

Attitudes, Beliefs and Practices Relevant to Malaria Prevention and Treatment in Liberia

Final Report



Summary

A cross-sectional survey was implemented in Liberia in 2014 with the primary aim of identifying attitudes and beliefs that are associated with four outcomes of malaria prevention and treatment: use of bed nets, receipt of malaria prophylaxis during antenatal care visits, use of health services when a child has an episode of fever and acceptance of indoor spraying. This report examines the relationship of socio-demographic variables, ideational factors, exposure to malaria messages and household variables with prevention and treatment behavioral outcomes. Indoor residual spraying was common in targeted areas: 50 percent of sampled households in the five districts reported being covered by PMI were sprayed at the time of the survey. Over a third of households had at least one net (36 percent). However, in households with nets, most caretakers slept under a net on the night before the survey. Treatment of child with fever was almost universal and about two-thirds of treated children received Artemisinin-based Combination Therapy (ACT) (67 percent). About half of the children who received ACT did so the same or next day of the start of the child's fever. The majority of pregnant women (91 percent) reportedly took medicine to prevent malaria; almost all of these women reported that they took at least one dose of sulfadoxine/pyrimethamine (SP). Uptake of at least two doses of Intermittent preventive treatment of malaria (IPTp2+) was widespread with 75 percent of women with children ages two years old or younger reporting that they took two or more doses of the medication during their last pregnancy.

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Marc Boulay, former research director of HC3, was responsible for developing the protocol for the study and oversaw the data collection stage. Special thanks go to Subah-Belleh Associates for implementing data collection. Stella Babalola, associate professor at Johns Hopkins University and Center for Communication Programs (CCP) senior research advisor, led the data analysis and reporting process. Grace Awantang, CCP senior data analyst, performed data analysis and wrote portions of this report.

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Acronyms

ACT	Artemisinin-based Combination Therapy
ANC	Antenatal care
CCP	Johns Hopkins Center for Communication Programs
IPTp	Intermittent preventive treatment of malaria in pregnancy
IRS	Indoor residual spraying
ITN	Insecticide-treated net
LLIN	Long lasting insecticide-treated nets
NGO	Non-governmental Organization
NMCP	National Malaria Control Program
PMI	President’s Malaria Initiative
RBHS	Rebuilding Basic Health Services
RBM	Roll Back Malaria
SBCC	Social and Behavioral Change Communication
SP	Sulfadoxine/pyrimethamine
UL-PIRE	University of Liberia – Pacific Institute for Research & Evaluation
WHO	World Health Organization

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1. Introduction

A growing body of evidence supports the use of social and behavioral change communication (SBCC) programs as an effective approach for increasing the prevalence of positive health behaviors, including those related to malaria prevention and treatment. To be effective, however, SBCC program messages need to target the specific perceptions and beliefs that influence individuals' decisions related to these behaviors. Qualitative studies using focus groups and other unstructured assessments have identified several attitudes and beliefs that may contribute to these behaviors. These findings are useful to identify underlying behavior-related factors that program planners can address. In the area of malaria, however, there is a dearth of survey data to help programs prioritize their messages. Survey data allow the isolation of the independent effect of specific attitudes on behaviors or show how different attitudes combine to influence behaviors. In addition, survey data provide information on the relative prevalence of these attitudes in the overall population or among specific population subgroups.

This study aimed to provide managers and implementers with guidance to inform and improve SBCC programs for malaria control. More specifically, the first objective was to identify the attitudes and beliefs that are positively associated with the following four outcomes related to malaria prevention and treatment: a) the use of bed nets, b) receipt of malaria prophylaxis during antenatal care visits, c) use of health services when a child has an episode of fever and d) acceptance of indoor spraying. The second was to assess whether the relationships between attitudes and behaviors vary among locations with differing levels of endemicity for malaria. The survey tool also includes several questions on exposure to communication programs to determine if attitudes or behaviors varied by level of exposure to anti-malaria campaigns implemented during the last five years.

This report summarizes key survey findings. The narrative and graphs that follow summarize the characteristics, attitudes, preventive behaviors and care-seeking behaviors of survey respondents, including 1200 women and 360 men. Emphasis is placed on the four major outcomes of interest: use of a bed net, indoor residual spraying (IRS) of the household, intermittent presumptive treatment of pregnant women (IPTp) and care-seeking habits for febrile children.

2. Methodology

2.1 Sampling

Based on results of the 2011 Malaria Indicator Survey (MIS), county prevalence rates were used to categorize each county into either a lower or higher transmission category, based on whether the prevalence rate of malaria in children under five was below or above the median prevalence in 2011. Then, two counties from each category were selected at random from each category. The counties with lower prevalence rates among children were Bong (41 percent) and Rivercess counties (50 percent), and those with a higher prevalence were Cape Mount (59 percent) and Grand Kru (70 percent). It should be noted that while Bong and Rivercess had lower rates of parasitemia, all the counties would be normally classified as zones of high malaria prevalence (> 40 percent parasitemia).

The survey sampled 600 households in each of the two endemicity zones. Fifteen clusters were chosen from each of the four counties containing 20 households each. The probability of sampling a cluster in a location was proportional to the location's population as reported in the 2008 National Population and Housing Census data. Households with children under five years old were the subjects of interest and so only households with children under five were eligible for participation in the survey. In each household, the head of household or surrogate head was interviewed using the household questionnaire.

Fieldworkers randomly selected a child between the ages of 0 and 4 years from a list of household members and interviewed the mother of this child using the individual questionnaire. In the case that this mother was also the head of household or surrogate head, only one person was interviewed in the household. In every third household, the father of the child was also interviewed with the individual questionnaire if he was not the primary caretaker of the child. This means that at least one and up to three different people in the house could be interviewed with one or a combination of the household and individual questionnaires. The final sample included 1200 households (300 from each county) and 1560 adults (1200 women and 360 men).

2.2 Data Collection

Twenty data collectors, four supervisors and sixteen enumerators were trained and hired by Subah-Belleh Associates. Data collection took place from March 31 to April 22, 2014. Interviewers used paper questionnaires and the data were then entered into a CS Pro data shell. Research staff of the Johns Hopkins Center for Communication Programs analyzed all findings in STATA 13.0.

2.3 Ethical Approval

IRB approval was obtained from Johns Hopkins University and the UL-PIRE Africa Center at the University of Liberia. Interviewers read a verbal consent script to each respondent to obtain informed consent prior to interviewing them.

3. Sample Characteristics

3.1 Respondents' Demographics

Within the 1200 households, 1560 adults were interviewed with the individual questionnaire, including 360 males (23 percent) and 1200 females (77 percent) who were caretakers of children aged 0-4 years. Almost half (47 percent) of these caretakers had no formal schooling, while about a third (35 percent) had completed up to primary school and almost a fifth (18 percent) had completed secondary school or a higher level of formal schooling. Three quarters (75 percent) of respondents were Christians and a fifth (22 percent) were Muslim. Over four-fifths (89 percent) were married or living with someone as if married at the time of survey. For three-quarters of caretakers, the youngest child was two years old or younger.

Table 3.1 Demographics of Respondents, Liberia 2014						
Caretaker Characteristics	Men		Women		Overall	
	Mean /%	n	Mean /%	N	Mean /%	n
County						
Bong	25.0%	90	25.0%	300	25.0%	390
Cape Mount	25.0%	90	25.0%	300	25.0%	390
Grand Kru	25.0%	90	25.0%	300	25.0%	390
Rivercess	25.0%	90	25.0%	300	25.0%	390
Mean Age in years	36.7	360	29.1	1200	30.9	1560
Highest Level of formal education						
None	25.6%	92	54.1%	649	47.5%	741
Primary Incomplete	18.9%	68	27.2%	326	25.3%	394
Completed Primary	14.2%	51	8.2%	98	9.6%	149
Secondary Incomplete	24.4%	88	8.8%	106	12.4%	194
Completed Secondary	13.6%	49	1.7%	20	4.4%	69
More than Secondary	3.3%	12	0.08%	1	0.8%	13
Religion						
Christian	75.6%	272	74.9%	899	75.1%	1171
Muslim	21.7%	78	21.7%	260	21.7%	338
Traditional Religion	2.5%	9	2.6%	31	2.6%	40
Other Religion	0.3%	1	0.8%	10	0.7%	11
Marital Status						
Single	0.6%	2	14.8%	177	11.5%	179
Married	99.4%	358	85.3%	1023	88.5%	1381

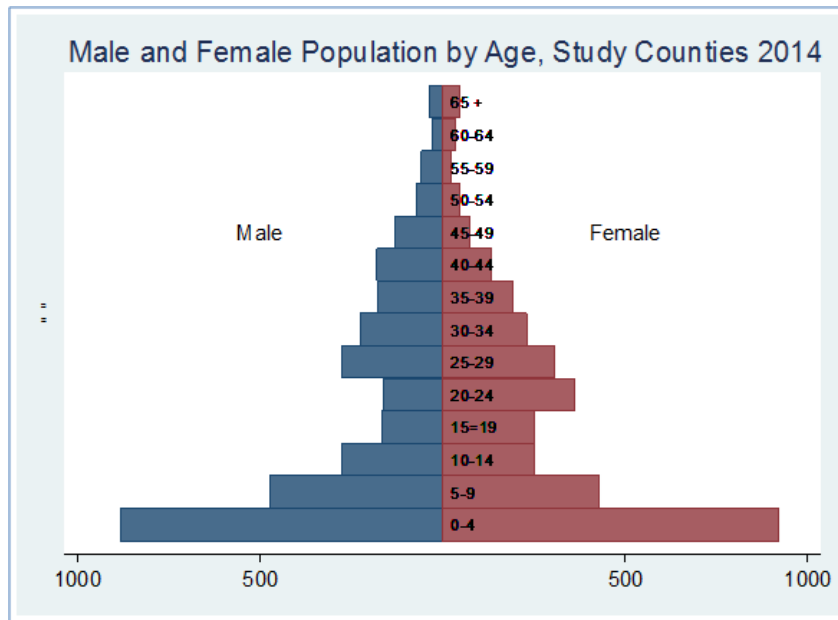
3.2 Household Characteristics

The survey team collected information on household characteristics from 1200 households in which children under five years of age resided; 300 households were interviewed from each of the four counties: Bong, Cape Mount, Grand Kru and Rivercess. The surveyed households were home to a total household population of 6463 residents. The average household was home to 5.4 residents ranging from just one mother and child to as many as 19 individuals. Figure 3.1 displays the age categories of the household members according to their gender while Table 3.1 describes other characteristics of the sampled households.

Information about household assets, house construction materials and access to water were used to estimate the relative wealth of households sampled. The majority of households sourced water from a mechanical well (51 percent), spring water (23 percent) or surface water (11 percent). Other water sources such as dug wells (8 percent) and piped water were less frequent (2 percent). Less than half of

households (42 percent) had a working radio and just over a third (35 percent) had a mobile phone, while a fifth (20 percent) owned a watch. Car ownership was virtually non-existent with only 9 (1 percent) of households possessing a car. Almost a third of households (30 percent) owned livestock, herds, poultry or other farm animals. Only 3 percent of households had a bank account while only 11

Figure 3.1: Household member population pyramid.



households (1 percent) had electricity. A little over two-fifths (42 percent) of the households were home to someone who owned agricultural land; those who did own an average of 7.8 acres and a median of 4 acres.

Almost three quarters (70 percent) of households had earth or sand floors. About a fifth (21 percent) of households had cement floors. Just under half (49 percent) had thatch or

palm roofs, while a similar proportion (47 percent) of households had metal roofs. Household exterior walls were primarily made from dirt (34 percent), bamboo with mud (43 percent) or cement (11 percent).

4. Media Consumption Habits and Exposure to Malaria Messages

Information about respondent's exposure to malaria messages was collected to assess the reach of relevant communication programs and to determine whether knowledge, attitudes or behaviors varied with exposure. In section 4.1, we examine the media habits of the respondents—frequency of listening to the radio and watching the television. Subsequently in 4.2, we look at exposure to two specific malaria-related campaigns designed and implemented by the Rebuilding Basic Health Services Project (RHBS).

4.1 Media Consumption Habits

Slightly over half (60 percent) of respondents listened to the radio at least once a week. Most radio listeners tuned in the morning (28 percent) or in the evening (53 percent). Almost no respondents (4 percent) watched TV at least once a week and among those that did, three quarters (77 percent) watched it in the evening. Media habits varied widely by county of residence and by sex (Figure 4.1).

