was designed using the ideational model as a guide (Figure 2).

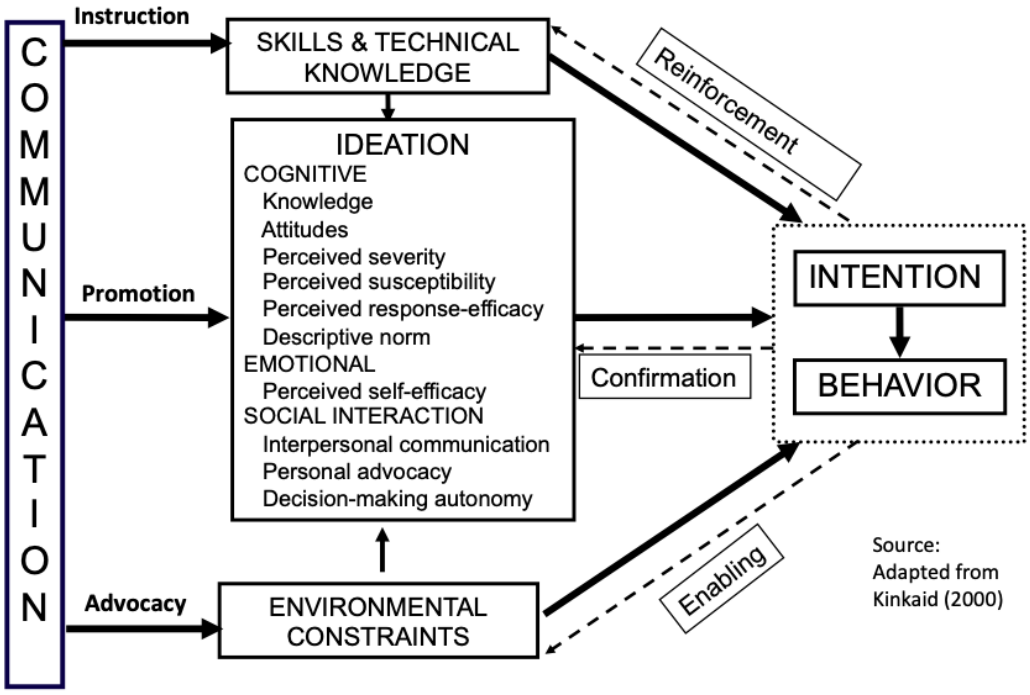


Figure 2: Ideation model of strategic communication and behavior change

The ideation model (Kincaid, 2000) posits that SBCC strategies can change intention to act and subsequently actual behaviors to the extent that they change people's ideation (or views and ideas that people hold about the behavior). The model recognizes three dimensions of ideation that are relevant for behavior change: cognitive, emotional, and social interaction. The variables under each dimension were borrowed from leading theories of behavior change and have been found to be associated with various health behaviors (Fishbein et al., 2001).

Three questionnaires were used to conduct the study. The household questionnaire was designed to collect basic demographic information about each household, determine the relative wealth status of the household, estimate the distance of the household from various sources of health care, determine the age and sex of each person within a household, as well as to collect information about each net owned by the household.

The women's and men's questionnaires were similar but had some important differences. Both the women's and men's questionnaires collected basic sociodemographic information about the interviewee and included questions about ITN use, repurposing, and disposal. Both questionnaires also included questions to measure ideational factors related to recommended malaria prevention and treatment behaviors. However, only women were asked about any recent episodes of care-seeking for a child with fever, receipt of SMC among children, and receipt of IPTp during their last pregnancy. Consistent with the ideational model, the ideational factors assessed included the following:

- Knowledge about malaria-related behaviors;
- Perceived susceptibility to malaria, that is, perceptions about the likelihood of being infected with malaria;
- Perceived severity of malaria or the perception that malaria can lead to severe health consequences;
- Attitudes (values and beliefs) towards malaria-related behaviors and recommended solutions
- Interspousal communication about malaria, that is, discussing malaria or malaria-related behaviors with others;
- Perceive response-efficacy or belief in the effectiveness of malaria-related behaviors or products;
- Perceived self-efficacy or confidence in one's ability to perform recommended behaviors; and,
- Descriptive norm or a person's perception about how people in their community behave with respect to malaria prevention and treatment.

Both questionnaires also included questions about each individual's exposure to malaria-related messages. By including questions on malaria-related behaviors and their sociodemographic and ideational determinant, the research team are able to examine correlations between exposure and these ideational factors, as well as between exposure and key behaviors.

Data Collection, Treatment, and Analysis

Breakthrough ACTION hired a local research firm, IRESCO, to implement data collection in the study sites in Far North and North Regions. IRESCO created digital versions of the questionnaires using SurveyToGo and loaded them on Android tablets. IRESCO and Breakthrough ACTION staff co-facilitated a four-day participatory training of 41 data collectors and eight team leaders followed by one day of pretesting the data collection instruments and procedures in three non-survey EAs near Garoua. From the group of 41 data collectors, 32 were selected based on a combination of the following criteria: their prior experience in similar surveys; familiarity with relevant languages (French or English and either Pidgin or Fulfulde) assessed during the selection interview; mastery of the digital questionnaires assessed during the role plays; performance during field practice to pretest the instrument; and score on a written posttest. Four teams of data collectors worked to collect interview data between September 5 and October 1, 2019. During this time, Breakthrough ACTION and NMCP staff visited teams in the field to observe their progress. NMCP staff supervised data collection in both Far North and North Regions. IRESCO submitted three data sets, one for the household heads (2797 respondents), one for women (3565 respondents), and one for men (949 respondents) to CCP which then analyzed them using Stata 16.0.

Measures of ideational variables (e.g., positive attitudes, perceived self-efficacy to take actions, and perceived response efficacy of malaria treatment) were derived based on relevant questions from the women's and men's questionnaires. Similar to the analytic procedure described in the Malaria SBCC Indicator Reference Guide (RBM, 2017), responses for each item were scored and then collapsed into dichotomous measures. Most of the ideational variables were measured by asking respondents to

indicate agreement or disagreement with Likert statements such as, “The medicine given to prevent malaria during the rainy season can harm children.” Respondents were asked whether they agreed or disagreed with each statement. For these variables, each respondent received a score for that question based on their response: (-1) disagree, (0) don’t know/not sure/missing, and (1) agree. If disagreement with the statement corresponded to a favorable response, the scoring for that particular statement was reversed. Thus, the respondent received a positive score for disagreeing (+1) with that statement and their resulting index score increased. An index score was calculated to reflect how each individual responded to the set of questions for that ideational factor. The index score was the sum of the individual question scores across all the questions for a given ideational factor. For example, three Likert scale statements were used to measure the perceived efficacy of nets to prevent malaria, the resulting index scores were integer values ranging from -3 to +3. Based on that index score, each respondent was classified as having expressed a favorable ideational construct or not. A binary variable was created by classifying respondents with zero or a negative index score as not, for example, believing nets effectively prevent malaria (i.e. response efficacy related to net use, 0). By extension, those with a positive score (above zero, 1) were considered to believe that nets were effective in preventing malaria. For the ideational variables (e.g., spousal communication about malaria, descriptive norm about ITN use) that were measured through a single question, the responses were recoded to distinguish between positive and negative ideational characteristics.

In addition to presenting the prevalence of recommended malaria behaviors and their psychosocial determinants, this report also presents the results of bivariate statistical tests to assess associations between outcomes and a limited number of background variables (e.g. region, sex, household wealth quintile, urban versus rural residence); these associations are described in the narrative of the report. The results presented in the Tables show how the outcome variables vary by these background variables. The level of significance is indicated on the Tables by asterisks: one for 0.05, two for 0.01, and three for 0.001. To facilitate interpretation, especially when sample sizes were small, respondents living in the two poorest household wealth quintiles were frequently compared to those in the three more wealthy quintiles. Finally, the results of multivariable logistic regressions are presented for key behavioral outcomes. Such multivariate regressions are useful in identifying correlations among individual exposure, ideational determinants, and the practice of recommended behaviors.

Ethical Considerations

Before implementation, the research team obtained ethical approval from the Johns Hopkins School of Public Health Institutional Review Board and the National Ethics Committee for Human Health Research (CNERSH) in Cameroon. Several steps taken during training, recruitment, and interviewing of participants minimized potential risks to study participants. Data collectors underwent training on the ethics guidelines to follow when collecting data on human research subjects. To obtain informed consent from participants, trained data collectors verbally explained the purpose of the survey, the types of questions that would be asked, the potential risks associated with participating in the survey, and the actions the study team will take to protect the confidentiality of the participants. In addition,

data collectors made clear that participants did not have to participate in the study, that they could decide at any point to discontinue their interview, and that they did not need to answer any questions they did not want to.

In order to protect the identity of participants, nicknames were used when possible, instead of legal names. The household listing sheet in a given EA was destroyed when data collection in the corresponding cluster finished. Signed consent/assent forms were kept in locked and secure locations at all times. In addition, each participant received an information sheet about the study as well as a hard copy of the consent or assent form they signed after verbally discussing their participation.

In accordance with the CNERSH guidelines, data collectors obtained assent for research participants under the age of 21 years unless they were married and therefore considered legally emancipated. Minors were given the option, although not obliged, to participate in data collection if their parent or legal guardian agreed to their participation first. The consent/assent forms included the contact information of the Principal Investigator of the study and CNERSH so that participants could ask questions or express concerns about their participation in the activity.

3. Results

3.1. Sample Description

This section presents the characteristics of the households from which participants were interviewed. It includes a basic description of the household population, the physical characteristics of household dwellings, and their possession of various assets which was used to estimate each household's level of wealth relative to other households in the study sample. The basic sociodemographic characteristics of the men and women of reproductive age interviewed with the individual questionnaire, such as level of education and age category, are also presented in this section. In summary, information was collected from 2,797 heads of household, 3,565 women, and 949 men (**Table 3**). As noted, depending on the composition of a household, women of reproductive age or their male partners may also have been interviewed as head of household or his/her representative.

TABLE 3. ACTUAL SAMPLE SIZE BY STRATUM, NORTH AND FAR NORTH REGIONS, CAMEROON, 2019

STRATA		CLUSTERS	HOUSEHOLDS		WOMEN		MEN	
			Approached	Interviewed	Approached	Interviewed	Approached	Interviewed
North	Rural	38	771	747	1013	1007	267	261
	Urban	34	705	683	876	871	223	218
Far North	Rural	34	663	660	818	818	228	226
	Urban	35	710	706	869	869	246	244
Both regions		141	2849	2796	3576	3565	964	949

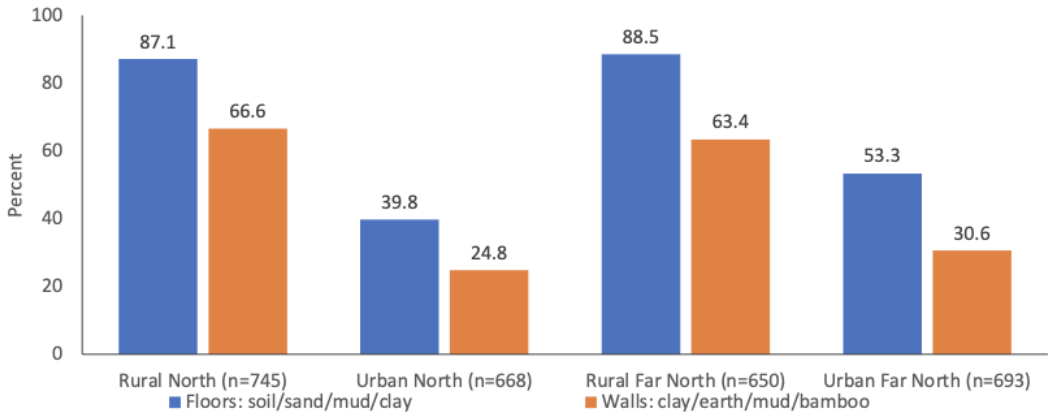
Population and Household Characteristics

This section presents data on households and their members. The data cover relevant dwelling unit characteristics, household assets, and key household members' characteristics. The data are presented for each region and for both regions combined.

Housing Characteristics

The housing characteristics of respondents in the two regions were largely similar with a few exceptions. Overall, the average number of rooms per household used for sleeping was roughly 2.4 and there was no difference between regions. In the North Region, the average number of sleeping rooms per household was higher in rural (2.5) than in urban (2.2) areas ($p < 0.01$). On average, there were about 2.4 household members per sleeping room; there was a small but significant difference in the North Region (2.5) compared to the Far North Region (2.3). More striking was the difference in the regional proportions of dwellings with ceiling eaves completely closed which was 64.1% in North and 35.9% in the Far North. Fewer than one third (30.7%) of the households had electricity; the prevalence of electricity did not differ between North (30.8%) and Far North (30.6%). In contrast, there were proportionally more households with electricity in urban areas (72.4% in the North; 63.1% in the Far North) than in rural areas (13.0% in the North; 12.8% in the Far North). Only 22.5% of dwelling units had cement floors. The use of various flooring materials did not differ significantly between North and Far North but a significantly higher proportion of dwelling units in rural (87.9%) than in urban areas (48.0%) had a rudimentary floor ($p < 0.001$), whereas cement floors were more common in urban (44.8%) than in rural (11.4%) areas ($p < 0.001$; Figure 3). In terms of wall construction, over half (52.8%) of dwelling walls in the two regions were made of a combination of clay, earth, mud or bamboo. This did not vary significantly by region but did between urban and rural areas. In both regions, dwellings with walls constructed from rudimentary materials predominated in rural areas (66.6% in the North; 63.4% in the Far North) whereas cement walls were more common in urban areas (60.5% in the North; 41.8%) in Far North. (**Annex Table A** shows data on the proportion of households living in housing with different characteristics as well as a comparison between the housing of urban and rural respondents).

Figure 3: Percentage of household dwellings built with rudimentary floor and wall construction materials, Cameroon 2019



Household-owned Durable Goods

The data collected on household-owned durable goods reveal a relatively poor population with limited ownership of durable goods that are indicative of wealth (**Annex Table B**). For example, less than one third (30.4%) of the households in both regions owned a radio while about one fifth (20.5%) owned a television set. Whereas television ownership did not vary by region, the proportion of households that owned a radio was significantly higher in the Far North (33.6%) compared to the North (26.1%): $p < 0.05$. For each of these two items and in each region, ownership was more prevalent in urban areas than in rural areas. Refrigerators, computers, cars/trucks and air conditioners were all very rare household goods. Overall, only 4.7% of the households in both regions owned a refrigerator, 2.8% owned a computer, 1.5% owned a car or truck while only 0.7% owned an air conditioner. Whereas data on ownership of these items did not vary between the North and Far North, the items were considerably more likely to be found in urban areas than in rural areas. In contrast, bicycles were more common in the Far North (23.1%) than in the North (9.2%): $p < 0.001$. Bicycle ownership did not vary by place of residence in the Far North but did in the North Region; it was more common in rural areas compared to urban areas ($p < 0.05$). Overall, about one sixth of households owned a motorcycle. Whereas there was no difference in the ownership of this item by region, in the Far North, it was more common in urban (29.3%) than in rural (11.5%) areas.

Composition of Households

Overall, the households sampled included a higher proportion of males (50.9%) than females (49.1%): $p < .05$. Looking at each region separately, it appears there are differences in the gender composition of the two regions (see **Annex Table C**). Specifically, the households surveyed in the North Region included

proportionally more females (53.0%) than males (47.0%): $p < 0.001$. In contrast, in the Far North, there were more males in the households surveyed (51.7%) than females (48.3%): $p < 0.001$.

The age distribution of the household population reflects a typical young age structure with almost half (46.8%) less than 15 years old and only 9.5% aged 45 years or more. The mean age was 20.0 years in the North and 20.6 years in the Far North. There were some differences by region in the age distribution. Proportionally fewer household members in the Far North (12.3%) than in the North Region (17.5%) were under 5 years old ($p < 0.001$). In contrast, a larger proportion of household members in the Far North (55.0%) than in the North Region (51.1%) were 15 years old or older ($p < 0.05$).

Sociodemographic Characteristics of Interview Respondents

Consistent with the study design, the interview subjects included more women (79%) than men (21%); the proportion of men and women interviewed did not vary by region or by place of residence. In both regions, more than one fifth of the men and women were 15-24 years of age while more than one third was 25-34 years of age. The mean age did not differ significantly between North (32.6 years) and Far North (32.8 years). There were, however, significant differences in age distribution between the sexes with an average age of 28.8 years for women and 37.7 years for men ($p < 0.001$; **Table 4**).

About half (49.9%) of the survey respondents had no formal education while only a little over one fifth (21.4%) had secondary education or higher. A little over one quarter (28.7%) of the respondents had primary education. There were no educational differences by region but educational levels were, on average, higher for men than for women. For example, 42.3% of men compared to 55.9% of women had no formal education ($p < .001$). In addition, 27.8% of men compared to 16.3% of women had secondary education or higher ($p < .001$). Differences in education level between urban and rural respondents were significant in each of the study regions. In the North Region, 55.5% in rural areas had no formal education compared to 40.9% in urban areas; in contrast, 16.3% in rural areas had secondary education or higher compared to 36.3% in urban areas. A similar pattern is observed in the Far North: 57.4% of the rural respondents compared to 33.5% of the urban respondents had no formal education whereas 13.3% of rural respondents compared to 34.4% of their urban counterparts had secondary education or higher. The data reveal that more than half (52.2%) of the men and women were Christian while 44.3% were Muslim. Adherents of traditional African religions and those with no religion represented only 3.3%. Religious affiliation did not differ by region. (**Annex Table D** compares the proportion of men and women with different sociodemographic characteristics in urban areas compared to rural areas for each region in tabular form).

TABLE 4. SOCIODEMOGRAPHIC CHARACTERISTICS OF MEN AND WOMEN OF REPRODUCTIVE AGE, CAMEROON 2019

PERCENTAGE OF RESPONDENTS BY SOCIODEMOGRAPHIC CHARACTERISTICS, BY REGION

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=1,046)	Urban (n=1,029)	Total[1] (2,075)	Rural (989)	Urban (1,243)	Total[1] (2,232)
Age (years)						
15-24	22.5	20.8	22.0	22.4	20.2	21.6
25-34	36.5	35.3	36.1	34.3	34.4	34.3
35-44	24.5	28.8	25.7	28.4	30.8	29.2
45+	16.6	15.2	16.2	14.9	14.6	14.8
Education Level						
None	55.3	40.9	51.2**	57.4	33.5	48.9***
Primary	28.4	22.8	26.8	29.3	32.2	30.3
Secondary or higher	16.3	36.3	22.0***	13.3	34.4	20.8***
Religion						
Christian	58.1	36.0	51.7***	61.1	36.9	52.4***
Muslim	37.5	63.0	44.3***	34.1	62.5	44.3***
Traditional/No religion	4.4	1.0	3.4	4.8	0.6	3.3
Total	71.0	29.0	100.0	64.0	36.0	100.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each characteristic between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

3.2. Media Consumption and Message Exposure

Media Consumption Habits

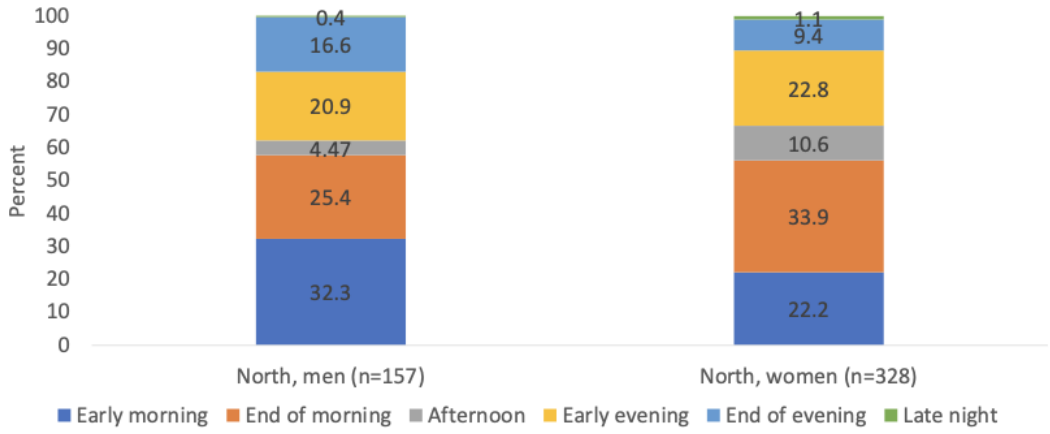
Radio

Due to the relatively low possession of radios, radio listenership in the general population is rather low). The data reveal that programs distributed via radio have the potential to reach only 17.4% of men and women in the North Region and 23.8% in the Far North. Among households with a radio (30.4% of households), such programs would reach 37.1% in the North compared to 49.6% in the Far North. In each region, radio listenership varied significantly by sex, place of residence, age group, and level of education (**Table E in Annex**). Among households with a radio in North Region, 49.0% of men compared to 27.6% of women reported regularly listening to the radio ($p < 0.001$); among their peers in the Far

North, 70.4% of men compared to 30.5% of women reported regularly listening to the radio ($p < 0.001$). In both regions, radio listenership increased consistently with age group and was significantly higher among men 35–44 years of age ($p < 0.001$) and 45+ years of age ($p < 0.001$) compared to younger men 15–24 years of age. Also in both regions, regularly listening to the radio was more prevalent among those with secondary education or higher compared to those with primary or no education. The association with household wealth was such that, among households with a radio, radio listenership was considerably lower among people from poorer households (i.e. two lowest quintiles) compared to their wealthier counterparts (living in three wealthier quintiles). People from poorer households were indeed at a great disadvantage: only 7% of them in the North and 9% in the Far North would be reached by programs via the radio. In the North Region, regular radio listenership was significantly higher in urban areas compared to rural areas; in the Far North, the association with place of residence was not significant in households with a radio.

The preferred time for listening to the radio was generally in the morning or early evening in both regions (**Annex Tables F and G**). In the North Region, 28.3% of radio listeners reported they preferred to listen to the radio during early morning (before 8 am), 28.8% preferred late morning (between 8 am and 12 noon), while 21.7% preferred early evening (between 4 pm and 8 pm). In the Far North, the pattern is similar with 28.8% preferring early morning, 27.1% indicating preference for late morning, while 29.1% preferred early evening. In the North Region, men (32.8%) were more likely than women (22.2%) to report preference for early morning radio listening ($p < 0.05$) (Figure 4). The respondents in the Far North expressed small differences in preferred listening time by sex (Figure 5).

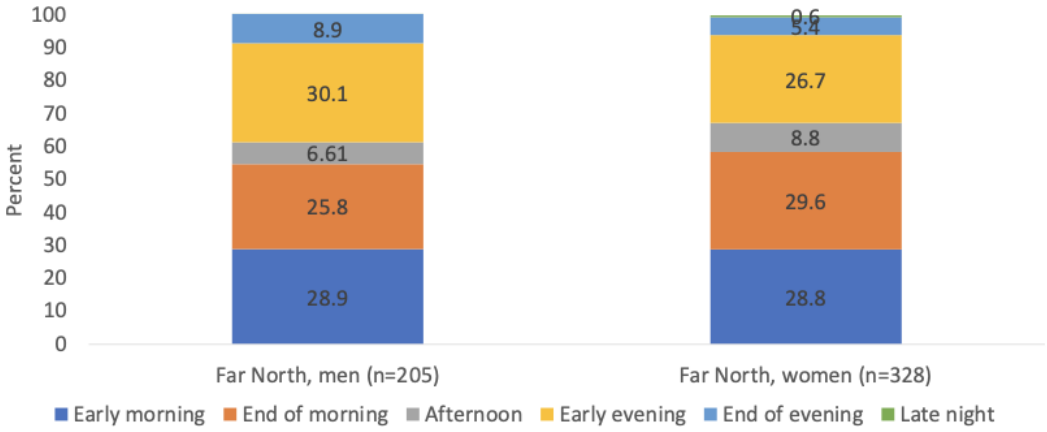
Figure 4: Percentage of men or women that prefer to listen to the radio at a certain time, among those who listen at least once a week in the North, Cameroon 2019



In the North Region, the data further revealed that radio listening time preferences varied by age group and education level (**Annex Table G**). Specifically, young people 15-24 years old were less likely than

older age groups to report a preference for listening in the early morning and more likely than those 45 years old or older to report a preference for early evening. Differences in preference by education level

Figure 5: Percentage of men or women that prefer to listen to the radio at a certain time, among those who listen at least once a week in the Far North, Cameroon 2019

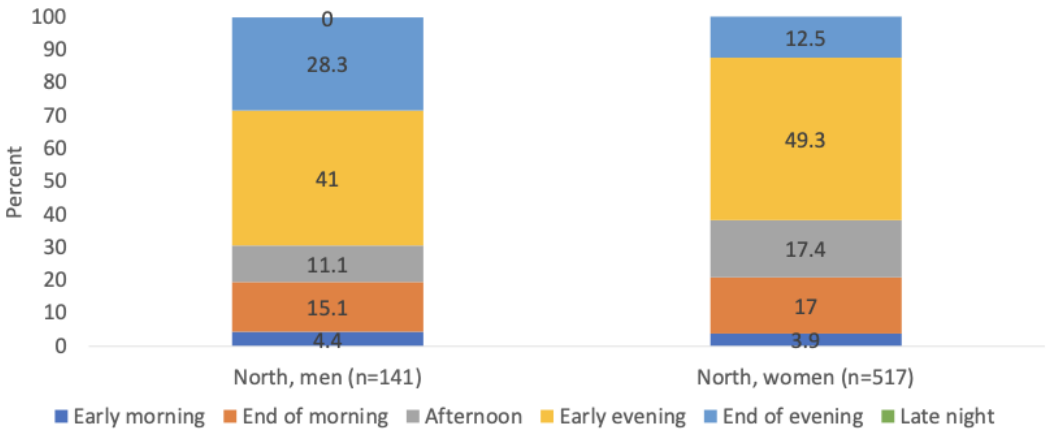


were such that people with primary or no education were significantly less likely than those with secondary education or higher to report preference for early morning. In addition, men and women with no education were more likely than their peers with secondary education or higher to prefer late morning. In the Far North Region, there were significant differences by age group and poverty level (**Annex Table H**). In this region, as also observed in the North Region, young people were less likely than the oldest age group to prefer early evening. Individuals from poor households were less likely to report preference for early morning than their wealthier peers.

Television

Overall, only about one fifth of the men and women in the study regions reported watching television regularly, that is, at least once a week. Lack of television ownership is the main reason why most non-viewers did not watch television regularly. Among men and women in households with a television, 70.9% in the North and 77.3% in Far North reported regular television viewing. Looking at television viewership among the general population, the data reveal that the only population groups that potentially can be reached at a significant level are men and women with secondary education or higher, urban residents, and those from the three upper wealth quintiles (**Annex Table H**). Among the households with a television, no differences existed in regular viewership between men and women or by age group in either region. There were, however, clear differences in regular viewership by place of residence and poverty level in both regions. The differences by place of residence were such that rural residents with a television were less likely than their urban peers to watch televised programs regularly. Differences by education level were significant in the Far North Region but not in the North Region.

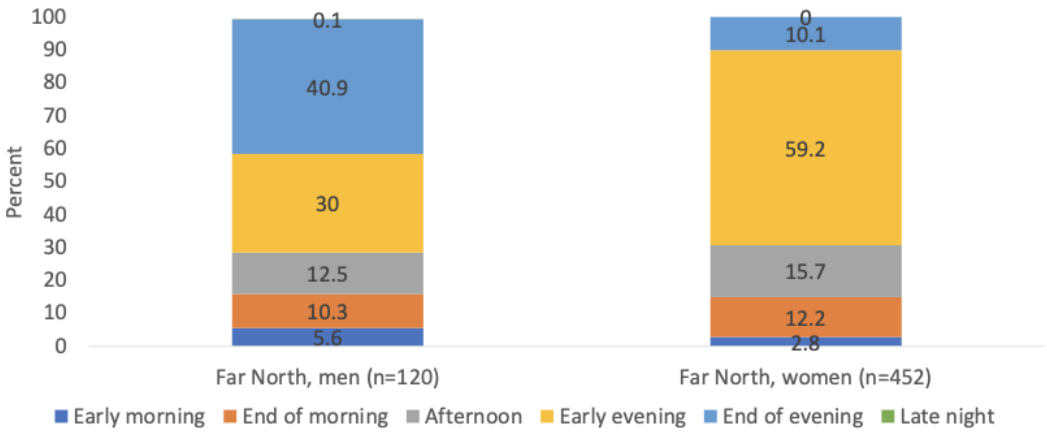
Figure 6: Percentage of men or women that prefer to listen to the television at a certain time, among those who watch at least once a week in the North, Cameroon 2019



As shown in Figures 6 and 7, most respondents preferred to watch television in the early evening (4 pm to 8 pm) or late evening (8 pm to midnight). In the North Region, 41% of men and 49% of women indicated a preference for watching television in the early evening. Men (28%) were more likely than women (13%) to report preference for late evening. In contrast, more women (17%) than men (11%) preferred watching television in the afternoon. In the Far North, 59% of women, compared to 30% of men, reported preference for early evening. On the other hand, in this region preference for late evening was more prevalent among men (41%) than among women (10%) (Figure 7).

Preferred times for watching television also varied by age group, place of residence, education level, and poverty level in both regions (**Annex Table I and J**). Young people (53.2% in North and 61.5% in Far North) were more likely than the oldest age group (41.0% in North and 37.1% in Far North) to report preference for early evening. In the Far North but not in the North Region, preference for late evening was less common among young people compared to the older age groups. In the North Region, individuals with secondary education or higher were less likely than individuals with lower education to report preference for late morning and afternoon, and more likely to prefer early evening. In the Far North, people with secondary education or higher were more likely to prefer late evening and less likely to prefer the afternoon compared with people with primary or no education. Finally, people from poor households were less likely to prefer watching the television in the afternoon and more likely to prefer late morning compared to individuals from wealthier households (i.e., three upper wealth quintiles). Furthermore, in the North Region, men and women from poor households (55.4%) were more likely to prefer early evening compared to those from wealthier households (44.9%); the reverse was true in the Far North.