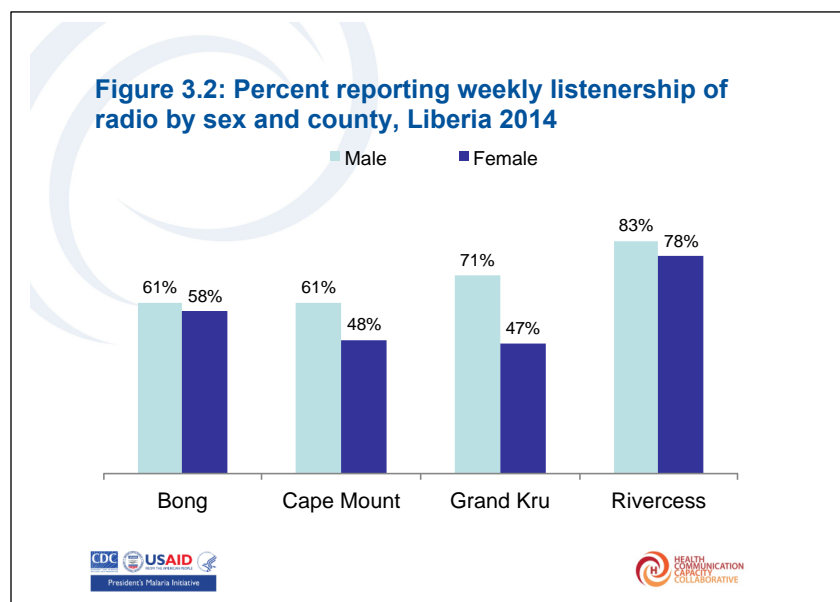
	% / Mean	n
Malaria Transmission zone		
Lower	50.0%	600
Higher	50.0%	600
Main water source		
Piped Water	2.3%	27
Tubewell/ Borehole/ Handpump	50.5%	606
Dug well	8.2%	98
Water from spring	23.3%	280
Surface water	10.5%	126
Other	5.3%	63
Floor Material		
Earth/ Sand	70.1%	841
Dung	7.8%	94
Cement	21.3%	255
Other	0.8%	10
Roof Material		
Thatch/ Palm leaf	49.3%	592
Metal	47.0%	564
Other	3.7%	44
No of Rooms Used for Sleeping		
1	30.4%	365
2	30.6%	367
3	25.0%	300
4 +	14.0%	168
Mean number of rooms used for sleeping	2.3	1200
Household Size		
1-3	19.8%	238
4-5	42.6%	511
6-7	23.2%	278
8 +	14.4%	173
Mean household size	5.4	1200
Household Wealth		
Lowest (RC)	20.1%	241
Second	19.9%	239
Middle	20.0%	240
Fourth	20.0%	240
Highest	20.0%	240

Whereas 79 percent of the residents of Rivercess reported listened to the radio every week, only 59 percent in Bong, 52 percent in Grand Kru and 51 percent in Cape Mount did. In addition, radio listenership was significantly higher for men (69 percent) than for women (58 percent): $\chi^2=15.5$, $p<0.001$. The 58 caretakers who regularly viewed television were mainly from Rivercess (66 percent) or Cape Mount (31%). None of the respondents from Grand Kru and only two respondents from Bong reported regularly watching the television.

4.2 Exposure to Malaria Messages

Four-fifths (82 percent) of respondents said they had heard or seen messages about malaria prevention or treatment during the last year. Indicators related to message exposure are listed in Annex C.6. The messages most commonly heard or seen were about the risk of malaria (63 percent), treatment for small children or pregnant women (49 percent), and the severity of malaria (42 percent). A quarter (26 percent) of caretakers had heard a community leader speaking publicly on the topics of malaria prevention or treatment

during the last year. It is not clear whether the messages to which the respondents referred in response to these general questions had anything to do with RBHS programs. In the following paragraphs, we specifically look at exposure to RBHS campaigns.



In collaboration with Liberia’s National Malaria Control Program (NMCP), RHBS launched two anti-malaria campaigns during the past five years. The “Take Cover” campaign focused on promoting ITN use and was launched in November 2009. The “Healthy Baby Happy Mother” campaign was launched in 2011 and focused on improving early case

management of fever among caregiver. Activities implemented under both of these programs included

Table 4.1: Percent distribution of level of campaign exposure by selected socio-demographic variables, Liberia 2014

Variable	Low	Medium	High	χ^2/p
Gender				
Male	44.2	30.0	25.8	8.2/ 0.017
Female	36.8	30.6	32.7	
Education Level				
None	44.8	28.5	26.7	28.8/0.0001
Primary	34.4	32.6	33.0	
Secondary and higher	29.4	31.5	39.1	
Religion				
Non-Christian	51.7	33.9	14.4	72.0/0.0001
Christian	34.1	29.3	36.6	
County of Residence				
Bong	19.5	22.1	58.5	571/0.0001
Cape Mount	45.1	38.5	16.4	
Grand Kru	77.4	20.5	2.1	
Rivercess	11.8	40.8	47.4	
Household Wealth				
Lowest (RC)	40.8	25.1	34.1	68.9/0.0001
Second	45.5	30.7	23.9	
Middle	40.5	29.6	29.9	
Fourth	37.9	34.6	27.5	
Highest	27.9	32.3	39.9	
Weekly Radio Exposure				
No	51.1	24.7	24.7	68.9/ 0.0001
Yes	30.1	34.3	35.6	

radio spots, distribution of print materials and community mobilization. Since first launched, both programs have been broadcast on radio intermittently every three or six months.

Three-quarters of respondents had heard of or seen the phrase “Take cover under the net every night” from the “Take Cover” campaign. Most respondents said they heard the phrase on the radio (47 percent), from a health care worker (45 percent) and/or saw it on a poster (27 percent).

Additionally, three-quarters (74 percent) of respondents had also heard or seen the phrase “Healthy Baby Happy Mother.” Most of them heard this message from the radio (45 percent), health care workers (44 percent) and/or posters (20 percent). It is interesting to note that past campaigns have relied almost equally on radio and health providers to reach adult caregivers. They commonly associated the campaign catch phrase with the act of taking a full dose of treatment (46 percent), using a bed net every night (40 percent) and prompt treatment of fever (21 percent).

Using responses to questions on message recall and sources of exposure to the messages, we computed an index of exposure to RBHS campaigns. We then divided the resulting index score into tertiles to denote low, medium and high levels of campaign exposure. Table 4.2 shows the variation of this exposure indicator by key socio-demographic characteristics.

The data showed that campaign exposure varied significantly by level of education, religion, household wealth, county of residence and radio listenership. Specifically, proportionally more people in Bong and Rivercess than in Cape Mount or Grand Kru had a high level of exposure to the campaign. Those who listened to radio at least once a week were also more likely to have a higher level of exposure compared to those who did not. The proportion with a high level of exposure increased monotonically with education and was higher for Christians than for non-Christians. Whereas the proportion of caregivers with high level of exposure was similar across the first four wealth quintiles, a high level of exposure was significantly more common among the respondents from the wealthiest households.

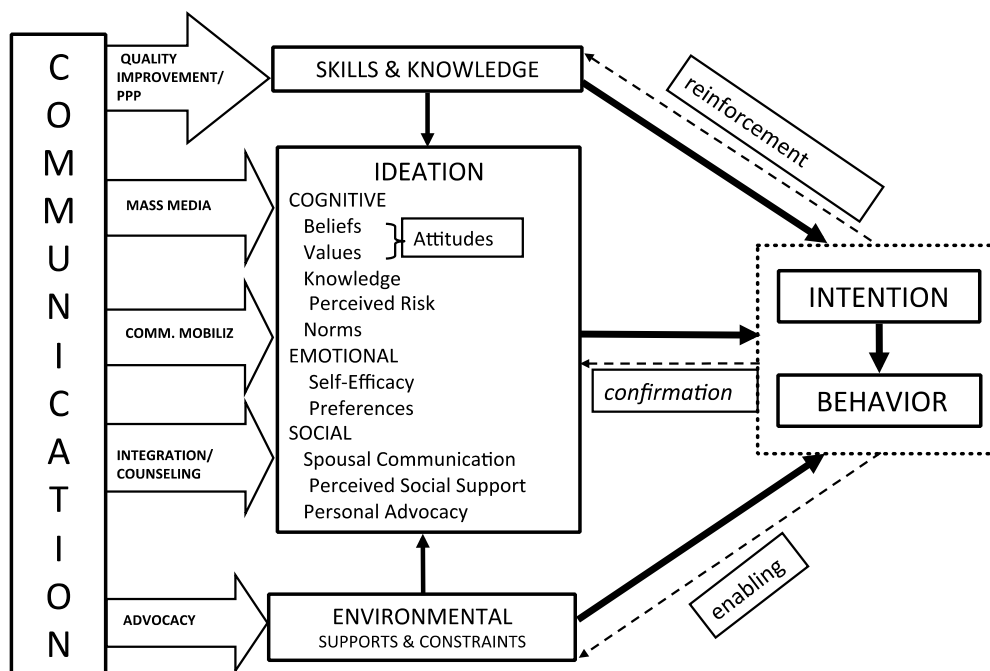
5. Malaria-Related Ideational Factors

This section considers the ideational factors related to malaria behavioral outcomes. Van de Kaa (1996, p. 423) defined ideation as “views and ideas that people hold individually;” Kincaid (2000a) argued that these views and ideas reflect ways of thinking and can be transmitted through the mass media and by means of social interactions. As an explanation of behavior change, the concept of ideation has its genesis in demographic literature where it gained prominence in the 1980’s as an alternative to the classical demographic transition theory in explaining fertility decline (Bongaarts and Watkins 1996; Cleland 1985; Cleland and Wilson 1987; Lesthaeghe 1983; Lesthaeghe and Surkyn 1988; van de Kaa 1996). Nonetheless, the inferences made by demographers on the role of ideation in fertility decline have been indirect, mostly relying on spatial patterns of fertility decline.

Kincaid (2000b) proposed a model that made it possible to conceptualize and operationalize the various elements of ideation and demonstrate the link with behavior; an adapted version is shown in Figure 5.1. The Ideation Model of Strategic Communication and Behavior Change (Kincaid 2000b) is applicable to various forms of human behaviors. Kincaid posits ideation as an intermediate construct between

behavior and contextual factors. Ideation is behavior-specific and comprises three dimensions: cognitive, emotional and elements of social interactions. The cognitive dimension includes knowledge, attitudes, perceived risk, subjective norms and self-image. The elements in the emotional domain include emotional response, empathy and self-efficacy. The social interactions elements of ideation include social support, social influence, interpersonal communication and personal advocacy (Babalola and Kincaid 2009; Kincaid 2000a, 2000b). These ideational elements are borrowed from various theories of behavior change and have been widely recognized to influence behaviors (Fishbein et al. 2001). Collectively, the ideational elements work synergistically and simultaneously, much like risk factors, to

Figure 5.1: Ideation Model of Strategic Communication and Behavior Change.



produce change in behaviors. In other words, the more of these ideational elements a person has, the more likely it is that they will adopt the desired behavior.

Studies have documented the significant link between ideation and a variety of health-related behaviors, including contraceptive use, water and sanitation-related behaviors, adolescent sexual behaviors, HIV prevention and HIV treatment compliance (Figuroa and Kincaid, 2010; Amouzou and Becker 2009; Babalola and Vondrasek 2005; Kincaid 2000a,b).

This chapter examines several ideational elements that relate to malaria behavioral outcomes using the Kincaid Ideational Framework. While some of these ideational elements are related to one or more of the outcomes, others are relevant for all the four outcomes. The ideational elements examined include the following: malaria knowledge, attitudes about malaria, knowledge about bed nets, willingness to pay for bed nets, intention to purchase a net, interpersonal communication on various aspects of malaria, perceived response efficacy of malaria prevention strategies, perceived self-efficacy for malaria-

prevention behaviors and descriptive norms about malaria-prevention behaviors. Other ideational elements examined include perceived efficacy of health providers for malaria treatment in children, malaria diagnosis and treatment attitudes, descriptive norm about malaria treatment, and participation in household decision-making about malaria prevention and treatment.

The analyses presented in this section start with cross-cutting ideational elements that we collectively termed general malaria ideational elements. Then, we discuss the elements relevant to specific behavioral outcomes. This section provides only a description of the prevalence of the ideational factors and examines their variations by county and gender. Later on in this report, the link between these ideational factors and behavioral outcomes is examined.

5.1 General Malaria Ideational Factors

The ideational factors that are relevant to one or more of the behavioral outcomes include the following: malaria knowledge, perceived susceptibility, perceived severity, self-efficacy to prevent malaria, self-efficacy to recognize severe malaria and interpersonal communication about malaria.

5.1.1 Malaria Knowledge

Cause: Whereas the majority (93 percent) of the respondents knew that malaria is caused by mosquitoes, most (86 percent) also mentioned one or more incorrect causes demonstrating that misinformation is widespread among the sampled population. The incorrect causes most frequently mentioned include dirty surroundings (67 percent), drinking dirty water (20 percent), working outside in the sun (15 percent) and eating dirty food (11 percent). Incorrect understanding of the causes of malaria was more prevalent in Rivercess County where all respondents mentioned at least one incorrect cause compared to 73 percent in Grand Kru, 82 percent in Bong and 89 percent in Cape Mount. Men (90.0 percent) were more likely than women (84.7 percent) to mention incorrect causes: $\chi^2=6.3$, $p<0.05$.

Symptoms: Knowledge about the symptoms of malaria is relatively high. More than two thirds (69 percent) of the respondents mentioned three or more symptoms while only nine respondents were unable to mention any symptom. The symptoms most frequently mentioned were chills (77 percent), poor appetite (53 percent) and fever (52 percent). The proportion that mentioned fever, the main symptom of malaria, was similar between men (50 percent) and women (53 percent), but it varied widely by county: 75 percent in Bong, 58 percent in Rivercess, 40 percent in Grand Kru, and 35 percent in Cape Mount: $\chi^2=154.3$, $p<0.0001$.

Prevention: The level of awareness about malaria prevention is equally high. More than three quarters of the respondents named two or more correct ways of malaria prevention. Only 56 respondents (4 percent) could not name any correct method. The mean number of correct prevention methods known was slightly higher for men (2.0) than for women (1.9) ($p<0.05$). Awareness of correct prevention methods was significantly higher in Rivercess (mean number of correct methods known = 2.3) and Bong (2.0) than in Cape Mount (1.7) or Grand Kru (1.6) ($p<0.001$). The prevention method most widely mentioned was sleeping under a bed net (76 percent), although few respondents (19 percent) specifically mentioned sleeping under an ITN. About one-quarter (24 percent) of the respondents

mentioned taking prophylaxis, while very few mentioned spraying the house with insecticide (5 percent), using mosquito coils (4 percent) or using mosquito repellent (2 percent).

It is also important to note that more than half of the respondents (57 percent) reported at least one method that is probably good hygienic practice, but that has not been found effective for malaria control. Specifically, 52 percent of the respondents mentioned keeping house surroundings clean while 30 percent mentioned cutting grass around the house. The former method may reduce populations of *Culex* mosquitoes, but neither has any effect on Anophelines mosquitoes (Hackett, 1938). Incorrect knowledge of prevention methods does not vary by sex. In contrast, the residents of Bong County were more likely than those of any other county to report incorrect prevention methods.