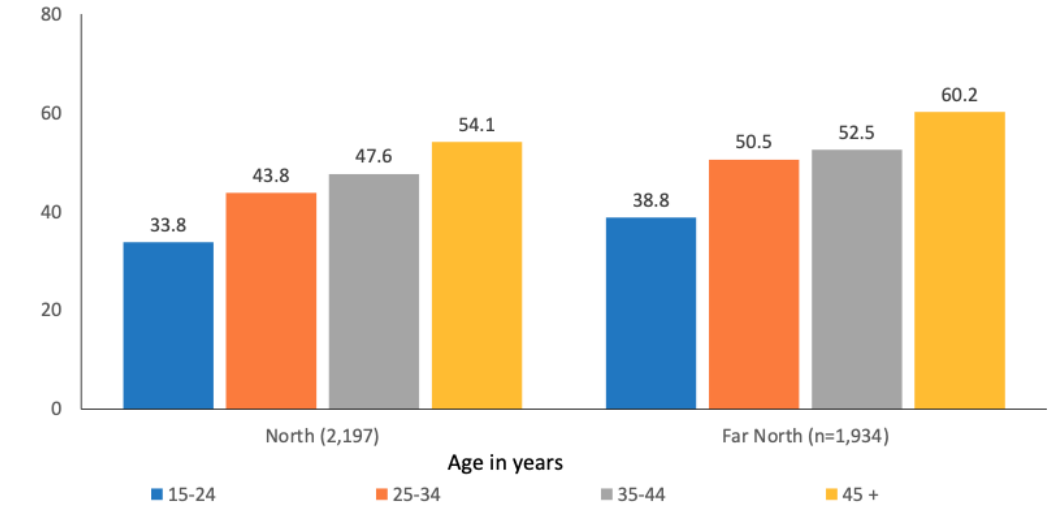
Figure 7: Percentage of men or women that prefer to listen to the television at a certain time, among those who watch at least once a week in the Far North, Cameroon 2019



Ownership of Mobile Phone and Associated Media

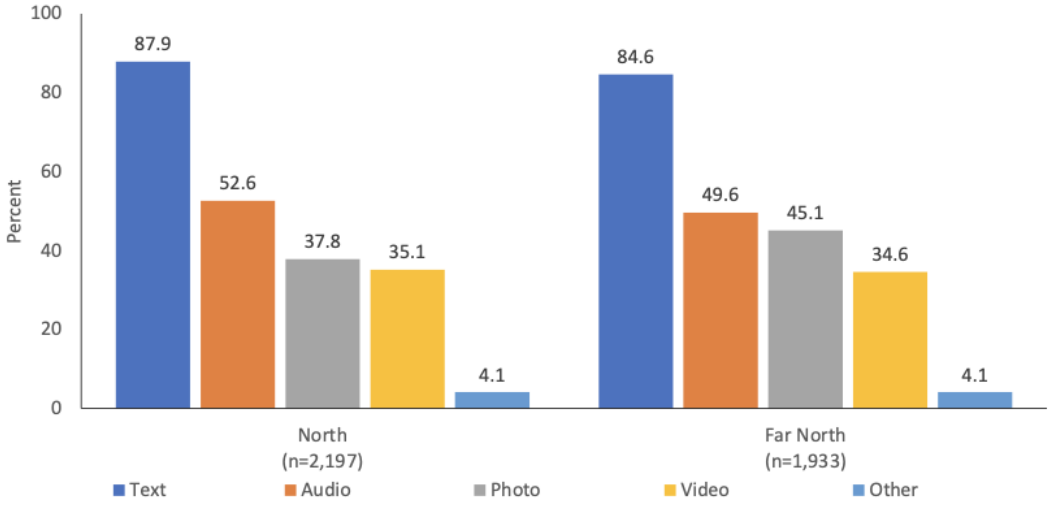
Ownership of mobile phones is far from being universal in the study regions: 50.6% in the North Region and 56.3% in the Far North reported owning a mobile phone. In both regions, women were less likely than men to own a mobile phone. In some cases (12.0% of those owning a phone), respondents shared the available mobile phones with other users. Overall, 44.1% of respondents in the North Region and 49.9% in the Far North had a mobile phone that was not shared with anyone. Ownership of a non-shared mobile phone was significantly more widespread among men (61.7% in North Region; 65.1% in Far North) compared to women (31.6% in North Region; 35.6% in Far North). Ownership varied by age group in both regions (Figure 8). Specifically, both men and women younger than 25 years were significantly less likely than older men and women to report ownership of a non-shared phone. In both regions, the oldest age group was the most likely to report ownership. There were also significant differences in phone ownership between urban and rural areas in each region (**Annex Table K**).

Figure 8: Percentage of survey respondents who owned a non-shared mobile phone by age group and region, Cameroon 2019



Most of the respondents' mobile phones were capable of receiving SMS or text messages: 87.9% of individuals with a mobile phone in the North Region and 84.6% in the Far North reported their mobile phone was capable of receiving text messages (Figure 9). In contrast, a smaller proportion of these individuals had a phone capable of receiving photographs (37.8% in the North Region; 45.1% in the Far North), videos (35.1% in the North Region; 34.6% in the Far North), or audio files (52.6% in the North Region; 49.6% in the Far North).

Figure 9: Percentage of respondents that can receive different types of media via telephone or tablet, Cameroon 2019



Exposure to Messages on Malaria

More than half (51.5%) of the survey respondents reported being exposed to a malaria-related message from any source in the past six months. Exposure to malaria-related messages was significantly more common in the Far North Region (61.2%) compared to the North Region (39.6%) (**Table 5**). In both regions, exposure to malaria messages was more common in urban areas than in rural areas. Men were also more likely than women to be exposed to malaria-related messages. For example, in the North Region, 46.4% of men, compared to 34.6% of women, reported they saw or heard a malaria-related message in the past six months ($p < 0.001$). Similarly, in the Far North, 65.9% of men, compared to 57.4% of women, reported they saw or heard a malaria-related message. In both regions, exposure increased steadily with education level and was higher in urban areas than in rural areas.

TABLE 5. EXPOSURE TO MALARIA MESSAGES, CAMEROON 2019[1]

PERCENTAGE OF RESPONDENTS WHO RECALLED SEEING OR HEARING A MALARIA-RELATED MESSAGE IN THE LAST SIX MONTHS BY BACKGROUND CHARACTERISTICS

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=1,225)	Urban (1,007)	Total[1] (n=2,232)	Rural (n=997)	Urban (n=2,000)	Total[1] (n=2,997)
Sex						
Men	43.8	53.1	46.4	63.5	70.3	65.9
Women	28.0	50.4	34.6***	53.5	64.8	57.4*
Age (years)						
15-24	20.9	44.6	27.0***	51.6	61.5	54.8
25-34	35.8	54.3	41.1**	52.2	68.6	59.3*
35-44	37.9	54.1	43.9*	67.1	70.6	68.4
45+	47.2	49.4	47.6	58.7	67.5	61.7
Education Level						
None	31.6	44.5	34.3*	54.1	53.9	54.1
Primary	37.5	50.3	40.7	58.2	70.4	62.7
Secondary or higher	40.9	60.4	50.1***	74.4	77.5	76.2
Total	34.9	51.5	39.6	57.9	67.3	61.2

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of exposure to malaria messages between urban and rural respondents with similar characteristics (e.g. primary education) in each place of residence and region.

* $p < .05$; ** $p < .01$; *** $p < .001$

For people who reported exposure to any malaria-related messages, the most common sources of exposure overall were community health workers at 53.2%, health facilities (41.2%), and friends or family (32.1%; **Annex Table L**). Relatively small numbers of people were exposed to the messages through the radio (13.5%); the television (6.0%); print media such as newspaper, magazine, and posters

(6.0%); or community leaders (2.0%). A few differences existed between regions regarding the source of malaria-related messages. For example, health facilities were a more common source of messages in the Far North Region (49.7%) than in the North Region (24.6%): $p < 0.001$. Similarly, community health workers were more frequently cited in the Far North (60.0%) compared to the North Region (40.3%): $p < .001$. In contrast, radio and television were more commonly cited sources in the North Region than in the Far North. The average number of sources of exposure was 1.6; this indicator was lower in the North Region (1.4) compared to Far North (1.7): $p < .001$.

The messages to which the respondents reported being most frequently exposed focused on use of bed nets; overall, 40.0% of all respondents reported exposure to bed net messages. Other common themes the respondents recalled included SMC (18.9%), ANC (10.6%), case management (10.5%), and IPTp (6.2%). The specific messages recalled varied by region and sex. For example, men (42.2%) were more likely than women (38.2%) to recall hearing messages related to bed net use ($p < 0.05$). Exposure to bed net-related messages was also more common in the Far North Region (46.6%) than in the North Region (31.8%): $p < 0.001$. Similarly, SMC-related messages were more widespread in the Far North (reported by 28.5%) compared to the North Region (7.2%): $p < 0.001$. In contrast, ANC-related messages were more likely to be recalled in the North Region (13.6%) compared to Far North (8.6%): $p < 0.01$.

3.3. Cross-sectional Ideational Determinants

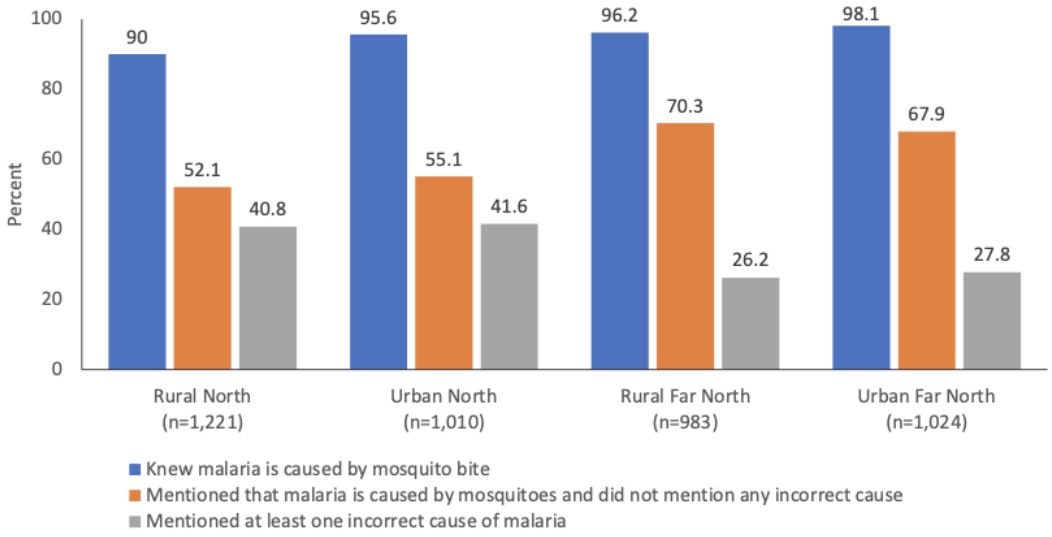
This section presents data on psychosocial variables that are associated with cross-cutting malaria-related behaviors. The data cover knowledge about malaria, perceived severity of malaria, perceived susceptibility to malaria, perceived self-efficacy for malaria prevention, and interpersonal communication about malaria. This section also includes MBS results on gender norms and perceptions of health care providers.

Knowledge of Malaria

Knowledge about malaria is assessed through questions about the symptoms and causes of malaria (Figure 10; **Annex Table M**). The majority of respondents (North 87.1%; Far North 92.7%) mentioned fever as a symptom of malaria. Similarly, over 90% of participants across both regions acknowledged that mosquitoes transmit malaria. Regarding this indicator, significant urban-rural differences were observed in the North, but not the Far North. Compared to rural residents in the North (90.0%), about 95.6% of urban residents knew that mosquito bites transmit malaria ($p < 0.01$). Many respondents mentioned one or more incorrect causes of malaria. Notably, 41.1% in the North and 26.8% in the Far North named at least one incorrect cause of malaria, including eating dirty food, eating unripe fruits, drinking dirty water, being malnourished, staying long in the sun, as well as others. No significant urban-rural differences in the misconceptions about the causes of malaria were apparent in either region. Overall, 62.1% of respondents mentioned mosquito bites as the cause of malaria and did not mention

any incorrect cause. This indicator of adequate knowledge about the cause of malaria was higher in the Far North Region (69.5%) compared to North Region (53.0%): $p < .001$. There were no differences by sex.

Figure 10: Percentage of respondents with specific knowledge related to the cause of malaria, Cameroon 2019



Perceived Susceptibility

Perceived susceptibility refers to one's perception of their chances of catching a disease or illness. This psychosocial determinant was assessed by measuring respondents' agreement with four statements related to their perceived susceptibility to malaria (**Table 6**). The majority (91.6% in North; 95.3% in Far North) agreed they were worried every day during the rainy season that a member of their family might get malaria. Similarly, 87.3% in the North Region and 90.3% in Far North feared that a child with fever might have malaria. These two beliefs were more prevalent in rural areas compared to urban areas in the North Region; no urban-rural differences were observed in the Far North. In addition, about 90% of study participants believed that almost every year a member of their community got a severe case of malaria. Furthermore, 71.2% in the North Region and more than half (56.2%) in the Far North, were of the opinion that people in their community developed malaria only during the rainy season. There were no differences by sex in any of these items.

TABLE 6. PERCEIVED SUSCEPTIBILITY TO MALARIA, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,231)	Urban (1,014)	Total[1] (n=2,245)	Rural (n=982)	Urban (n=1,022)	Total[1] (n=2,004)
During the rainy season, you are afraid almost every day that a member of your family will suffer from malaria.	92.2	90.1	91.6	95.4	95.0	95.3
When your child has a fever, you're almost always afraid it's malaria.	88.8	83.6	87.3*	91.6	88.0	90.3
Almost every year, a person in this community catches severe malaria.	90.5	83.3	88.4**	88.7	87.9	88.4
People in this community catch malaria only during the rainy season.	71.8	69.7	71.2	59.0	51.0	56.2
Percent of respondents who perceived susceptibility to malaria[2]	87.1	82.7	85.8	91.0	91.0	91.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Based on the composite variable that was created based on scoring responses to each of the statements above.

As described in the Methods section, responses that reflected high perceived susceptibility received a score of 1 for that statement, a response that reflected low perceived susceptibility received a score of -1, and a response that reflected a neutral perspective received a score of 0. A respondent's scores to the four statements were summed together to calculate their index score for perceived susceptibility; the total score was then split at 0 to indicate higher perceived susceptibility (total score of one and higher) or lower perceived susceptibility (total score of zero and less) Overall, most respondents reported high perceived susceptibility to malaria (North 85.8%; Far North 91.0%). No significant differences in high perceived susceptibility to malaria were observed across urban-rural places of residence or sex in either region.

Perceived Severity

Perceived severity refers to one's perception of the potential seriousness of a disease or illness. This psychosocial determinant was assessed through four statements related to perceived severity of

malaria. **Table 7** below summarizes the respondent's perception of the potential severity of malaria. Perceptions of the severity of malaria were mixed and varied by region. The data showed that about a fifth of participants in the North (21.0%) and 15.6% in the Far North were not afraid of malaria because it could be treated easily. Similarly, 23.1% in the North and 14.5% in the Far North perceived that only weak children could die of malaria. Proportionally more people in the Far North (85.3%) than in the North Region (64.6%) believed that each case of malaria could easily lead to death. Whereas this belief did not vary by place of residence in the Far North, a significantly higher proportion of individuals in urban (72.5%) compared to rural (61.4%) areas in the North believed that each case of malaria could potentially lead to death ($p < 0.05$).

TABLE 7. PERCEIVED SEVERITY OF MALARIA, CAMEROON 2019

PERCENT OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS	NORTH			FAR NORTH		
	Rural (n=1,231)	Urban (n=1,014)	Total[1] (n=2,245)	Rural (n=982)	Urban (n=1,022)	Total[1] (n=2,004)
You are not afraid of malaria, because it can be treated easily.	20.0	23.5	21.0	15.3	16.2	15.6
Only weak children can die of malaria.	23.4	22.3	23.1	14.9	13.7	14.5
Each case of malaria can potentially lead to death.	61.4	72.6	64.6*	84.2	87.4	85.3
When someone you know has malaria, you usually expect them to recover completely within a few days.	74.1	75.6	74.5	74.5	71.7	73.5
Percent of respondents who perceive malaria as severe[2]	55.6	62.3	57.5	76.2	80.2	77.6

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above.

Similar to how perceived susceptibility was measured, responses to these questions were scored, aggregated and dichotomized; index scores of one and higher indicated higher perceived severity of malaria, and scores of zero and less represented lower perceived severity of malaria. More than half (57.5%) of the participants in North and 77.6% of respondents in the Far North had a high perceived severity of malaria. There was no significant difference in proportion of respondents who perceived malaria infection as severe across urban-rural residence in either region. In North Region, there were slightly more women (60.7%) who perceived malaria as severe than men (55.2%, $p < 0.01$), but no such difference in Far North Region.

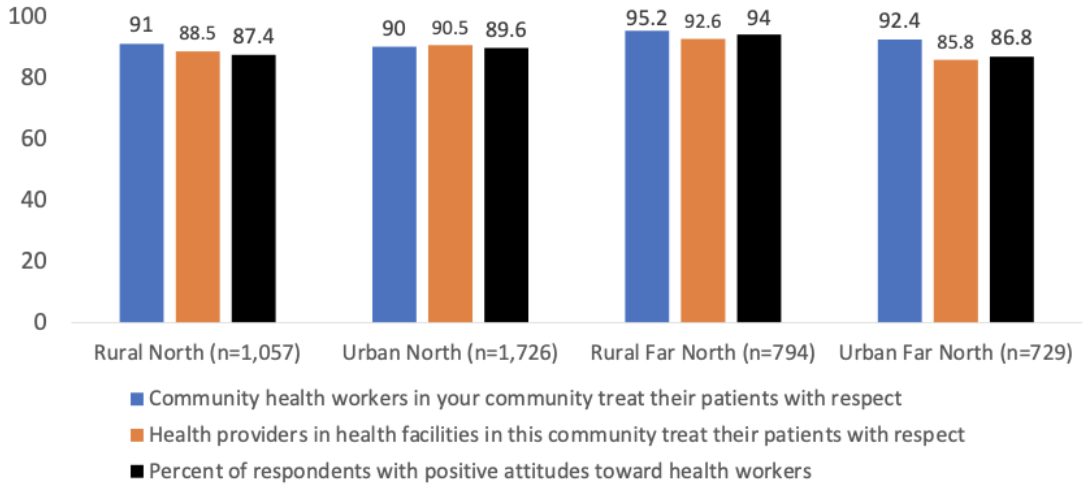
Interpersonal Communication About Malaria

Interpersonal discussion about a specific health behavior has been associated with one's likelihood of practicing that behavior (Kilian et al., 2016; Babalola et al., 2018). Discussions about malaria were common among participants (**Annex Table N**). Many participants had had either such a discussion with a spouse/partner or such discussions with another family member or friend (North, 76.7%; Far North, 82.0%). No urban-rural differences were seen in the proportion of people who had had any discussion about malaria across both regions. Spousal communication about malaria in the past six months was reported by many (North 74.4%; Far North 73.9%) of the respondents. No significant differences across urban-rural residence were noted in the proportion of participants who had discussed malaria with their spouses or partners. Similarly, about 73.1% of participants in the North and 77.4% of respondents in the Far North reported that they had discussed malaria with a friend or family member in the six months preceding the survey.

Perception of Health Workers

Overall, respondents' perception of health workers was positive (North, 87.9%; Far North, 91.8%) (Figure 11, **Annex Table O**). Regarding treatment of patients with respect, most respondents indicated that health workers in health facilities did so (North, 89.0%; Far North, 90.5%), as did community health workers (North, 90.8%; Far North, 93.9%). By scoring and combining these two items as described in the Methods section, results show the majority of respondents (89% in the North; 90.5% in the Far North) positively perceived the health workers. The perceptions did not vary by place of residence in either region. However, there were some differences by sex. Significantly higher proportions of women than men believed that health workers in the health facilities (men, 88.6%; women, 90.9%; $p < 0.05$) and in the community (men, 91.4%; women, 93.9%; $p < 0.05$) treated their patients with respect. Overall, a higher proportion of women (91.6%) had positive attitudes toward health workers than did men (88.3%) ($p < 0.001$).

Figure 11: Percentage of respondents that agreed with statements used to measure attitudes towards health workers, Cameroon 2019



Gender Norms

Measurement of gender equity concepts regarding malaria prevention and treatment (**Table 8**) revealed attitudes that favored girls. About a quarter of respondents in the North agreed that when there were not enough nets, female children should be given preference (27.1%). Roughly the same proportion agreed that when there was not enough money, female children with fever should be prioritized over male children for medicine (24.5%). Comparatively, in the Far North, 19.2% agreed that female children should be given priority when nets were scarce, and 17.6% agreed that female children with fever should be given priority for medication over male children when money was limited. Few respondents in either region agreed that male children should be prioritized over female children when there were not enough nets (North, 7.4%; Far North, 8.3%). Similarly, few respondents agreed that male children should be preferentially treated for malaria when insufficient resources existed to pay for drugs (North, 8.1%; Far North, 8.6%).

When responses expressing agreement or disagreement with these four statements were combined, the data showed that more than three fourths (70.8%) of the study participants (North, 67.4%; Far North, 73.7%) favored egalitarian treatment of boys and girls. This indicator did not vary significantly by urban-rural residence or education level in either region. In the Far North region, however, people from wealthier households (81.1%) were more likely to display egalitarian attitudes compared to their poorer peers (67.0%): $p < .05$. Women in both regions were more likely to favor egalitarian treatment of boys and girls (North, 83.7%; Far North, 75.2%) than men (North, 70.0%; Far North, 63.0%).

TABLE 8. GENDER NORMS RELATED TO MALARIA, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS	NORTH			FAR NORTH		
	Rural (n=1,246)	Urban (n=1,036)	Total[1] (n=2,282)	Rural (n=990)	Urban (n=1,047)	Total[1] (n=2,037)
When there are not enough nets, it is more important that female children sleep under the available nets rather than male children.	27.2	26.8	27.1	20.9	15.5	19.2
When there are not enough nets, it is more important that male children sleep under the available nets rather than female children.	7.3	7.6	7.4	10.1	4.3	8.3*
When there is not enough money, it is more important that male children with fever get medicine rather than female children.	7.9	8.6	8.1	10.3	4.8	8.6
When there is not enough money, it is more important that female children with fever get medicine rather than male children.	24.5	24.7	24.5	20.0	12.3	17.6
Percentage of respondents with egalitarian gender attitudes related to malaria[2]	67.3	67.7	67.4	71.9	77.6	73.7

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

3.4. Insecticide-treated Nets

There is abundant evidence in literature about the efficacy of mosquito nets as a means to prevent malaria. As in other countries in sub-Saharan Africa, mass distribution of ITNs in Cameroon and promotion of their use among the population play a key role in the national malaria control response. Whereas access to a net within one's household is critical for use of mosquito nets, other factors, including psychosocial variables, are important too. This section of the report examines the availability of bed nets within households, the use of bed nets by individuals, and the determinants of use. It is pertinent to note that data collection coincides with the mass ITN distribution campaign in North region but precedes the activity in Far North region.

Behavioral Determinants

Knowledge

This report uses two variables to assess bed net-related knowledge: awareness of mosquito nets as a malaria prevention method and awareness of a place to buy mosquito nets. When asked how to prevent malaria, the majority (89.8%) of the men and women mentioned using a bed net. Men (92.1%) were more likely than women (88.1%) to mention use of bed nets as a prevention method. It is pertinent to note that, overall, only 59.1% specifically indicated ITNs (as opposed to just any bed net) as a preventive method. Proportionally more people in the North (65.6%) than in the Far North (53.9%) region specifically mentioned ITNs.

Attitudes Toward Net Use

This study gauged attitudes toward use of bed nets using nine Likert scale items (**Table 9**). The data shows that attitudes were generally positive toward bed nets among the survey respondents. More than nine-tenths of the survey respondents believed that it was easier to have a pleasant night when one slept under a bed net (90.6%) and that bed nets were useful (95.6%). Similarly, more than three quarters of the population believed that bed nets were generally easy to use (86.3%) and that sleeping under an ITN was safe (83.6%).

Nonetheless, it is pertinent to note that some negative attitudes toward bed nets were common. For example, 44.8% agreed they did not like sleeping under a bed net when the weather was warm, 44.0% believed that expensive bed nets were more efficacious than cheap ones (in terms of cost), and 39.1% agreed that the insecticide in bed nets made them feel uncomfortable. There were some regional variations in these attitudes. For example, the belief that sleeping under a bed net every night was problematic because of the hassle of unfolding the net was more widespread in the North (27.0%) than in the Far North (18.4%). Similarly, residents of the North Region (42.5%) were more likely than their peers from the Far North Region (22.0%) to believe that sleeping under a bed net is inconvenient for a couple that wants to have children: $p < 0.001$. Furthermore, the belief that the odor from the insecticide in a bed net makes people uncomfortable was more widespread in the North Region (45.3%) compared to Far North Region (35.0%): $p < 0.01$. The belief that sleeping under a bed net is safe was more common in the North Region (88.8%) than in the Far North (79.5%): $p < 0.001$. Proportionally more people in the North Region (55.5%) than in the Far North (34.8%) believed that more expensive bed nets were more efficacious than cheap ones: $p < 0.001$.

TABLE 9. ATTITUDES TOWARD ITN USE, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,246)	Urban (n=1,036)	Total[1] (n=2,282)	Rural (n=990)	Urban (n=1,047)	Total[1] (n=2,037)
It is easier to get a good night's sleep when I sleep under a mosquito net	90.1	90.6	90.2	90.5	91.8	91.0
It is not easy to sleep under a net because every night you have to unfold it and cover the sleeping space	25.6	30.9	27.0	18.2	18.9	18.4
I do not like sleeping under a mosquito net when the weather is too warm	43.5	47.2	44.5	45.8	44.6	45.4
Sleeping under a net is an inconvenience for a couple that wants to make children	44.3	37.8	42.5	24.7	16.6	22.0*
The smell of the insecticide makes it uncomfortable for me to sleep under a mosquito net	46.4	42.2	45.3	36.3	32.3	35.0
Mosquito nets are generally easy to use for sleeping	88.0	81.8	86.3	86.7	85.6	86.3
Insecticide-treated nets does not pose a risk to one's health	89.2	87.9	88.8	78.4	81.7	79.5
Mosquito nets are very useful	93.6	93.3	93.5	96.8	98.4	97.3
More expensive mosquito nets are more effective than cheaper or free mosquito nets	59.6	44.7	55.5**	37.4	29.5	34.8
Percentage of respondents with favorable attitudes towards net use[2]	70.0	66.0	68.8	75.9	69.5	73.6

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

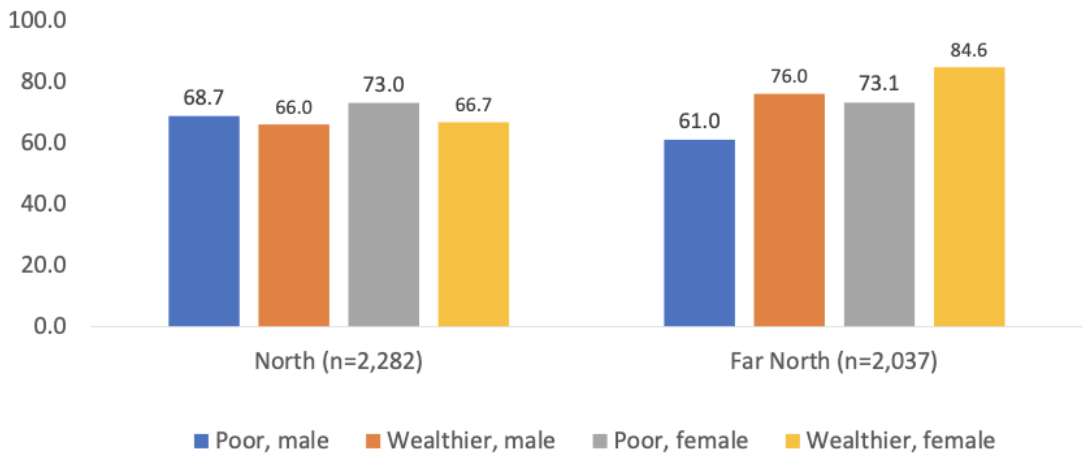
* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

The nine attitudinal items were used to create a dichotomous variable reflecting positive attitudes towards net use, as explained in the Methods section. The data showed that, overall, 71.5% of the survey respondents had a positive attitude toward net use. Positive attitudes were more prevalent among women (74.6%) than among men (67.5%), but did not vary between regions (North, 68.8%; Far North, 73.6%) or by place of residence in either region. The data further showed that the indicator

differed between respondents in poor versus wealthier households, but only in Far North (Figure 12). In this region, respondents living in relatively wealthier households were less likely to have positive net attitudes (67.5%) than those in poor households (80.8%): ($p < 0.001$).

Figure 12: Percentage of respondents with positive attitudes towards net use by sex and household wealth category, Cameroon 2019



Attitudes Toward Bed Net Care

Two attitudinal questions made it possible to gauge attitudes toward net care or actions that ensure bed net longevity. The first one asked about the belief that a person could take steps to make bed nets last longer and a second about the belief that taking good care of bed nets in the household could protect one's family from malaria. The majority (92.5%) of the survey respondents believed that there were steps they could take to prolong the lifespan of their nets. More than nine tenths (93.4%) of the survey respondents believed that taking good care of their nets could help prevent malaria. These beliefs did not vary by sex, place of residence, or region.

Perceived Response Efficacy

Perceived response efficacy of nets (or belief in the effectiveness) was assessed through three Likert scale items: the belief that bed nets prevent mosquito bites only when used over a bed, the belief that one's chances of getting malaria are the same whether or not one sleeps under a bed net, and the belief that sleeping under a bed net every night is a good way to avoid malaria (**Table 10**). Perceptions about the response efficacy of bed nets are mixed. More than half (54.4%) of the population believed that bed nets were effective only when used with a bed (as opposed to suspending them over the floor or a mat), while 35.5% felt that the chances of getting malaria were the same whether or not one slept under a

bed net. Nonetheless, the majority (92.5%) of the population believed that consistent use of bed nets was the best way to prevent malaria. When these three items were combined to create an indicator of perceived response efficacy, the data showed that, overall, more than two thirds (68.8%) of the survey respondents believed in the efficacy of bed nets. There were no significant variations in perceived response efficacy by key sociodemographic characteristics.

TABLE 10. PERCEIVED RESPONSE EFFICACY OF ITNS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS	NORTH			FAR NORTH		
	Rural (n=1,246)	Urban (n=1,036)	Total[1] (n=2,282)	Rural (n=990)	Urban (n=1,047)	Total[1] (n=2,037)
Mosquito nets prevent mosquito bites only when used on a bed	51.5	55.9	52.7	56.6	54.2	55.8
My chances of getting malaria are the same whether or not I sleep under a mosquito net	32.4	34.5	33.0	38.3	36.4	37.7
Sleeping under a mosquito net every night is the best way to avoid getting malaria	90.2	89.9	90.1	94.5	94.3	94.4
Percentage of respondents that perceive bed nets as effective in preventing malaria[2]	68.3	64.7	68.8	72.3	65.7	70.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region. None of the differences were significantly significant.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Perceived Self-efficacy

Perceived self-efficacy refers to the level of confidence that a person has in their ability to successfully implement a specific action. Four Likert scale items were used to operationalize perceived self-efficacy for bed net use. These items include the following: perceived self-efficacy to sleep under a bed net when there are lots of mosquitoes, perceived self-efficacy to sleep under a bed net when there are few mosquitoes, perceived self-efficacy to sleep under a bed net every night of the year, and perceived self-efficacy to make one's children sleep under a bed net every night of the year (**Table 11**). The majority of the survey respondents reported confidence in their ability to sleep under a bed net when there were lots of mosquitoes (96.6%) or when there are few mosquitoes (87.0%). Similarly, most (81.4%) perceived the self-efficacy to make their children sleep under a bed net all year round. In contrast, only two thirds (66.7%) of the respondents perceived the self-efficacy to sleep under a bed net all year round. None of these indicators varied significantly by place of residence in either region. There were, however, some differences between men and women. In the North Region, women were more likely than men to report

confidence in their ability to sleep under a net when there were few mosquitoes or every night of the year. In addition, proportionally more Far North women compared to their male peers reported that they could sleep under a net when there were few mosquitoes.

TABLE 11. PERCEIVED SELF-EFFICACY TO USE ITNS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREE THEY ARE ABLE TO DO THE FOLLOWING	NORTH			FAR NORTH		
	Men (n=1,246)	Women (n=1,036)	Total[1] (n=2,282)	Men (n=990)	Women (n=1,047)	Total[1] (n=2,037)
Sleep under a mosquito net for the entire night when there are lots of mosquitoes	94.7	96.3	95.6	97.2	97.5	97.4
Sleep under a mosquito net for the entire night when there are few mosquitoes	86.4	90.7	88.9*	81.9	88.0	85.4**
Sleep under a mosquito net every night of the year	68.4	74.0	71.6*	60.4	64.5	62.7
Get all of your children to sleep under a mosquito net every night of the year	77.6	78.8	78.2	84.4	83.8	84.0
Percentage of respondents who agree they could sleep under an net consistently[2]	77.5	73.2	76.3	83.4	67.9	77.8

Notes:

[1] Adjusted Wald tests were run to compare the percentage of men and women that agreed with each statement in each region. * p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

The indicator of perceived self-efficacy derived from these four items shows that 77.1% of the survey respondents reported high self-efficacy to consistently use an ITN for bed net use. This indicator did not vary by region. Whereas it did not vary by place of residence in the North Region, in the Far North, proportionally more respondents agreed they could sleep under a net consistently in rural areas (83.4%) compared to urban areas (67.9%): $p < 0.001$. In both regions, this indicator was higher among women than among men. In North Region, 72.8% of men compared to 78.8% of women ($p < 0.05$) demonstrated a high level of perceived self-efficacy for net use. Comparatively in the Far North, the indicator was 71.3% for men and 83.2% for women: $p < 0.001$.

Descriptive Norms

Use of bed nets was generally perceived as a community norm: 73.2% of the study respondents believed that at least half of the people in their community who had bed nets slept under them every night. There were no differences by region, urban residence, or household wealth quintile. In contrast, there were some significant differences between men and women. In North Region, men (75.9%) were more

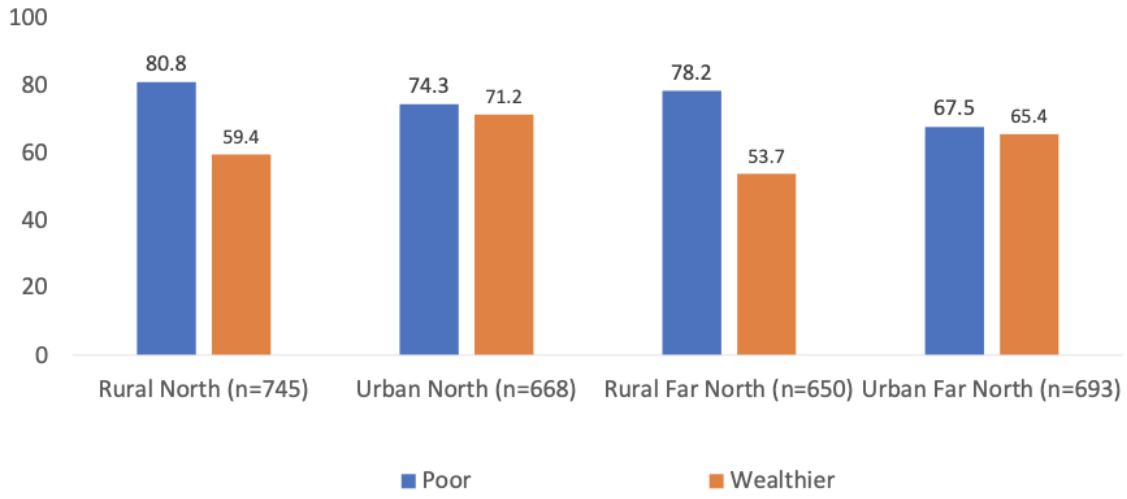
likely than women (69.7%) to hold this belief ($p < 0.01$). In Far North Region, the perception was more common among women (75.9%) compared to men (71.6%): $p < 0.05$ (**Annex Table P**).

Practices and Behaviors

Access and Possession of ITNs Within Households

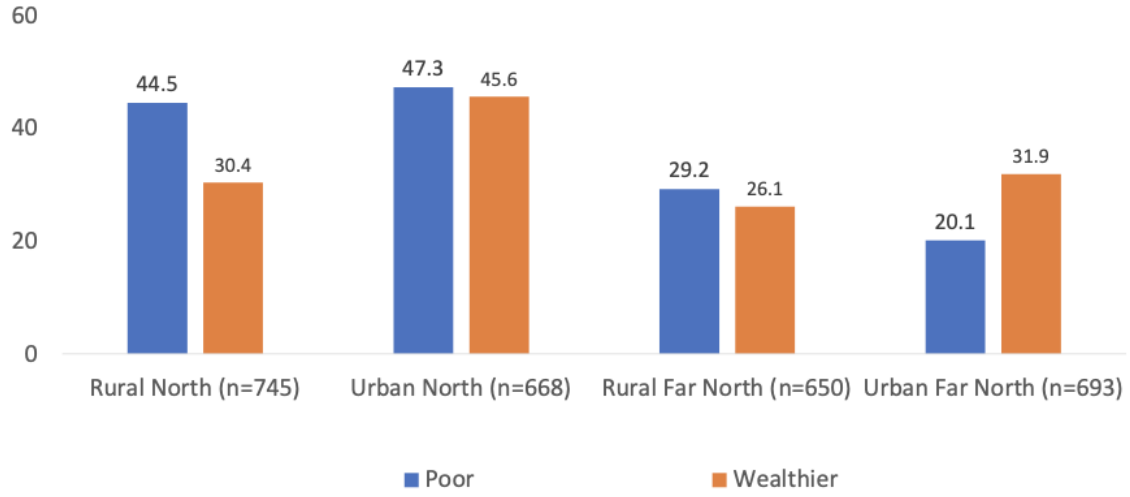
More than two thirds (69.9%) of the households had at least one bed net, usually an ITN. This indicator was not significantly different by region or by urban/rural residence overall. There were, however, significant differences between the poor (two lower quintiles) and the wealthier (three higher quintiles) households in both regions, with ownership less common among the wealthier households compared to poorer counterparts, especially in rural areas (Figure 13, **Annex Table Q**).

Figure 13: Percentage of households with at least one bed net, Cameroon 2019



The mean number of bed nets in households with at least one bed net was 2.1. Overall, 34.2% of the households had a sufficient number of bed nets (household net coverage), that is, at least one bed net for every two household members. Possessing enough ITNs was significantly more prevalent in the North Region (41.5%) than in the Far North Region (28.7%): $p < 0.001$. Within each region, there were no significant differences between urban and rural areas, but there were significant differences by household wealth. In rural North Region, net sufficiency was more common among poor households compared to their wealthier counterparts whereas in urban Far North, wealthier households were more likely than their poor peers to report net sufficiency (**Figure 14, Annex Table R**).

Figure 14: Percentage of households with at least one bed net per two people that slept in household the night prior to interview, Cameroon 2019

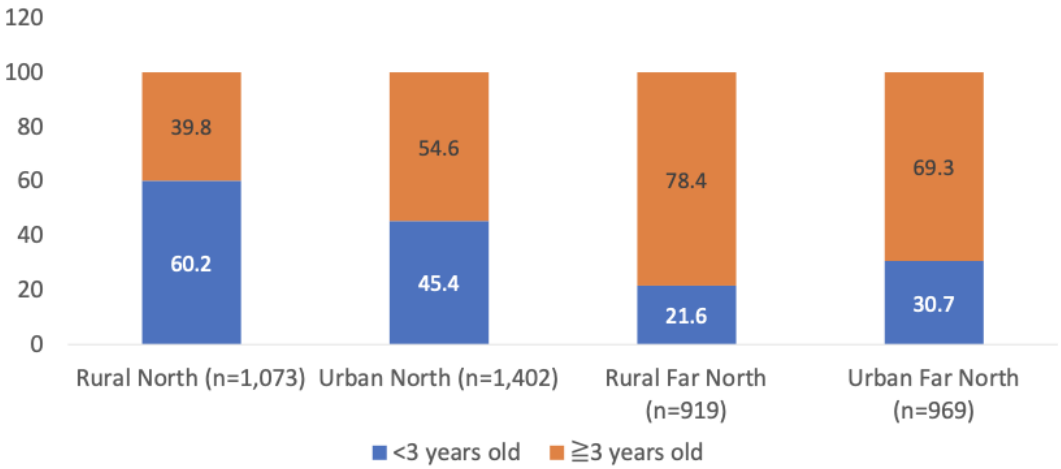


The proportion of the population with access to an ITN (that is, the population that could sleep under an ITN if each ITN in the household were used by two people) was 54.3% overall. The indicator was 55.4% in the North Region and 53.3% in the Far North. In either region, the indicator did not vary significantly by place of residence, but there were significant variations by household wealth quintile in North Region.

Characteristics of Mosquito Nets Available in Households

A total of 4,363 bed nets were enumerated in the surveyed households. The majority (99.0%) of these nets were ITNs. The nets were obtained mostly (98.2%) free of charge; the sources of the nets were mainly through mass campaigns (84.1%) and antenatal care (12.6%). Very few nets were obtained from community health workers (1.2%) or other sources (2.1%). Proportionally more bed nets in the North Region (89.1%) compared to Far North (77.4%) were obtained during a mass campaign: $p < 0.001$. The timing of the MBS in relation to the ITN mass distribution campaign may explain this difference. A large proportion (63.8%) of the enumerated bed nets were three years old or older (**Figure 15, Annex Table S**). Proportionally more nets in the Far North (78.9%) than in the North Region (52.3%) were three years old or older. The MBS data collection coincided with the most recent ITN mass distribution campaign in North region whereas it preceded the campaign by a few weeks in the Far North.

Figure 15: Distribution of household nets by age, Cameroon 2019



Overall, most (80.3%) of the enumerated bed nets were used for sleeping the night preceding the survey. A significantly larger proportion of the bed nets in the Far North (90.8%) than in the North Region (72.4%) were used the night before the survey ($p < 0.001$). Nets in wealthier households (82.7%) were more likely than those in poor households (77.5%) to have been used the night before ($p < 0.001$).

Net Care and Repair Habits

Folding up or tying suspended bed nets when they are not in use can help preserve the quality and lifespan of the nets (Koenker et al., 2015). Among the nets that were used on the night before the survey, only about one third (34.2%) were observed to be suspended, folded, or tied while more than half (57.1%) were found suspended and untied. This indicator of net care behavior did not vary by region or between poor and wealthier households. There were, however, significant differences by age of the ITN. Older nets (aged three years or more) were more likely than newer ones to be found hanging and untied (52.5% compared to 35.0%; p<.001) or hanging and tied/folded (33.5% compared to 21.9%; p<.001). In contrast, newer nets were more likely than older ones to be found stored away either packed (16.3% compared to 2.8%; p<.001) or unpacked (15.2% compared to 3.7%; p<.001).

The potency of insecticide in ITNs is reduced over time if washing is too frequent; for this reason, it is recommended that people wash their ITNs gently and no more than every three months with mild soap (Hunter, Acosta, & Koenker, 2016). About half (52.3%) of the nets in the North Region compared to over two thirds (70.1%) in the Far North had ever been washed (**Table 12**). A larger proportion of nets in urban North (65.3%) than in rural North (42.5%) and in urban Far North (72.6%) compared to rural Far North (67.5%) had ever been washed. In about two thirds of the cases (69.8% in the North Region and 67.7% in the Far North), the nets were washed with a form of mild multi-purpose bar soap (Macabo), consistent with WHO recommendations. It is interesting to note that about one quarter of the washed

bed nets in the North Region and 15.6% in the Far North were washed with powdered or liquid detergent, contrary to WHO recommendations.

The WHO recommends leaving washed bed nets outside in the shade to dry (WHO, 2002). Interestingly, about three quarters (76.0%) of the bed nets that had been washed were dried in the sun. This practice was more common in the Far North (80.4%) than in the North Region (70.2%): $p < 0.001$. The data further revealed a higher prevalence of leaving nets to dry in the sun among poor households (80.5%) compared to wealthier households (71.7%): $p < 0.001$).

TABLE 12. ITN CARE, CAMEROON 2019

PERCENTAGE OF ITNS THAT HAVE BEEN CARED FOR IN VARIOUS WAYS

ITN CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=1,399)	Urban (n=1,066)	Total[1] (n=2,465)	Rural (n=911)	Urban (n=963)	Total[1] (n=1,874)
% ITNs that were ever washed	42.5	65.3	52.3***	67.5	72.6	70.1*
Product Used to Wash ITN						
Macabo bar soap	76.6	64.1	69.8	63.4	71.5	67.7
Other bar soap	2.9	3.0	3.0	16.5	10.3	13.2
Powdered or liquid detergent	17.7	31.0	24.9	15.3	15.9	15.6
Other	2.9	1.9	2.3***	4.9	2.3	3.5***
Where ITN Was Dried						
Outside in the shade	30.0	28.1	29.0	16.1	21.7	19.1
Outside in the sun	69.9	71.9	71.0	83.9	78.3	80.9
Other	0.2	0.0	0.1	0.0	0.0	0.0**

Notes:
[1] Test of significance was run to compare the percentage of ITNS with each characteristic in urban compared to rural households in each region.
* p < .05; ** p < .01; *** p < .001

Use of ITN by Household Members

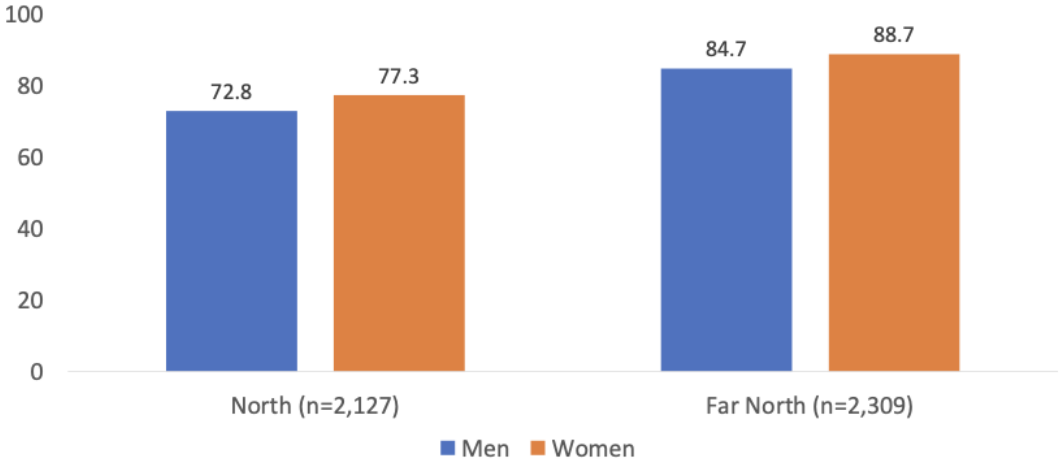
Data on the use of bed nets by household members on the night before the survey were derived from the household survey tool. Overall, less than half (48.4%) of all household members slept under an ITN on the night prior to the survey. This indicator was higher in North region (43.1%) than in Far North region (52.8%) - p<.01. The data further showed about two thirds (68.1%) of household members slept under a net in households with at least one net while more than three quarters (80.9%) did in households with a sufficient number of nets.

The data show that, in households with at least one bed net, use varied by sex and age group (**Table T in Annex**). Use of bed nets is more prevalent in the Far North Region (74.2%) compared to the North (60.7%). In each region, whereas use of bed nets did not vary by household wealth quintile or place of

residence, there were significant variations by sex and age group. In both regions, the proportion that slept under a bed net was lower among older children and adolescents aged 5-17 years compared to under-5 children. In the Far North Region, use is more prevalent among under-5 children compared to adults, while in the North Region there was no difference between these two age groups. In both regions, men were less likely than women to sleep under a bed net.

When the analysis is limited to households with a sufficient number of nets, the sociodemographic differences persist, although attenuated in some cases, indicating that prioritization due to insufficient nets alone does not explain differences in net use across sociodemographic groups. In the context of net sufficiency, women were still more likely to sleep under a net (**Figure 16**). Similarly, under-5 children were still more likely than older children, adolescents, or adults to sleep under a bed net.

Figure 16: Use of ITNs by persons in households with a sufficient number of nets, Cameroon 2019



Use-access Ratio

The use-access ratio reflects the ratio of mosquito net utilization to bed net access in the population. The indicator looks at the proportion of people who use bed nets among only those people who have access to bed nets. The indicator typically varies between 0.00 and 1.00, which would indicate that everybody who has access (assuming that two people sleep under a net) to a bed net in a household uses the net they have access to. ITN use:access is greater than 1.00 when there is a tendency in the population for more than two people to sleep under a net. The use: access ratio gives SBC programmers a better measure of net use behavior. It is particularly useful in determining if non-use of bed nets is related more to net use behavior rather than insufficient number of bed nets. The calculations presented in this report use the methodology proposed by Koenker & Killian, 2014.

Overall, the use-access ratio was 0.91, suggesting that most people in the survey regions who have access to a net actually use it. There were significant differences between the two regions: North: 0.83; Far North: 1.00: $p < 0.001$ (**Table 13**). The situation in the North Region suggests that not everyone with access to a bed net sleeps under it. On the other hand, the situation in the Far North suggests that use is more in alignment with access. In both regions, the use: access ratio was comparable between urban and rural areas. The data reveal that, in the North Region, use: access ratio was lower in the lower wealth quintiles compared to the higher wealth quintiles. In contrast, in the Far North Region, the indicator is higher in the lower wealth quintiles than in the highest wealth quintile. The data show that in the lower wealth quintiles in the Far North, the indicator is greater than 1.00, suggesting a tendency for more than two people to sleep under the same bed net.

TABLE 13. ITN USE ACCESS RATIO, CAMEROON 2019

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=3,115)	Urban (n=2,127)	Total (n=5,242)	Rural (n=2,328)	Urban (n=2,309)	Total (n=4,637)
Household Wealth Quintile						
Lowest	0.79	0.73	0.76	1.05	1.12	1.09
Second	0.75	0.79	0.77	1.06	1.05	1.06
Middle	0.82	0.86	0.84	1.05	1.04	1.04
Fourth	0.96	0.84	0.90	1.06	0.96	1.01
Highest	0.95	0.82	0.88	0.65	0.92	0.79
Total	0.85	0.81	0.83	0.97	1.02	1.00

Use of Nets among Men and Women Surveyed

Among men and women surveyed who lived in households with at least one bed net, 77.2% (80.0% of women compared to 73.6% of men: $p < 0.01$) slept under a bed net on the night preceding the survey. Among households with a sufficient number of nets, there was no difference between men (85.8%) and women (86.4%). Use of bed nets was more prevalent in the Far North Region (80.6%) than in the North Region (73.1%) in households with at least one net and in households with bed net sufficiency (80.2% in North Region, 93.3% in Far North: $p < 0.001$). Consistent use of bed nets (that is, every night) was reported by 72.9% of the men and women surveyed in households with at least one net and by 75.6% in households with net sufficiency.

Table 29 presents the results of multivariable logistic regression models of consistent use of bed nets on selected sociodemographic, psychosocial, household and other variables among respondents from households with at least one net. The data show differences and commonalities in the factors associated with consistent use of bed nets in the North and Far North Regions.

In the North Region, women were 51% more likely than men to report consistently using bed nets. There was also a positive association with age, with every single year increase in age associated with a 3% increase in the odds of consistent use of bed nets. These two variables were not significantly associated with consistent use in the Far North Region. Furthermore, the relationship with education was positive in the North Region but negative in the Far North. The association with education in the North Region was such that the odds of consistent use were about twice as high among people with secondary education or higher compared with their peers with no formal education. In contrast, in the Far North, the odds were 63% lower for people with secondary education compared to their peers with no formal education. Curiously, exposure to malaria-related messages was negatively correlated with consistent bed net use in the North Region; in the Far North, the relationship was not significant. While the reason for this unexpected relationship, it raises concerns about the quality of SBC activities implemented during the six months prior to the MBS. These activities include: (1) using community mobilizers, community radio and town criers to explain how to obtain nets and prepare the new nets for installation; (2) using community mobilizers and community radio to explain the importance, process of administration, and required dosage of the SMC drug; and (3) using community mobilizers and community radio to explain the importance of sleeping under an ITN every night, prompt care-seeking for a child with fever, prevention of malaria in pregnancy, and environmental sanitation to eliminate mosquito breeding sites.

The data revealed the important role of psychosocial variables for consistent use of bed nets in both regions, although there were differences by region. Of the eight psychosocial variables assessed, three were similarly and positively associated with consistent net use in both regions: perceived self-efficacy for net use, perceived susceptibility to malaria, and descriptive norm about net use. Specifically, perceived self-efficacy for net use was associated with almost a four-fold increase in consistent use in the North Region and almost a two-fold increase in the Far North. Similarly, perceiving nets as effective in preventing malaria increased the odds of consistent use by more than two-fold in the Far North and by 40% in the North Region. Compared to people who did not consider consistent use of bed nets as a community norm, those who perceived the use of bed nets as a community norm were more than twice as likely to report consistent use in the Far North and 34% more likely in the North Region. Positive attitudes toward use of bed nets were positively associated with consistent use in the North Region, but the association was not significant in the Far North. Curiously, discussion of malaria and perceived response efficacy of bed nets were negatively correlated with consistent use in the North Region. Both of these variables were not significant correlates in the Far North.

As expected, the availability of a sufficient number of household nets was a significant correlate of net use, increasing the odds of use by 48% in the North Region and by 50% in the Far North, compared to living in a household without a sufficient number of nets. Similarly, the presence of an under-5-years-old child in the household was associated with an increase in odds of consistent use of bed nets of 43% in

TABLE14. RESULTS OF THE LOGISTIC REGRESSION OF CONSISTENT USE OF BED NETS ON SELECTED VARIABLES, BY REGION, CAMEROON 2019

CORRELATES	NORTH		FAR NORTH	
	ODDS RATIO	STD. ERROR	ODDS RATIO	STD. ERROR
Sex (RC=Male) Female	1.51**	0.23	1.33	0.26
Age in years	1.03***	0.01	0.99	0.01
Education Level (RC=None)				
Primary	1.38*	0.19	0.51***	0.10
Secondary +	1.98***	0.34	0.37***	0.08
Exposed to messages on malaria in last six months	0.68**	0.08	0.79	0.13
Positive attitudes toward use of bed nets	2.14***	0.36	1.34	0.35
Perceived severity of malaria	1.05	0.13	1.33	0.26
Perceived susceptibility to malaria	1.40*	0.24	2.31***	0.53
Discussed malaria with others in last 12 months	0.64**	0.10	1.12	0.25
Perceived response efficacy of bed nets	0.65***	0.09	0.74	0.15
Perceived self-efficacy for bed net use	3.78***	0.52	1.78**	0.34
Perceived use of bed nets as a community norm	1.34*	0.18	2.45***	0.41
Household includes an under-5 child	1.43**	0.18	1.45*	0.22
Household wealth quintile (RC=Lowest)				
Second	1.75***	0.30	0.99	0.21
Middle	1.61*	0.32	1.81*	0.47
Fourth	1.81**	0.37	2.34**	0.65
Highest	1.60	0.41	0.95	0.27
All ceilings completely sealed	0.77	0.18	1.36	0.36
All windows in dwelling unit equipped with netting	1.47	0.38	5.18***	2.39
Household has at least one bed net for every two persons (RC=Household has at least one bed net but fewer than one for every two persons	1.48**	0.18	1.50**	0.24
Urban residence (RC=Rural)	0.90	0.15	0.78	0.14
Pseudo-R^2	11.7%		12.0%	
Number of observations	1,626		1,368	

the North Region and 45% in the Far North. In both regions, the relationship with household wealth was curvilinear: there were no differences between the lowest and the highest wealth quintiles. In the North Region, people in the second, middle, and fourth quintiles were more likely to report consistent use than their peers in the lowest quintiles; in the Far North, significant differences are observed only when the lowest wealth quintile is compared with the middle or fourth quintiles. Finally, compared to their peers in households with partial or no window netting, residents of households with complete window netting were more than five times as likely to report consistent use in the Far North; this variable was not significant in the North Region.

When the logistic regression analysis was limited to households with a sufficient number of bed nets, the data revealed that significant age, sex, and wealth quintile differences persisted in North Region whereas in Far North Region, there were no longer significant differences by any sociodemographic characteristics. Furthermore, the only ideational variable that was positively associated with consistent use of bed nets was the perception that consistent bed net use was a community norm. This variable was associated with 50% higher odds of consistent bed net use in North Region and 150% higher odds in Far North Region. In addition, in North Region, the association with perceived self-efficacy (OR=3.73; $p < .001$) and favorable attitudes toward net use (OR=2.21; $p < 0.001$) was positive, whereas the relationship with discussion of malaria with others was negative (OR=0.45; $p < .001$). In Far North Region, the only other significant ideational variable was perceived susceptibility (OR=2.15; $p < .05$).

3.5. Seasonal Malaria Chemoprophylaxis for Children Under Five Years Old

Seasonal malaria chemoprevention is a WHO-recommended malaria prevention tool used in countries with high seasonal transmission, like those in Sahelian West and Central Africa. Children under five years are given a three-day dose of prophylactics on a monthly basis by community health workers throughout the high transmission season. Typically, the household is responsible for administering the doses on day two and day three of the three-dose cycle. This section describes the behavioral outcomes related to SMC and relevant ideational variables.

Ideational Factors

Widespread acceptance and compliance with the SMC medication regimen is key to achieving improved health outcomes among children under five years old. Similar to other health interventions, ideational variables (including knowledge, attitudes, efficacy beliefs, and norms) are crucial to the uptake of SMC and program success.

Knowledge

The majority of male and female respondents have heard about the program that protects young children from malaria in the rainy season by giving them preventive medication (**Annex Table U**). Overall, men (88.3%) were significantly more likely than women (83.9%) to have heard of SMC: $p <$

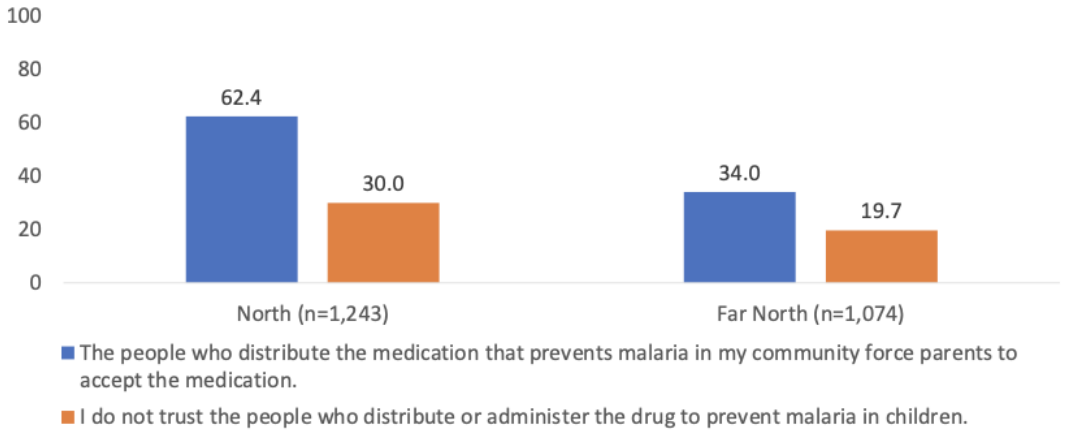
0.001. The proportion of respondents who had heard of SMC was significantly higher in the Far North (88.9%) than in the North (81.9%). In terms of the timing of SMC, roughly half of respondents (46.2% in the North; 54.9% in the Far North) knew that the medication is taken by children for three days in a given month. Less than one fifth (18.5%) of respondents knew that the medication is taken by children for four months during the rainy season. An indicator of comprehensive SMC knowledge was derived to denote knowledge about the number of months per year and the number of days per month that a child should take SMC. This indicator revealed a very low overall level of SMC-related knowledge. Indeed, fewer than one-tenth of respondents in North Region and just about one fifth in the Far North had adequate knowledge about SMC as defined by this indicator ($p < 0.001$). In the North Region, this indicator is particularly low in urban areas (5.7%), especially among urban men (3.5%) and people with no formal education (2.7%). In the Far North Region, the indicator is lower among people 45 years old or older in urban areas (13.9%) and among people in wealthier households in rural areas. Even among the men and women in households with at least one under-five child in the household, 9.1% (10.0% of men and 7.9% of women) in North Region and 26.3% (19.9% of men and 34.5% of women) in Far North had comprehensive knowledge of SMC.