The proportion with adequate malaria prevention knowledge (defined as mentioning at least one correct prevention measure and no incorrect measure) is relatively low: 41 percent. Again, there are no differences in this indicator by sex, but the variations by county are considerable: 50 percent in Rivercess and 47 percent in Cape Mount, compared with 37 percent in Grand Kru and 28 percent in Bong: $\chi^2=47.5$, $p<0.0001$.

5.1.2 Perceived Threat of Malaria

Following the Health Belief Model, perceived threat of malaria is assessed in terms of perceived susceptibility and perceived severity of the disease. The survey tool included questions measured on the Likert scale that allowed respondents to state their level of agreement with specific statements. The relevant indicators were calculated using the Roll Back Malaria (RBM) Indicator guidelines. Responses were coded so that desirable attitudes (perceived susceptibility or perceived severity) were positively coded as 1 or 2, while undesirable attitudes were negatively coded as -1 or -2 and summed for each individual. The caregivers who perceived they are at high risk of malaria or that the consequences of malaria are serious are those with a positive mean score.

Perceived susceptibility: Seven questions measured on a Likert scale allow us to assess perceived susceptibility to malaria (Annex A.1). As the responses to each of the statements indicate, most people believe themselves and their family members susceptible to malaria. For example, more than four-fifths of the respondents agreed they worried that someone in their family might have malaria during the rainy season. Similarly, almost 70 percent of the respondents disagreed with the statement that people in their community only get malaria during the rainy season. In addition, more than 80 percent agreed that nearly every year, someone in their community gets a serious case of malaria. It is, however, surprising to note that about 70 percent of the respondents agreed that people only get malaria when there are lots of mosquitoes around.

Overall, the proportion with a high level of perceived susceptibility to malaria, that is, those whose composite score on the seven items above was positive was 76 percent. This indicator did not vary by sex, but it was significantly higher in Bong County (87 percent), Rivercess (85 percent), Grand Kru (79 percent) than in Cape Mount (54%): $\chi^2=149.4$, $p<0.0001$.

Perceived severity: Perceived severity was assessed through five questions measured on the Likert Scale. (see Annex A.2). The responses to these questions are mixed: while some responses reflect low

perceived severity of malaria, others indicate a high sense of perceived severity. For example, whereas more than 90 percent of the respondents almost always worried that fever in their child might be indicative of malaria and 67 percent believed that every case could lead to death, more than 65 percent indicated that they expected someone with malaria to completely recover within a few days.

Overall, about two-thirds (68 percent) of the respondents demonstrated a high level of perceived severity of malaria. Men (72 percent) were significantly more likely than women (66 percent) to report a high level of perceived severity of malaria: $\chi^2=4.15$, $p<0.05$. There were also significant differences by county of residence. Surprisingly, as shown in Figure 5.1, perceived severity of malaria is lower in the higher malaria transmission zones of Cape Mount and Grand Kru than in the lower transmission zones (Bong and Rivercess).

5.1.3 Self-efficacy for prevention:

Both theory and empirical data have demonstrated the importance of self-efficacy beliefs for behavior change. When people hold self-efficacy beliefs about a behavior, they are in a better position to practice the behavior. The data reveal a high level of perceived self-efficacy for malaria prevention for self and one's children. Four-fifths of the caregivers reported that they could easily protect themselves from malaria, while 77 percent stated that they could easily protect their children from malaria. Based on these two items, the proportion of respondents with high level of perceived self-efficacy for malaria prevention was 76 percent. Perceived self-efficacy for malaria prevention did not vary significantly by sex, but did vary significantly by county of residence. Proportionally, more people from Rivercess (92 percent) and Bong (86 percent), compared to Cape Mount (69 percent) or Grand Kru (57 percent) demonstrated a high level of perceived self-efficacy for malaria prevention: ($\chi^2=158.8$, $p<0.0001$).

5.1.4 Interpersonal Communication on Malaria:

Interpersonal communication about a behavior or product allows people to exchange ideas, clarify misconceptions, be better informed and generally foster the diffusion of information about the behavior or product. Discussing a behavior or product with people in one's network is critical, not just as an end in itself, but as a means to an end. Indeed, it is an important step to changing negative social norms about the behavior or product.

Spousal communication about malaria: Of the 1318 respondents (341 men and 977 women) who were married or cohabiting, roughly half (52 percent) reported that they had discussed malaria with their spouse during the previous 12 months. Men (57 percent) were slightly more likely than women (50 percent) to report spousal communication on the subject of malaria: $\chi^2=3.8$, $p=0.05$. Discussion with the spouse about malaria was surprisingly less common in higher transmission counties (Cape Mount – 25 percent; Grand Kru – 46 percent), than in the lower transmission counties (Bong – 65 percent; Rivercess – 68 percent): $\chi^2=152.2$, $p<0.0001$.

Communication with friends: A little over one-third (36 percent) of the respondents admitted that they had discussed malaria with their friends during the past year. This proportion was slightly higher for men (40 percent) compared to women (35 percent). Discussing malaria with friends was more likely to have

occurred in Bong (53 percent) or Rivercess (41 percent), than in Grand Kru (29 percent) or Cape Mount (22 percent): $X^2=96.6$, $p<0.0001$.

Communication on the risk of malaria: It is not just important for people to communicate on certain behaviors or products, what they discuss about the issues also matters. Overall, 52 percent of the caretakers had discussed malaria with spouse and/or friends. Of these, 74 percent reported that they had communicated on the risk of malaria. The proportion who discussed the risk of malaria with a spouse or friend was not significantly different for men (79 percent) and women (73 percent). There were, however, significant variations in the likelihood of discussing malaria risk by county—almost all the respondents from Bong (93 percent) who had discussed malaria with someone stated that they communicated on the risk of malaria compared to 80.0 percent in Rivercess, 74 percent in Cape Mount and 39 percent in Grand Kru.

5.1.5 Overall General Malaria Ideation

Seventeen items were combined in a summative index to describe the overall crosscutting ideational items relating to all malaria behavioral outcomes. These and other elements can be found in Annex B.1. The general malaria ideation score varies between -15 and 28 with a mean of 8.4.

A multivariable regression revealed that education, campaign exposure, county of residence, age, household wealth and household size were the significant correlates of general malaria ideation score (Table 5.1). Caretakers that had completed secondary school or higher were more likely to score higher on malaria ideation than those who had no formal education. A medium level of exposure to campaign messages was also correlated with an increase in favorable general malaria ideation. Respondents in Bong had significantly higher ideation scores relative to those in Cape Mount, Grand Kru and Rivercess. Age had a curvilinear

Variable	Coefficient	SE
Gender		
Male (RC)	0.00	
Female	0.312	0.420
Education Level		
None (RC)	0.00	
Primary	0.455	0.367
Secondary and higher	1.800***	0.471
Religion		
Non-Christian (RC)	0.00	
Christian	-0.312	0.509
Marital Status		
Non-married (RC)	0.00	
Married	-0.317	0.485
Level of exposure to malaria-related campaigns		
Low (RC)	0.00	
Medium	1.250**	0.395
High	0.488	0.446
County of Residence		
Bong (RC)	0.00	
Cape Mount	-7.727***	0.587
Grand Kru	-6.646***	0.532
Rivercess	-2.533***	0.461
Current age in years	0.181*	0.082
Square of age	-0.002	0.001
Household Wealth		
Lowest (RC)	0.000	
Second	0.332	0.476
Middle	-0.229	0.476
Fourth	-1.013*	0.489
Highest	-0.039	0.510
Household size	0.283***	0.070
Explained Variance (R^2)	23.9%	
Number of Obs.	1560	

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

relationship with general ideation score in that the caregivers with higher score were likely to be in the middle range of child-bearing years. Respondents in households of the fourth wealth quintile were less likely than those of the lowest wealth quintile to have a higher general ideation score. Finally, the score for general malaria increases significantly with household size.

5.2 Ideational Factors Related to Bed Nets

5.2.1 Mosquito Net Acquisition:

Awareness about a place to buy bed nets: Very few (9 percent) respondents were aware of a place in their community where they could purchase bed nets. In basic bivariate analysis, men (12 percent) were not significantly more likely than women (8 percent) to report knowing where to buy a net (12 percent). The residents of Cape Mount (27 percent) were significantly more likely than those of Bong (5 percent), Grand Kru (3 percent) or Rivercess (1 percent) to report knowing a place to buy nets: $\chi^2 = 210.0$, $p < 0.0001$.

Willingness to pay for bed nets: In spite of the low level of awareness of a place where to purchase a net in their community, more than two-thirds (69 percent) of the respondents indicated the willingness to pay for a net. Nonetheless, the amount that most respondents were willing to pay was less than 500 Liberian dollars (about \$6.00). Men (77 percent) were significantly more likely than women (67 percent) to report willingness to pay for a bed net: $z = 12.9$, $p < 0.0001$. The differences by county are equally striking. Whereas willingness to pay for a bed net was 88.7 percent in Grand Kru and 81 percent in Rivercess, it was 68 percent in Cape Mount and 39 percent in Bong: $\chi^2 = 262.3$, $p < 0.0001$.

5.2.2 Perceived Self-Efficacy for Bed Net Use:

Perceived self-efficacy for bed net use was generally high (Annex A.3). Almost three-quarters (72 percent) of the respondents perceived the self-efficacy to obtain bed nets for all the sleeping spaces in their household. In addition, the majority of the respondents stated that they could sleep under a bed net when there are lots of mosquitoes (92 percent) or when there are few mosquitoes (89 percent). The indicator of perceived self-efficacy for bed net derived from these three items show that the majority (92 percent) of the caregivers felt confident they could use a bed net. There was no significant difference in likelihood that a man or a woman felt confident about their ability to use a net. The data further show that this indicator was lower in Cape Mount (82 percent) than in Grand Kru (94 percent), Rivercess (95 percent) and Bong (97 percent): $\chi^2 = 77.2$, $p < 0.0001$.

5.2.3 Perceived Response Efficacy of Bed Nets:

Belief in the response efficacy or effectiveness of a product or prescribed action is a strong determinant of adoption of the action or product. When people believe that a product or action is effective, they are more likely to try it when the opportunity arises. Annex A.4 presents the level of agreement with three bed net response efficacy statements. Overall, only 26 percent of the respondents displayed a high level of perceived response efficacy of bed nets. Moreover, agreement with the specific question items yielded inconsistent results concerning perceived response efficacy of bed nets. For example, whereas the majority (85 percent) of the respondents believed that sleeping under a bed net was the best way to avoid malaria, almost three-quarters (73 percent) agreed that the chances of getting malaria were the

same whether or not they slept under a bed net. There were no differences by sex of the caregiver, but the data showed some slight variations in the proportion of those who felt bed nets effectively prevented malaria by county: from 21 percent in Cape Mount to 29 percent in Rivercess and Grand Kru: $\chi^2 = 9.13$, $p < 0.05$.

5.2.4 Attitudes towards Bed Net:

Annex A.5 shows the responses to ten attitudinal statements about bed nets. Based on the level of agreement with these statements individuals, a composite score for attitudes toward nets was computed. A positive composite score indicates that the individual possesses an overall favorable attitude or positive assessment of bed nets. The majority of caretakers were of the opinion that bed nets allow people to have a good night's sleep (88 percent) or that they use a bed net to avoid malaria (88 percent). Furthermore, over half (63 percent) of the respondents disagreed that the effectiveness of a bed net depended on its cost, while 57 percent disagreed that bed nets were only effective when used with certain types of beds. However, less favorable attitudes about bed nets were also common. For example, the majority (82 percent) of the respondents believed that it was difficult to sleep under a bed net when the weather was warm, while 60 percent agreed that the insecticide on bed nets could be dangerous to people.

Overall, 58 percent of the respondents had a favorable or positive attitude toward bed net use. The data showed no difference between men and women in this indicator. In contrast, there are significant differences by county. Specifically, positive attitudes toward bed nets were more prevalent in Grand Kru (73.3 percent) than in Rivercess (62.6 percent), Bong (58.0 percent) and Cape Mount (39.7 percent).

5.2.5 Discussion about Bed Net:

About one-third (32 percent) of the respondents reported that they had discussed bed nets with others during the last 12 months. Discussion about bed net was more common among men (38 percent) than among women (31 percent): $z = 7.1$, $p < 0.01$. There are also noticeable variations by county: 42 percent in Bong, 32 percent in Grand Kru, 32 percent in Rivercess and 23 percent in Cape Mount: $\chi^2 = 30.4$, $p < 0.0001$.

5.2.6 Participation in Household Decisions about Bed Net:

Having a say in household decision-making is a way to ensure that one's views and opinions are taken into consideration in issues concerning self and other household members. For women especially, participation in household decisions is an indicator of empowerment and egalitarian conjugal relationships. Among the respondents whose household has at least one bed net, 85 percent of men, compared with 57 percent of women, reported that they participated in decisions about which sleeping spaces would receive a net and/or who would sleep under one: $z = 5.8$; $p < 0.0001$. Women's participation in decisions about net use was less common in Bong (52 percent) than in Rivercess (69 percent), Cape Mount (68 percent) or Grand Kru (61 percent): $\chi^2 = 9.5$, $p < 0.05$.

5.2.7 Descriptive Norm about Bed Net:

Less than one-third (30 percent) of the respondents were of the opinion that at least half of the households in their community used bed nets. This proportion of caregivers who perceived net use as a social norm was particularly low in Grand Kru (8 percent), relatively higher though still infrequent in

Rivercess (26 percent) and Cape Mount (33 percent), and common in Bong (52 percent): $X^2=178.7$, $p<0.0001$.

5.2.8 Net Shape and Color Preferences

Regarding mosquito net shape and color preferences, just over a third of respondents preferred white

Variable	Coefficient	SE
Gender		
Male (RC)	0.00	
Female	-0.461	0.384
Education Level		
None (RC)	0.00	
Primary	0.018	0.334
Secondary and higher	0.327	0.432
Religion		
Non-Christian (RC)	0.00	
Christian	-0.245	0.467
Marital Status		
Non-married (RC)	0.00	
Married	0.481	0.441
Level of exposure to malaria-related campaigns		
Low (RC)	0.00	
Medium	-0.277	0.363
High	0.117	0.409
County of Residence		
Bong (RC)	0.00	
Cape Mount	-4.120***	0.539
Grand Kru	-0.464	0.489
Rivercess	0.742	0.423
Current age in years	0.003	0.016
Household Wealth		
Lowest (RC)	0.000	
Second	0.743	0.436
Middle	0.362	0.437
Fourth	0.676	0.448
Highest	1.080*	0.467
Household size	0.358***	0.064
Explained Variance (R^2)	12.4%	
Number of Obs.	1560	

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

nets (38 percent), slightly less preferred blue nets (30 percent) and roughly a quarter (24 percent) had not preference at all. The most commonly preferred net shape was rectangular (42 percent). About a third of caretakers preferred conical nets (29 percent) or had no preference (29 percent).

5.2.9 Overall Bed Net Ideation:

All 21 ideational items pertaining to bed net acquisition and use were combined into a single index for bed net ideation. County in Annex B.2 lists elements related to bed net use. The ideational items have a Cronbach's alpha coefficient for scale reliability of 0.71, indicating that the items measure various dimensions of the same underlying concept. The resulting bed net ideation score varies between -14 and 28 with a mean of 5.8, indicating that, overall, bed net ideation is only moderately favorable.

Results of multivariable regression revealed that the most significant correlates of bed net ideation include county of residence, household size and household wealth (Table 5.1). Specifically, compared to the residents of Bong, respondents from Cape Mount had significantly less favorable ideation toward bed nets. The relationship between household size and bed net ideation is strongly positive such that the people with the most favorable bed net ideation were those in the largest households, on average. In addition, bed

net ideation was comparatively more positive among the respondents from the wealthiest quintile compared to their peers from the poorest quintile.

5.3 ANC and IPTp-Related Ideation

5.3.1 Knowledge about IPTp

Knowledge about IPTp is gauged through two questions: knowledge of the name of the antimalarial given to pregnant women to prevent malaria and knowledge of the timing of the first IPTp dose. More than half (53 percent) of the respondents knew that SP was the prophylaxis given to pregnant women to prevent malaria. Women (62 percent) were considerably more likely than men (24 percent) to mention SP for the prevention of malaria in pregnant women: $z=-12.5$, $p<0.0001$. The respondents from Grand Kru (38 percent) and Cape Mount (39 percent) were more likely than those from Bong (67 percent) or Rivercess (67 percent) to report knowledge of the prophylaxis for malaria prevention in pregnant women: $\chi^2=-124.7$, $p<0.0001$. In contrast, very few respondents (11 percent) knew that the first dose of SP should be given early in the second trimester. Again, this knowledge was more common among women (13 percent) than among men (5 percent): $z=20.4$, $p<0.0001$. In addition, the prevalence of this knowledge varies significantly by county: 30 percent in Rivercess, 8 percent in Grand Kru, 5 percent in Bong and 2 percent in Cape Mount: $\chi^2=-191.0$, $p<0.0001$.

5.3.2 Attitudes toward ANC and IPTp:

Attitudes toward ANC and IPTp were mixed (Annex A.6). A large majority (98 percent) of the respondents were of the opinion that a pregnant woman should see a health provider as soon as possible once she suspects that she might be pregnant. Similarly, the majority (98 percent) believed that health providers would not give a pregnant woman any medication that might be harmful to her. Nonetheless, whereas malaria prophylaxis for pregnant women (SP) is safe when taken on an empty stomach, the majority (97 percent) of the respondents believed that taking medications on an empty stomach might make a pregnant woman sick. In addition, about two-fifths (44 percent) of the respondents believed that a pregnant woman should wait a few months before seeing a health provider.

Overall, more than three-quarters (76 percent) of the respondents had positive attitudes towards ANC and IPTp. Whereas this indicator did not vary significantly between men (77 percent) and women (76 percent), there were considerable variations by county: 86 percent in Grand Kru, 83 percent in Bong, 74 percent in Rivercess, and 62 percent in Cape Mount: $\chi^2=74.4$, $p<0.0001$.

5.3.3 Perceived Response Efficacy of IPTp:

Perceived response efficacy of IPTp is generally low. Most (88 percent) of the respondents believed that pregnant women were still at risk for malaria even if they took the medicine intended to keep them from getting malaria. Belief in the response efficacy of IPTp was significantly more common in Rivercess (22 percent) than in any other county (Bong: 11 percent; Cape Mount: 10 percent; Grand Kru: 4 percent).

5.3.4 Interpersonal Communication on Malaria in Pregnancy:

Less than one-fifth of the respondents (17 percent) reportedly discussed the issue of malaria in pregnancy with spouses or friends during the last 12 months. Women (19 percent) were significantly

more likely than men (12 percent) to have discussed this issue: $z=3.0$, $p<0.01$. Similarly, discussion of malaria in pregnancy was more common in Bong (36 percent) than in Rivercess (18 percent), Grand Kru (10 percent) or Cape Mount (5 percent): $X^2=156.6$, $p<0.0001$.

Table 5.2: Results of the regression of ANC/IPTP ideation score on individual and household characteristics, Liberia 2014

Variable	Coefficient	SE
Gender		
Male (RC)	0.00	
Female	0.557***	0.148
Education Level		
None (RC)	0.00	
Primary	0.045	0.129
Secondary and higher	0.151	0.166
Religion		
Non-Christian (RC)	0.00	
Christian	0.085	0.180
Marital Status		
Non-married (RC)	0.00	
Married	0.087	0.169
Level of Exposure to Malaria-related campaigns		
Low (RC)	0.00	
Medium	0.833***	0.140
High	0.350*	0.157
County of Residence		
Bong (RC)	0.00	
Cape Mount	-1.859***	0.207
Grand Kru	-0.698***	0.188
Rivercess	0.195	0.163
Current age in years	0.006	0.006
Household Wealth		
Lowest (RC)	0.000	
Second	0.194	0.168
Middle	0.255	0.168
Fourth	0.445**	0.173
Highest	0.609***	0.180
Household size	-0.025	0.025
Explained Variance (R^2)	15.6%	
Number of Obs.	1560	
Notes: * $p<0.05$; ** $p<0.01$; *** $p<0.001$		

5.3.5 Descriptive Norm about ANC:

Almost three-fifths (57 percent) of the respondents believed that most of the pregnant women in their community obtain at least four ANC visits. This descriptive norm in favor of optimal ANC visits was more common among women (58 percent) than among men (51 percent): $z=2.4$, $p<0.05$. The respondents from Grand Kru (19 percent) were considerably less likely than those from the other three counties (69 percent) to perceive ANC as the norm in their community: $z=17.4$, $p<0.0001$.

5.3.6 Overall ANC/IPTp-Related Ideation:

Six ANC/IPTp-related ideational items were combined to derive a score for ideation (see Annex B.3 for a list). The composite

score ranged between -6 and 11 with a mean of 3.6, indicating a moderate level of ideation in favor of ANC/IPTp among the caregivers. Results of the multivariable regression of ANC/IPTp-related ideation score on selected socio-demographic and household variables reveal that the most significant correlates are sex of the caregivers, their county of residence, their household socio-economic status and their level of exposure to campaign health messages (Table 5.2). Substantively, the ideation score was significantly higher for women than for men, and for those with medium or high level of exposure to malaria-related campaigns than for their peers with a low level of exposure. Compared to the residents

of Bong, the respondents from Cape Mount and Grand Kru had a significantly lower ideation score, on average. Finally, there is a positive dose-response relationship with socio-economic status.

5.4 Malaria Treatment

5.4.1 Knowledge about Malaria Treatment:

There is widespread awareness about ACT as an antimalarial: more than four-fifths (84 percent) of the respondents mentioned ACT as the medication for treating malaria. Awareness of ACT as an antimalarial was significantly higher in Rivercess (93 percent) and Bong (91 percent) compared to Cape Mount (81 percent) or Grand Kru (73 percent). There were no significant differences between men (86 percent) and women (83 percent) in this indicator.

5.4.2 Self-efficacy about Malaria Detection and Severity Recognition

Self-efficacy beliefs about malaria treatment are presented in Annex A.7. The data show that about three-quarters (74 percent) of the respondents were confident in their ability to recognize a fever indicative of malaria. An individual's confidence in detecting malaria fever did not vary by sex or county.

Ability to recognize the signs of malaria complications is an important antecedent of effective management of the disease. Overall, 72 percent of the respondents reported the self-efficacy to recognize the signs of serious malaria in a child. This indicator did not vary by sex, but varied somewhat by county. Indeed, the indicator was slightly lower in Bong (66 percent) than in Cape Mount (71 percent), Grand Kru (74 percent) or Rivercess (75 percent).

5.4.3 Perceived Response-Efficacy of Malaria Diagnostic Test

To assess the perceived response efficacy of the malaria diagnostic test, respondents were asked to what extent they agree with the following statement: "The health care provider is better than the test at diagnosing malaria, so I rely on the provider to tell me whether the fever is caused by malaria." About half (49 percent) of the respondents did not agree with the statement, indicating that they believed in the efficacy of the test. Whereas perceived response-efficacy of the diagnostic test did not vary by sex, the differences by county were considerable. Indeed, proportionally fewer respondents from Cape Mount (17 percent) than in Bong (51 percent), Grand Kru (61 percent) or Rivercess (67 percent) believed in the response-efficacy of the diagnostic test: $\chi^2=233.4$, $p<0.0001$.

5.4.4 Treatment-Related Attitudes:

Attitudes toward malaria treatment were mixed (Annex A.8). There was widespread confidence in health providers' ability to treat malaria. Indeed, practically all the respondents (99 percent) agreed that the health provider was the best person to talk to when a child had malaria. Similarly, an overwhelming majority (96 percent) believed that a person should only take an antimalarial if the health provider confirmed that they had malaria. The majority (83 percent) of respondents agreed that many people visit a second health provider when the first provider does not confirm that a fever is caused by malaria. A similar proportion of caregivers (80 percent) agreed that parents would sometimes know that a child had malaria even if the health provider said that the fever was not due to malaria. Disturbingly, almost three-fifths (58 percent) of the respondents believed that providers often gave malaria medicine even

when malaria test indicated otherwise. In addition, more than four-fifths (83 percent) believed that it was easy to tell if a fever was malaria or not.

Overall, a little over two-fifths (43 percent) of the respondents had attitudes that are highly in favor of appropriate treatment of malaria. The prevalence of favorable attitudes towards treatment did not vary by sex. As with most of the ideational variables so far examined, positive attitudes toward treatment were less prevalent in Cape Mount (14 percent) than in any other county. Rivercess (59 percent) is the county with the most favorable attitudes towards appropriate malaria treatment.

5.4.5 Discussion about Malaria Treatment:

Discussions about malaria treatment were relatively common among the study population: more than two-fifths (41 percent) of the respondents reportedly communicated with someone on the issue during the past year. Men (46 percent) were more likely than women (40 percent) to have discussed malaria treatment with others: $z=2.0$; $p=0.05$. The indicator also varied significantly by county: from 13 percent in Cape Mount to 43 percent in Grand Kru, 46 percent in Bong and 63 percent in Rivercess: $X^2=212.3$, $p<0.0001$.

5.4.6 Participation in Child Health-Related Decisions

The majority (85 percent) of men and more than half (55 percent) of women reported that they participated in decisions concerning the health of their children. Such individuals either made the decision themselves or made a joint decision with their spouse. In addition, 90 percent of men and 47 percent of women reported that they usually participated in decisions regarding medicine purchase for a child with malaria. Overall, participation of female caretakers in decisions regarding the health of their children, including purchase of anti-malarial drugs did not vary significantly by county.

5.4.7 Descriptive Norm about Prompt Malaria Treatment:

More than half (56 percent) of the respondents believed that prompt treatment (on the same day as fever presents) of children with malaria was the norm in their community. Descriptive norm in favor of prompt treatment of malaria in children was similar for men (53 percent) and women (57 percent). In contrast, very few perceived prompt treatment to be the norm in Grand Kru (7 percent) compared to Rivercess (70 percent), Bong (71 percent) and Cape Mount (75 percent): $X^2=501.7$; $p<0.0001$.

5.4.8 Overall Ideation for Appropriate Treatment of Malaria:

The score for ideation related to appropriate treatment of malaria derived from fourteen ideational items related to the treatment of malaria varied between -7 and 18, with a mean value of 5.1. As the regression results presented on Table 5.3 reveal, the most significant correlates of favorable ideation toward malaria treatment include education, religion, marital status, county of residence, household wealth status and campaign exposure. The relationship with education is not clear-cut: whereas the score was significantly higher for people with primary education than for those with no formal education, post-primary education did not appear to make any significant difference over no education. Compared to Islam or no religion, Christianity was associated with a lower treatment ideation score. Furthermore, residents of Cape Mount displayed a significantly lower level of favorable ideation compared to their peers from Bong. In contrast, malaria treatment ideation was more favorable in

Table 5.3: Results of the regression of malaria treatment ideation score on individual and household characteristics, Liberia 2014

Variable	Coefficient	SE
Gender		
Male (RC)	0.00	
Female	-0.529*	0.266
Education Level		
None	0.00	
Primary	0.575**	0.231
Secondary and higher	0.280	0.299
Religion		
Non-Christian (RC)	0.00	
Christian	-0.763*	0.323
Marital Status		
Non-married (RC)	0.00	
Married	1.393***	0.305
Level of Exposure to Malaria-related campaigns		
Low (RC)	0.00	
Medium	1.253***	0.251
High	0.143	0.283
County of Residence		
Bong (RC)	0.00	
Cape Mount	-3.714***	0.373
Grand Kru	0.186	0.338
Rivercess	0.687*	0.293
Current age in years	-0.0001	0.011
Household Wealth		
Lowest (RC)	0.000	
Second	0.337	0.302
Middle	0.022	0.302
Fourth	0.744*	0.310
Highest	0.608	0.323
Household size	0.066	0.045
Explained Variance (R ²)	18.5%	
Number of Obs.	1560	
Notes: * p<0.05; ** p<0.01; *** p<0.001		

Rivercess than in Bong. Finally, favorable ideation was more common among those who had a medium level of exposure to campaign messages compared to those with low exposure.