Attitudes Related to Seasonal Malaria Chemoprophylaxis

Attitudes related to SMC may influence uptake of the intervention and compliance with the medication regimen. Attitudes toward SMC among the respondents were mixed. The majority of respondents agreed that door-to-door distribution of SMC was more convenient than facility-based distribution (87.6%), that community leaders support SMC (91.8%), and religious leaders support SMC (91.2%). Nonetheless, it is pertinent to note that 46.8% of the respondents believed that SMC distributors forced parents to accept SMC, while 37.9% were of the opinion that healthy children did not need to take SMC. Similarly, 45.0% believed that SMC could harm children and 24.4% did not trust SMC distributors. Significant differences in some of these beliefs existed by region (**Annex Table V**). For example, respondents in the North Region (62.4%%) were more likely to believe that distributors of SMC force parents to accept the medication as compared to their peers in the Far North (34.0%) (Figure 17). Similarly, the belief that healthy children do not need to take SMC was more prevalent in the North Region (50.6%) than in the Far North (27.5%). Lack of trust in the distributors of SMC was more common

in the North Region (30.0%) than in the Far North (19.7%).

Figure 17: Attitudes related to the trustworthiness of SMC distributors, North and Far North regions, Cameroon 2019



The composite indicator derived from these seven measures allowed us to classify each individual as having positive attitudes if they had a total score greater than zero, or negative attitudes otherwise. This indicator revealed that positive attitudes were common in the study regions: 77.1% in the North Region and 82.6% in the Far North Region demonstrated a positive attitude toward SMC. Positive attitudes were more widespread among women compared to men in both regions: $p < 0.01$. The prevalence of positive attitudes related to SMC did not differ by place of residence, age category, or education level in either region.

Perceived Response Efficacy of Seasonal Malaria Chemoprophylaxis

Parents who are approached about giving their children SMC may be less likely to follow through with the intervention if they do not believe the medication is effective. Respondents were asked to agree or disagree with three statements to detect whether they believed in the effectiveness (response efficacy) of SMC (**Table W in Annex**). There was nearly universal agreement with two of the three statements: 1) the medication given to children during the rainy season to prevent malaria actually prevents malaria and 2) if all children in a given community take the medication there will be fewer cases of malaria. In contrast and rather surprisingly, roughly half of respondents (46.6% in the North, 46.7% in the Far North) said that a child has the same likelihood of getting malaria whether or not they take the medication to prevent it. This statement may not have been well understood if the concept of probability did not translate well to Fulfulde, the language in which most interviews were conducted. When the three statements were combined as described in the Methodology section, the data showed that 77.1% of respondents in North region and 82.6% in Far North perceived SMC as effective in

preventing malaria. Perceived effectiveness (response efficacy) of SMC did not differ significantly across region, place of residence, education level or household wealth quintile.

Perceived self-efficacy

Successful SMC administration requires that caregivers of children under five years old feel confident in their ability to comply with the three-day dosing regimen as directed by SMC campaign workers. The questions related to perceived self-efficacy to take action related to SMC were asked only of female caregivers as they generally play a larger role in caregiving for children. Results reflect that nearly all female caregivers were confident they could perform behaviors related to SMC such as making sure their children take all the doses of SMC medication given to them, obtaining spousal permission for their child to take the SMC medication, and finding money to take their children to the health facility for SMC if they miss the home visit (**Table X in Annex**). Perceived self-efficacy was equally high in both regions and across all sociodemographic groups in each region.

Descriptive Norms

A person's perception of normative behaviors around them can strongly influence their own behaviors. In this study, survey respondents were asked about various descriptive norms related to SMC, including children under five years old receiving SMC, caregivers seeking the malaria prevention medication from a health facility after missing a household visit from SMC door-to-door distributors, and children taking the full course of the medication they received. About three-quarters (78.5%) of respondents perceived that half or more of the children in their communities take the medication to prevent malaria during the rainy season (**Table 15**). Seeking out SMC in a health facility if a person misses the door-to-door distribution and children receiving the full course of the medication were less likely to be perceived as the norm in their communities. Fewer than two thirds (64.4%) in both regions considered children taking the full course of the medication as the norm. Furthermore, only half (49.9%) of respondents in both regions believed that seeking out SMC medication at a health facility if they missed a household visit from SMC campaign workers was the norm. The prevalence of these perceptions did not vary significantly by region. In contrast, both the perception that SMC was the norm (82.9% for women and 76.3% for men: $p < 0.001$) and the perception that children taking the full course of SMC was the norm (68.7% for women and 62.4% for women: $p < 0.01$) was more widespread among women compared to men.

TABLE 15. PERCEIVED NORMS RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT PERCEIVE THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=570)	Urban (n=454)	Total[1] (n=1,024)	Rural (n=478)	Urban (n=465)	Total[1] (n=943)
Half or more of the children in my community take the medication to prevent malaria during the rainy season.	78.2	71.5	76.5	78.0	84.3	80.0
Half or more of the people in my community take their children to the health facility to get the medication that prevents malaria if they miss the household visit.	53.9	49.5	52.7	46.6	49.7	47.6
Half or more of the people in your community, after having received a dose from a SMC campaign worker or health facility provider, give the medication for two more days.	68.8	67.4	68.4	60.1	63.7	61.3

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each descriptive norm between urban and rural respondents in each region. No significant differences were detected.

Attitudes Toward Seasonal Malaria Chemoprophylaxis Distributors

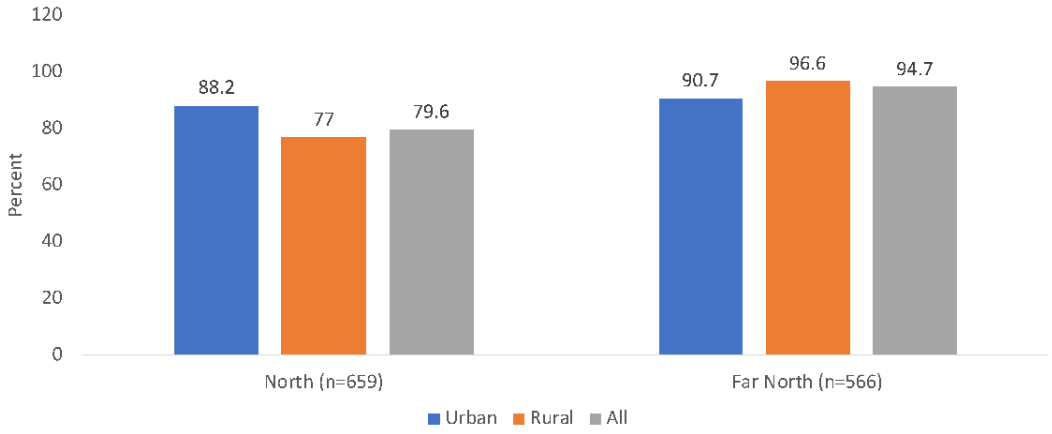
In general, the availability and reach of SMC medication was favorably perceived by the respondents. About nine out of ten respondents (87.8%) in both regions agreed that SMC distributors came to their community several times during the rainy season to give medication that prevents malaria in children. The medications given for SMC were also widely (81.2%) perceived as available in health facilities during the rainy season within the respondents' communities (**Table Y in Annex**). The perception that SMC medications were always available in health facilities was less prevalent in the Far North (75.4%) than in the North (88.1%). Both indicators were higher in rural North compared to urban North; there were no urban-rural differences in the Far North Region. An indicator of attitudes toward health workers regarding distribution and availability of SMC medication derived from these two items as described in the Methodology section revealed that favorable attitudes toward health workers in this regard were more prevalent in the North (90.9%) compared to the Far North (82.0%). Women in both regions (94.4% in the North, 87.4% in the Far North) were significantly more likely to have positive perceptions of health workers regarding the administration of SMC compared to men (87.0% in the North, 76.7% in the Far North). In addition, the prevalence of these positive attitudes appeared to decrease with increasing age category in both regions: from 95.8% in the 15-24 age group to 87.5% in the 45 years or older group

in North Region p < 0.01), and from 88.8% in the 15-24 age group to 77.8% in the 45 years or older group in Far North Region p < 0.01);

Intention

Intention to perform a behavior is recognized in many theories of behavior change as the most proximate predictor of actual behavior (Fishbein et al., 2001). In this study, the majority (87.2%) of female caregivers said they will readily agree to have their child receive the medication that prevents malaria during the rainy season next year. Intention to accept SMC was more widespread in the Far North than in the North: p < 0.001 (Figure 18). In the North Region, urban women were more likely than their rural peers to indicate intention to accept SMC next year (p < 0.01). In the Far North, the reverse was the case: p < 0.01.

Figure 18: Percentage of women who reported intention to obtain SMC for their children during the next rainy season, Cameroon 2019



Behaviors

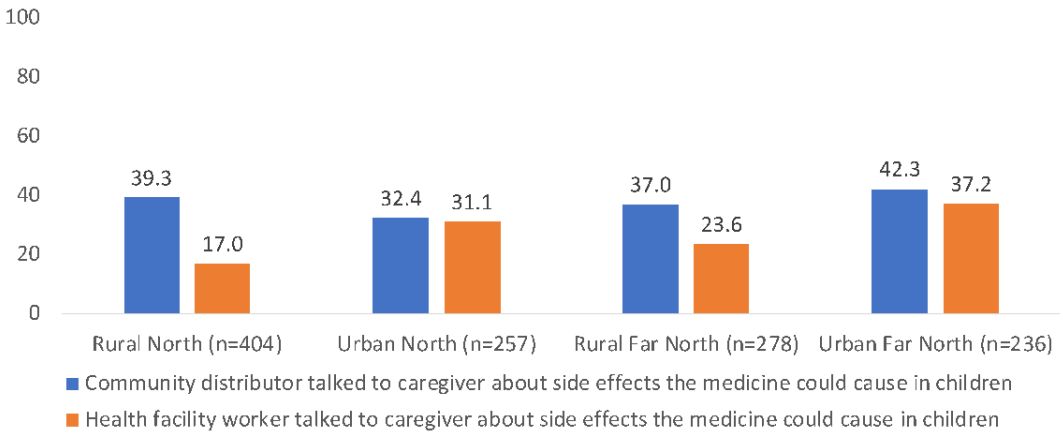
To understand the population's access to SMC from the community perspective, female respondents with at least one child aged less than five years old were asked about their interactions with personnel distributing SMC at either the household or facility level. The SMC policy in Cameroon makes provision for facility-based distribution of SMC medication as a back-up plan for caregivers whose children do not receive SMC during household distribution. The survey tool therefore also included questions about receipt of SMC from health facilities for those who missed the SMC distributor's visit to their homes.

CHW Behaviors During Door-to-door SMC Distribution

Based on responses from caregivers of children under the age of five years, the vast majority (97.0%) of surveyed households in both the North and Far North Regions were visited at least once by a door-to-door distributor of SMC during the 2019 rainy season to dispense the medicine that prevents malaria in children. The proportion of female caregivers who reported receiving SMC household visits did not vary urban/rural residence or region.

About two out of every five female caregivers in the North (37.7%) and the Far North (38.7%) regions who were present during the last household visit said that the CHW talked to them about side effects that the medicine could cause in children (Figure 19). The likelihood of side effects being discussed did not vary across place of residence in either region.

Figure 19: Discussion of side effects among distributors of Seasonal Malaria Chemoprophylaxis as reported by female caregivers, Cameroon 2019



The side effects that the SMC distributors were most likely to have discussed with the caregivers include vomiting (66.5% in the North Region and 56.8% in the Far North, $p < 0.05$), fever (62.8% in the North Region and 51.9% in the Far North, $p < 0.05$), and tiredness (12.4% in the North Region and 25.4% in the Far North, $p < 0.001$). Some caregivers who reported communication about side effects also said the distributor talked about diarrhea (21.2% in North Region and 15.9% in Far North) and headache (21.2% in North Region and 3.4% in Far North). Other possible (albeit rare) side effects of SMC, such as itching, mild abdominal pain, and rash were apparently not mentioned by the distributors.

Among the few women (n=298) who were not able to obtain the SMC medication for one or more of their children during the door-to-door distribution and who sought the medication in a health facility), less than one third (29.5%) reported that the health facility worker talked to them about the side

effects. Health facility workers in the Far North (33.0%) were more likely than their peers in the North (23.1%) to discuss side effects with the caregivers.

The SMC guidelines in Cameroon specify that the health provider or distributor should observe the child swallow the first dose of the SMC medication. The vast majority (North: 94.4%, Far North: 98.9%) of caregivers present during the last SMC distribution household visit said they obtained the SMC medication from a CHW during the most recent door-to-door distribution (**Table 16**). Overall, in about three quarters (72.3%) of the cases the survey respondent reported that the distributor observed the children actually swallow the medication. This indicator was significantly higher in the Far North (83.7%) compared to the North Region (60.8%), $p < 0.001$. Overall, the majority (94.6%) of the children took the first dose given by the CHW, either directly observed by the CHW or given to the child later by the caregiver. Proportionally more children in the Far North (97.6%) compared to the North (91.5%) reportedly took the first dose of SMC ($p < 0.001$).

TABLE 16. BEHAVIORS RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS DOOR-TO-DOOR DISTRIBUTION AS REPORTED BY FEMALE CAREGIVERS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT REPORTED THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=419)	Urban (n=261)	Total[1] (n=680)	Rural (n=278)	Urban (n=237)	Total[1] (n=515)
During the last household visit, SMC distributor provided SMC doses for child	94.6	93.8	94.4	99.3	97.8	98.9
During the last household visit, SMC distributor observed child take medication	61.4	59.0	60.8	88.4	72.8	83.7
During the last household visit, child took the first dose of medication either directly observed by distributor or given later by caregiver	92.2	89.2	91.5	98.8	94.8	97.6

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each reported CHW behavior between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

Women in Far North were significantly more likely (34.8%) than those in North (13.3%) to report that one of their children had been taken to a health facility to obtain SMC during that rainy season ($p < 0.001$). For the few women (n=298) who did seek out SMC in a health facility because they missed the door-to-door distribution, only about half (51.4%) reported they were able to obtain the medication from the health facility. Caregivers who took their children to the health facilities for SMC in the North (33.0%) were less likely than those in the Far North (61.1%) to have obtained the medication ($p < 0.001$).

The proportion of children who were given SMC in a health facility and whose first dose was directly observed by the facility-based health provider was 72.1% (48.9% in the North, 83.6% in the Far North). In all, 83.4% (62.5% in the North and 93.8% in the Far North, $p < 0.001$) of the children taken to the health facility for SMC took the first dose of the medication either directly administered by the health provider or given later by the caregiver.

Prevalence of Side Effects

The side effects such as vomiting and diarrhea that may result from taking SMC medication are rare but can be severe. Past SMC campaigns in Cameroon have identified pharmacovigilance systems as an area for improvement. To inform such efforts, female caregivers were asked about the side effects their child experienced, if any, from the medication obtained during their most recent encounter with the SMC medication. Reports of side effects were relatively rare. Among the women whose child took at least the first dose provided by a CHW, 12.5% reported their child experienced side effects after taking medication. Among the women who sought SMC from a health facility, 8.4% reported an experience of side effects in their child. The reported side effects experienced were mainly vomiting and fever.

3.6. Malaria Case Management Among Children Under Five Years Old

Early diagnosis and prompt treatment of malaria is recommended within 48 hours of fever onset. In Cameroon, malaria rapid diagnostic testing is provided by both CHWs and health facility providers while CHWs refer patients to the facility for treatment as needed. This section examines the ideational and behavioral variables related to the management of malaria in children.

Ideational Factors

Increasing evidence demonstrates the link between ideational factors and malaria care-seeking, testing, and treatment behaviors. The ideational factors related to malaria case management among children under five years old include knowledge of when to seek care for fever, attitudes toward prompt care-seeking for fever, perceived response efficacy of diagnostic testing, perceived response efficacy of malaria treatment options, perceived self-efficacy for prompt care-seeking, descriptive norm, and perceptions of health workers regarding treatment of malaria in children. These ideational variables are discussed in detail in the following sections.

Knowledge

This section discusses the knowledge of recommended care-seeking behaviors for fever as well as the diagnosis and treatment of malaria in children under five years old. The majority (90.2% in the North Region, 86.2% in the Far North) of individuals in both regions mentioned a blood test as the best way to diagnose malaria (**Table 17**). When asked when one should seek advice or treatment for a child with fever, most individuals (79.9% in the North Region, 85.8% in the Far North) said one should do so the same day or day following the fever's onset. Overall, almost three-quarters (72.2% overall; North: 76.5%, Far North: 68.7%, $p < 0.01$) knew that ACTs are a way to treat malaria. None of these three indicators of knowledge varied significantly by urban/rural residence in the North Region. In contrast,

knowledge about blood tests as a means to diagnose malaria and knowledge about ACT as an effective treatment for malaria were significantly more widespread in urban Far North than in rural Far North.

TABLE 18. KNOWLEDGE OF MALARIA CASE MANAGEMENT, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT REPORTED THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
Should seek advice or treatment when a child under five years old has a fever the same day or the day following the onset of the fever	61.4	59.0	60.8	88.4	72.8	83.7
Mentioned drawing blood for a malaria test as the best way to know if someone has malaria	92.2	89.2	91.5	98.8	94.8	97.6

Notes:
[1] Adjusted Wald tests were run to compare the prevalence of each item between urban and rural respondents in each region.
* p < .05; ** p < .01; *** p < .001

Furthermore, knowledge of ACTs as an effective treatment for malaria varied significantly by sex and education level in the North Region. Specifically, men (80.5%) were more likely than women (73.5%) to have this knowledge while the proportion displaying the knowledge increased steadily with higher education level. In the Far North, in addition to urban residence, knowledge of ACTs also varied by level of education, with knowledge being higher among those with post-primary education compared to those with no formal education.

Attitudes Toward Appropriate Care-seeking and Effective Treatment of Malaria

Evaluation of seven attitudinal statements provided an overview of attitudes toward appropriate care-seeking for fever and treatment for malaria (**Table Z in Annex**). Agreement with these statements varied by region and place of residence. The majority of respondents agreed that the health provider is the best person to talk to when a child has fever (93.3% in the North, 94.3% in the Far North), and that taking all the prescribed antimalarials is important to ensure complete recovery (92.9% in the North Region, 93.6% in the Far North). Similarly, a huge proportion of individuals reported agreeing that a person should take malaria medicine only if a health provider says that the person has malaria (85.4% in the North, 86.8% in the Far North). Some detrimental attitudes, however, were also prevalent. For example, attitudes were favorable toward self-medication and use of health facilities as a last resort in the case of child fever. More than three-quarters of respondents (81.9% in the North, 75.7% in the Far North) believed it is best to start by giving a child with fever any available medicine at home. Similarly, overall more than half of respondents (60.6% in the North, 47.3% in the Far North) admitted they would not take a child with fever directly to a health facility but will first go buy medicine for the child. Furthermore, many respondents (51.4% in the North and 44.9% in the Far North) believed a caregiver

should still ask for antimalarial drugs even if the test indicates the fever is not due to malaria. Some urban-rural differences emerge regarding these attitudes in both regions. For example, compared to their urban peers (52.9%), proportionally more individuals from rural North Region (64.2%) stated they would ask for antimalarials even if the health provider says the fever is not caused by malaria. In the Far North, the only significant urban-rural difference observed was in connection with the use of health services as a last resort for treatment of fever in children under five years old. Proportionally more individuals in rural Far North (53.3%) than in urban Far North (34.6%) agreed they would first seek to buy medication for their child with fever ($p < 0.01$).

The indicator of positive attitudes toward prompt care-seeking for fever in a health facility or from a CHW was derived from seven items (**Table Z in Annex**) as described in the Method section. This indicator revealed some interesting patterns. Overall, about two thirds of men and women in the North Region and 76.2% in the Far North demonstrated positive attitudes toward appropriate care-seeking for fever ($p < 0.05$). This indicator was significantly higher in urban areas than in rural areas in both regions. Furthermore, positive attitudes increased with older age group and were more prevalent in the higher wealth quintiles compared to the lower ones in the North Region. In the Far North, positive attitudes became more prevalent with higher education level and women were more likely than men to report positive attitudes about case management.

Attitudes Toward Injectable Antimalarials

Widespread preference for injectable antimalarials over tablets existed in both regions. Almost three quarters (72.5%) of men and women in the North Region and about two thirds (64.5%) of their peers in the Far North agreed that a parent should ask for an injection from the health provider if they think that their child has malaria. Similarly, about four fifths (79.4%) in the North and 63.1% in the Far North preferred their child with fever to be treated with an injection rather than tablets. Overall, 63.7% in the North and 62.9% in the Far North displayed attitudes favorable to injections. Preference for injectable was similar across the urban-rural divide (**Table 19**) and gender categories overall and within each region The same was true of respondents from poor and wealthier household except in the North region where poor respondents were more likely to have attitudes favoring injections (68.1%) than wealthier respondents (59.2%, $p < 0.05$).

TABLE 19. PREVALENCE OF ATTITUDES TOWARDS INJECTABLE MALARIA TREATMENT, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT REPORTED THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
A parent should ask for an injection from the health provider or community health worker if they think his/her child has malaria.	74.2	67.7	72.5	64.3	64.9	64.5
I prefer that my child receive the medicine to treat malaria by injection rather than swallow it.	81.3	73.7	79.4	62.6	64.1	63.1
Favorable attitudes towards injections to treat child with malaria[2]	65.3	59.2	63.7	62.7	63.3	62.9

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Perceived Response Efficacy of Malaria Diagnostic Tests

Three Likert scale items allowed assessment of perceived response efficacy of diagnostic tests (**Table 20**). The results were mixed. The majority (93.5% in the North, 90.5% in Far North) of the respondents believed that a blood test is the only way to know if someone really has malaria or not. All the same, a

TABLE 20. AGREEMENT WITH SPECIFIC STATEMENTS RELATED TO PERCEIVED RESPONSE EFFICACY OF MALARIA TESTING, CAMEROON, 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
A blood test for malaria is the best way to know if someone really has malaria or not.	93.3	94.3	93.6	88.9	93.9	90.5
A person should still take malaria medicine even if the malaria test result says that the fever is not due to malaria.	64.4	51.8	61.2*	32.3	32.6	37.1

TABLE 20. AGREEMENT WITH SPECIFIC STATEMENTS RELATED TO PERCEIVED RESPONSE EFFICACY OF MALARIA TESTING, CAMEROON, 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
Parents can diagnose malaria by a person's symptoms just as well as a blood test for malaria.	70.4	62.5	68.4	73.8	67.5	71.8
Percentage of respondents with perceived response efficacy of malaria testing[2]	38.6	51.9	42.0	52.3	65.4	56.5

Notes:

[1] Adjusted Wald test were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* $p < .05$

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

large proportion of the respondents (68.4% in the North, 71.8% in the Far North) also believed that parents were able to diagnose malaria by their children's symptoms just as well as a test. Furthermore, 61.2% in the North and 37.1% in the Far North believed that a person with fever should still take antimalarial medication if the test is negative for malaria.

The indicator of perceived response efficacy derived from these three items as described in the Methodology section revealed that overall, 50.0% of the population believed in the efficacy of diagnostic tests (**Table 20**). Perceived response efficacy of diagnostic tests was more common in the Far North Region (56.5%) than in the North (42.0%; $p < 0.001$). In both regions, perceived response efficacy varied by sociodemographic variables. In the North Region, the indicator was higher for urban than rural residents, it increased with age group, and it was higher for people from wealthier households compared to people from poor households. In the Far North, belief in efficacy of diagnostic tests increased with the level of education while urban residents were more likely than rural residents to report perceived response efficacy of testing (**Table AA in Annex**).

Perceived Response Efficacy of Malaria Treatment

Perceived response efficacy of treatment might influence an individual's willingness to engage in treatment. Two questions allowed us to operationalize the concept of perceived response efficacy of facility-based treatment for malaria (**Table 21**). There is a very high level of consensus among respondents on the efficacy of antimalarial drugs (injectable or not) obtained from health facilities: 95.3% in the North Region and 93.4% in the Far North agreed that antimalarial drugs obtained from health facilities were effective in treating malaria. Nonetheless, about half the men and women (55.7% in the North Region, 47.9% in the Far North) believed that antimalarial medications obtained from

markets were as effective as the ones obtained from the health facility. In the North Region, rural residents (59.3%) were more likely than their urban peers (45.1%) to hold this belief; urban-rural difference on this belief was not significant in the Far North. In sum, perceptions about the response efficacy of treatment drugs did not particularly favor health facilities over other sources of care. Combining the two variables, only 41.4% in the North Region and 47.2% in the Far North demonstrated perceived response efficacy of antimalarial drugs obtained from health facilities. In the North Region, the response efficacy varied significantly by age group (lower prevalence among the younger respondents compared to their older peers) and was more prevalent in the highest wealth quintile compared to the other wealth quintiles. In the Far North, the indicator is higher for women than for men and it varied somewhat by wealth quintile.

TABLE 21. PERCEIVED RESPONSE EFFICACY OF MALARIA TREATMENT, NORTH AND FAR NORTH REGIONS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
The malaria drugs obtained from the health facility are effective in treating malaria.	95.8	94.0	95.3	92.5	95.2	93.4
The malaria medicines that you buy in the market are as good as the ones distributed at the health facility.	59.3	45.1	55.7*	51.3	40.9	47.9
Percentage of respondents with a high perceived response efficacy of malaria treatment[2]	37.7	52.4	41.4*	43.5	54.8	47.2

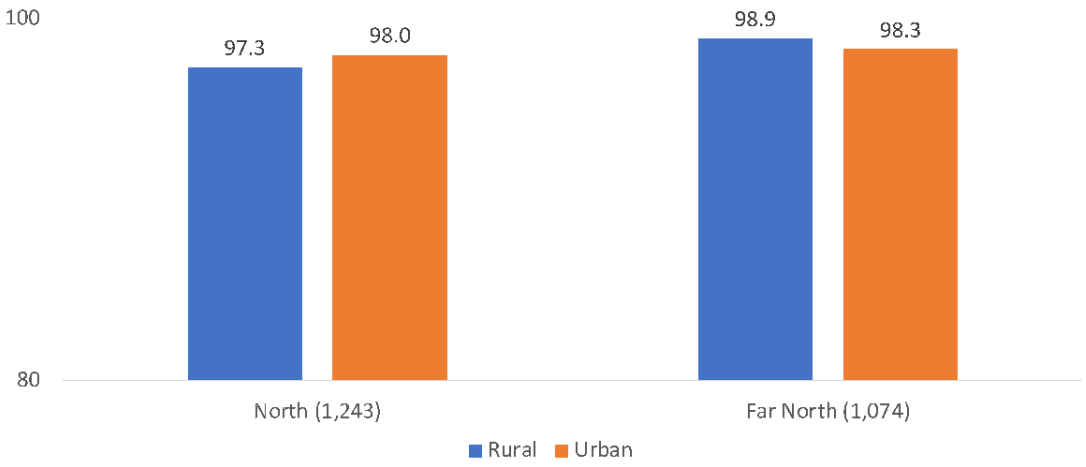
Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Figure 20: Percentage of respondents with perceived self-efficacy to practice malaria testing and treatment behaviors, Cameroon 2019



Perceived Self-efficacy to Obtain Malaria Testing and Treatment

A person's confidence in their ability to perform a health behavior, or perceived self-efficacy, has been linked to their likelihood of practicing that behavior (Kincaid, 2000; Fishbein et al., 2001, Babalola et al., 2018). Six items were used to assess this concept during the survey (**Table AB in Annex**). Agreement with the items was almost universal with more than 90% agreeing with each self-efficacy statement (Figure 20). Overall, the indicator of perceived self-efficacy obtained by combining these six items indicates a very high level of perceived self-efficacy to take actions related to malaria case management: 97.5% in the North Region and 98.7% in the Far North demonstrated this concept.

Descriptive Norms

Literature shows that individuals are more likely to perform malaria-related behaviors if they perceive that others like them have adopted those behaviors (Babalola et al., 2018; Perkins et al., 2019; Storey et al., 2018). Favorable descriptive norms related to prompt care-seeking and malaria testing were only moderately common in both study regions. The proportion of respondents who perceived prompt care-seeking from a health worker as a norm in their communities was 59.5% in the North Region and 60.6% in the Far North (**Annex Table AC**). This indicator did not vary by place of residence in either region. In contrast, significant differences existed by sex in both regions. In the North Region, women (63.4%) were more likely than men (57.0%) to report prompt care-seeking as a community norm ($p < 0.05$); the reverse was the case in the Far North (63.3% of men compared to 55.7% of women, $p < 0.01$). This

indicator did not vary significantly by any other sociodemographic variable in the Far North, but in the North differences existed by level of education.