5.5 Ideation Related to Indoor Residual Spraying (IRS)

Only 183 caregivers (11.8 percent) were aware that IRS programs existed. The U.S President’s Malaria Initiative (PMI) implemented IRS in only five districts of Bong County; so, this is not surprising. Whereas more than one third (37 percent) of the respondents from Bong reported awareness of IRS, respectively, 1 percent, 3 percent and 6 percent of the respondents from Rivercess, Grand Kru and Cape Mount did. Among the few people who reported being aware of IRS as an intervention for malaria control, levels of perceived response efficacy of the practice was very high: 94 percent of caregivers displayed a

high level of perceived response efficacy. Perceived self-efficacy related to IRS was equally high among this subset of respondents: 88 percent were confident that they could remove all their possessions from their house so the house could be sprayed, while 92 percent were confident that they could sleep in a house after the walls had been sprayed.

Discussion about IRS was not very common. Only 15 percent of the respondents who were aware of IRS reportedly discussed the practice with others. Of the few who were aware of IRS, most (65 percent) perceived the practice to be the norm in their community.

IRS uptake is largely dependent on geographic positioning of a household due to the focal nature of such programming. Within the sprayed districts, ideation related to IRS was average. The score for ideation related to IRS varied between -5 and 8, with a mean value of 3.2.

6 Behavioral Outcomes and their Correlates

6.1 Bed nets

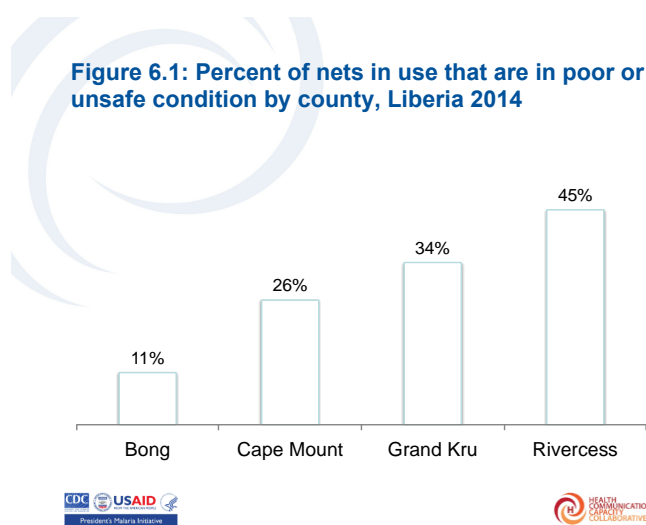
In this section, we examine various indicators related to bed net use, including net ownership, net condition and use by various categories of household members. Annex C.1 lists the prevalence of these outcomes by county.

6.1.1 Possession of Bed Nets

Just over one third (36 percent) of households had at least one bed net. Only 4 percent of households, mostly in Bong and Cape Mount counties, had enough ITN for all household members, that is, had at least one bed net for every two members of the household. Almost all bed nets were one of two LLIN brands (34 percent Olyset and 66 percent Permanet). Only four (less than 1 percent) of the 682 nets present in the study households were of another brand.

6.1.2 Net Condition

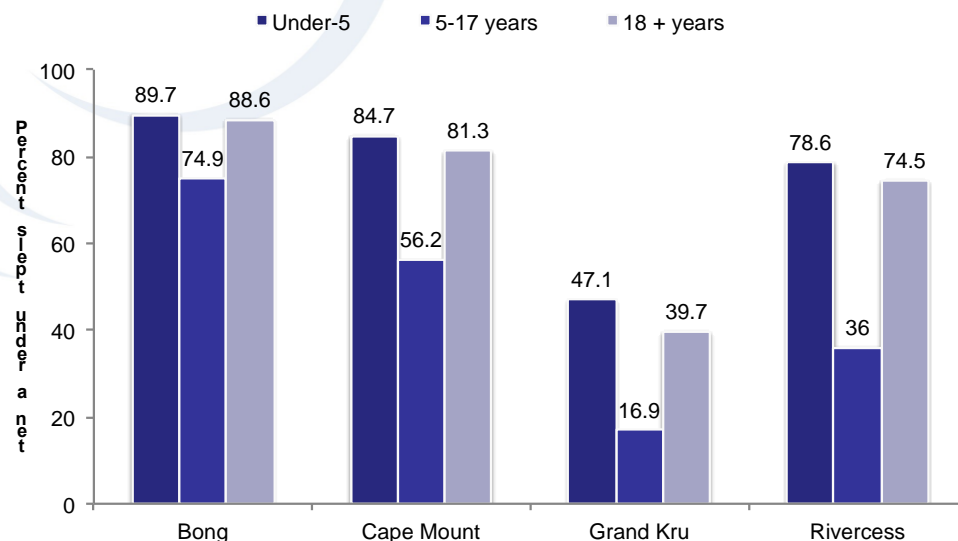
Nets were assessed visually and categorized as having been in good condition (no holes), fair condition (no holes as large as a flashlight battery), poor condition (one to four holes as large as a battery), or unsafe condition (more than five holes as large as a battery). About three fifths (58 percent) of the nets in use in the surveyed households were in good condition (no holes), while 17 percent were in fair condition (a few holes, but not as large as a flashlight battery.) Many of the nets were in poor (20.3) or unsafe (4.1 percent) conditions. Nets were less likely to be in poor or unsafe conditions in Bong and Cape Mount counties, compared to Grand Kru or Rivercess (Figure 6.1).



6.1.3 Use of Bed Nets

Bed net use information came from two sources: household members' data and caregivers' individual data.

Figure 6.2: Net use among various age categories in households with at least one bed net



Household members: While access to nets was low, overall, one-quarter of the population (24 percent) and 27 percent of children under 5 years old slept under a net the night before survey. It is pertinent to note that in many households with nets, up to four persons slept under the same net. In fact, the median number of users per net was three household members. Three or more users shared over half of the nets (64 percent) in the surveyed households on the night before interview.

Among households with at least one ITN, about two-thirds of residents and more than three quarters of children under 5 years of age slept under a net on the night before the survey. Annex C.1 displays overall net use (regardless of ownership), while Figure 6.2 shows net use among households that own at least one net. The data showed that the vast majority of households with nets use them: 88 percent of the nets in these households were used by at least one person the previous night. Furthermore, the data showed that under-5 children did not appear to be privileged over adults in net allocation. This is probably because children under five often share a net with an adult. However, under-5 children and adults were significantly more likely than those aged 5 to 17 to sleep under a net (Figure 6.2).

Figure 6.3 shows the relationships of household ownership of nets and county poverty level with

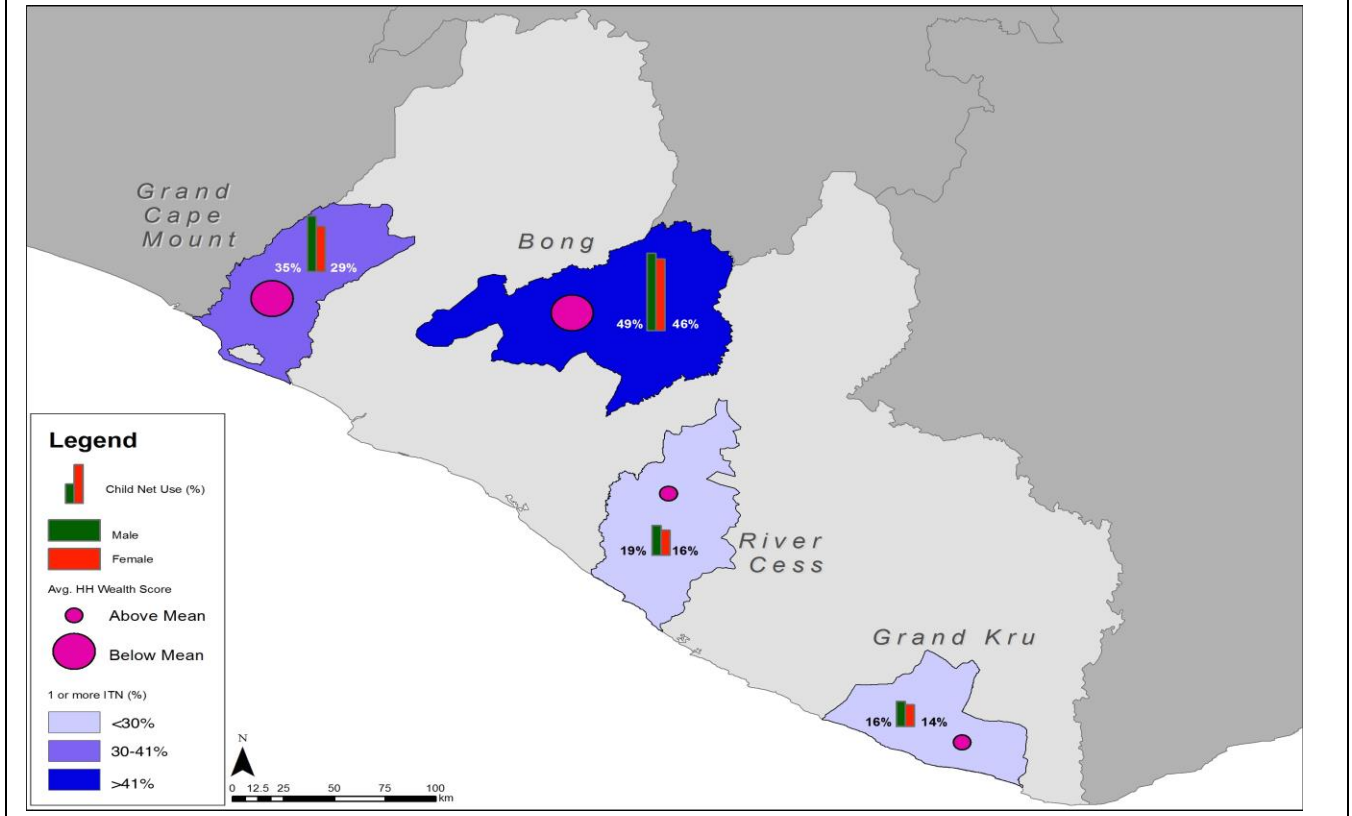
Table 6.1: Results of the logistic regression of bed net use among household members of different age groups on individual and household characteristics; Households with at least one ITN, Liberia 2014			
Variable	1 Children (0-4 years)	2 Adults	3 All ages¹
Gender			
Male (RC)	1.00	1.00	1.00
Female	0.926	1.615**	1.327**
County of Residence			
Bong	1.00	1.00	1.00
Cape Mount	0.884	0.691	0.742*
Grand Kru	0.237***	0.160***	0.244***
River Cess	0.898	0.670	0.640**
Household Wealth			
Lowest (RC)	1.00	1.00	1.00
Second	1.328	0.968	1.143
Third	1.185	1.080	1.289**
Fourth	1.317	1.237	1.366*
Fifth	1.540	0.976	1.860***
Number of nets in household			
One	1.00	1.00	1.00
Two	3.371***	2.457***	4.183***
Three or more	2.059*	3.624***	4.480***
Household size	0.785***	0.815***	0.763***
Pseudo R ²	20.2%	21.7%	23.1%
Number of Obs.	622	1086	2298
Notes: * p<0.05; ** p<0.01; *** p<0.001			
¹ Including older children and adolescents aged 5-17 years			

child net use. It appears that the larger the proportion of poor households in a county, the lower net use among children is. Table 6.1 presents the correlates of bed net use by household members in different age groups residing in households with at least one ITN: children aged 0-4 years (panel 1), adults aged 18 years and above (panel 2) and household members of all ages (panel 3). The data revealed that residing in larger households significantly decreased the odds of using a net across all age categories. There were also regional differences in net use in all age categories.

Except for under-5 children, females were more likely than males to use a net. Across all age groups, the odds of net use were significantly lower in Grand Kru than in Bong. In addition, residence in Rivercess was a predictor of decreased net use among the general household population. When considering residents of all ages, residence in wealthier households did significantly increase the odds of net use.

Caregivers: The second source of information about net use came from the individual questionnaire completed by caregivers. A third (32 percent) of caregivers of children younger than five years old reported sleeping under a net the night before the interview. Caregivers' use of net did not vary by sex. In contrast, caregivers from Bong (52 percent) and Cape Mount (39 percent) were more likely

6.3 Child Net Use, Percentage of Poor Households, and Percentage of Households with at least 1 ITN



than their peers from Grand Kru (18 percent) and Rivercess (20 percent) to have slept under a net: $\chi^2=141.4$, $p<0.0001$.

The vast majority (91 percent) of caregivers who did not sleep under a net the night before said this was because they did not have a net. Very few (2 percent each) said they did not sleep under a net because of the poor condition of the net, because it was too hot or because the net was not hung up. Mosquito nets were predominately used for sleeping with only 31 adults saying that a household net had ever been used for a reason other than sleeping. In these few cases, they were mostly used for fishing (12 respondents) or the covering/protection of plants (11 respondents).

6.2 Antenatal Care (ANC) and Intermittent Preventive Treatment of Pregnant Women (IPTp)

The outcome variables that we examine in this section include use of antenatal care services (ANC) and uptake of IPTp. Annex C.2 lists the prevalence of these outcomes by county.

6.2.1 ANC

Female caretakers with under-5 children were asked various questions about their experiences with ANC when pregnant with their youngest child. The vast majority (96 percent) of mothers went for antenatal care during their most recent pregnancy. The majority (92 percent) of the women who obtained ANC saw a doctor, nurse/midwife, or physician's assistant. Roughly four-fifths (83 percent) of the women obtained the recommended four or more ANC visits during their most recent pregnancy. The proportion of women who obtained at least four ANC visits was 71 percent in Grand Kru, 81 percent in Rivercess, 84 percent in Bong and 89 percent in Cape Mount: $\chi^2=27.3$, $p<0.0001$.

6.2.2 Uptake of IPTp2

Female caretakers were also asked various questions about their experiences preventing malaria during pregnancy. The majority of women reportedly took medicine to prevent malaria during their most recent pregnancy (94 percent), mainly SP. Most women that took SP obtained it during an ANC visit (98 percent) and/or less commonly during another facility visit (8 percent). Amongst the 99 women who did not take medicine to prevent malaria during their pregnancy, 44 percent said their provider did not offer the medicine and a quarter said none was available at their facility. Only 4 percent said they were afraid of the medicine's effects on their health and only one woman said she was fearful of its impact on the fetus' health.

Consistent with Liberia's 2009-2013 National Malaria Strategic Plan, IPTp coverage is defined as receiving two or more doses of SP during pregnancy. This indicator is limited to women whose youngest child was aged two years or younger. Note that this differs from

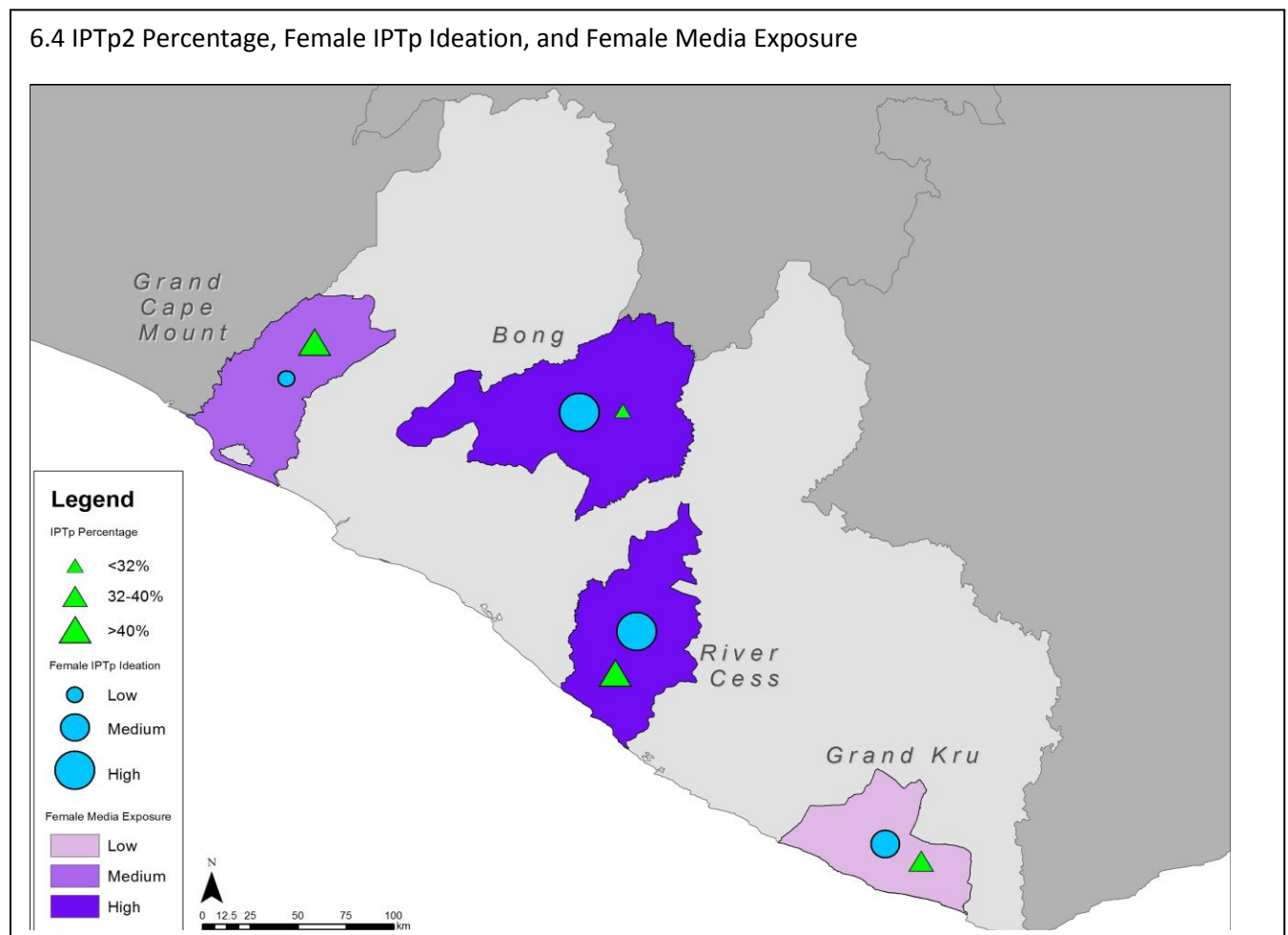
Variable	Odds Ratio	SE
Education Level		
None (RC)	1.00	
Primary	1.185	0.199
Secondary	1.270	0.332
Religion		
Non-Christian (RC)	1.00	
Christian	0.087	0.259
Marital Status		
Non-married (RC)	1.00	
Married	1.539*	0.301
Current age in years	0.989	0.00952
General Malaria Ideation Score	1.001	0.01234
IPTp Ideation Score	1.088*	0.0365
Level of Campaign Exposure		
Low (RC)	1.00	
Medium	1.666**	0.317
High	2.177**	0.492
County of Residence		
Bong (RC)	1.00	
Cape Mount	1.397	0.433
Grand Kru	0.746	0.200
Rivercess	1.125	0.262
Household Wealth		
Lowest (RC)	1.00	
Second	1.273	0.276
Middle	1.692*	0.385
Fourth	1.423	0.326
Highest	1.075	0.256
Household size	1.002	0.032
Pseudo R ²	5.7%	
Number of Obs.	1140	
Notes: * p<0.05; ** p<0.01; *** p<0.001		

the 2013 WHO recommendations of three or more doses during pregnancy. While most women took some medicine to prevent malaria, IPTp2 coverage was relatively high as three-quarters of women took two or more SP doses during their most recent pregnancy. IPTp2 coverage varied significantly by county: 80 percent in Bong, 61 percent in Grand Kru, 76 percent in Cape Mount and 82 percent in Rivercess: $\chi^2 = 37.9$; $p < 0.0001$

6.2.3 Correlates of IPTp2

Figure 6.4 shows how the uptake of IPTp2 varies as a function of IPTp ideation and women’s exposure to malaria prevention and treatment communication programs at the county level. The map shows that uptake is higher in counties with a higher level of IPTp ideation and communication exposure. In addition, we used a multivariable logistic model to assess the correlates of IPTp2 uptake. The results (Table 6.2) showed that collectively, the individual and household variables

6.4 IPTp2 Percentage, Female IPTp Ideation, and Female Media Exposure



included in the model contribute little in explaining the uptake of IPTp. Nonetheless, the odds of obtaining at least two doses of IPTp during pregnancy were respectively two to three times higher among those who had medium and high levels of campaign exposure compared to those who had low levels of exposure. Whereas general malaria ideation did not appear to make a significant difference in the odds of IPTp uptake, positive IPTp2 ideation significantly increased these odds.

Married women had 54 percent higher odds of IPTp2 uptake relative to single women. Although belonging to the fourth and highest wealth quintile was not a significant predictor of IPTp2, women in households belonging to the middle wealth quintile were more likely than those of the lowest wealth quintile to complete two or more doses. Education, religion, age, household size and county of residence were not significant correlates of IPTp2 uptake.

6.3 Case Management of Fever in Children

This section focuses on prevalence, diagnosis and management of fever in under-5 children. To avoid double counting a child described by both the female and male caretakers, we examined these indicators using information provided by female caretakers.

6.3.1 Prevalence of Fever among Children

About half (53 percent) of female caretakers reportedly had a child sick with fever during the last two weeks. The prevalence of febrile conditions varied by county: 35 percent in Bong, 46 percent in Cape Mount, 60 percent in Rivercess and 71 percent in Grand Kru: $X^2=115.9$, $p<0.0001$. In the five districts of Bong with indoor residual spraying program, there was no difference in fever prevalence between children from sprayed households (36 percent of children) and those from households that had not been sprayed (34 percent of children).

6.3.2 Seeking Advice or Treatment in Children

Virtually all (98 percent) female caretakers with a febrile child during the two weeks preceding the survey had sought treatment and/or advice for their sick child. Similarly, for those with no sick child during the last two weeks, but whose child was sick with fever within the last six months, 99 percent of respondents had sought advice or treatment for the febrile child. Roughly half of those who sought treatment did so at a government hospital, about a quarter at a community health center and about a tenth (13 percent) from friends or family. Only 4 percent of female caregivers sought out black baggers¹ as a source of treatment for their child's fever (Figure 6.5).

6.3.3 Diagnosis

The percentage of febrile children that received a finger or heel stick was used as an indicator of effective malaria diagnosis as this is required for both blood smear and rapid diagnostic test (RDT) kits. Almost three quarters (74 percent) of the caretakers of children with fever in the past two weeks reported that their child had blood taken for testing. Use of diagnostic test among these children did not vary significantly by county—69 percent in Grand Kru, 76 percent in Bong, 78 percent in Cape Mount and 78 percent in Rivercess. Among children tested in the two weeks before interview, about one-tenth (11 percent) of female caretakers were not told the results of the test. Women in Grand Kru were less likely to receive the results of the test (71 percent) compared to Bong (100 percent), Rivercess (98 percent) and Cape Mount (95 percent): $X^2=67.8$, $p<0.0001$. For those who were informed of the test results, the test was positive for

¹ Black baggers are men and women without formal health care certification that provide health care and/or sell drugs at the village level.

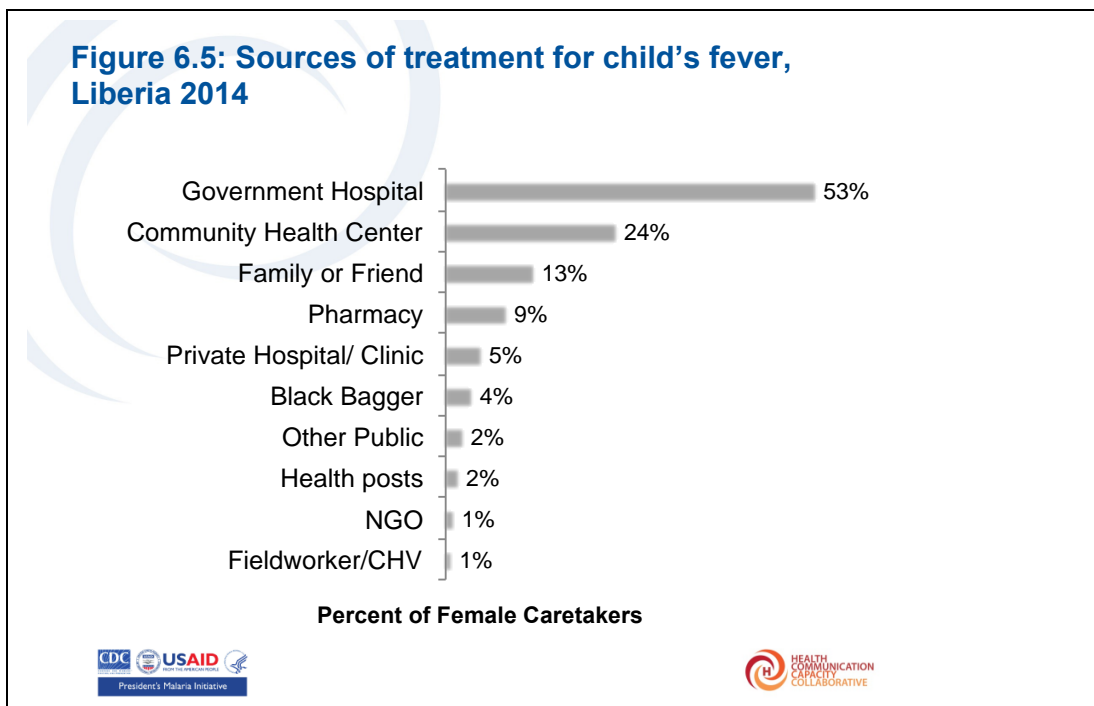
malaria parasites in the vast majority (93 percent) of cases. The rate of positive tests did not vary significantly across counties.

6.3.4 Drug Administration

Almost all (98 percent) of children with fever in the last two weeks reportedly received some form of medication for the sickness. The most common form of antimalarial received included ACT (69 percent) and Chloroquine (19 percent). In addition, most children received an antipyretic, mainly Paracetamol (65 percent). Among the children of female caretakers with a confirmed case of malaria during the last two weeks, 83 percent received ACT. In addition, five of the 25 children with negative malaria test results reportedly received ACT.

6.3.5 Prompt ACT Treatment

Among the children with fever in the last two weeks who took any anti-malarial drug, fewer than two-fifths (39 percent) reportedly received ACT promptly, that is, on the same or next day of the start of the fever. Prompt ACT treatment was more common in Bong (50 percent) and Cape Mount (50 percent), than in Grand Kru (28 percent) or and Rivercess (39 percent): $\chi^2=20.5$, $p<0.0001$.



We used a multivariate logistic regression model to identify predictors of prompt ACT treatment of malaria in children with fever in the last two weeks. The data showed that caretaker socio-demographic, ideational and household factors play a limited role in explain prompt ACT treatment. Nonetheless, the key correlate of prompt ACT treatment was campaign exposure (Table 6.3). Specifically, a high level of campaign exposure was associated with more than a two-fold increase in the odds of prompt ACT treatment compared to caregiver's with a low level of exposure. Education, religion, marital status, age, county of residence, treatment ideation,

general malaria ideation and household size were not correlated with odds of a child receiving prompt ACT treatment.