Perceptions about the prevalence of malaria diagnostic testing for children taken to a health facility or a CHW in the community followed a similar pattern to what was observed for the descriptive norm about prompt care-seeking. More than half of respondents in the North Region (53.3%) and the Far North Region (58.9%) perceived malaria diagnostic testing as a community norm. The indicator did not vary significantly by urban residence in either region. Proportionally more women than men in the North Region and proportionally more men than women in the Far North perceived testing as a community norm. In the Far North Region, the perception is more widespread in the upper wealth quintiles compared to the lower ones.

Perceptions About the Availability of Malaria Diagnostic and Treatment Services

Perceived availability of services at a point of care may affect a person's decision to seek treatment at such points of care. The survey tool included four attitudinal questions designed to gauge perceptions about the availability of testing and treatment services in health facilities and among community health workers. These questions were asked of all respondents irrespective of where they reside.

Almost three quarters (73.2%) of the respondents in the North Region and 59.7% in the Far North believed that CHWs always have the medications for treating malaria (**Table 22**). Compared to perceived availability of medications, proportionally fewer respondents perceived testing kits to be available with CHWs: 61.4% in the North Region and 44.7%. These two indicators did not vary significantly by urban residence in the North Region; in the Far North, rural respondents (63.3%) were more likely than their urban peers (51.9%) to agree that testing kits were always available with CHWs. The study found no significant variations by sex in either region. An indicator of perceived availability of malaria services among CHWs derived from these two items showed that 62.9% of the men and women in the North and 55.5% in the Far North believed in the availability of malaria services among CHWs.

TABLE 22. PERCEPTIONS ABOUT COMMUNITY HEALTH WORKERS REGARDING THE AVAILABILITY OF MALARIA CARE SERVICES, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Community health workers always have the medication to treat malaria.	74.8	68.3	73.2	63.3	51.9	59.7*
Community health workers in this community always have the blood test kit to tell if a person has malaria.	61.4	61.5	61.4	47.8	38.1	44.7

TABLE 22. PERCEPTIONS ABOUT COMMUNITY HEALTH WORKERS REGARDING THE AVAILABILITY OF MALARIA CARE SERVICES, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Percentage of respondents with favorable perceptions of service availability with CHWs[2]	63.1	62.4	62.9	59.2	47.3	55.5

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Ninety percent of respondents in the North Region and 77.4% in the Far North believed that antimalarials are always available in health facilities while 88.1% of respondents in the North Region and 77.6% in Far North believed the same regarding testing kits (**Table 23**). These perceptions did not vary by urban residence in either region. In the Far North, women (79.8%) were more likely than men (75.1%) to perceive that malaria diagnostic kits were always available in health facilities. When these two items were combined to derive an indicator of perceived availability of malaria services in health facilities, the results showed that 87.3% in the North Region and 77.4% in the Far North believed in the continuous availability of malaria services in health facilities. There were no significant differences in this indicator by place of residence or by sex.

TABLE 23. PERCEPTIONS OF FACILITIES REGARDING THE AVAILABILITY OF MALARIA CARE SERVICES, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Health facilities always have the medication to treat malaria.	90.4	88.6	90.0	79.8	72.3	77.4
Health facilities in this community always have the blood test kit to tell if a person has malaria.	88.8	85.9	88.1	77.6	77.6	77.6
Percentage of respondents with favorable perceptions of service availability in health facilities[2]	87.5	86.8	87.3	80.0	71.8	77.4

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region. No significant differences were detected.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Attitudes Toward Health Workers Regarding Diagnosis and Treatment of Children with Fever

Community attitudes toward both community health workers and health facility providers may influence care-seeking behaviors. Community health workers are the key source of care for most of the population in rural areas, whereas urban populations generally have better access to secondary and tertiary health care facilities. This section examines perceptions of community health workers and facility-based health providers separately, due to their distinct roles in malaria case management. Three items served to assess attitudes toward each of these cadres of health providers.

About three quarters (72.6% in the North and 74.2% in the Far North) of the respondents were of the opinion that CHWs were knowledgeable about malaria treatment (**Table AD in Annex**). However, it is pertinent to note that many respondents perceived that CHWs make their clients pay for malaria testing (51.6% in the North Region, 32.0% in the Far North) and for antimalarial drugs (38.9% in the North Region, 28.1% in the Far North) for children with fever. These attitudes did not vary significantly by urban residence in either of the regions. The overall indicator of attitudes toward CHWs derived from these three items showed that just about half (50.6%) of men and women in the North Region and about two thirds (65.7%) in the Far North had a positive attitude toward CHWs regarding the provision of health services for malaria. There were no significant urban-rural differences in positive attitude toward CHWs in either region. In contrast, in the North Region, but not in the Far North, women (52.6%) were more likely than men (48.4%) to display positive attitudes toward CHWs. Furthermore, in the North Region, there appeared to be a curvilinear relationship with household wealth quintile with people in the middle quintile being more likely than their peers in any other quintile to display a favorable attitude toward CHWs. In the Far North Region, men and women in the higher wealth quintile appeared to have less favorable attitudes toward CHWs compared to those in the lower wealth quintiles.

Regarding attitudes toward facility-based health providers, the results were equally mixed. The majority of the respondents in both regions believed that health facility providers in their community knew how to treat malaria in children (93.2% in the North and 90.9% in the Far North; **Table AE in Annex**). The data, however, revealed that some negative perceptions were common. For example, 67.1% in the North and 56.5% in the Far North agreed that facility-based health providers made parents pay for malaria diagnostic tests for their children. In the same vein, 57.0% in the North and 43.8% in the Far North agreed that health facility providers made their clients pay for antimalarial drugs for their children. Overall, based on the indicator that combined these three items, 39.6% of men and women in the North compared to 51.8% in the Far North had a positive attitude toward facility-based health providers ($p < 0.001$). This indicator did not vary by urban residence or sex in either region. In contrast, in the North Region, it was higher for men and women with post-primary education compared to their illiterate peers and higher in the upper wealth quintiles compared to the lower wealth quintiles.

Participation in Decision-making About Care-seeking

Decisional autonomy or the extent to which an individual is involved in decisions regarding themselves or their households has been linked to positive health behaviors in many settings (Callahan and Becker 2012; Saleem and Bobak 2005). During the survey, respondents were asked who in their household makes specific decisions about care-seeking for their sick child. The data showed that 59.7% of women in the North Region and 60.1% in Far North made decisions about seeking care for their child with fever either solely or in conjunction with their spouse. Comparatively fewer women (37.5% in the North Region and 44.7% in Far North) contributed to household decisions about buying medications for a sick child.

Behaviors

Prevalence of Fever

To put the subsequent behaviors in context, it is helpful to look at the percentage of children under five years old who were either biological children of, or in the charge of, surveyed women who were sick with fever in the last two weeks. Overall, 20.3% of under-5 children in the North and 19.9% in the Far North reportedly had a fever in the last two weeks (**Annex Table AF**). In both regions, the prevalence of fever did not vary by household wealth or woman's education level. In the North Region, fever was more prevalent in urban areas compared to rural areas.

Care-seeking for Fever

A significantly larger proportion of women in the Far North (81.8%) than in the North (51.8%) reported prompt care-seeking, meaning having sought treatment or advice for their child sick with fever on the same or the next day as the onset of fever in the two weeks before the survey (**Table AG in Annex**). This proportion did not vary by urban residence in either region. Regarding the percentage of women who sought care in a health facility at any time during the child's sickness, again, significantly more women in the Far North (71.6%) compared to the North (41.9%) reported this behavior. No urban-rural difference was detected in this indicator.

Among the women with a child sick with fever, 62.2% in the Far North and 41.0% in the North reported seeking care in a health facility or with a CHW as a first recourse. Again, there were no urban-rural differences in this indicator in either region. Appropriate care-seeking for a child with fever (defined as taking the child to a health facility or a CHW as a first recourse within 48 hours of the onset of fever) was not very common, particularly in the North Region. Only 32.9% in the North Region and 57.4% in the Far North reported this behavior.

To further understand the factors associated with appropriate care-seeking (defined as prompt care-seeking for fever in a health facility as a first recourse), we estimated a multivariable logistic regression model. The estimated multivariable model in **Table 24** adjusted for ideational and background variables that, in bivariate models, were associated with appropriate care-seeking at the level of $p < 0.2$. The results revealed that regular television viewership was associated with more than a two-fold increased

odds of reporting appropriate care-seeking behavior. The data revealed three ideational variables that were strongly associated with appropriate care-seeking: knowledge of ACT as an effective antimalarial drug, knowledge about how soon after fever starts a caregiver should seek care, and preference for antimalarials administered as injections. Specifically, knowing a person should seek care on the same day or the next as the onset of fever increased the odds of appropriate care-seeking almost four-fold; and knowing that ACTs were effective antimalarials increased the odds more than three-fold.

Furthermore, caregivers who reported preference for injectable antimalarial were 84% more likely to report appropriate care-seeking behavior than their peers that did not report such a preference. In addition, agreeing that antimalarials were always available in the health facility in the community and disagreeing that facility-based health workers make their clients pay for antimalarial drugs for children were both positively, but marginally, associated with appropriate care-seeking behavior. Finally, caregivers in the Far North Region were three times as likely as their peers from the North Region to report appropriate care-seeking behavior.

TABLE 24. RESULTS OF THE LOGISTIC REGRESSION OF APPROPRIATE CARE-SEEKING[1] FOR FEVER ON SELECT VARIABLES, CAMEROON 2019

	NORTH AND FAR NORTH REGIONS	
CORRELATES	ODDS RATIO	STD. ERROR
Watches television at least once a week	2.302**	0.743
Agreed that antimalarials are always available in the health facility in the community	2.410 ‡	1.148
Disagreed that facility-based health workers make their clients pay for antimalarial drugs for children	1.872‡	0.620
Perceived that diagnostic test is the norm in the health facility in their community	1.519	0.645
Knew that care for fever in children should be sought the same day or the next as the onset of fever	3.938**	2.058
Knew that ACT is an effective drug for malaria in children	3.363***	1.248
Perceived that prompt care-seeking for fever is the norm in their community	1.433	0.571
Expressed preference for injectable antimalarials	1.841*	0.550
Disagreed that when their child has fever, they would start by giving the child medication they have at home	1.940	0.789
Far North Region (RC = North Region)	2.923***	0.902
Pseudo R^2	18.2%	
Number of observations	278	

Notes:

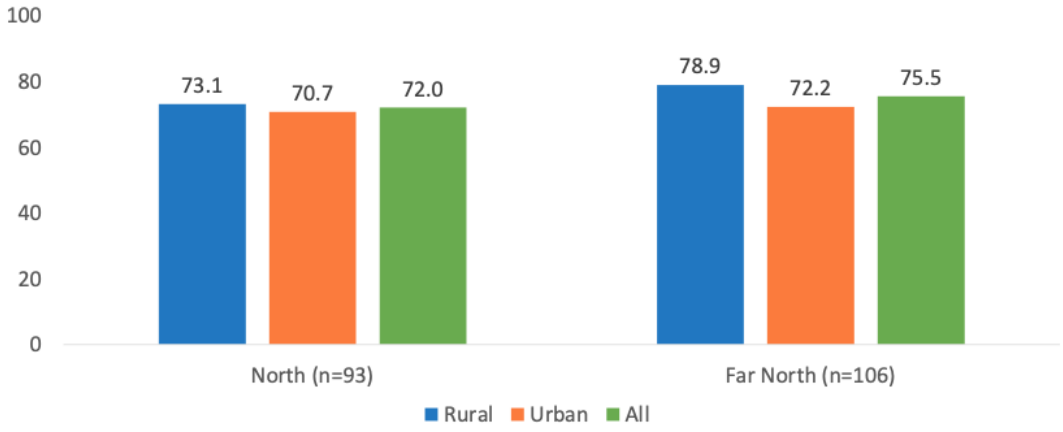
[1] Defined as taking the child to a health facility or a CHW as a first recourse within 48 hours of the onset of fever.

RC = Reference Category
‡ p < .1; * p < .05; ** p < .01; *** p < .001

Diagnosis and Treatment of Fever in Children

Prompt diagnosis and treatment of children under five with fever can reduce the severity of malaria infection and save lives. Among those children who were reportedly sick with fever and were taken to a health facility or a CHW, 72.0% in the North and 75.5% in the Far North had a blood sample taken to test for malaria (Figure 21). This indicator did not vary much by background characteristics. The only exception was in the North Region where women with no education were less likely than their peers with post-primary education to report that their child received a diagnostic test (**Table 25**).

Figure 21: Percentage of children sick with fever taken to a health facility/CHW who received a diagnostic test, Cameroon 2019



To assess which medication was given to a child sick with fever, caregivers were asked for the name of the medicine that was given to their child. Interviewers then checked the name provided by the caregiver against a list of ACT brands available in Cameroon. ACTs, including artesunate-amodiaquine (ASAQ) and artemether-lumefantrine (AL) are the recommended drugs for treating uncomplicated malaria. For children with confirmed fever, 65% of caregivers in the North Region and 70.8% in the Far North reported that their child received an ACT during their facility/CHW visit. This indicator did not vary significantly across sociodemographic groups (**Table 25**).

TABLE 25. MALARIA DIAGNOSIS AND TREATMENT AMONG CHILDREN SICK WITH FEVER IN THE LAST TWO WEEKS, CAMEROON 2019				
	Percentage of children sick with fever in the last two weeks taken to a health facility/CHW and whose blood was tested for malaria (n=199)		Percentage of children sick with confirmed malaria who received ACT from a health facility/CHW (n=127)	
	NORTH	FAR NORTH[1]	NORTH	FAR NORTH[1]
Mother's Education				
None	66.7**	80.8	63.3	80.0
Primary	68.0	70.3	52.9	60.0
Secondary and higher	94.1	70.6	84.6	60.0
Place of residence				
Rural	73.1	78.8	64.7	69.4
Urban	70.7	72.2	65.4	72.4
Total	72.0	75.5	65.0	70.8

[1] Adjusted Wald tests were run to compare the prevalence of each outcome across sociodemographic groups within each region.
*p<0.05, **p<0.01, ***p<0.001

3.7. Malaria in Pregnancy

Ideational Factors

This section presents information on ideational variables that may influence the use of antenatal care (ANC) and intermittent preventive treatment of malaria during pregnancy (IPTp). The survey measured the following ideational variables relevant to pregnancy and pregnancy care: knowledge, attitudes, perceived severity of malaria in pregnancy, perceived response efficacy of IPTp, perceived self-efficacy, descriptive norms relating to IPTp, perceptions of health providers, as well as spousal communication and decision-making about ANC.

Knowledge

Respondents were asked if they knew when a pregnant woman should start ANC, the recommended number of ANC visits a pregnant woman should attend, and the recommended number of doses of sulphadoxine-pyrimethamine a woman should receive during the course of her pregnancy (**Table 26**).

TABLE 26. PERCENTAGE OF RESPONDENTS WITH SPECIFIC KNOWLEDGE OF ANC AND IPTP, CAMEROON 2019

PERCENTAGE OF RESPONDENTS WITH SPECIFIC KNOWLEDGE OF ANC OR IPTP	NORTH			FAR NORTH		
	Rural (n=1,230)	Urban (n=1,013)	Total[1] (n=2,243)	Rural (n=981)	Urban (n=1,019)	Total[1] (n=2,000)
Knew that a pregnant woman should start ANC in the first trimester or as soon as she knows she is pregnant	43.3	54.8	46.6**	46.7	57.8	50.6*
Knew that a pregnant woman should attend at least four ANC visits during her pregnancy	52.3	54.4	52.9	36.5	44.3	39.2
Knew that a pregnant woman should receive preventive treatment for malaria three times during pregnancy	38.7	43.2	40.0	27.9	33.5	29.9
Answered two out of the three knowledge questions above correctly	44.9	52.5	47.1*	34.8	42.4	37.5

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each knowledge item between urban and rural respondents in each region.

*p < 0.05, **p < 0.01, ***p < 0.001

Only about half of respondents in both regions (46.6% in North, 50.6% in Far North) knew that a woman should start ANC as soon as she knows she is pregnant or in the first trimester. Within each region, this knowledge remained low and varied significantly by place of residence with respondents from urban areas (54.8% in North, 57.8% in Far North) demonstrating a higher level of knowledge than those from rural areas (43.3% in North, 46.7% in Far North). Women had slightly higher levels of this knowledge (50.3%) than men (46.8%). Overall, knowledge that pregnant women should attend at least four ANC visits was low. Knowledge of the recommended number of ANC visits was much lower in the Far North (39.2%) than in the North (52.9%) and did not vary significantly by place of residence. Women had significantly higher levels of knowledge regarding ANC recommendations (52.2%) than men (36.6%). Similarly, respondents had very low levels of knowledge when it came to the recommended number of doses of SP/Fansidar a pregnant woman should take. Only 40.0% of respondents in North and 29.9% of respondents in Far North knew that women should receive at least three doses of SP/Fansidar during pregnancy. Again, women had higher levels of this knowledge (41.9%) compared to men (25.2%).

Using the three knowledge items noted above, an overall knowledge score was created. Respondents who correctly knew two out of the three knowledge items were said to have basic knowledge of ANC

and IPTp. Results indicate that fewer than half of respondents had basic knowledge of ANC and IPTp (47.1% in North, 37.1% in Far North). In each region, basic knowledge varied significantly by sex, age, and household wealth quintile across sociodemographic groups. In the North, basic knowledge also varied significantly by level of education and place of residence, with respondents with a secondary level of education and from urban areas having proportionally higher levels of knowledge.

Perceived Severity

Contracting malaria during pregnancy poses a serious threat to the health and well-being of both mother and child (**Table 27**). Respondents were well aware of these risks as evidenced by the high levels of perceived severity in both regions. Most men and women (88.8% North, 85.3% Far North) agreed that the effects of malaria could be serious for the woman and her unborn child. Agreement with this statement did not vary by region or by place of residence within each region. In contrast, proportionally more people in the North Region (88.1%) compared to Far North (78.4%) agreed that pregnant women were more likely to die from malaria compared to women who were not pregnant.

TABLE 27. PERCENTAGE OF RESPONDENTS WHO PERCEIVE MALARIA TO BE SEVERE FOR PREGNANT WOMEN, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,229)	Urban (n=1,013)	Total[1] (n=2,242)	Rural (n=981)	Urban (n=1,019)	Total[1] (n=2,000)
When a pregnant woman gets malaria, the effect on her and her unborn child is very serious	88.1	90.5	88.8	84.7	86.4	85.3
Pregnant women are more likely to die from malaria compared to women who are not pregnant	87.8	88.9	88.1	77.8	79.6	78.4

[1] Adjusted Wald tests were run to compare the prevalence of agreement between urban and rural respondents in each region. No significant differences were detected.

Attitudes

The data indicates that attitudes toward early debut of ANC generally were not very positive, which may impact the use of ANC and its timing. About half of the respondents (54.1% in North and 40.8% in Far North) believed a woman should wait a few months before seeing a health provider, even if she thinks she may be pregnant. In addition, about a third of respondents were of the view that a woman does not need to see a health provider as soon as she thinks she is pregnant if she has previously given birth (36.4% in North, 31.6% in Far North). Combining these two items can create an indicator of positive

attitudes toward early debut of ANC. Overall, 29.3% in the North Region and 36.0% in the Far North had a positive attitude toward ANC (**Table 28**).

TABLE 28. ATTITUDES TOWARD EARLY ANTENATAL CARE, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,229)	Urban (n=983)	Total[1] (n=2,212)	Rural (n=981)	Urban (n=973)	Total[1] (n=1,954)
Even if a woman thinks she may be pregnant, she should wait a few months before she sees a health provider.	54.6	52.6	54.1	43.2	35.9	40.8
A woman who has given birth before does not need to see a health provider as soon as she thinks she might be pregnant.	37.1	34.5	36.4	34.8	25.0	31.6*
Percentage of respondents with favorable attitudes toward early debut of ANC[2]	28.5	31.2	29.3	33.0	41.6	36.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Assessment of respondents' attitudes toward IPTp was done by asking them their level of agreement with three attitudinal statements (**Table AH in Annex**). The majority of respondents agreed that the medications given to a pregnant woman to prevent malaria are safe for both mothers and their babies (81.0% in North, 74.8% in Far North). Similarly, most respondents believed that a pregnant woman must take several doses of the medicine to prevent malaria during pregnancy (77.6% in North, 67.1% in Far North). In contrast, few respondents believed that it is okay for a pregnant woman to take malaria prevention medicine on an empty stomach (28.3% in North, 23.2% in Far North).

An indicator of favorable attitudes toward IPTp was created based on these three attitudinal statements. Two thirds of respondents held favorable attitudes toward IPTp (65.0% in North, 67.8% in Far North). In both regions, favorable attitudes toward IPTp increased by age group. The indicator did not vary by gender or household wealth category in either region (**Table AI in Annex**).

Perceived Response Efficacy

Most respondents believed that using IPTp services is an effective means of preventing malaria in pregnancy (**Table 29**). The majority of respondents (92.1% in North, 87.8% in Far North) believed that

consulting health providers during pregnancy is one way of ensuring mother and baby are healthy. This belief was more prevalent among men (92.2%) than among women (87.9%). Most respondents also believed the drugs to prevent malaria during pregnancy are effective at keeping women healthy (North 86.8%, Far North 83.0%).

TABLE 29. PERCEIVED RESPONSE EFFICACY OF ANC AND IPTP, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,229)	Urban (n=982)	Total[1] (n=2,211)	Rural (n=981)	Urban (n=972)	Total[1] (n=1,953)
Consulting health facility providers during pregnancy is a way to make sure the baby and mother are healthy	92.1	92.3	92.1	86.1	91.3	87.8*
The medicine given to pregnant women to prevent malaria works well to keep the mother healthy	86.1	88.7	86.8	80.4	88.1	83.0*

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

Perceived self-efficacy

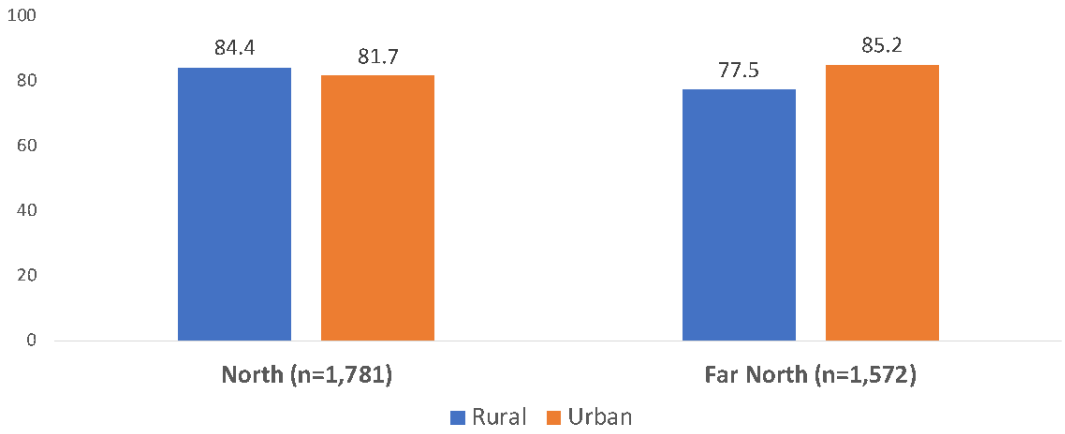
This section summarizes data on respondents' self-efficacy (i.e., an individual's confidence in their ability to take action) for actions related to ANC and IPTp. Since the questions were worded differently for women and men, the results are presented separately.

Overall, perceived self-efficacy to attend ANC was high among women (**Table AJ in Annex**). Women in the North were more likely than women in Far North to agree with specific perceived self-efficacy statements. Specifically, proportionally more women in North believed they can go for ANC as soon as they are pregnant (81.5%) and go for the recommended four visits (86.8%) as compared to women residing in Far North (69.9% and 81.7%, respectively). Over three quarters of women in North (78.8%) felt they could convince their husband to accompany them to a health center, whereas only about two thirds of women in Far North (65.0%) felt they could do so. Most women felt they could go for ANC even if their religious leader disagreed (76.7% in North, 71.5% in Far North). An indicator derived by combining these four items revealed a higher level of perceived self-efficacy for ANC-related actions in North Region than in Far North: 85.5% of women in North Region compared to 77.7% in Far North displayed perceived self-efficacy for ANC-related actions ($p < 0.001$).

When it comes to perceived self-efficacy to receive IPTp (**Table AK in Annex**), most women felt confident that during an ANC visit they could ask for the medicine to prevent malaria (87.8% in North,

81.3% in Far North) and take the medication at least three times during pregnancy (83.3% in North, 74.7% in Far North). The indicator of perceived self-efficacy for IPTp-related actions derived from these two items showed that 83.6% of women in the North Region and 80.2% in Far North displayed perceived self-efficacy (Figure 22).

Figure 22: Percentage of women with perceived self-efficacy to practice IPTp-related behaviors, Cameroon 2019



The data for men showed even higher levels of perceived self-efficacy (**Table AL in Annex**). As with the women's data, agreement with some of the statements of perceived self-efficacy was higher in the North Region compared to the Far North. The majority of men felt they could support a spouse to go for ANC as soon as she knows she is pregnant (95.6% in North, 89.3 in Far North) and encourage her to attend at least four ANC visits (95.1% in North, 89.3%). Most men also reported feeling confident in their ability to accompany their wife to the health facility for ANC (82.4% in North, 77.9% in Far North) and to support their wife going for ANC even if their religious leader disagreed (87.8% in North, 83.2% in Far North). The overall level of perceived self-efficacy for ANC-related actions was high among men: 93.6% in the North Region and 89.2% in the Far North.

Regarding perceived self-efficacy for IPTp-related actions (**Table AM in Annex**), the data showed that the majority of men believed they could encourage their spouse to ask for malaria preventive drugs during her ANC visits (94.0% in North, 85.1% in Far North) and to take the medications at least three times during pregnancy (94.9% in North, 89.8% in Far North).

Decision-making about antenatal care

There were regional differences in the proportion of women who had a birth in the last two years and reported deciding jointly with their spouse or on their own to seek ANC during pregnancy. In the North, a little more than one third (37.6%) of women reported being involved in deciding whether or not they go for ANC, compared to two thirds (67.6%) in the Far North ($p < .001$). In the North, female participation in decision-making about ANC was higher in urban areas than in rural areas (**Table 30**). In the Far North, female participation in decision-making in the Far North was higher among women with a primary school education (81.3%) compared to those with no education (61.4%) or post-primary education (53,6%). The difference between those with no education and their peers with post-primary education was not statistically significant. Furthermore, in Far North Region, female participation in decision-making was higher among women from the two lowest wealth quintiles (76.5%) compared to women from the three higher quintiles (60.5%).

TABLE 30. PERCENTAGE OF WOMEN WHO WERE INVOLVED IN DECISION-MAKING REGARDING ANTENATAL CARE, CAMEROON 2019

AMONG MARRIED/PARTNERED FEMALE RESPONDENTS WHO HAD A LIVE BIRTH IN THE LAST TWO YEARS

BACKGROUND CHARACTERISTICS	NORTH (n=567)	FAR NORTH (n=351)
Age		
15-29	37.7	70.6
30 and above	37.4	59.8
Education Level		
None	32.7	61.4***
Primary	40.1	81.1
Secondary school or higher	59.7	53.6
Wealth Quintile		
Poor (two lowest quintiles)	34.2	76.5**
Wealthier (higher three quintiles)	41.2	60.5
Place of Residence		
Rural	32.3***	71.1
Urban	55.3	61.5
Total (%)	37.6	67.6

Notes:

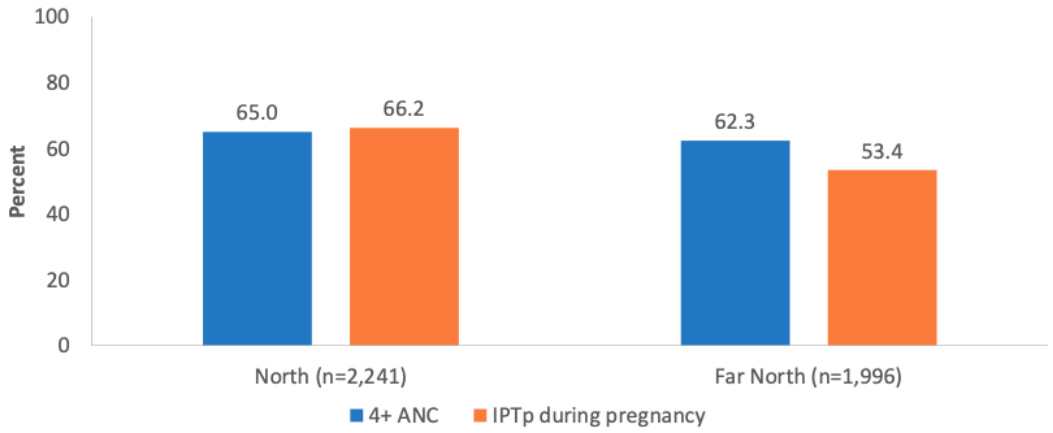
Adjusted Wald tests were run to compare the prevalence of involvement in ANC decision-making between female respondents across different sociodemographic groups in each region.

**p < 0.01, ***p < 0.001

Descriptive Norms

About two thirds of respondents (65.9% North, 66.2% Far North) believed that the majority of women in their community go for four ANC visits during their pregnancy (Figure 23). This varied significantly by urban residence only in the Far North, where more urban residents (72.2%) felt this was the norm as compared to rural residents (62.9%). Across both regions, proportionally more women perceived going for four ANC visits as the norm (68.0%) as compared to men (62.8%).

Figure 23: Percentage of respondents who perceived antenatal care and IPTp behaviors as norms in their community, by region, Cameroon 2019



Regarding descriptive norm related to IPTp, less than two thirds of respondents from North Region (62.3%) believed that the majority of pregnant women in their community take medicine to prevent malaria during pregnancy, whereas only about half of respondents in Far North Region felt this was the norm (52.4%). The descriptive norm of IPTp use during pregnancy varied significantly by urban residence again only in the Far North. Proportionally more urban residents (60.7%) believed IPTp use during pregnancy was the norm as compared to rural residents (49.5%). This indicator was higher for women compared to men: 60.6% of women compared to 53.4% of men ($p < .01$) perceived IPTp as a community norm.