6.4 Indoor Residual Spraying

6.4.1 Behaviors Related to IRS

The respondents who reported IRS activities in their community were mainly from Fuamah, Jorquelleh, Yeallequellah, Panta and Sanoyeah districts, all in Bong County. Annex C.4 lists the prevalence of behaviors related to bed net use by county. Half of the households in these five districts had reportedly been sprayed within the last year. The sprayed households represent only 30 percent of the households sampled from Bong County. A government worker or program sprayed roughly two-thirds (65 percent) of households, while just over a third (35 percent) were sprayed by an NGO within the last year. The proportion of sprayed houses was higher among households in the fourth and highest wealth quintiles, compared to the lowest wealth quintiles: $\chi^2=14.1$, $p<0.01$.

6.4.2 Vector Control Coverage

Following RBM and WHO guidelines, we define vector control coverage as the percent of households owning at least one ITN and/or have been sprayed with insecticide within the past year. Annex C.5 lists rates of vector coverage across the four counties. Taking into account that bed net ownership and use was at its highest levels in Bong County, it is not surprising that vector control levels were also highest in Bong County (63 percent of households) and significantly lower in Cape Mount (41 percent), Grand Kru (29 percent) and Rivercess (23 percent): $\chi^2=117.4$, $p<0.0001$. Household net possession was higher in sprayed (63 percent) than in unsprayed (45 percent) districts of Bong County: $\chi^2=9.2$, $p<0.01$. It is, therefore, not surprising that vector control coverage was 74 percent in sprayed districts compared to 31 percent in unsprayed districts of Bong County.

Variable	Odds Ratio	SE
Caregiver's education Level		
None (RC)	1.00	
Primary	0.970	0.199
Secondary	1.123	0.371
Caregiver's religion		
Non-Christian (RC)	1.00	
Christian	0.703	0.204
Caregiver's marital status		
Non-married (RC)	1.00	0.240
Married	0.895	
Caregiver's current age in years	1.011	0.011
Treatment ideation score	1.042	0.027
General Malaria Ideation Score	0.986	0.015
Level of Media Exposure		
Low (RC)	1.00	
Medium	1.507	0.383
High	2.296**	0.713
County of Residence		
Bong (RC)	1.00	
Cape Mount	0.926	0.373
Grand Kru	0.518	0.205
Rivercess	0.582	0.176
Household Wealth		
Lowest	1.00	
Second	0.984	0.273
Middle	1.176	0.330
Fourth	1.545	0.447
Highest	0.937	0.293
Household size	1.034	0.042
Pseudo R ²	4.9%	
Number of Obs.	583	

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

7 Summary and Recommendations

This document reports findings from a 2014 survey on malaria-related ideational and behavioral outcomes in four counties in Liberia. The survey targeted 1200 households and collected information from 1560 caregivers. In addition, the survey collected basic socio-demographic and net use information on a total of 6463 household members. In the following paragraphs, we summarize the key findings from this robust data set and discuss their implications for program, policy and future research.

Media Habits: Radio was the primary form of mass media consumed by the study population with about three-fifths of the caretakers reportedly listening to the radio at least once a week. However, radio listenership was much lower for women than for men.

Radio should continue to be at the center of malaria communication efforts in Liberia. Still, it is pertinent to explore additional communication channels to reach the majority of the intended audience with relevant information, as women were less likely to listen to radio. Possible sources to explore and intensify include community events, group meetings, mobilization by students and mobile channels of outreach.

Campaign Exposure: The majority of the respondents had heard about the “Take Cover” and/or the “Healthy Baby, Happy Mother” campaigns. Many were exposed to the campaigns from multiple sources, primarily radio and health providers, and could recall the main messages of these campaigns. Although exposure to malaria campaign messaging was high, however, it was particularly low in Grand Kru and Cape Mount where the lower portions of caregivers reported listening to the radio every week. In general, campaign exposure was positively associated with most of the desired ideational and behavioral outcomes.

The results contribute to growing evidence of the relevance of strategic communication for malaria ideational and behavior change. Future efforts should prioritize use of multiple media to reach the intended audience, especially in Grand Kru and Cape Mount. Ironically, these two counties had higher rates of malaria endemicity than the other two surveyed counties. These findings regrettably support the notion that the inverse care law is at play; this law predicts that the health or social care is less available where the need for such care is greater. Research is particularly needed on how best to reach the residents of Grand Kru and Cape Mount with information that will empower them to take appropriate malaria prevention and treatment action.

General Malaria Ideation: Awareness of mosquitoes as the cause of malaria is almost universal in the study population, but there is also widespread misinformation about the causes of the infection. Less than half of caregivers have adequate knowledge of malaria. Only two out of every five people had adequate knowledge about prevention and this figure dropped to less than one out of every three people in Bong County. In addition, a slight majority of caregivers perceived the consequences of malaria infection to be serious, but less did so in Cape Mount and Grand Kru. Nonetheless, indicators of perceived susceptibility, perceived self-efficacy for prevention and perceived self-efficacy for severity

recognition are moderately high. Interpersonal communication among spouses and friends about malaria was fairly common overall, but remains limited in Cape Mount and Grand Kru.

Communication efforts should continue to focus on increasing knowledge about malaria symptoms, particularly fever, and correcting widespread misinformation about what causes malaria and how to prevent it. Programs should also aim to increase caregiver understanding about the severity of the infection. In addition, it is pertinent to encourage and provide opportunities for discussions about the infection among community members. Consistent with the Expanded Parallel Processing Model (Witte, 1992), efforts to increase understanding about the symptoms, prevention and severity of the infection should go hand-in-hand with messages and activities designed to strengthen the self-efficacy to take appropriate action.

Literature provides specific guidelines for increasing the self-efficacy to act (Bandura, 1977). There is consensus among experts that self-efficacy is learned and can be strengthened in four ways: (1) successful performance of the behavior; (2) vicarious experience or modeling; (3) exhortative arguments that seek to persuade and encourage individuals to take action; and, (4) emotional arousal. In line with these points, programs should endeavor to identify and address logistic, psychological and cultural barriers to enacting appropriate malaria prevention and treatment behaviors. It is important to provide opportunities to the intended audience to watch or hear about how people similar to them successfully perform the desired behaviors. In line with the exhortative means of increasing self-efficacy, behavior change programs should increase their target audience's understanding of the benefits of practicing the desired behaviors, promote interpersonal communication about the desired behaviors and encourage personal advocacy about the behaviors. Finally, strategies should be designed and implemented to reduce anxiety and address fears and misconceptions about the desired behaviors.

Behavior change programs should also promote interpersonal communication about the desired behaviors and encourage caregivers to talk to people in their network about malaria prevention and treatment. Key populations to target with such activities include caregivers in poorer households, those living in counties other than Bong and those with less than a secondary education.

Bed net ideation and use: Whereas very few of the respondents knew of a place to purchase a bed net in their community, more than two-thirds of the respondents were willing to pay for a net; most were willing to pay up to 500 Liberian dollars (about US\$6). Although the vast majority felt confident they could use a bed net, only about a quarter of respondents believed nets were effective at preventing malaria. Positive attitudes toward bed nets lagged behind confidence that one could use a bed net and willingness to buy a net. Such attitudes were relatively common in Grand Kru and Rivercess, but not prevalent in Cape Mount and Bong. Furthermore, discussion about bed nets was not common and a minority perceived the behavior to be common in their communities. Women tended to be marginalized in decisions about net acquisition and household net allocation. Overall, bed net ideation is only moderately favorable.

Bed net coverage is currently low with only 4 percent of households having adequate net access. Nonetheless, when a household did have a net, caregivers very commonly used it. The exception was Grand Kru where household members in general, as well as caregivers, were less likely to use a net than in other counties. Overall net use by all household members was higher in Bong than in any other county. Data suggest that more caregivers would use nets if they had at least two instead of just one.

The study revealed that children were prioritized over adolescents in net allocation; although not over adults who frequently shared the net with one or more children. Female adults were prioritized over male adults and married caregivers more often used a net than unmarried caregivers. Despite the high rates of use among households with one or more nets, about one-quarter of the nets observed were in poor or unsafe conditions.

The population in the surveyed counties need to have a better understanding about where they could buy bed nets, the effectiveness of nets, the safety of insecticide-treated nets, as well as how to maintain nets to maximize their effectiveness. In addition, strategically designed messages are greatly needed to address negative attitudes about nets, which are held by most caregivers. The most prevalent of such attitudes include the belief that sleeping under a bed net is too difficult when the weather is warm and that the insecticide on treated nets is dangerous to those who sleep under them. LLIN distribution plans should consider that white rectangular nets were most preferred by caretakers and that male caregivers are more likely to decide if a net will be purchased relative to women.

Behavior change communication programs to promote bed net use should consider focusing resources on Grand Kru in particular considering that residents of this county are least likely to use a net even when it is available.

There may also be a need to educate caregivers on the need for every household member to sleep under a net every night, including older children and adolescents. Household decision-makers, particularly men, should also be encouraged to continue to prioritize women of reproductive age, in general, and pregnant women, in particular. A recent study has shown that in households with at least one net, pregnant women are not always prioritized (Ricotta et al., 2014).

There is a need to intensify efforts to increase bed net availability and access and provide additional nets in households that have only one or two nets. Liberian's willingness to pay up to \$6 USD for a net may make a subsidized retail LLIN program feasible as a component of the country's overall LLIN strategy, whether combined or not with planned mass campaign activities. Considering the preponderant role that men play in decisions about net acquisition and intra-household allocation, distribution systems should target them as primary customers. Net promotion targeting men should also encourage spousal communication about bed net use and acquisition, and the need to involve women in household decisions and bed nets. Such marketing could promote net use as a social norm as most caregivers do not perceive it to be.

Considering that many of the nets in use in the study households were in need of repairs, communication that promotes net care and repair is relevant. Improved net condition will not only help to increase useful lifespan of the net, but may also help to increase perceived effectiveness of bed nets (Loll et al., 2014).

Intermittent Preventive Treatment in Pregnancy: Many men and women knew the name of the medicine used to prevent malaria in pregnant women. Nonetheless, awareness of the timing of the start of the IPTp regimen was very limited. Attitudes toward IPTp were moderately positive, but perceived response-efficacy of the prophylaxis was very low with a large majority of caretakers believing a woman on IPTp was still at risk of contracting malaria. Most caretakers had not discussed the issue of malaria in pregnancy with anyone in the last 12 months and about half of women reported that they were not involved in decisions involving their health.

Uptake of IPTp2 was high and did not vary across counties. Nonetheless, married caretakers, those in wealthier households and those with higher exposure to anti-malarial campaign messaging were more likely to complete two or more doses of SP.

Despite the fact that the two campaigns examined did not emphasize IPTp the data strongly suggest that communication programs that target the ideational factors positively related to IPTp have the potential to promote its uptake. Such programs should aim to increase understanding about SP as a drug that prevents malaria during pregnancy, the timing of the first dose of SP and the effectiveness of IPTp to prevent malaria. Strategically designed messages are also needed to promote interpersonal communication about IPTp with spouses in particular. Grand Kru and Cape Mount should be prioritized to receive messages aimed at changing views and ideas relating to ANC and IPTp as they were a significant predictor of IPTp uptake.

Overall, the study found that socio-demographic, ideational and household factors contributed relatively little in explaining differences in IPTp2 uptake. This finding suggests that supply-side factors might play a greater role than demand factors in the uptake of IPTp. Indeed, the health provider was a key source of information about IPTp more frequently so than radio among the study population. Among the few women that did not obtain any prophylaxis during pregnancy, the main reason was that the health provider did not offer it or that it was not available at the health facility. It is, therefore, important to identify and design strategies to address supply-side factors hindering the completion of two SP doses at the appropriate times during pregnancy. Further research may also be needed to understand the reasons why some women do not obtain the required doses of SP. In addition to advocacy to ensure continuous availability of SP in health facilities, efforts to improve interpersonal communication and technical skills of health providers with respect to IPTp may be necessary to ensure IPTp is offered to all pregnant women.

Case management of fever and malaria treatment: There is widespread awareness about ACT as the frontline medicine for treating malaria. Most of the respondents reported perceived self-efficacy to recognize signs of a severe case of malaria. Nonetheless, positive attitudes toward appropriate

treatment of malaria were only moderately common. Most people did not believe in the efficacy of the diagnostic test. In addition, many respondents did not trust the health provider's ability to correctly diagnose and appropriately treat malaria. Furthermore, half of the study participants did not see prompt treatment of malaria in children as the norm in their community. Overall, favorable ideation for prompt and appropriate treatment of malaria was not widespread. Favorable ideation towards prompt and appropriate treatment of malaria was less prevalent among women, residents of Cape Mount and Rivercess, and Christians.

Less than half of children diagnosed with malaria in the last two weeks received prompt ACT treatment, indicating that many children do not receive appropriate malaria treatment until two or more days after a child's fever presents, which may be too late. Prompt ACT treatment was less prevalent in Rivercess than in Bong. Exposure to prevention and treatment messages was significantly and positively associated with prompt treatment. Collectively, the socio-demographic and ideational variables play a limited role in explaining prompt ACT treatment.

Communication efforts should focus on increasing understanding about the response-efficacy of diagnostic test and strengthening community confidence in health workers and the health system. These strategies should be implemented in tandem with interventions aimed at improving the competence of health care providers to manage malaria. Modeling a typical caregiver who takes their child to the health facility and whose child promptly receives ACT after a positive diagnostic test would help to strengthen the belief that prompt ACT treatment is the norm and thereby help encourage more caregivers to adopt the behavior.

The limited role of socio-demographic, household and ideational variables in explaining prompt ACT treatment underscores the need for further research to better understand the multilevel factors that hinder prompt and appropriate treatment of malaria in children. Findings from such a study would help to design an appropriate multi-component response.

Indoor Residual Spraying: IRS activities were highly localized in nature and only one-tenth of respondents throughout the four study counties were aware of IRS activities in their community. IRS coverage in the five districts targeted by PMI appeared to contribute to the high level of vector coverage in this Bong County. However, only half of the sampled households in these districts had been sprayed and wealthier households were more likely to have been sprayed. Among all respondents, perceived response-efficacy of the strategy and perceived self-efficacy to take necessary action to have their rooms sprayed were very high.