Perceptions of Health Workers Providing ANC and IPTp

An assessment of respondents' perceptions of health workers who provide ANC and IPTp to pregnant women utilized six Likert-style items. Perceptions of health workers were somewhat mixed (**Table AN in Annex**).

On the positive side, the majority of respondents felt that health providers treat pregnant women with respect (85.8% North, 78.5% Far North). Most respondents from North (86.8%) and nearly two thirds from Far North (60.5%) believed that health providers in the community always offer pregnant women

medication to prevent malaria. This perception differed significantly between rural (57.1%) and urban (67.8%) residents from Far North only. Across both regions, women (75.8%) believed this more strongly than men (69.3%).

However, some negative perceptions of health workers existed, and these seem to be more pronounced in the North. For instance, nearly three quarters of respondents from North (73.2%) and half from Far North (50.3%) perceived that health providers give pregnant women medication to prevent malaria only if they have eaten beforehand. Differences between men and women emerged here too, with 67.0% of women believing this about health workers as compared to 54.4% of men. Nearly a third (30.0%) of respondents in North felt that health providers would refuse services to a pregnant woman if she were in the first two months of her pregnancy, whereas only 12.7% of respondents felt the same way in Far North. Proportionally more women (22.3%) agreed with this statement than men (18.9%), a difference that was statistically significant. Moreover, about a quarter (24.7%) of respondents in North and about one fifth (18.7%) from Far North believed that health providers make pregnant women pay for medicines to prevent malaria. A noticeable proportion of women held the perception that health providers would turn a pregnant woman away if she were not accompanied by her husband (20.9% North, 11.2% Far North).

An overall measure of perceptions toward health workers providing ANC and IPTp care was created using six items. In both regions, about three quarters of respondents (78.1% North, 76.7% Far North) had favorable perceptions of health workers. There was not much variation in overall perceptions. In the North, perceptions were most favorable among respondents from the middle and fourth quintiles. In contrast, perceptions varied by sex in Far North with 78.1% of women holding favorable perceptions toward health workers as compared to 71.4% of men.

Practices and Behaviors

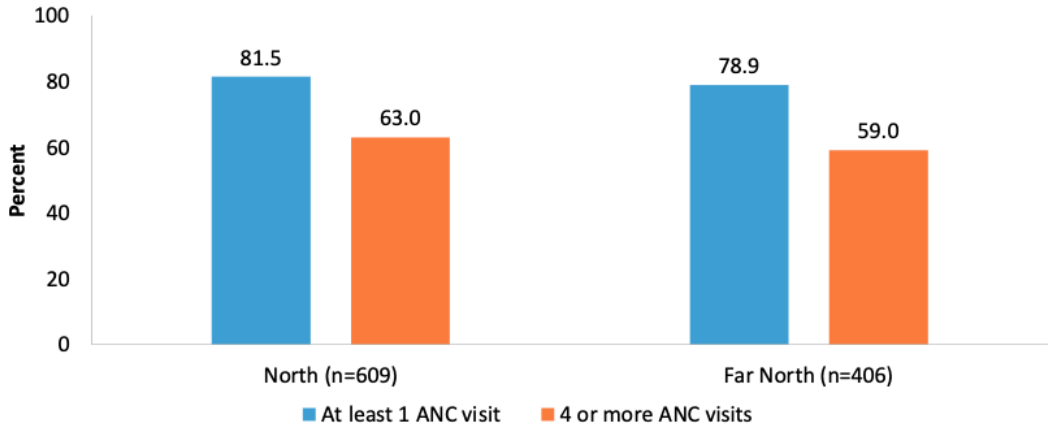
Antenatal Care

Across the two regions, most women who had at least one live birth in the last two years attended at least one ANC visit (Figure 24). Slightly more women from North (81.5%) reported attending at least one ANC visit than women from Far North (78.9%). In both regions, recently pregnant women residing in urban areas and with higher levels of education were significantly more likely to report having gone for ANC at least once (**Table AO in Annex; Figure 24**). In North, recently pregnant women from higher household wealth quintiles were also significantly more likely to have attended at least one ANC visit: 81.6% among the lowest quintile versus 94.1% among the highest quintile.

The results indicate there was a considerable drop-off in ANC utilization when looking at the proportion of women who attended at least four ANC visits, the recommended number per Cameroonian policy (Figure 24). In North, 63.0% of recently pregnant women attended four or more ANC visits and in Far North only 59.0% of women reported doing so. For women from the North, the proportion who reported going for four or more ANC visits increased with education and was higher among women from

urban areas. For women in both regions, attendance of four or more ANC visits varied by household wealth quintile (**Table AO in Annex**).

Figure 24: Percentage of women who attended at least one ANC visit or at least four visits during pregnancy, by region, Cameroon 2019



In addition to receiving the recommended number of ANC visits, it is critically important that pregnant women begin ANC visits early, specifically during the first trimester. However, the results indicate that seeking ANC early in pregnancy was not common. Only a third (32.7%) of women in the North reported starting ANC in the first three months of pregnancy. In the Far North, almost half (48.3%) of recently pregnant women began ANC in the first trimester. In both regions, early reporting for ANC varied significantly by education and place of residence. In both regions, this indicator varied significantly across wealth quintiles (**Annex Table AO**).

Spousal Presence During ANC

Across both regions, a little more than a third (37.5% North, 37.2% Far North) of women who had a birth in the last two years reported that their spouse accompanied them to ANC visits. This kind of support from a spouse varied significantly by household wealth in the North Region but not in the Far North Region. Wealthier women from the North Region (44.8%) were more likely to report that their spouse accompanied them compared to their poor peers (29.2%): $p < 0.05$. There were no differences by age group in the North Region; in Far North women younger than 30 years old (44.9%) were significantly more likely to report that their spouses accompanied them to ANC visits than were women 30 years and older (26.0%: $p < 0.05$). Being a first-time mother appeared to make a difference in the Far North where 49.4% of first-time mothers reported that their spouse accompanied them to ANC compared to 33.8% of the others, $p < 0.05$. No urban-rural differences were detected in either region.

Use of IPTp

In Cameroon, health policy recommends that pregnant women take at least three doses of SP during pregnancy to prevent malaria. Proportionally more women in the North (72.7%) reported taking at least one dose of SP as compared to women in Far North (65.3%) (Figure 25). In both regions, even fewer women reported receiving at least three doses of SP: 43.0% in North compared to 45.0% in Far North.

Across the two regions, there was a significant difference in use of IPTp by ANC attendance and education level. Among women who attended four or more ANC visits, over half of women (58.6% North, 61.9% Far North) received at least three doses of SP. Similarly, women with a secondary level of education were more likely than their peers with no formal education to have taken at least three doses of SP during their most recent pregnancy (55.1% North, 50.6% Far North). In addition, women residing in urban areas in Far North (54.8%) were more likely to report taking at least three doses of SP than their peers from rural areas (39.4%).

Figure 25: Percentage of women who had a live birth in the last two years who received at least one or at least three doses of SP/Fansidar, by region, Cameroon 2019

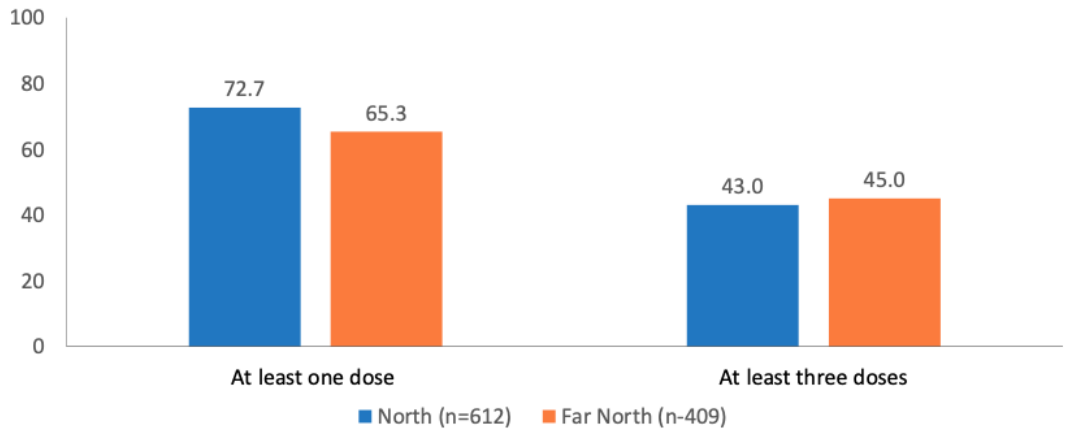


TABLE 31. RESULTS OF LOGISTIC REGRESSION OF RECEIPT OF AT LEAST THREE DOSES OF IPTP ON SELECTED VARIABLES, CAMEROON 2019

AMONG WOMEN WHO HAD A LIVE BIRTH IN THE LAST TWO YEARS

CORRELATES	NORTH (n=605)		FAR NORTH (n=405)	
	ODDS RATIO	STD. ERROR	ODDS RATIO	STD. ERROR
Education level (RC = None)				
Primary	1.025	0.218	1.658*	0.425
Secondary and higher	1.839*	0.552	1.297	0.465
Christian religious affiliation (RC = Non-Christian)	1.144	0.227	0.850	0.206
Current age	0.772**	0.076	0.976	0.138
Square of age	1.004**	0.002	1.000	0.002
Married or cohabiting (RC = not married nor cohabiting)	0.866	0.360	0.607	0.302
Four or more children-ever-born (RC = Three or fewer)	0.933	0.214	1.685‡	0.476
Urban residence (RC = Rural)	0.692	0.159	1.274	0.334
Lower two wealth quintiles (RC = Higher three quintiles)	0.692	0.159	0.983	0.266
Obtained at least four ANC visits (RC = Obtained three or fewer visits)	4.302***	0.913	3.726***	0.914
Had first ANC visit in first trimester (RC = Had first ANC visit in 2nd or 3rd trimester)	1.767**	0.363	2.329***	0.562
Spouse/partner accompanied woman to ANC	1.147	0.236	0.909	0.562
Pseudo-R^2	13.3%		15.3%	

Notes:
RC = Reference Category
‡ p < .1; * p < .05; ** p < .01; *** p < .001

As the results of the logistic regression presented in **Table 31** indicate, both differences and commonalities exist between the North Region and the Far North Region in the sociodemographic and behavioral variables significantly associated with receipt of three or more doses of IPTp. Starting ANC early in a pregnancy and receiving the recommended number of ANC visits are important gateway behaviors to IPTp uptake in both regions. Women who started ANC during the first trimester of pregnancy were 77% more likely in the North Region and more than twice as likely in the Far North to

obtain the required number of IPTp doses compared to those who commenced ANC later in pregnancy. Similarly, obtaining at least four ANC visits increased the odds of receiving three or more doses of IPTp more than four-fold in the North Region and 273% in the Far North. Education level was a significant correlate in both regions, but the pattern of association was different between the two regions. In the North Region, women with post-primary education were 84% more likely to report receipt of the recommended number of IPTp doses compared to their peers with no education. In the Far North, the difference was mainly between the women with no education and their peers with primary education. With regard to age, the association was curvilinear in the North, with the odds of receipt of the recommended number of IPTp doses decreasing until around age 30 years and then increasing thereafter. Age was not significant in the Far North.

Sources of IPTp

In both regions, almost all women who took at least one dose of SP during their most recent pregnancy said they obtained the medication during an ANC visit (92.2% North, 98.7% Far North). Roughly 10% of women mentioned getting SP at a health center outside of a scheduled ANC visit (10.1% North, 11.9% Far North). In the Far North, ten percent of women also reported getting SP from a pharmacy, whereas only 3% of women did so in the North Region.

Intention to Obtain IPTp During Future Pregnancies

All women were asked if they intend to obtain IPTp should they become pregnant in the next two years. Overall, 81.0% of the women reported such an intention; there was no significant difference between North (81.4%) and Far North (80.6%) regions in this indicator. In contrast, in each region, the indicator is lower among women with no formal education (78.2% in North, 75.3% in Far North) compared to their peers with primary education (87.5% in North, 87.8% in Far North) or secondary education and higher (87.9% in North, 92.3% in Far North).

Table 32 presents results of a logistic regression model that relates IPTp intentions to sociodemographic and ideational variables. The data show some similarities and differences in the pattern of relationships. For example, education level was positively and significantly associated with intention in the Far North, but not in the North Region. Whereas the association with age was negative in the North Region, the relationship was curvilinear in the Far North with the odds of reporting IPTp intention initially increasing with age until around age 25 years and decreasing thereafter. In both regions the association with exposure to malaria-related messages was positive, although the relationship was only marginally significant.

TABLE 32. RESULTS OF THE LOGISTIC REGRESSION OF INTENTION TO TAKE IPTP SHOULD THE WOMAN BECOME PREGNANT IN THE NEAR FUTURE ON SELECT VARIABLES, CAMEROON 2019

CORRELATES	NORTH (n=1,249)		FAR NORTH (n=1,062)	
	ODDS RATIO	STD. ERROR	ODDS RATIO	STD. ERROR
Education Level (RC = None)				
Primary	1.104	0.261	1.961**	0.473
Secondary or higher	1.355	0.471	2.931**	1.251
Christian religious affiliation (RC = Muslim and others)	1.203	0.228	0.888	0.184
Current age	0.910***	0.011	1.203*	0.113
Square of age	N/A	N/A	0.996**	0.001
Four or more births (RC = 3 births or fewer)	1.045	0.212	0.852	0.203
Exposure to malaria-related messages in last six months	1.515‡	0.325	1.457‡	0.299
Urban residence (RC = Rural residence)	1.128	0.255	0.903	0.194
Lower two wealth quintiles (RC = Higher three quintiles)	0.752	0.167	1.883**	0.435
Perceived self-efficacy for ANC	0.816	0.246	1.584	0.448
Perceived self-efficacy for IPTp	1.157	0.335	2.843***	0.920
Perceived response efficacy of IPTp	2.327**	0.707	1.445	0.532
Knew the recommended number of IPTp doses	1.917***	0.352	3.169***	0.703
Positive perceptions about ANC/IPTp services	1.965***	0.409	0.874	0.220
Perceived IPTp as a community norm	1.635**	0.311	1.646*	0.360
Discussed malaria with others during the last six months	2.178***	0.461	0.958	0.258
Perceived severity of malaria	0.682*	0.126	0.945	0.231
Positive attitudes about ANC/IPTp	1.074	0.202	2.974***	0.633
Perceived that pregnant women are more likely to catch malaria compared to non-pregnant women	1.130	0.238	0.949	0.158
Perceived severity of malaria in pregnancy	0.971	0.242	0.825	0.170
Perceived susceptibility to malaria	1.401	0.376	0.771	0.279
Pseudo-R^2	19.4%		30.6%	

Notes:
RC = Reference Category
‡ p < .1; * p < .05; ** p < .01; *** p < .001

Two ideational variables were significant in both regions: awareness of the recommended number of IPTp doses and the perception that IPTp is a community norm. Specifically, knowing the recommended number of IPTp doses increased the odds of intending to obtain IPTp by 92% in the North Region and three-fold in the Far North. Perceiving that IPTp is a community norm was associated with a 64% increase in North Region and a 65% increase in Far North in the odds of reporting intention for IPTp. In addition to these two ideational variables, others showed significant association with intention, although only in one region or the other. For example, perceived self-efficacy for obtaining IPTp and positive attitudes toward IPTp were significant in the Far North but not in the North Region. In contrast, perceived response efficacy of IPTp, positive perceptions about ANC/IPTp services, and discussion of malaria with others were significant correlates only in the North Region. In addition, perceived severity of malaria was a significant correlate only in the North Region, although the association was negative.

Obtaining a Mosquito Net During Pregnancy

Overall, about two thirds of the women who were recently pregnant and who attended ANC received an insecticide-treated mosquito net during an ANC visit. This was higher in Far North (72.9%) than in the North (62.6%): $p < 0.05$. Receipt of a net during an ANC visit varied significantly by place of residence and household wealth quintile for women in the North Region (**Table AP in Annex**). Proportionally more women residing in rural areas (66.6%) in the North received an ITN as compared to urban residents (51.3%). In addition, the proportion of women in both regions who received an ITN during an ANC visit was marginally higher among the women from poorer households compared to those from wealthier households.

3.8. Indoor Residual Spraying

The WHO recommends IRS as a primary vector control tool that can be deployed in high-, medium-, and low-transmission settings. IRS sprayers apply once or twice a year to the walls of dwelling units in targeted communities. The insecticide typically remains effective for around six months. After taking a blood meal, female *Anopheles* mosquitoes rest on nearby walls and are exposed to the insecticide. IRS can rapidly reduce malaria transmission in targeted areas when applied effectively. Cameroon does not currently include IRS as part of its national malaria control strategy. PMI and the NMCP have, however, identified the North and Far North Regions as promising potential future sites for IRS. As such, IRS is included in the Cameroon National Malaria Strategy 2019-2023.

Ideational Determinants

Although IRS has not yet been implemented in these regions, the survey collected the following ideational determinants: knowledge, attitudes, and perceived effectiveness of IRS, in order to prepare for the potential implementation of these activities.

Knowledge

Respondents reported very little knowledge of IRS. Only 5.7% of respondents in the Far North and 9.0% in the North Region were aware of IRS programs. Considering that the program was yet to be

implemented in Cameroon, it is not certain that these people were not confusing IRS with another intervention. Men were more likely than women to have heard of IRS, but the difference was significant only in the Far North Region (men 7.7%, women 4.0%, $p < 0.05$). Urban residents in both regions were more likely than rural residents to have knowledge of IRS, with a greater disparity in the North Region (18.6% urban, 5.2% rural; $p < 0.001$) compared to Far North Region (7.1% urban, 4.9% rural). Across the two regions, respondents with a higher education level and household wealth quintile generally possessed greater awareness of IRS, with a significant difference across wealth quintiles (North $p < 0.001$, Far North $p < 0.01$) in both regions and education levels ($p < 0.05$ for both regions).

Potential IRS Acceptance

The survey queried all respondents about willingness to accept IRS, whether or not they had heard of the intervention prior to the survey. For those who had not heard about the program before the survey, interviewers first described the program to them. The data reveals that potential IRS acceptance among all respondents was high in both regions (North 91.1%, Far North 88.9%). In North Region, respondents with prior awareness of IRS were more open to the idea of accepting spraying in their household compared to their peers who had not heard of the program before the survey (97.8% compared to 90.5%; $p < .001$). The reverse was the case in Far North: 58.5% of those with prior awareness compared to 90.7% without prior awareness reported that they would be willing to accept IRS; $p < 0.001$.

Attitudes

Among those previously aware of the IRS intervention (n=339), slightly more than half (57.7%) of North Region residents compared to 75.1% of Far North residents ($p < 0.05$) felt it was safe to touch house walls after the sprayed insecticide dried (**Table 33**). IRS was more highly associated with bed bugs and fleas after spraying in the Far North Region (39.0%) than in the North Region (20.4%, $p < 0.05$). This belief did not vary between men (27.9%) and women (29.6%). Of note for any future IRS campaigns, 40.5% of Far North and 28.3% of North Region residents would be bothered by leaving their household items outside during spraying. The urban/rural difference was significant in the North Region (17.1% rural, 37.7% urban, $p < 0.05$). Women (76.7%) were much more likely than men (27.9%) to say IRS was worth moving their personal belongings. Overall, the percentage of respondents with prior awareness of IRS who had a positive attitude toward IRS was significantly higher in the North Region (73.8%) than in the Far North Region (49.9%, $p < 0.05$).

TABLE 34. ATTITUDES TOWARDS INDOOR RESIDUAL SPRAYING, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=45)	Urban (n=168)	Total[1] (n=213)	Rural (n=45)	Urban (n=67)	Total[1] (n=112)
Many people have skin problems (skin rashes, itching) after spraying insecticides on the walls inside their houses	21.8	38.5	30.9	45.8	44.6	45.3
A person can safely touch the walls after the sprayed insecticide has dried up.	61.0	54.8	57.7	77.0	72.1	75.1
People have problems with bed bugs/fleas after spraying insecticide on walls	23.1	18.1	20.4	43.7	31.4	39.0
The benefits of spraying insecticide in my home are worth the effort of having to take out my belongings to allow spraying.	43.2	66.3	55.7	44.8	51.9	47.5
It would bother me to leave my belongings outside my house while the insecticide is sprayed on the walls	17.1	37.7	28.3	41.8	38.5	40.5
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.	84.2	83.8	84.0	66.7	85.7	74.0
Percentage of respondents with positive attitudes towards IRS[2]	75.4	72.4	73.8	42.5	60.3	49.4

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

Perceived Response-Efficacy

Respondents aware of IRS generally felt that spraying the inside walls of a house is an effective way to prevent malaria (North 92.8%, Far North 82.1%) and that people who live in houses that have been sprayed are less likely to contract malaria (North 91.2%, Far North 70.3%, p < 0.01). There were no

significant differences in perceived IRS efficacy by key demographics in the North Region. However, in the Far North Region, men (92.0%) were more likely than women (72.9%) to believe IRS is an effective vector control tool ($p < 0.01$). Higher educational attainment also was associated with an increase in perceived IRS efficacy in the Far North (no formal education, 76.7%; primary school, 87.2%; secondary or higher, 95.0%, $p < 0.05$).

Perceived Self-Efficacy

A majority of respondents familiar with IRS felt confident they would be able to move their furniture out of the house to prepare for spraying (North 90.6%, Far North 81.0%). There was no difference in response between the two regions or urban/rural status when asked whether they would be able to sleep in their house the night the house was sprayed (North 88.2%, Far North 79.1%). In total, more than three quarters of both regions perceived the self-efficacy to adjust for IRS spraying (82.7% North, 79.6% Far North). Similar to perceived response efficacy, perceived self-efficacy was higher in Far North among those with a secondary education or better (94.9%) compared to primary school (71.7%) or no formal education (72.6%, $p < 0.05$).

4. Summary and Recommendations

This survey collected valuable information about various malaria-related behaviors and their determinants in the North and Far North Regions. The data came from 2,756 households, 3,565 women of reproductive age, and 949 of their male spouses/partners. This information, representative of the urban and rural populations in both regions, provides a basis on which to better identify, prioritize, and reach target audiences with tailored and effective SBC messages. This section summarizes the key findings and highlights their implications for malaria programs in these regions.

General Recommendations

Media Habits

The potential reach of radio and television is limited in both urban and rural areas of both study regions. The low reach of radio is partly due to low household possession of the device; however, even in households with a radio, listenership remains low. The only exceptions to this trend are men and women from more affluent urban households and men from the Far North Region, especially older men. As for the television, although only about one fifth of households possess a television, those from households with the device watch televised programs regularly. In sum, both radio and television have limited relevance on their own for providing population-level access to malaria prevention and case management messages. Access to mobile phones is limited in rural areas but relatively common in urban areas. Moreover, most people with a mobile phone reported capability to receive text messages while a noticeable proportion reported that their phone is capable of receiving photographs, video, and audio files. Based on these findings, we offer the following recommendations:

- Overall, an approach that relies on a combination of channels is ideal for the intended population in the study region. The strategy should consider a combination of interpersonal and community based interventions, radio, television, and mobile technology, and consider the limitations of each while focusing on the target audience's reported highest listenership/viewership times.
- Radio is well suited for reaching more affluent urban men 35 years and older in both regions, and generally older men in the Far North Region.
- Malaria messages broadcast over radio should be aired in the morning or early evening when most people prefer to listen to the radio.
- Dissemination of SBC materials via television is unsuitable in rural areas, but could be considered in urban areas, where about half of households have a television. In urban areas, television offers a more equitable means of reaching the population regardless of their gender and age, relative to radio.
- Mobile phones offer a better means of reaching the population than radio or television as respondents were more likely to own a mobile device than to live in a household with a radio or television. Text and audio messages are best able to reach the population since nearly half of

respondents had a mobile device that could receive such content. Efforts involving the use of text messages should carefully consider the low literacy level of the population, particularly in rural areas where more than half had no formal education. Audio and video materials might be more appropriate for such low-literate population groups.

- Given the limitations of mass media channels to reach rural women of reproductive age, social mobilization, as well as interpersonal communication with community health workers and facility-based health providers, should be critical parts of any effort to sensitize populations in these regions about malaria prevention, diagnosis, and treatment.

ITN Ownership and Use

Household mosquito net ownership was not universal; almost one third of households in both regions had no mosquito nets. Wealthier households appeared to have lower net ownership than poor households. At 34.2% and 54.3%, respectively, the indicators of household net coverage and population access were rather low. All the same, the indicator of use: access ratio indicates that most people who have access to a net actually use it. The data suggest that in the Far North Region, there is a tendency for more than two people to share a net. Among the population in households with at least one net, use the previous night was lower among older children and teenagers 5 to 17 years old compared to younger children or adults. Among the male and female caregivers interviewed, the ideational variables positively associated with consistent bed net use in both regions include perceived susceptibility to malaria, perceived self-efficacy to use nets, and the perception of net use as a community norm. In addition, in the North Region, there was a positive link with attitudes toward the use of bed nets and a negative association with perceived response efficacy of nets, discussion of malaria with others, and exposure to malaria messages; these relationships were not observed in the Far North Region. In both regions, household net coverage was positively associated with consistent use. Also, in both regions, a significant association with education level existed, although the direction was not the same in both regions. In light of these findings, we suggest the following recommendations:

- There is a need to encourage consistent use of mosquito nets by all members of the household, every night, all year long. Appropriate SBC materials need to position the use of bed nets as a necessity for all members of the household irrespective of age, gender, education level, and household wealth. In both regions, the lower use of nets among older children and teenagers needs to be addressed with appropriate SBC materials that emphasize the need to protect this age group from malaria. Furthermore, it is important to understand the reasons for lower prevalence of consistent use of nets among educated people in Far North Region. In North Region, programs may want to specially focus on men, not only as key household decision makers, but because they were less likely than women in that region to report consistent net use.
- Considering the strong association of perceived susceptibility to malaria, perceived self-efficacy to use nets, and the perception of net use as a community norm with consistent use of nets, messages that address these constructs are relevant. To position net use as a community norm,

SBC materials can model an ordinary community member or a role model who explains why and how they use bed nets consistently as well as the positive consequences of net use for them and their family. Consistent with Bandura (1977), this type of vicarious experience may also help to strengthen perceived self-efficacy for consistent net use. Other approaches for strengthening perceived self-efficacy include addressing psychological, logistic, and structural barriers to net use; accessing opportunities to educate the audience on the benefits of net use; promoting discussion of the benefits of net use with others; and correcting misconceptions about the negative side effects of insecticide-treated nets. In the North Region, efforts to promote positive attitudes toward bed nets are also relevant. Specifically, SBC materials that emphasize the ease of using bed nets, promote the benefits of using nets in warm weather, stress the safety of insecticide-treated nets and link bed nets to a good night sleep are relevant.

- It is curious that exposure to malaria SBC materials was negatively correlated with net use in the North Region. While the reason for this unusual finding is not clear, it raises questions about the quality of disseminated information on bed nets. It may be useful for implementing partners to submit proposed messages and materials to the National Malaria Control Program or relevant Regional Health Delegations for vetting prior to dissemination. This will help to ensure harmonization and to assure that quality information is always provided to the population.

ITN Care Attitudes and Behaviors

The majority of the survey respondents believed there are steps a person can take to ensure net durability and that a person can protect the health of family members by taking care of their nets. Nonetheless, observed net care behaviors were largely not favorable to net durability. Only about a third of the nets enumerated in the households and used for sleeping on the night preceding the survey were suspended, folded, and tied over the sleeping space. Furthermore, whereas the WHO guidelines for washing nets with a mild soap was generally followed by the population, the majority of washed nets were left to dry in the sun instead of outside in the shade. The recommendations based on these findings are as follows:

- Programs may consider widely disseminating guidance for net care. This can be done through by disseminating SBC messages as part of net distribution and through community events, brochures, radio and television programs, and mobile technology.
- There is a need for a better understanding of the factors, other than lack of knowledge, preventing people from drying their nets in the shade. These factors may be structural, related to living conditions, or cultural, related to community norms. A well-designed qualitative research or HCD-type activity may be useful to understand exactly how nets are dried and identify the barriers and proffer solutions.

Seasonal Malaria Chemoprophylaxis

Awareness of SMC is widespread in the study regions but relatively few of the caregivers had basic knowledge about the program, including knowledge about the number of months per year and the

number of days per month that the medication should be administered. Most adults had heard of SMC and perceived that most children took SMC in their communities during the rainy season. While overall attitudes related to SMC were generally positive, certain negative perceptions toward its distribution and its benefit in protecting healthy children were common in the study regions. For example, the belief that taking SMC makes no difference to a child's probability of contracting malaria was quite common. Many respondents believed that healthy children do not need to take SMC and that SMC could harm children. Furthermore, many caregivers believed that SMC distributors force the medication on parents while about one fifth expressed lack of trust in SMC providers. Providers reportedly did not always follow established protocols while distributing the medication. Although SMC is supposed to be taken by children under direct observation of the provider, results indicate that this was not the case for many children. In as many as two fifths of the cases in the North Region, the SMC distributors gave the medication to a caregiver, but did not observe it being taken. Furthermore, a large proportion of caregivers reported that the provider did not discuss side effects of the medication with them. Both household and facility-based channels of SMC distribution in both regions were largely successful in ensuring that at least nine out of ten target children took the first dose of the SMC regimen. Perceived self-efficacy to complete three days of prophylaxis was almost universal but the actual completion of the three doses appears to be much less frequent. The recommendations devolving from these findings are the following:

- Programs should appropriately craft SBC materials that explain the frequency and duration of administration of SMC.
- Correcting negative perceptions about the medication will require a multi-pronged approach. Messages disseminated through the media and community channels may target caregivers and household decision makers with correct information on benefits of SMC and the possible side effects of the medication. In addition, community SMC distributors and facility-based providers should be trained and empowered to adequately explain the benefits and side effects of the medication to caregivers. Job aids to help SMC distributors, providers, and other SMC campaign communicators are essential.
- Prevailing negative perceptions of SMC distribution agents from the 2019 SMC campaign is a cause for concern. Population acceptance of SMC could be strengthened by addressing these negative perceptions and improving the image of SMC distributors or choosing a different cadre of SMC campaign staff more familiar to the community to administer the medication. In any case, effective intervention in this respect may involve strengthening interpersonal communication skills of SMC distributors, using distributors who are familiar with the culture of the communities in which they work, engaging community leaders, and providing visibility to agents who excel in their job.

Malaria Case Management

Knowledge of blood tests as an accurate method of diagnosing malaria, ACT as an effective malaria treatment, and how soon to seek care for fever was relatively common. Overall, knowledge was higher

in the North Region compared to Far North. Positive attitudes related to malaria care-seeking and treatment were widespread, but some negative attitudes persisted. Attitudes favoring self-medication remained widespread and a strong preference existed for injectable antimalarials over tablets. The indicator of perceived response efficacy of malaria diagnostic test revealed a moderate level of conviction about the efficacy of the test. Many people believed that parents were able to diagnose malaria as well as a test and that people should still take an antimalarial even if the test were negative. The data also revealed evidence that many people doubt the superiority of antimalarial drugs obtained from a health facility or CHW over those obtained off-the-shelf from the market. The perception that prompt care-seeking and undergoing malaria diagnostic tests were community norms was only moderately common. Women were not always involved in household decisions related to care-seeking for a child with fever.

Malaria tests and treatment were generally perceived to be always available at health facilities; proportionally fewer men and women believed that these services were always available with CHWs. Whereas belief in the technical and interpersonal competence of facility-based providers and CHWs who provide malaria services was widespread, a large proportion of the respondents were of the opinion that these service providers make parents pay for malaria testing and treatment.

Prompt care-seeking for children with fever was relatively common in the Far North, but significantly less so in the North Region. Taking a child sick with fever to a health facility or CHW as a first recourse on the same day or the next as the onset of fever was considerably less common, particularly in the North Region where only about one third of women with a sick child reported this behavior. The ideational variables associated with prompt care-seeking in a health facility or from a CHW as a first recourse include: knowledge of ACT as an effective antimalarial drug, knowledge about how soon after fever starts a caregiver should seek care, preference for antimalarials administered as injections, agreeing that antimalarials are always available in the health facility in the community, disagreeing that facility-based health workers make their clients pay for antimalarial drugs for children, and disagreeing that when their child has fever, they would start by giving the child medication they have at home.

The recommendations emanating from these findings include the following:

- Programs should consider addressing the issue of preference for self-medication through carefully crafted SBC materials that emphasize the need to take a child with fever to a health facility or CHW promptly and directly. Also relevant are messages that promote the accuracy of malaria diagnostic tests and the efficacy of antimalarial drugs obtained from health facilities and CHWs.
- Efforts to position prompt care-seeking and receipt of malaria diagnostic tests as community norms are relevant. SBC materials that show ordinary community members or role models proudly displaying these behaviors are relevant.
- The common belief that service providers make patients pay for malaria testing and treatment needs to be addressed from the demand and supply perspectives. The population needs a

better understanding of what the fees connected with case management at the health facility or from a CHW are meant to cover (i.e., consumables such as gloves, health cards, cotton, etc., versus the actual RDT or ACTs). Service providers need training on how to effectively communicate the nuances about charges to their clients and clinics need to clearly advertise their prices. Programs may also consider strengthening supervision and monitoring to ensure that service providers do not abuse their positions.

- There is a need for efforts to increase the participation of women in household decisions about care-seeking. In this regard, a better qualitative understanding of the cultural and gender norms limiting women's participation in household decision-making may be warranted. In addition, programs should consider using modeling approaches to promote spousal communication about the health of their children in general, and about malaria treatment in particular. Efforts that foster male engagement in care-seeking for children under five with fever should be pursued.
- Efforts to promote prompt care-seeking for fever in a health facility or from a CHW are needed. These efforts are likely to be more effective if they address the ideational variables associated with this behavior. As such, programs should consider appropriate strategies to increase knowledge of ACTs as an effective antimalarial drug, and the need to seek care as soon as fever is noticed. Furthermore, positioning prompt care-seeking as a community norm is relevant. Similarly, efforts designed to ensure uninterrupted supply of malaria testing and treatment drugs to health facilities and CHWs, and to communicate such availability to the population are relevant.
- The positive link between appropriate care-seeking behavior and preference for antimalarials administered as injections warrants appropriate programmatic SBC actions from both the demand and supply perspectives. Specifically, the population needs to be convinced on the efficacy of recommended malaria treatment drugs (ACTs) administered as tablets and situations where injectable antimalarials might be necessary (for example, to treat severe malaria). Programs should strengthen the capacity of service providers to communicate the efficacy of antimalarials administered as tablets to their clients.

Malaria in Pregnancy

Knowledge related to the timing of the first ANC visit, the number of ANC visits a woman should make during a pregnancy, and the recommended number of IPTp doses was generally low. All the same, most respondents were cognizant of the severity of malaria during pregnancy. Attitudes were generally not very positive toward ANC and IPTp. In particular, attitudes favoring delay in seeking antenatal care—especially if the woman is not primigravida—were relatively common. Also common was the belief that a woman should not take IPTp medication on an empty stomach. Perceived response efficacy of IPTp, and perceived self-efficacy to take actions related to ANC and IPTp were widespread in both regions. Participation in decision-making about seeking pregnancy care was moderate in the Far North but especially low in the North Region. In the Far North, there appears to be an inverse relationship of participation in ANC decision-making with both education level and wealth quintile. ANC and IPTp were perceived to be community norms by about two thirds of the respondents. Perceptions of health

workers were somewhat mixed. The majority of respondents from both regions believed that health workers treat their clients with respect. In the North Region, most of the respondents believed that health workers usually offered IPTp to their clients; this belief was less common in the Far North. The belief that health workers would not give their clients IPTp unless they had eaten was common in both regions. There was also a noticeable prevalence of specific negative perceptions, including that health workers would send a woman home if she sought ANC too early in pregnancy, that health workers make a woman pay for IPTp, and that health providers would turn away a woman unaccompanied to ANC by her husband. These negative attitudes were more prevalent in the North Region compared to the Far North.

Whereas most women obtained at least one ANC consultation, obtaining the recommended number of ANC consultations was far from being a universal practice in either region. Spousal presence during ANC visits was not common. Fewer than half of the women with a live birth in the last two years obtained at least three doses of IPTp. Even among women who attended ANC four or more times, less than two thirds obtained the recommended number of IPTp doses. The data show that after controlling for sociodemographic and other background behaviors, obtaining the recommended number of ANC visits and early commencement of pregnancy care were critical gateway behaviors for IPTp uptake. About four fifths of women reported the intention to obtain IPTp should the woman become pregnant in the near future. The ideational variables strongly and positively associated with intention in both regions were awareness of the recommended number of IPTp doses and the perception that IPTp was a community norm. Other ideational variables showed significant association with intention, although only in one region or the other. Perceived self-efficacy for obtaining IPTp and positive attitudes toward IPTp were significant in the Far North, but not in the North Region. In contrast, perceived response efficacy of IPTp, positive perceptions about ANC/IPTp services, and discussion of malaria with others were strong correlates only in the North Region.

Based on these findings, we offer the following recommendations:

- A need exists to increase the knowledge of the population on recommended specifics of ANC and IPTp-related behaviors. Programs should consider a multi-channel approach targeting various segments of the population, including men and women of reproductive age, community and religious leaders, and grandmothers. Carefully crafted SBC messages should seek to increase knowledge about the ideal timing of the first ANC visit, the number of ANC visits a woman should make during a pregnancy, and the recommended number of IPTp doses.
- Efforts to improve attitudes toward obtaining the recommended number of ANC visits and IPTp doses are relevant in both regions. In particular, there is a need to foster positive attitudes regarding early debut of pregnancy care, irrespective of the number of births a woman already has.
- These regions need SBC programmatic efforts that address prevailing gender and cultural norms that limit the participation of women in household decisions regarding their health in general, and ANC in particular.

- Messages about how and when to take the IPTp drug are important for providers, pregnant women, and their influencers alike. While SBC materials are relevant to communicate these points to the clients and their influencers, service providers should be trained, provided with relevant job aids, and held accountable to discuss the points with their clients.
- These regions need efforts to improve population perceptions about health workers with regard to ANC and IPTp. Specifically, the beliefs that health workers would not give their clients IPTp unless they had eaten, that health workers would send a woman home if she sought ANC early in pregnancy, that health workers would make a woman pay for IPTp, and that health providers would turn away a woman unaccompanied to ANC by her husband need to be addressed in SBC materials reframing the common beliefs around these services . SBC materials geared towards changing health provider behavior should encourage health providers to examine their biases related to these points, as well as clarifying the appropriate provider behaviors in these matters to the population, may help to change these attitudes. Further qualitative research may help determine how pervasive these practices are and help identify root causes in cases where these beliefs are true, from the provider side.
- Both regions require efforts to address the problem of low uptake of ANC and IPTp. Qualitative research can provide better understanding of the supply and demand factors associated with the low prevalence of the recommended ANC and IPTp behavior. Nevertheless, given the strong link of the timing of first ANC visit and the number of visits with obtaining the required number of IPTp doses, this survey indicates that efforts to promote obtaining the recommended number of ANC visits and early debut of pregnancy care are critical to improving the uptake of IPTp.
- In addition to promoting the recommended number of ANC visits and early debut of pregnancy care, efforts to improve IPTp uptake in both regions should seek to increase awareness of the recommended number of IPTp doses and the perception that IPTp is a community norm.
- In the Far North Region especially, fostering perceived self-efficacy for obtaining IPTp and positive attitudes toward IPTp may be considered as part of the focus of an effective strategy for increasing the uptake of IPTp.
- In the North Region, efforts should also focus on increasing perceived response efficacy of IPTp, positive perceptions about ANC/IPTp services, and discussion of malaria with others.
- In the North Region, women in the middle childbearing ages should be a priority audience group as they are less likely than other women to receive the recommended number of IPTp doses. A better understanding of the reasons why this age group is disadvantaged in IPTp uptake is necessary to develop an appropriate strategy. Qualitative research may be useful in this respect.

Indoor Residual Spraying

Very few of the respondents had heard of the IRS program prior to the survey. Potential acceptance of the program was very high in both regions. Among those who had heard about the IRS program prior to the survey, there were some concerns about the program. Many people, particularly in North Region, felt it was unsafe to touch house walls after the sprayed insecticide dried up, associated IRS with increased appearance of bed bugs and fleas, and were concerned about having to take their property

outside in order to accommodate the IRS agents. Perceived response efficacy and perceived self-efficacy to prepare their dwelling unit for spraying were high. The recommendations emanating from these findings are the following:

- The population was not averse to the IRS program. Nevertheless, any attempt to roll out the program is likely to be more effective if preceded by efforts to increase knowledge about the procedures that households will have to go through to prepare their dwelling unit for spraying and address the concern about removing household belongings to accommodate sprayers . It is also important to educate the intended audience on the benefits and side effects of the strategy in order to promote a positive attitude towards it.
- Programs need to consider effective ways of addressing the population's concerns regarding the program, especially those related to the safety of the insecticide used for spraying, the association of IRS with increased appearance of bed bugs, and fears about privacy and security when people have to leave their property outside in order to accommodate the IRS agents.

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5. Annexes

TABLE A. HOUSING CHARACTERISTICS, NORTH AND FAR NORTH REGIONS, CAMEROON 2019						
CHARACTERISTIC	NORTH			FAR NORTH		
	Rural (n=745)	Urban (n=668)	Total[1] (n=1,413)	Rural (n=650)	Urban (n=693)	Total[1] (n=1,343)
Average number of rooms used for sleeping in dwelling	2.5	2.2	2.4**	2.5	2.2	2.4
Number of people per room used for sleeping	2.6	2.3	2.5**	2.3	2.3	2.3
Households with electricity	13.0	72.4	30.8***	13.0	72.4	30.6***
Flooring Material						
Soil/sand/mud/clay	87.1	39.8	72.7***	88.5	53.3	76.2***
Cement	12.0	52.1	24.2***	11.0	40.0	21.2***
Other	0.9	8.1	3.1***	0.5	6.7	2.7**
Wall Material						
Clay/earth/mud/bamboo	66.6	24.8	54.2***	63.4	30.6	51.9***
Cement	8.1	60.5	23.7***	10.9	41.8	21.8***
Brick	8.8	9.0	8.9	15.0	17.5	15.9
Other	16.4	5.8	13.3***	10.7	10.2	10.5
Eaves						
Partially or completely open	58.1	38.7	52.2**	67.7	57.5	47.8*
Completely closed	41.9	61.3	64.1**	32.3	42.5	35.9*

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each household characteristic between urban and rural households in each region. * p < .05; ** p < .01; *** p < .001

TABLE B. HOUSEHOLD OWNERSHIP OF DURABLE GOODS, CAMEROON 2019						
HOUSEHOLD GOODS	NORTH			FAR NORTH		
	Rural (n=745)	Urban (n=668)	Total[1] (n=1,413)	Rural (n=650)	Urban (n=693)	Total[1] (n=1,343)
Radio	18.1	44.8	26.1***	25.1	49.3	33.6***
Television	8.2	50.5	20.9***	6.6	45.2	20.2***
Refrigerator	5.1	16.7	5.4***	2.2	11.5	4.2***
Internet access	0.4	8.5	2.9***	0.0	12.1	4.3***
Bicycle	10.7	5.7	9.2*	24.6	22.2	23.1
Motorcycle	15.9	21.1	17.5	11.5	29.3	17.8***
Car	0.7	3.5	1.5**	0.3	3.7	1.5*
Computer	0.5	7.7	2.7***	0.5	7.4	2.9***
Watch	25.2	53.4	33.7***	29.4	51.5	37.2***
Smartphone or tablet	4.1	28.6	11.5***	3.9	26.5	11.9***
Simple mobile phone	68.5	87.7	74.2***	58.9	82.5	67.2***

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of ownership of each household good between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

TABLE C. CHARACTERISTICS OF HOUSEHOLD MEMBERS, CAMEROON 2019						
CHARACTERISTIC	NORTH			FAR NORTH		
	Rural (n=4,353)	Urban (n=3,019)	Total[1] (n=7,372)	Rural (n=3,357)	Urban (n=3,329)	Total[1] (n=6,686)
Sex						
Men	47.6	45.4	47.0	52.1	51.0	51.7
Women	52.4	54.6	53.0	47.9	49.0	48.3
Age (years)						
Average	19.0***	23.1	20.0***	20.0	21.7	20.6***
0-4	18.9	13.1	17.5***	12.7	11.5	12.3
5-14	32.8	27.3	31.4***	34.0	30.2	32.7*
15-24	14.3	16.4	14.8	18.1	19.3	18.5
25-34	14.7	17.1	15.3*	15.2	16.1	15.5
35-44	10.0	13.5	10.9***	11.8	12.4	12.0

TABLE C. CHARACTERISTICS OF HOUSEHOLD MEMBERS, CAMEROON 2019

CHARACTERISTIC	NORTH			FAR NORTH		
	Rural (n=4,353)	Urban (n=3,019)	Total[1] (n=7,372)	Rural (n=3,357)	Urban (n=3,329)	Total[1] (n=6,686)
45+	9.3	12.7	10.2***	8.2	10.5	9.0**

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of characteristics between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

TABLE D. SOCIODEMOGRAPHIC CHARACTERISTICS OF MEN AND WOMEN OF REPRODUCTIVE AGE, CAMEROON 2019

PERCENTAGE OF RESPONDENTS BY SOCIODEMOGRAPHIC CHARACTERISTICS, BY REGION

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=1,046)	Urban (n=1,029)	Total[1] (n=2,075)	Rural (n=989)	Urban (n=1,243)	Total[1] (n=2,232)
Age (years)						
15-24	22.5	20.8	22.0	22.4	20.2	21.6
25-34	36.5	35.3	36.1	34.3	34.4	34.3
35-44	24.5	28.8	25.7	28.4	30.8	29.2
45+	16.6	15.2	16.2	14.9	14.6	14.8
Education Level						
None	55.3	40.9	51.2**	57.4	33.5	48.9***
Primary	28.4	22.8	26.8	29.3	32.2	30.3
Secondary or higher	16.3	36.3	22.0***	13.3	34.4	20.8***
Religion						
Christian	58.1	36.0	51.7***	61.1	36.9	52.4***
Muslim	37.5	63.0	44.3***	34.1	62.5	44.3***
Traditional/No religion	4.4	1.0	3.4	4.8	0.6	3.3
Total	71.0	29.0	100.0	64.0	36.0	100.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of characteristics (e.g. Muslim) between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

TABLE E. WEEKLY RADIO LISTENERSHIP, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT LISTEN TO THE RADIO AT LEAST ONCE A WEEK[1]

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH		FAR NORTH	
	Among all respondents (n=2,282)	In households with a radio (n=727)	Among all respondents (n=2,037)	In households with a radio (n=805)
Sex				
Men	25.0***	49.0***	36.1***	70.4***
Women	11.7	27.6	13.7	30.5***
Age (years)				
15-24	11.3***	23.7***	13.3***	30.8***
25-34	15.1	34.9	23.9	45.8
35-44	22.2	43.2	26.9	56.4
45+	23.7	50.5	32.3	70.8
Education Level				
None	10.2***	25.6***	13.6***	37.6***
Primary	15.9	32.0	26.5	51.7
Secondary or higher	36.5	54.6	44.3	59.8
Place of Residence				
Rural	10.7***	26.8***	16.6***	47.0
Urban	34.0	47.9	36.7	51.9
Household Wealth Category				
Poor (lower two quintiles)	7.7	30.5	9.0	39.9
Wealthier (higher three quintiles)	26.6	38.6	36.2	51.4
Total	17.4	37.1	23.8	49.6

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of listening to the radio in each region among all respondents and among those with a radio in the household. A significant difference between any two sociodemographic categories (e.g. different education levels) is noted with asterisks in the first row of that sociodemographic group.

* p < .05; ** p < .01; *** p < .001

TABLE F. PREFERRED TIME OF DAY TO LISTEN TO THE RADIO IN NORTH REGION, CAMEROON 2019						
AMONG RESPONDENTS THAT LISTEN TO THE RADIO AT LEAST ONCE A WEEK						
SOCIODEMOGRAPHIC CHARACTERISTICS	Early morning (4-8 am; n=136)	End of morning (8-12 pm; n=144)	Afternoon (12-4 pm; n=42)	Early evening (4-8 pm; n=108)	End of evening (8 pm-midnight; n=51)	Late night (12-4am; n=4)
Sex						
Men	32.3	25.4	4.5	20.9	16.6	0.4
Women	22.2	33.9	10.6	22.8	9.4	1.1
Age (years)						
15-24	17.7	35.1	6.5	29.1	10.8	0.8
25-34	28.5	29.9	10.6	19.3	10.8	0.9
35-44	30.1	29.4	6.8	15.6	18.0	0.0
45+	32.6	21.7	1.9	28.5	14.2	1.0
Education Level						
None	21.9	35.8	8.7	18.2	15.1	0.4
Primary	22.6	30.6	9.3	22.6	12.8	2.1
Secondary or higher	35.6	23.1	4.5	23.5	13.3	0.0
Place of Residence						
Rural	24.8	30.2	3.8	25.9	14.7	0.7
Urban	31.4	27.5	9.6	18.2	12.8	0.6
Household Wealth Category						
Poor (lower two quintiles)	24.8	29.2	1.0	23.1	21.0	8.4
Wealthier (higher three quintiles)	29.3	28.6	8.7	21.3	11.6	5.9
Total	28.3	28.8	6.9	21.7	13.7	0.2

TABLE G. PREFERRED TIME OF DAY TO LISTEN TO THE RADIO IN FAR NORTH REGION, CAMEROON 2019						
AMONG RESPONDENTS THAT LISTEN TO THE RADIO AT LEAST ONCE A WEEK						
	Early morning (4-8 am; n=136)	End of morning (8-12 pm; n=144)	Afternoon (12-4 pm; n=42)	Early evening (4-8 pm; n=108)	End of evening (8 pm-midnight; n=51)	Late night (12-4am; n=4)
Sex						
Men	28.9	25.8	6.6	30.1	8.2	0.4
Women	28.8	29.6	8.8	26.7	5.4	0.6
Age (years)						
15-24	21.4	27.4	13.1	25.4	12.7	0.0
25-34	28.6	29.1	5.6	31.6	4.9	0.0
35-44	29.8	27.6	9.1	21.6	10.7	1.3
45+	31.4	22.0	3.4	41.0	2.2	0.0
Education Level						
None	26.3	35.0	7.5	24.3	5.3	1.6
Primary	26.7	23.6	5.2	38.0	6.5	-
Secondary or higher	32.7	23.8	9.0	24.9	9.6	-
Place of Residence						
Rural	29.6	26.6	6.2	28.7	8.0	0.9
Urban	28.2	27.4	8.2	29.4	6.7	0.1
Household Wealth Category						
Poor (lower two quintiles)	9.7	35.7	5.7	39.6	9.3	-
Wealthier (higher three quintiles)	33.1	25.1	7.7	26.7	6.9	0.6
Total	28.8	27.0	7.3	29.1	7.3	0.5

TABLE H. REGULAR TELEVISION VIEWERSHIP, CAMEROON 2019				
AMONG THOSE WHO WATCH TELEVISION AT LEAST ONCE A WEEK				
SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH		FAR NORTH	
	Among all respondents (n=2,282)	In households with a television (n=644)	Among all respondents (n=2,037)	In households with a television (n=563)
Sex				
Men	18.9	69.2	21.2	75.6
Women	19.5	72.1	20.7	78.6
Age (years)				
15-24	18.4	63.3	20.6	80.6
25-34	19.1	72.1	21.4	76.7
35-44	21.2	70.8	19.2	77.4
45+	17.7	79.9	23.9	74.4
Education Level				
None	10.2	68.9	8.3	58.8
Primary	18.6	63.5	21.2	82.0
Secondary or higher	41.2	77.4	50.2	83.4
Place of Residence				
Rural	6.8	52.9	6.4	56.0
Urban	49.8	77.9	46.9	83.9
Household Wealth Category				
Poor (lower two quintiles)	1.3	0.0	1.1	4.4
Wealthier (higher three quintiles)	36.1	72.6	37.6	78.8
Total	19.2	70.9	20.9	77.3

TABLE I. PREFERRED TIME OF DAY TO WATCH TELEVISION IN IN NORTH REGION, CAMEROON 2019						
INCLUDES ONLY RESPONDENTS THAT LISTEN TO THE RADIO AT LEAST ONCE A WEEK						
	Early morning (4-8 am; n=28)	End of morning (8-12 pm; n=95)	Afternoon (12-4 pm; n=106)	Early evening (4-8 pm; n=321)	End of evening (8 pm-midnight; n=108)	Late night (12-4am; n=0)
Sex						
Men	4.4	15.1	11.2	41.0	28.3	-
Women	3.9	17.0	17.4	49.3	12.5	-
Age (years)						
15-24	4.1	13.2	13.8	53.2	15.8	-
25-34	3.4	12.5	17.8	46.0	20.4	-
35-44	5.6	21.7	11.1	42.3	19.3	-
45+	3.3	18.5	14.7	41.0	22.5	-
Education Level						
None	2.3	22.1	16.5	40.4	18.6	-
Primary	5.5	21.5	21.0	40.3	11.6	-
Secondary or higher	4.4	9.4	9.7	51.9	24.6	-
Place of Residence						
Rural	2.7	23.1	14.0	47.3	12.9	-
Urban	4.7	13.3	14.9	44.9	22.2	-
Household Wealth Category						
Poor (lower two quintiles)	0.0	29.5	7.5	55.4	7.6	-
Wealthier (higher three quintiles)	4.4	15.2	15.2	44.9	20.3	-
Total	4.1	16.2	14.6	45.6	19.5	0.0

TABLE J. PREFERRED TIME OF DAY TO WATCH THE TELEVISION IN FAR NORTH REGION, CAMEROON 2019						
INCLUDES ONLY RESPONDENTS THAT WATCH TELEVISION AT LEAST ONCE A WEEK						
	Early morning (4-8 am; n=136)	End of morning (8-12 pm; n=144)	Afternoon (12-4 pm; n=42)	Early evening (4-8 pm; n=108)	End of evening (8 pm-midnight; n=51)	Late night (12-4am; n=4)
Sex						
Men	5.6	10.3	12.5	30.0	40.9	5.6
Women	2.8	12.2	15.7	59.2	10.1	2.8
Age (years)						
15-24	2.0	14.2	10.1	61.5	10.8	2.0
25-34	4.3	6.4	18.4	43.7	27.1	4.3
35-44	1.7	12.0	16.1	42.1	28.2	1.7
45+	10.3	17.0	7.4	37.1	28.2	10.3
Education Level						
None	1.9	13.2	22.9	48.1	12.4	1.9
Primary	1.6	8.4	14.4	52.5	23.2	1.6
Secondary or higher	6.6	12.3	10.5	40.8	29.8	6.6
Place of Residence						
Rural	7.5	16.3	18.6	31.4	24.7	7.5
Urban	3.2	10.1	13.1	49.5	24.1	3.2
Household Wealth Category						
Poor (lower two quintiles)	24.0	19.2	6.4	24.8	25.6	24.0
Wealthier (higher three quintiles)	3.5	11.1	14.5	46.4	24.2	3.5
Total	4.1	11.3	14.2	45.9	24.2	4.1

TABLE K. OWNERSHIP OF A PHONE OR TABLET, CAMEROON 2019[1]

Percentage of respondents that own a telephone or tablet	NORTH			FAR NORTH		
	Rural (n=1,225)	Urban (n=972)	Total[1] (n=2,197)	Rural (n=977)	Urban (n=959)	Total[1] (n=1,936)
Own a phone (shared or not)	42.1	74.1	50.7***	46.9	75.5	56.3***
Own a phone not shared with others	36.1	65.9	44.2***	41.7	66.8	49.9***

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of phone or tablet ownership between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

TABLE L. SOURCES OF EXPOSURE TO MALARIA-RELATED MESSAGES, CAMEROON, 2019

INCLUDES ONLY RESPONDENTS WHO WERE EXPOSED TO AT LEAST ONE MESSAGE

SOURCE	NORTH			FAR NORTH		
	Rural (n=366)	Urban (n=521)	Total[1] (n=887)	Rural (n=517)	Urban (n=631)	Total[1] (n=1,148)
Health Facility	23.9	25.9	24.6	51.8	46.6	49.7
Community Health Worker	48.9	25.1	40.0***	66.1	50.4*	60.0
Friends/Family	34.5	27.7	33.0	35.3	26.2*	31.8
Community Event	2.1	0.2	1.4*	0.1	0.2	0.2
Print Media	3.1	9.9	5.5**	6.1	7.9	6.7
Television	3.2	21.9	10.2***	0.9	8.4***	3.8
Radio	14.3	26.0	18.7**	8.4	13.9*	10.9
Community Leader	0.6	3.2	1.6	0.1	2.6	2.3
Total	366	521	887	517	631	1,148

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of exposure between urban and rural respondents in each region.
* p < .05; ** p < .01; *** p < .001

TABLE M. INDICATORS OF KNOWLEDGE OF MALARIA, CAMEROON 2019

Percentage of respondents that:	NORTH			FAR NORTH		
	Rural (n=1,221)	Urban (n=1,010)	Total[1] (n=2,231)	Rural (n=983)	Urban (n=1,024)	Total[1] (n=2,007)
Knew fever is a symptom of malaria	85.8	90.2	87.1	93.8	90.7	92.7
Knew malaria is caused by mosquito bite	90.0	95.6	91.6**	96.2	98.1	96.9
Mentioned at least one incorrect cause of malaria	40.8	41.6	41.1	26.2	27.8	26.8
Mentioned that malaria is caused by mosquitoes and did not mention any incorrect cause	52.1	55.1	53.0	70.3	67.9	69.5

Notes:
[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.
* p < .05; ** p < .01; *** p < .001

TABLE N. INTERPERSONAL COMMUNICATION ABOUT MALARIA, NORTH AND FAR NORTH REGIONS, CAMEROON 2019

Percentage of respondents that agreed with the following statements:	NORTH			FAR NORTH		
	Rural (n=1,246)	Urban (n=1,036)	Total[1] (n=2,282)	Rural (n=990)	Urban (n=1,047)	Total[1] (n=2,037)
Talked about malaria with their spouse/partner in the previous six months	74.7	73.4	74.3	74.6	72.6	73.9
Talked about malaria with a friend or family member in the previous six months	73.1	73.2	73.1	78.4	75.5	77.4
Talked about malaria with their spouse/partner, friend, or family member in the previous six months [2]	77.4	75.1	76.7	83.7	78.9	82.0

Notes:
[1] Adjusted Wald tests were run to compare the prevalence of communication between urban and rural respondents in each region. No significant differences were detected.
[2] Final row represents a combination of the responses to the statements above it.

TABLE O. PERCEPTION OF HEALTH WORKERS, CAMEROON 2019						
Percentage of respondents that agreed with the following statements:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=729)	Total[1] (n=1,523)
Community health workers in your community treat their patients with respect	91.0	90.0	90.8	95.2	92.4	94.3
Health providers in health facilities in this community treat their patients with respect	88.5	90.5	89.0	92.6	85.8	90.5
Percent of respondents with positive attitudes toward health workers[2]	87.4	89.6	87.9	94.0	86.8	91.8

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region. No significant differences were detected.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE P. PERCEIVED NORM REGARDING ITN USE, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS WHO PERCEIVE THAT MORE THAN HALF OF RESIDENTS IN THEIR COMMUNITY WHO OWN NETS SLEEP UNDER A NET EVERY NIGHT						
SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (N=1,246)	Urban (N=1,036)	Total[1] (n=2,282)	Rural (n=990)	Urban (n=1,047)	Total[1] (n=2,037)
Sex						
Men	79.2	66.6	75.7	72.5	70.1	71.6
Women	71.1	66.6	69.7**	76.9	74.1	75.9*
Age (years)						
15-24	66.8	63.1	65.8	74.1	71.6	73.3
25-34	77.3	70.5	75.4	76.9	73.0	75.5
35-44	76.8	70.0	74.6	76.7	72.9	75.2
45+	76.6	57.8	71.5**	68.5	69.9	69.0

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of perceived norms related to ITN use between sociodemographic groups in rural and urban areas of each region.