Whereas the current limited scope of the IRS program in the study counties precludes any conclusive remarks on its effectiveness, it is nonetheless pertinent to note that this study found no difference in the percent of children with fever between sprayed and unsprayed households. This is in spite of the fact that net ownership was generally higher in sprayed districts than in unsprayed districts in Bong.

The findings indicate that the IRS program may not be reaching targeted households equitably. A larger subsample of sprayed households would allow us to identify the socio-demographic and community-level factors that may impact IRS ideation and uptake. A larger subsample would

also make it possible to assess the effectiveness of the intervention and offer more meaningful recommendations on this malaria control strategy.

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ANNEXES

Annex A: Select Ideational Question Items		
Annex A.1: Measures of perceived susceptibility to malaria		
Statement	Percent reporting that they ...	
	Agree	Disagree
I don't worry about malaria because it can be easily treated	47.6	52.4
During the rainy season, I worry almost every night that someone in my family will get malaria	85.1	14.9
My children are so healthy that they would be able to recover from a case of malaria	44	56
People in this community only get malaria during the rainy season	30	69.9
People only get malaria when there are lots of mosquitos	69.3	30.7
Only weak children can die from malaria	25.8	74.2
Nearly every year, someone in this community gets a serious case of malaria	81.7	18.3
Annex A.2: Measures of perceived severity of malaria		
Statement	Percent reporting	
	Agree	Disagree
I cannot remember the last time someone I know became dangerously sick with malaria	44.3	55.7
When my child has a fever, I almost always worry that it might be malaria	91.4	8.6
Every case of malaria can potentially lead to death	66.7	33.3
When someone I know gets malaria, I usually expect them to completely recover in a few days	65.8	34.2
My children are so healthy that they would be able to recover from a case of malaria	44	56
Annex A.3: Measures of perceived self-efficacy for bed nets		
Statement	Percent stating	
	Could	Could Not
Obtain enough bed nets to cover all of the sleeping spaces in your household	72	28
Sleep under a bed net for the entire night when there are lots of mosquitoes	92.5	7.5
Sleep under a bed net for the entire night when there are few mosquitoes	89.3	10.7
Annex A.4: Measures of perceived response efficacy of bed nets		
Statement	Percent stating	

	Agree	Disagree
My chances of getting malaria are the same whether or not I sleep under a bed net	73.2	26.8
Many people who sleep under a bed net still get malaria	86.7	13.3
Sleeping under a bed net every night is the best way to avoid getting malaria	85.2	14.8
Annex A.5: Level of agreement with specific attitudinal statements about bed nets		
Statement	Percent stating	
	Agree	Disagree
More expensive bed nets are more effective than less expensive or free bed nets	36.9	63.1
Bed nets only prevent mosquito bites when used with certain types of beds	43.1	56.9
It only takes a few months for a bed net to get too many holes to stop mosquitoes	41.3	58.7
The insecticide on bed nets can be dangerous to people who sleep under them	59.9	40.1
It is difficult to sleep well under a bed net when the weather is warm	81.7	18.3
Sleeping under a bed net is a good way to get privacy in a crowded house	34.9	65.1
Many people will choose not to sleep under a bed net if they don't like its color	34.2	65.8
It is easier to get a good night's sleep when you sleep under a bed net	88.1	11.9
I mainly use a bed net to avoid malaria	87.6	12.4
I mainly use a bed net to avoid pests that can bite me while I sleep	81.3	18.7
Annex A.6: Level of agreement with specific attitudinal statements about ANC and IPTP		
Statement	Percent stating	
	Agree	Disagree
Once a pregnant woman thinks she may be pregnant, she should see a health provider as soon as possible	98.4	1.6
Pregnant women often feel sick when they take medicine on an empty stomach	96.8	3.2
Even if a woman thinks she may be pregnant, she should wait a few months to know for certain before she sees a health provider	44.1	55.9
Health providers will only give a pregnant woman medicine if they know for certain that it is not harmful to her or the baby	97.6	2.4
Annex A.7: Level of agreement with specific self-efficacy statements about malaria detection		

Statement	Percent stating	
	Could	Could Not
Know if a fever is a sign of malaria or something else	85.2	85.2
Know if a child has a typical or serious case of malaria	85.2	85.2
Annex A.8: Level of agreement with specific attitudinal statements about malaria treatment		
Statement	Percent stating	
	Agree	Disagree
The health provider is always the best person to talk to when you think your child may have malaria	98.9	1.1
It is easy to tell whether a fever is malaria or not	83.2	16.8
A person should only take malaria medicine if a health provider says that a fever really is malaria	95.9	4.1
Sometimes, parents will know that a child has malaria even if a health provider's test says that he or she does not have malaria	80.4	19.6
Many people will go to a second health provider for malaria medicine if the first provider says that the fever is not due to malaria	83.4	16.6
Providers often give malaria medicine even when the malaria test says that the fever was not caused by malaria	57.9	42.1

Annex B: Individual Ideational Elements by County

Indicators	Bong		Cape Mount		Grand Kru		Rivercess		Overall	
	Percent	n	Percent	n	Percent	n	Percent	n	Percent	n
Annex B.1: Elements related to General Malaria										
% of respondents that mentioned fever as a primary symptom of malaria	75%	293	35%	138	40%	156	58%	225	52%	1560
% of respondents that mentioned mosquitoes as a cause of malaria	93%	362	93%	363	87%	341	99%	388	93%	1454
% of respondents that mentioned at least one correct malaria prevention method	96%	373	96%	375	94%	367	100%	389	96%	1504
% of respondents with adequate prevention knowledge (mentioned at least one correct malaria prevention method and did mention any incorrect prevention methods)	28%	110	47%	182	37%	146	50%	196	41%	634
% of respondents that believed they were susceptible to malaria	87%	338	54%	209	78%	306	85%	331	76%	1184
% of respondents that believed the consequences of malaria are serious	82%	321	57%	222	48%	187	84%	328	68%	1058
% of respondents that were confident they could prevent malaria	86%	334	69%	269	57%	222	92%	357	76%	1182
% of respondents that discussed malaria during the past year with their spouse	65%	224	25%	73	46%	150	68%	239	52%	686
% of respondents that discussed malaria during the past year with their friend	53%	207	22%	85	29%	113	42%	162	36%	567
Annex B.2: Elements related to Bed Net Use										
% of respondents that know where to buy a bed net	5%	18	27%	105	3%	11	1%	5	9%	139
% of respondents that are willing to pay for a net	39%	151	68%	265	89%	346	81%	314	69%	1076

% of respondents that have positive attitudes related to bed net use	58%	226	40%	155	73%	286	63%	244	58%	911
% of respondents that believe nets are effective at preventing malaria	26%	100	21%	81	29%	113	29%	113	26%	407
% of respondents that are confident in their ability to use a bed net	97%	379	82%	319	94%	368	95%	370	92%	1436
% of respondents that participate in decisions regarding bed net use within a household	68%	264	49	190	23%	88	63%	245	50%	787
% of respondents that discussed bed nets with a spouse or friend in the last year	42%	106	55	63	49%	85	21%	59	38%	313
% of respondents that believe at least half of households in their community use nets	36%	141	21	81	4%	17	11%	43	18%	282
Annex B.3: Elements related to ANC and IPTp Behaviors										
% of respondents that mentioned SP as drug used to prevent malaria during pregnancy	67	261	39	154	38	149	67	262	53	826
% of respondents that knew when IPTp should be started during pregnancy	5	19	2	9	8	31	30	118	11	177
% of respondents that have positive views towards ANC and IPTp	83	325	62	242	86	334	74	288	76	1189
% of respondents who believe IPTp is effective in preventing malaria during pregnancy	11	44	10	38	4	17	22	85	12	184
% of women that participate in decisions about their health	42	126	67	202	74	222	40	119	56	669
% of respondents that discussed malaria and pregnancy with a spouse or friend during the last year	36	142	5	19	10	39	18	69	17	269
% of respondents that perceive ANC is a norm in their community (believe that at least half of women in their community complete four or more antenatal visits during pregnancy)	70	274	68	265	19	73	70	272	57	884
Annex B.4: Elements related to Child Case Management										

% of respondents that felt the malaria test was effective at diagnosing malaria	51	200	17	65	61	236	67	260	49	761
% of respondents that felt confident they could detect malaria	67	260	67	261	71	275	67	260	68	1056
% of respondents that had discussed malaria treatment with a spouse or friend in the last year	46	180	13	50	43	167	63	247	41	644
% of respondents that perceive prompt treatment of child fever as a community norm (believe at least half of the children in their community visit a health provider the same or next day they develop a fever)	71	275	75	294	7	27	69	271	56	867
% of respondents that were involved in decisions regarding the child's health or purchase of malaria treatment	64	248	63	246	70	274	67	263	66	1031
% of respondents that had positive attitudes towards malaria treatment	42	162	14	56	57	223	59	231	43	672

Annex C: Household and Individual Behavioral Outcomes and Exposure by County

Indicators	Bong		Cape Mount		Grand Kru		Rivercess		Overall	
	Percent	n	Percent	n	Percent	n	Percent	n	Percent	n
C.1 Bed Nets										
% of respondents that slept under a bed net the night before	52%	390	39%	390	18%	390	20%	390	32%	1560
% of households with at least one ITN	56%	300	42%	300	29%	300	22%	300	38%	1200
% of households with at least one ITN for every two people (or “enough” ITNs)	8%	300	5%	300	2%	300	2%	300	4%	300
% of population with access to an ITN within their household	7%	1309	4%	1510	2%	1843	2%	1653	3%	6315
% of adults >17 yrs who slept under an ITN previous night	50%	627	36%	664	14%	871	15%	756	27%	2918
% of children <5 yrs who slept under an ITN previous night	48%	383	32%	493	15%	488	17%	430	27%	1794
% of households in which at least one child (<5) slept under a net the previous night	51%	300	37%	300	19%	300	19%	300	32%	300
% of existing ITNs used previous night	93%	243	92%	207	66%	134	89%	98	87%	592
% of population that slept under an ITN the previous night	48%	1317	31%	1568	12%	1891	14%	1687	24%	6463
C.2 IPTp										
% of respondents that did <u>not</u> take drugs to keep them from getting malaria while pregnant within the last two years	98%	300	92%	272	79%	280	97%	293	91%	1145

Indicators	Bong		Cape Mount		Grand Kru		Rivercess		Overall	
	Percent	n	Percent	n	Percent	n	Percent	n	Percent	n
% of women who received two or more doses of IPTp during an ANC visit during their last pregnancy within the last two years (IPTp2)	80%	239	76%	204	61%	172	82%	238	75%	853
% of women who received three or more doses of IPTp during an ANC visit during their last pregnancy within the last two years (IPTp3)	32%	207	50%	171	41%	169	51%	211	43%	758
C.3 Prevention and treatment of malaria*										
% of children <5 yrs with fever in last 2 weeks for whom advice or treatment was sought	100%	125	98%	188	99%	266	98%	230	98%	809
% of children <5 yrs with fever in last 6 months for whom advice or treatment was sought	81%	125	71%	190	79%	267	76%	233	77%	815
% of children under five years old with fever in the last two weeks who had a finger or heel stick	76%	99	78%	126	69%	204	78%	166	74%	595
% of children under five years old with fever in the last six months who had a finger or heel stick	73%	125	76%	190	70%	267	74%	233	73%	815
% of children under five years old with fever in the last two weeks who received an ACT	30%	96	16%	123	35%	199	36%	165	31%	583
% of children under five years old with fever in the last six months who received an ACT	28%	120	15%	176	34%	255	39%	218	30%	769

Indicators	Bong		Cape Mount		Grand Kru		Rivercess		Overall	
	Percent	n	Percent	n	Percent	n	Percent	n	Percent	n
% of children under five years old with fever in the last two weeks who received an ACT the same day or day following onset of the fever	50%	96	50%	123	28%	199	39%	165	39%	583
% of children under five years old with fever in the last six months who received an ACT the same day or day following onset of the fever	40%	120	35%	176	22%	255	29%	218	30%	769
C.4 Indoor Residual Spraying										
% of hh's that had their home sprayed within the last 12 months in Bong county	30%	300								
% of hh's that had their home sprayed within the last 12 months in five sprayed districts of Bong county	50%	180								
C.5 Vector Control										
% of households with at least one ITN and/or sprayed by IRS within the last 12 months	63%	300	41%	299	29%	299	23%	300	39%	1198
% of households with at least one ITN <u>for every two</u> people and/or sprayed by IRS within the last 12 months	34%	300	6%	299	3%	299	3%	300	12%	1198
C.6 Exposure to Health Messages										
% of people who recall hearing or seeing any malaria message within the last 12 months	88%	389	72%	389	70%	385	97%	390	82%	1553

Indicators	Bong		Cape Mount		Grand Kru		Rivercess		Overall	
	Percent	n	Percent	n	Percent	n	Percent	n	Percent	n
% of people who recall hearing or seeing the phrase “Take Cover Under the Net” during the last 6 months	80%	390	73%	389	52%	380	94%	390	75%	1549
% of people who recall hearing or seeing the phrase “Healthy Baby, Happy Mother” during the last 12 months	82%	390	76%	389	48%	385	90%	389	74%	1553
% of people who correctly identified key message of the “Healthy Baby, Happy Mother” campaign	42%	320	3%	295	11%	184	16%	349	19%	1148
% of people who recall hearing or seeing a message about malaria prevention or treatment	88%	389	72%	389	70%	385	97%	390	82%	1553
% of people who recall hearing or seeing a message through community leaders**	71%	390	83%	362	85%	381	58%	390	74%	1523

Notes

* Care-seeking and treatment indicators are presented using only information from female caretakers as opposed to both female and male caretakers to avoid double counting the same child. Indicators of prompt ACT treatment are computed based on children who took any drug for fever as opposed to the children who took a drug for malaria.

** Denominator is number of respondents, not the number of respondents who heard any message from a community leader as recommended by the 2014 RBM / WHO Indicator Guide.