* p < .05; ** p < .01; *** p < .001

TABLE Q HOUSEHOLD OWNERSHIP OF AT LEAST ONE MOSQUITO NET, CAMEROON 2019

PERCENTAGE OF HOUSEHOLDS WITH AT LEAST ONE ITN

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=745)	Urban (n=668)	Total[1] (n=1,413)	Rural (n=650)	Urban (n=693)	Total[1] (n=1,343)
Household Wealth Category						
Poor (lower two quintiles)	80.8	74.3	80.5	78.2	67.5	76.8
Wealthier (higher three quintiles)	59.4***	71.2	65.7***	53.7***	65.4	60.0***
Total	73.5	71.4	72.9	68.6	65.8	67.6

Notes:

[1] Adjusted Wald test was run to compare ownership of nets from poor and wealthier households in each region

* p < .05; ** p < .01; *** p < .001

TABLE R. HOUSEHOLD OWNERSHIP OF AT LEAST ONE BED NET PER TWO HOUSEHOLD MEMBERS, CAMEROON 2019

PERCENTAGE OF HOUSEHOLDS WITH AT LEAST ONE NET FOR EVERY TWO PERSONS WHO STAYED IN THE HOUSEHOLD LAST NIGHT

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=745)	Urban (n=668)	Total[1] (N=1,413)	Rural (n=650)	Urban (n=693)	Total[1] (n=1,343)
Household Wealth Category						
Poor (lower two quintiles)	44.5	47.3	44.6	29.2	20.1	28.0
Wealthier (higher three quintiles)	30.4***	45.6	38.4	26.1	31.9*	29.2
Total	39.6	45.7	41.5	28.0	29.8	28.7

Notes:

[1] Adjusted Wald tests were run to compare net ownership in poor and wealthier households in each region.

* p < .05; ** p < .01; *** p < .001

TABLE S. CHARACTERISTICS OF ITNs, CAMEROON 2019

PERCENTAGE OF ITNS WITH SPECIFIC CHARACTERISTICS AVAILABLE IN HOUSEHOLDS

ITN CHARACTERISTICS	NORTH			FAR NORTH		
	Rural (n=1,073)	Urban (n=1,402)	Total[1] (n=2,745)	Rural (n=919)	Urban (n=969)	Total[1] (n=1,888)
% of ITNs obtained for free	100.0	98.1	99.2	98.9	95.1	96.9
Source of ITN						
Mass campaign	90.1	87.8	89.1	77.2	77.9	77.6
ANC	9.6	9.5	9.6	18.5	14.7	16.6
Community health worker/ASC	0.1	0.3	0.2	2.9	2.2	2.6
Other	0.2	2.4	1.2	1.3	5.2	3.3
ITN Age						
<3 years	60.2	45.4	53.9	21.6	30.7	26.3
3 or more years	39.8	54.6	46.1***	78.4	69.3	73.7***
Location of ITN						
Suspended at sleeping place	40.6	43.0	41.7	51.6	54.2	52.9
Suspended, folded, and tied	25.2	27.1	26.0	32.5	30.2	31.3
Not suspended but not stowed	3.1	4.3	3.6	2.7	2.3	2.5
Out of the package but stowed	12.1	7.2	10.0	4.2	7.8	6.0
Stowed and still in its package	10.6	9.6	10.2	6.2	2.4	4.2
Other	8.4	8.8	8.5	2.9	3.0	2.9

Notes:

[1] Test of significance was run to compare the percentage of nets with different characteristics in urban and rural households in each region.

* p < .05; ** p < .01; *** p < .001

TABLE T. USE OF ITN BY PERSONS IN HOUSEHOLDS WITH AT LEAST ONE ITN AND HOUSEHOLDS WITH ITN SUFFICIENCY, CAMEROON 2019

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH[1]		FAR NORTH[1]	
	Households with at least one net (n=3,115)	Households with net sufficiency (n=2,127)	Households with at least one net (n=2,328)	Households with net sufficiency (n=2,309)
Sex				
Men	55.9	72.8	70.7	84.7

TABLE T. USE OF ITN BY PERSONS IN HOUSEHOLDS WITH AT LEAST ONE ITN AND HOUSEHOLDS WITH ITN SUFFICIENCY, CAMEROON 2019				
SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH[1]		FAR NORTH[1]	
	Households with at least one net (n=3,115)	Households with net sufficiency (n=2,127)	Households with at least one net (n=2,328)	Households with net sufficiency (n=2,309)
Women	65.4***	77.3*	78.1***	88.7*
Age (years) [2]				
< 5 years	65.9	84.4	89.4	94.3
5-17 years	53.3***	69.5***	69.9***	85.8***
18 years or older	64.4	75.9***	73.2***	85.5***
Household Wealth Category				
Poor (lowest two quintiles)	58.5	73.6	75.2	88.5
Wealthier (higher three quintiles)	63.6	77.3	72.9	85.0
Type of Residence				
Rural	59.5	73.4	75.5	88.0
Urban	64.5	79.7	71.4	84.1
Total	60.7	75.2	74.2	86.6

Notes:

[1] Adjusted Wald tests were run to compare prevalence of net use in each region among households with at least one net and among households with net sufficiency across different sociodemographic categories.

[2] The adjusted Wald tests were run to compare the 5-17 age group and 18 or older age group with under-5 children in each region.

* p < .05; ** p < .01; *** p < .001

TABLE U. KNOWLEDGE OF SEASONAL MALARIA CHEMOPREVENTION PROGRAM, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
Have heard of a medicine given to children under 5 years old to prevent malaria during the rainy season	83.6	77.4	81.9	88.8	89.1	88.9
Knew that in the rainy season, children must take the	14.5	7.6	12.7*	24.0	21.8	23.3

TABLE U. KNOWLEDGE OF SEASONAL MALARIA CHEMOPREVENTION PROGRAM, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
medication for four months to prevent malaria						
Knew how many days a month in the rainy season children must take the medication to prevent malaria	44.5	51.1	46.2	55.2	54.3	54.9
Knew both the number of days per month and the number of months per season that a child must take SMC	9.8	5.7	8.7	23.2	21.1	22.5

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of knowledge for each item between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

TABLE V. ATTITUDES TOWARD SEASONAL MALARIA CHEMOPREVENTION, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
Door-to-door distribution of the medicine to prevent malaria in children during the rainy season is more convenient for me than distribution at the health facility.	91.5	85.4	90.0*	86.4	84.3	85.7
Leaders in my community support the distribution of the medication that prevents malaria in children during the rainy season.	92.3	88.7	91.4	91.6	93.5	92.2
Religious leaders in my community support the distribution of the medication to prevent malaria in children during the rainy season.	94.4	85.7	92.2***	89.6	91.8	90.3

TABLE V. ATTITUDES TOWARD SEASONAL MALARIA CHEMOPREVENTION, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
The people who distribute the medication that prevents malaria in children in my community force parents to accept the medication.	64.8	55.3	62.4*	38.0	25.8	34.0
I do not trust the people who distribute or administer the drug to prevent malaria in children.	31.0	27.0	30.0	20.6	17.9	19.7
Healthy children do not need to take the medication to prevent malaria in children during the rainy season.	54.1	40.1	50.6*	29.8	22.8	27.5
The medication given to prevent malaria during the rainy season can harm children.	47.9	36.6	45.1	46.9	37.0	43.7*
Percent of respondents with favorable attitudes toward SMC[2]	76.4	79.1	77.1	80.7	86.6	82.6

Notes:

[1] Adjusted Wald tests were run to compare agreement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE W. PERCEIVED RESPONSE EFFICACY RELATED TO SEASONAL MALARIA CHEMOPREVENTION, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
The medication given to children to prevent malaria during the rainy season is effective in preventing malaria.	96.2	90.7	94.8***	91.9	93.3	92.3

TABLE W. PERCEIVED RESPONSE EFFICACY RELATED TO SEASONAL MALARIA CHEMOPREVENTION, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
If all the children in my community take the medication to prevent malaria, there will be fewer cases of malaria.	90.2	88.8	89.9	93.6	93.8	93.7
A child has the same chance of getting malaria whether or not s/he takes the medication given to prevent malaria during the rainy season	48.9	39.8	46.6	48.3	43.4	46.7
Percentage of respondents who perceived SMC as effective in preventing malaria[2] response efficacy of SMC	76.4	79.1	77.1	80.7	86.6	82.6

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE X. PERCEIVED SELF-EFFICACY RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT SAY THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=317)	Urban (n=279)	Total[1] (n=596)	Rural (n=274)	Urban (n=291)	Total[1] (n=565)
Make sure your children under five years old take the medication that prevents malaria during the rainy season.	97.4	89.3	95.0**	96.3	93.6	95.3
Find the money to take your child to a health facility when you have missed the door-to-door distribution of the medication that prevents malaria in children.	89.1	86.8	88.5	91.5	84.4	89.0*

TABLE X. PERCEIVED SELF-EFFICACY RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT SAY THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=317)	Urban (n=279)	Total[1] (n=596)	Rural (n=274)	Urban (n=291)	Total[1] (n=565)
Obtain your husband's or another family member's permission to give the medication that prevents malaria to your children.	95.2	83.9	91.8**	88.7	87.0	88.1
Make sure your child takes all the doses of the medication given to prevent malaria on the second and third days.	97.5	91.4	95.7**	96.7	94.0	95.7
Percent of respondents who agree they could perform SMC-related behaviors[2]	97.4	92.7	96.0*	96.8	95.4	96.3

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE Y. PERCEPTIONS OF HEALTH WORKERS RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS DISTRIBUTION, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=727)	Total[1] (n=1,521)
Community health workers in your community come several times during the rainy season to give the medication that prevents malaria in children less than five years old.	90.9	84.4	89.3**	86.1	87.8	86.6
In your community, health facilities always have the medication that prevents malaria in children during the rainy season.	89.8	83.1	88.2**	75.7	74.8	75.4

TABLE Y. PERCEPTIONS OF HEALTH WORKERS RELATED TO SEASONAL MALARIA CHEMOPROPHYLAXIS DISTRIBUTION, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=727)	Total[1] (n=1,521)
Percentage of respondents with positive perceptions of health workers involved in SMC distribution[2]	92.8	84.9	90.9***	81.9	82.1	84.7

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE Z. ATTITUDES TOWARD CARE-SEEKING AND MALARIA TREATMENT, CAMEROON 2019						
PERCENT OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
The health provider is always the best person to talk to when you think your child may have malaria.	93.3	93.3	93.3	93.9	95.5	94.5
One does not need to continue taking all the medicine doses against malaria if the patient is already cured.	39.2	39.9	39.4	37.7	29.8	35.1
A person should take malaria medicine only if a health provider says that the person's fever really is caused by malaria.	84.7	87.4	85.4	87.5	85.3	86.8
If a health provider says a person does not have malaria, the patient should ask for a malaria medication just in case the person needs it.	64.2	52.9	61.4	45.5	43.5	44.9
When my child has a fever, it is better to start by giving my child any malaria medicine I have at home.	83.6	76.2	81.7*	78.3	70.2	75.7

TABLE Z. ATTITUDES TOWARD CARE-SEEKING AND MALARIA TREATMENT, CAMEROON 2019						
PERCENT OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545)	Urban (n=529)	Total[1] (n=1,074)
It is important to take all the antimalarial pills prescribed to ensure a complete recovery.	92.9	93.1	92.9*	92.7	95.5	93.6
When my child has a fever, I do not go directly to the health facility, I first go elsewhere to buy my child medicine.	62.4	55.5	60.7	53.3	34.6	47.3**
Percentage of respondents with favorable attitudes toward malaria care-seeking and treatment[2]	65.9	72.7	67.6	73.4	82.0	76.2

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AA. PERCEIVED RESPONSE EFFICACY OF MALARIA TESTING, BY BACKGROUND CHARACTERISTICS AND REGION, CAMEROON 2019[1]		
BACKGROUND CHARACTERISTICS	NORTH (n=1,243)	FAR NORTH (n=1,074)
Sex		
Male	42.9	54.2
Female	40.6	60.4
Age Group		
15-24	34.2	53.4
25-34	42.3	63.5
35-44	41.9	50.8
45 and above	46.8**	55.3
Residence		
Rural	38.6	52.3
Urban	51.9*	65.4*
Education Level		

TABLE AA. PERCEIVED RESPONSE EFFICACY OF MALARIA TESTING, BY BACKGROUND CHARACTERISTICS AND REGION, CAMEROON 2019[1]		
BACKGROUND CHARACTERISTICS	NORTH (n=1,243)	FAR NORTH (n=1,074)
None	40.8	49.2
Primary	39.7	63.0
Secondary or higher	47.3	65.4**
Household Wealth Category		
Poor (lowest two quintiles)	36.6	53.5
Wealthier (higher three quintiles)	47.6**	59.3
All respondents	42.0	56.5

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of perceived response efficacy of malaria testing between socio-demographic groups within each region.

* p < .05; ** p < .01; *** p < .001

TABLE AB. PERCEIVED SELF-EFFICACY TO TEST AND TREATMENT MALARIA, NORTH AND FAR NORTH REGIONS, CAMEROON 2019						
PERCENT OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545))	Urban (n=529)	Total[1] (n=1,074)
Find the money to take your child to the health facility at the first sign of malaria.	97.4	97.0	97.3	95.6	95.5	95.6
Get permission from your husband or other family member to take your child to the health facility/health provider when your child has fever.	94.4	91.0	93.5	96.1	95.1	95.8
Take your child to the health facility the same day or next day they develop a fever.	93.6	95.4	94.1	96.7	96.2	96.5
Request a blood test at the health facility when you think your child might have malaria.	93.5	94.2	93.7	91.0	95.8	92.5*

TABLE AB. PERCEIVED SELF-EFFICACY TO TEST AND TREATMENT MALARIA, NORTH AND FAR NORTH REGIONS, CAMEROON 2019

PERCENT OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=710)	Urban (n=533)	Total[1] (n=1,243)	Rural (n=545))	Urban (n=529)	Total[1] (n=1,074)
Make sure your child takes the full dose of medicine that they are prescribed for malaria.	97.8	98.6	98.0	96.5	98.3	97.1
Find the money to pay for the medication the health provider recommends to treat malaria.	96.2	96.9	96.4	95.6	95.1	95.4
Percentage of respondents with perceived self-efficacy for malaria testing and treatment[2]	97.3	98.0	97.5	98.9	98.3	98.7

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AC. PERCEIVED COMMUNITY NORM, CAMEROON 2019

PERCENT OF RESPONDENTS THAT REPORTED THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=1,246)	Urban (n=1036)	Total[1] (n=1,162)	Rural (n=990)	Urban (n=1047)	Total[1] (n=2,037)
At least half of people take their children to a community health worker on the same day or day after they develop a fever.	59.4	59.6	59.5	58.9	63.5	60.6
At least half of children with fever in your community taken to a community health worker or a health facility get tested for malaria.	61.5	67.9	63.3	57.0	62.4	58.9

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of community norms between urban and rural respondents in each region. No significant differences were detected.

TABLE AD. PERCEPTIONS OF COMMUNITY HEALTH WORKERS REGARDING DIAGNOSIS AND TREATMENT OF MALARIA, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Community health workers in this community know how to treat malaria in children.	73.9	68.6	72.6	74.9	72.8	74.2
Community health workers in my community make parents of children less than five years old pay for the blood test to see if the child has malaria.	52.2	49.5	51.6	31.3	33.6	32.0
Community health workers in my community make parents pay for the medication to treat malaria in children less than five years old.	37.8	42.3	38.9	28.9	26.4	28.1
Percentage of respondents with favorable perceptions of community health agents regarding diagnosis and treatment of malaria [2]	53.0	43.4	50.6	65.0	67.2	65.7

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region. No significant differences were detected.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AE. PERCEPTIONS OF FACILITY-BASED HEALTH WORKERS REGARDING DIAGNOSIS AND TREATMENT OF MALARIA, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Health facility providers in my community make parents of children less than five years old pay for the blood test to see if the child has malaria.	69.4*	60.0	67.1	57.9	53.5	56.5

TABLE AE. PERCEPTIONS OF FACILITY-BASED HEALTH WORKERS REGARDING DIAGNOSIS AND TREATMENT OF MALARIA, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,057)	Urban (n=726)	Total[1] (n=1,783)	Rural (n=794)	Urban (n=728)	Total[1] (n=1,522)
Health providers at the health facilities in this community know about how to treat malaria in children.	93.1	93.3	93.2	90.6	91.4	90.9
Health providers at the health facility in my community make parents pay for the medication to treat malaria in children less than five years old.	57.8	54.6	57.0	44.3	42.8	43.8
Percentage of respondents with favorable perceptions of health facilities/providers regarding malaria diagnosis and treatment[2]	38.4	43.2	39.6	50.9	53.8	51.8

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AF. PERCENTAGE OF UNDER-5 CHILDREN WITH FEVER IN THE TWO WEEKS PRECEDING THE SURVEY, BY REGION AND OTHER CHARACTERISTICS, CAMEROON, 2019

SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH[1] (n=1,273)	FAR NORTH[1] (n=825)
Residence		
Rural	18.0	20.0
Urban	24.0*	19.9
Wealth Quintile		
Poor (two lowest quintiles)	17.8	21.2
Wealthier (higher three quintiles)	22.3	18.2
Education Level		
No formal education	20.0	19.7
Primary	20.0	21.3
Secondary or higher	22.4	17.4

TABLE AF. PERCENTAGE OF UNDER-5 CHILDREN WITH FEVER IN THE TWO WEEKS PRECEDING THE SURVEY, BY REGION AND OTHER CHARACTERISTICS, CAMEROON, 2019		
SOCIODEMOGRAPHIC CHARACTERISTICS	NORTH[1] (n=1,273)	FAR NORTH[1] (n=825)
Total	20.3	19.9

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of fever among children under five years old between sociodemographic groups within each region.

* p < .05; ** p < .01; *** p < .001

TABLE AG. PREVALENCE OF CARE SEEKING, DIAGNOSIS, AND TREATMENT BEHAVIORS FOR CHILDREN WITH FEVER, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT REPORTED THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=125)	Urban (n=97)	Total[1] (n=222)	Rural (n=75)	Urban (n=73)	Total[1] (n=148)
Sought advice or treatment for a child with fever the same day or the next as onset of fever	52.8	50.5	51.8	84.0	79.5	81.8
Took a child with fever to a health facility or CHW at any time during the sickness	41.6	42.3	41.9	69.3	74.0	71.6
Took a child with fever to a health facility or CHW as a first recourse during the sickness	41.6	40.2	41.0	61.3	63.0	62.2
Took a child with fever to a health facility or CHWs as a first recourse the same day or the next as onset of fever	33.6	32.0	32.9	56.0	58.9	57.4

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each behavior between urban and rural female caregivers in each region. No significant differences were detected.

TABLE AH. ATTITUDES TOWARD INTERMITTENT PREVENTIVE TREATMENT OF PREGNANT WOMEN FOR MALARIA, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH			FAR NORTH		
	Rural (n=1,229)	Urban (n=983)	Total[1] (n=2,212)	Rural (n=981)	Urban (n=973)	Total[1] (n=1,954)
It is okay for pregnant women to take the medicine to prevent malaria on an empty stomach.	28.9	26.6	28.3	24.5	20.5	23.2
The medications given to pregnant women to prevent them from getting malaria are safe for them and their babies.	80.4	82.8	81.0	72.8	79.0	74.8
A pregnant woman must take several doses of the medicine to prevent malaria during pregnancy.	78.5	75.1	77.6	67.2	67.0	67.1
Percentage of respondents with favorable attitudes toward IPTp	64.2	67.3	65.0	65.2	73.0	67.8

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement between urban and rural respondents in each region. No significant differences were detected.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AI. ATTITUDES TOWARD INTERMITTENT PREVENTIVE TREATMENT OF PREGNANT WOMEN FOR MALARIA, BY BACKGROUND CHARACTERISTICS AND BY REGION, CAMEROON 2019[1]

BACKGROUND CHARACTERISTICS	NORTH (n=1,243)	FAR NORTH (n=1,074)
Sex		
Male	64.9	69.6
Female	65.1	66.4
Age Group		
15-24	57.7	61.1
25-34	66.5	72.0
35-44	66.8	71.1
45 and above	69.0*	61.1**
Education Level		

TABLE AI. ATTITUDES TOWARD INTERMITTENT PREVENTIVE TREATMENT OF PREGNANT WOMEN FOR MALARIA, BY BACKGROUND CHARACTERISTICS AND BY REGION, CAMEROON 2019[1]		
BACKGROUND CHARACTERISTICS	NORTH (n=1,243)	FAR NORTH (n=1,074)
None	63.9	65.9
Primary	64.6	67.4
Secondary or higher	68.1	73.3
Household Wealth Category		
Poor (lowest two quintiles)	64.9	66.1
Wealthier (higher three quintiles)	68.5	69.3
Percentage of respondents with favorable attitudes toward IPTp	65.0	67.8

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of favorable attitudes between or among socio-demographic groups within each region.

* p < .05; ** p < .01; *** p < .001

TABLE AJ. PERCEIVED SELF-EFFICACY OF ANTENATAL CARE AMONG FEMALE RESPONDENTS, CAMEROON 2019						
PERCENTAGE OF RESPONDENTS THAT AGREE THAT THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=975)	Urban (n=806)	Total[1] (n=1,781)	Rural (n=775)	Urban (n=797)	Total[1] (n=1,572)
Go for antenatal care as soon as she thinks she might be pregnant	81.6	81.4	81.5	67.7	74.2	69.9
Convince her spouse/partner to accompany her to the health facility for antenatal care	79.1	78.1	78.8	64.8	65.3	65.0
Go to at least four antenatal care appointments at the health facility	87.1	86.0	86.8	80.4	84.2	81.7
Go for antenatal care even if her religious leader does not agree	78.4	72.6	76.7	71.3	71.7	71.5

TABLE AJ. PERCEIVED SELF-EFFICACY OF ANTENATAL CARE AMONG FEMALE RESPONDENTS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREE THAT THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=975)	Urban (n=806)	Total[1] (n=1,781)	Rural (n=775)	Urban (n=797)	Total[1] (n=1,572)
Percentage of women with perceived self-efficacy to attend ANC[2]	85.8	84.8	85.5	76.5	79.1	77.4

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region. No significant differences were detected.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AK. PERCEIVED SELF-EFFICACY OF IPTP AMONG FEMALE RESPONDENTS, CAMEROON 2019

PERCENTAGE OF RESPONDENTS THAT AGREE THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=975)	Urban (n=806)	Total[1] (n=1,781)	Rural (n=775)	Urban (n=797)	Total[1] (n=1,572)
Take the medicine to prevent malaria at least three times during pregnancy	87.8	87.9	87.8	79.3	85.0	81.3
Request the medicine that helps to prevent malaria when she goes for antenatal care	83.7	82.6	83.3	72.0	79.7	74.7
Percentage of women who agree that they could receive IPTp[2]	84.4	81.7	83.6	77.5	85.2	80.2*

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

* p < .05; ** p < .01; *** p < .001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AL. PERCEIVED SELF-EFFICACY AMONG MALE RESPONDENTS TO SUPPORT SPOUSE/PARTNER TO ATTEND ANC, CAMEROON 2019

PERCENTAGE OF MEN THAT AGREE THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=254)	Urban (n=176)	Total[1] (n=430)	Rural (n=206)	Urban (n=175)	Total[1] (n=381)
Support my spouse/partner to go for antenatal care as soon as she thinks she might be pregnant	95.5	95.7	95.6	86.6	95.4	89.3*
Accompany my spouse to the health facility for antenatal care	81.5	85.1	82.4	78.4	76.7	77.9
Support my spouse/partner to go for at least four antenatal care appointments at the health facility during pregnancy	94.5	97.1	95.1	87.4	93.6	89.3
Support my spouse/partner to go for antenatal care even if my religious leader does not agree	85.8	93.9	87.8	81.9	86.0	83.2
Percentage of men who agree they could support their spouse/partner to attend ANC[2]	92.9	95.9	93.6	87.7	92.4	89.2

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement with each statement between urban and rural respondents in each region.

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

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AM. PERCEIVED SELF-EFFICACY AMONG MALE RESPONDENTS TO SUPPORT SPOUSE/PARTNER TO RECEIVE OR REQUEST IPTP,, CAMEROON 2019						
PERCENTAGE OF MEN THAT AGREE THEY COULD DO THE FOLLOWING:	NORTH			FAR NORTH		
	Rural (n=254)	Urban (n=176)	Total[1] (n=430)	Rural (n=206)	Urban (n=175)	Total[1] (n=381)
Support my spouse/partner to take the medicine to prevent malaria at least three times during pregnancy	94.1	97.1	94.9	88.9	91.9	89.8
Support my spouse/partner to request the medicine that helps to prevent malaria when she goes for antenatal care	93.3	96.4	94.0	82.7	90.6	85.1
Percentage of men who agree that they could support their spouse/partner to receive IPTp[2]	93.2	95.8	93.9	89.1	92.2	90.1

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of agreement between urban and rural respondents in each region. No significant differences were detected.

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AN. PERCEPTIONS OF HEALTH WORKERS PROVIDING ANC AND IPTP, CAMEROON 2019		
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH (n=1,783)	FAR NORTH[1] n=1,520)
Prenatal health providers in this community generally treat pregnant women with respect	85.8	78.5
If a woman goes to the health facility during the first two months of her pregnancy, the health providers will send her away	30.0	12.7*
If a pregnant woman goes to the health facility without her husband/partner, the health providers will send her away.	20.9	11.2
In your community, providers at the health facility make pregnant women pay for SP/Fansidar/Maloxine the medicine to prevent malaria.	24.7	18.7

TABLE AN. PERCEPTIONS OF HEALTH WORKERS PROVIDING ANC AND IPTP, CAMEROON 2019		
PERCENTAGE OF RESPONDENTS THAT AGREED WITH THE FOLLOWING STATEMENTS:	NORTH (n=1,783)	FAR NORTH[1] n=1,520)
Health providers at the health facility in this community always offer the medicine to prevent malaria to pregnant women	86.8	60.5*
Health providers at the health facilities in this community always give pregnant women the medicine the medication to prevent malaria only if she's eaten beforehand.	73.2	50.3
Percentage of respondents with favorable perceptions of health workers[2]	78.1	76.7

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each statement between respondents from North and Far North regions.

*p < 0.05, **p < 0.01, ***p < 0.001

[2] Final row represents the composite variable that was created based on scoring responses to each of the statements above it.

TABLE AO. PREVALENCE OF THREE ANTENATAL CARE OUTCOMES BY BACKGROUND CHARACTERISTICS, CAMEROON 2019						
BACKGROUND CHARACTERISTICS	AT LEAST ONE ANC VISIT[1]		4 OR MORE ANC VISITS[1]		EARLY ANC[1]	
	NORTH (n=609)	FAR NORTH (n=406)	NORTH (n=609)	FAR NORTH (n=406)	NORTH (n=609))	FAR NORTH n=406)
Age Category						
15-24	82.4	79.3	65.3	60.7	28.5	38.7
25-34	82.2	79.5	62.9	60.1	25.1	41.2
35-44	80.6	75.3	60.4	49.8	32.0	24.7
45 and above	61.4	73.8	51.6	48.0	-	25.8
Level of formal education						
None	77.4	71.3	57.2	46.2	22.9	25.7
Primary	86.2	86.9	69.4	74.2	30.7	54.4
Middle school or higher	93.4	88.1	81.3	69.7	38.7	43.5
Place of Residence						
Rural	79.1	73.5	63.1	53.0	24.4	31.7
Urban	89.2	88.6	62.6	70.0	33.6	49.5

TABLE AO. PREVALENCE OF THREE ANTENATAL CARE OUTCOMES BY BACKGROUND CHARACTERISTICS, CAMEROON 2019

BACKGROUND CHARACTERISTICS	AT LEAST ONE ANC VISIT[1]		4 OR MORE ANC VISITS[1]		EARLY ANC[1]	
	NORTH (n=609)	FAR NORTH (n=406)	NORTH (n=609)	FAR NORTH (n=406)	NORTH (n=609))	FAR NORTH n=406)
Household Wealth Quintiles						
Lowest	81.6	77.0	58.6	65.7	22.2	21.8
Second	67.5	85.7	49.8	54.1	21.5	43.0
Middle	85.5	74.9	74.0	52.6	31.5	34.0
Fourth	90.4	70.2	73.1	56.9	28.8	44.7
Highest	94.1	86.9**	70.4	70.6*	37.3	53.7**
Total	81.5	78.9	63.0	59.0	26.6	38.1

Notes:

[1] Adjusted Wald tests were run to compare the prevalence of each behavior within each region across different background characteristics.

*<p.05, **p < 0.01, ***p < 0.001

TABLE AP. RECEIPT OF ITN DURING PREGNANCY BY BACKGROUND CHARACTERISTICS, CAMEROON 2019		
BACKGROUND CHARACTERISTICS	NORTH (n=1,783)	FAR NORTH[1] n=1,520)
Age Category		
15-24	61.0	78.1
25-34	62.8	69.9
35-44	64.7	67.2
45 and above	66.5	65.0
Education Level		
None	62.5	74.3
Primary	61.8	70.4
Middle school or higher	64.6	75.5
Place of Residence		
Rural	66.6	71.0
Urban	51.3	75.9
Household Wealth Category		
Poor (lowest two quintiles)	69.3	71.1
Wealthier (three higher quintiles)	64.0	68.2
Total	62.6	72.9